Implementing the Chronic Care Model for Diabetes is supported by an educational grant from Novo Nordisk Inc. It has been accredited by the American Association of Diabetes Educators (AADE) for nurses, dietitians, and pharmacists.
The following program is a narrated by Barbara Kocurek.

Dr. Kocurek graduated from the University of Pittsburgh in 1987 with a Bachelor of Science in Pharmacy and she received her PharmD degree from the Medical College of Virginia in 1989. Since that time she has been involved in diabetes education in various health care settings. Currently she is the Diabetes Program Manager, Chronic Disease and Care Redesign for the Baylor Health Care System located in north Texas. She oversees the American Diabetes Association (ADA) recognition and data management for 11 outpatient diabetes education centers.

Dr. Kocurek served on the National Certification Board for Diabetes Educators (NCBDE) from 1998–2002 and was Chair for the 2000–2001 year. In 2002–2003 she served as a member of the AADE’s Nominating Committee and in 2004 served on the Professional Development, Education, and Resources Committee. She currently serves on AADE’s Professional Practice Committee and in 2010 became a Fellow of the American Association of Diabetes Educators.
Objectives

- Describe deficiencies in the care of adults with type 2 diabetes that are widespread today
- Explain the elements of the chronic care model (CCM) and the ways in which they are relevant to the care of adults with type 2 diabetes
- Summarize the medical and economic benefits of implementing the CCM for diabetes
- Discuss examples of effective strategies for implementing the CCM for diabetes in various ambulatory care settings

The objectives for this knowledge-based program are:

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- Summarize the medical and economic benefits of implementing the CCM for diabetes
- Discuss examples of effective strategies for implementing the CCM for diabetes in various ambulatory care settings
Limitations of Chronic Illness and Diabetes Care
This activity focuses on implementing the chronic care model, with a special emphasis on using this model to improve the care of adults with diabetes.

The CCM was developed as a framework for the staff of ambulatory health care organizations who wish to improve the outcomes of patients with chronic illnesses.\(^1\)

The CCM is informed by the belief that real improvements in outcomes will occur only when clinical systems are reconfigured to address the needs and concerns of chronically ill patients.\(^2\)

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What is a Chronic Illness?

- **National Center for Chronic Disease Prevention and Health Promotion**¹
  - Prolonged in duration
  - Does not resolve spontaneously
  - Rarely cured completely
  - Usually noncommunicable

- **Developers of CCM**²
  - Requires ongoing activities and response from
    - Patients
    - Patients’ personal caregivers
    - Medical care system

- **Diabetes meets these criteria for a chronic illness**

According to the National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP), a unit of the Centers for Disease Control and Prevention (CDC), a chronic illness is one that is prolonged in duration, does not resolve spontaneously, and is rarely cured completely.¹ Chronic illnesses are usually noncommunicable, although the acquired immunodeficiency syndrome (AIDS) has become a chronic disease for patients with ongoing access to modern antiretroviral drugs.

The developers of the CCM have defined chronic illness more broadly as one that requires ongoing activities and response from patients, patients’ personal caregivers, and the medical care system.²

Clearly, diabetes meets all of these criteria for a chronic illness.

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In the United States, as in other developed countries, chronic illness is a major cause of death and disability.

Each year, chronic illness causes 70% of the deaths occurring in US adults.\(^1\)

Nearly half of US adults, or about 133 million people, have at least 1 chronic illness.\(^1\)

Comorbidity is common in people with chronic illness and is especially common in older adults who are chronically ill. According to one survey of adults aged 65 years or older, 83% of participants with coronary heart disease and 81% of those with chronic lower respiratory tract disease have more than 1 major chronic illness.\(^2\)

About one quarter of adults with chronic illness have one or more daily activity limitations.\(^1\)

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Impact of Diabetes in the US

- Diabetes currently affects 8.3% of the US population (25.8 million people)\(^1\)
- Estimated total costs are $174 billion\(^1\)
- Up to 33% of the population may have diabetes by 2050\(^2\)
- Diabetes is the leading cause of kidney failure, nontraumatic lower-limb amputations, and new cases of blindness among adults\(^1\)
- Diabetes is the seventh leading cause of death\(^1\)
- Comorbidity is very common in people with diabetes
  - In adults aged 35 to 71 years, the mean number of chronic illness diagnoses in addition to diabetes was 5; the range was 2 to 7\(^3\)
  - In a survey of adults aged ≥65 years, 83% had at least 1 major chronic illness in addition to diabetes\(^4\)

Diabetes has a major impact on the health of US residents. Today, diabetes affects 8.3% of the population, or about 25.8 million people.\(^1\) The estimated total costs of diabetes, including direct and indirect costs, are $174 billion.\(^1\) If current trends continue, the prevalence of diabetes may increase to 33% by 2050.\(^2\)

Diabetes is currently the leading cause of kidney failure, nontraumatic lower-limb amputations, and new cases of blindness among adults.\(^1\) It is also the seventh leading cause of death.\(^1\)

Comorbidity is very common in individuals with diabetes. In a study of adults aged 35 to 71 years who had type 2 diabetes, the mean number of chronic illness diagnoses in addition to diabetes was 5, and the range was 2 to 7.\(^3\) A survey of adults aged 65 years or older found that 83% had at least 1 major chronic disease in addition to diabetes.\(^4\)

Today, much of the US health care system is ill-equipped to handle patients with serious chronic illness such as diabetes.\textsuperscript{1–3}

The primary care system as a whole is focused on acute medical care. Care is typically reactive, delivered in unplanned 15-minute visits. The emphasis of these visits is on making an accurate diagnosis quickly, ruling out serious disease, and providing curative or symptom-relieving treatments. Insurance companies may or may not cover preventive services, including education.

Much of the care given within the US health care system is highly fragmented. Patients with a serious disorder, such as unstable type 2 diabetes, are typically referred by their primary health care provider to a specialist, who is almost always off-site. Once the referral takes place, communication between a patient’s primary care and specialty care provider is often inadequate and sometimes nonexistent. The fact that patients’ health records are frequently not integrated makes information-sharing between the primary care provider and the specialty provider particularly difficult.

Limitations in the way in which chronic care is delivered in the US have negative repercussions for people with diabetes. For example, many studies that have assessed processes of care have shown that the preventive care received by many adults falls short of current evidence-based standards recommended by the American Diabetes Association (ADA) and other major professional organizations.

This chart shows survey-derived data on the percentage of US residents 18 years of age and older who received preventive care measures between 2009 and 2010. Although these findings are more positive than those of many earlier surveys, there is obviously great need for improvement.

In this survey, 37% of respondents reported that they had not had an annual eye exam, 36% did not perform daily self-monitoring of blood glucose (SMBG), 33% had not had an annual foot examination, 32% had not had their A1C tested 2 times per year, 43% had never attended a diabetes self-management education class, and 50% had not received an annual flu vaccination.

Limitations in the way in which diabetes care is delivered in the US is also reflected in the intermediate outcomes attained by adults with diabetes.

This chart shows the percentage of patients who achieved target levels for the 3 intermediate outcomes of A1C, blood pressure, and LDL cholesterol.\(^1\) Data are from the 2003–2006 wave of the National Health and Nutrition Examination Survey (NHANES). Although more patients in this wave achieved the desired outcomes than patients in the 1999–2002 wave, it is clear that much work remains to be done.

In the 2003–2006 wave, 43% of participants had an A1C of 7% or greater, 56% had a blood pressure reading of 130/80 or higher, 54% had an LDL-C value of 100 mg/dL or greater, and 88% failed to reach all 3 targets.

Note that the blood pressure goal in this study was <130/80 mmHg. The revised general blood pressure goal in the ADA’s 2013 Standards of Medical Care in Diabetes is <140/80, although the standards state that a more rigorous systolic blood pressure (SBP) target may be appropriate for certain individuals.\(^2\)

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The accurate statement is: __________.

a. Nearly half of US residents with diabetes aged 65 years or older have at least 1 major comorbidity.

b. A major failing of the US health care system is that it delivers acute care following a model that is better suited to chronic care.

c. A survey of processes of diabetes care for the 2009–2010 period showed that about one third of participants did not have two A1C tests per year.

d. An analysis of data for the 2003–2006 NHANES wave found that more than half of participants attained target values for A1C, blood pressure, and LDL-C.
The correct answer is c.

A survey of processes of diabetes care for the period 2009–2010 showed that about one third of participants did not have two A1C tests per year.
The CCM and its Core Elements
History of the CCM

- Developed in 1993 by Edward Wagner, MD, and colleagues at MacColl Center for Health Care Innovation at Group Health Institute in Seattle.
- First major publications appeared in 1996.
- Widespread implementation became possible after R.W. Johnson Foundation awarded initial $25 million grant to Improving Chronic Illness Care (ICIC) program in 1998.
  - Model tested and refined in various practice settings throughout US.
  - ICIC website provides extensive educational resources (www.improvingchroniccare.org).

The CCM was developed in 1993 by Edward Wagner, MD, and his colleagues at the MacColl Center for Health Care Innovation at Group Health Institute in Seattle. Group Health Institute is a division of Group Health Cooperative, a consumer-governed, nonprofit health care system that provides care to more than 600,000 residents of Washington state and Idaho. The team at the MacColl Center began by reviewing the existing literature on chronic disease management, organizing it in an accessible way, and identifying the characteristics of effective chronic disease management programs. They found that successful programs were similar, no matter what chronic illness was being managed. The first major publications describing a new integrated approach to chronic illness care appeared in 1996.

Following their literature analysis, Dr. Wagner and colleagues established the Improving Chronic Illness Care (ICIC) program to implement the CCM. Widespread implementation became feasible after the Robert Wood Johnson Foundation awarded an initial $25 million grant to ICIC in 1998. This funding and additional grants from the foundation made it possible to test and refine the model in various practice settings throughout the US and to receive guidance from a nationwide panel of experts in chronic illness care. The ICIC established and continues to maintain a website (www.improvingchroniccare.org) that provides extensive educational resources about the CCM.

The diagram on this slide depicts the components of the CCM. For the sake of clarity, the diagram has been modified from the original diagram developed by Dr. Wagner and associates.¹ The original version is available at the Improving Chronic Illness Care website.¹

The CCM identifies the essential components of a system that encourage optimal chronic illness care and achieves both high-quality, satisfying encounters and improved outcomes.¹

Prerequisites for effective implementation of the CCM are productive interactions between an informed, activated patient and a prepared, proactive practice team.¹ These terms will be defined on the next slide.

Chronic care takes place on 3 overlapping levels.² The first is the provider organization, which might be a small ambulatory care clinic, a loose network of primary care physician practices, or an integrated delivery system such as the Group Health Cooperative. The 4 core elements of effective chronic illness care at the practice level are self-management support, delivery system design, decision support, and clinical information systems. Each of these elements will be discussed in detail later. The second level of chronic care is the overall national, regional, and local health care system, including its payment structures. The third level is the entire community, with its myriad resources and numerous public and private policies.

The key players in the CCM are an informed, activated patient and a prepared, proactive practice team.1

An informed patient is one who has sufficient information to become a wise decision-maker related to his or her illness.1 An activated patient understands the importance of his or her role in managing the illness and acts on this understanding. Thus, an informed, activated patient has the motivation, information, skills, and confidence needed to make decisions about his or her health and to manage it. The patient may function independently or with caregiver assistance.

A prepared practice team is an organized, trained, cohesive group of health care providers who have the patient information, decision support, and resources needed to deliver high-quality care during the patient encounter.1

Successful implementation of the CCM requires productive interactions between the patient and the practice team.¹

An interaction can be a face-to-face visit during which a health care provider meets with a single patient or even with a group of patients. An interaction might consist of a telephone conversation, an e-mail message, or another type of electronic communication.

A productive interaction is a patient encounter during which the work of evidence-based chronic disease care is accomplished systematically and the patient’s needs are met.

Implementing the CCM at Evergreen Medical Clinic (EMC)

- Privately owned medical clinic, 2 full-time and 2 part-time physicians
- Located in small “rust-belt” city with a community college and many active churches and civic organizations
- Physicians have clinical privileges at Oak Bridge Hospital, the city’s only hospital
- Characteristics of clinic patients
  - Mean age 46 years
  - Non-Hispanic white, 60%; African-American, 25%; Hispanic white, 10%; other, 5% (mostly Cambodian)
  - Mostly working-class or lower middle-class families; 11% currently unemployed
  - Privately insured, 53%; Medicare, 30%; Medicaid, 10%; uninsured, 7%

To learn more about the CCM, we will look at the way it is being implemented at the Evergreen Medical Clinic, or EMC.

EMC is a privately owned, independent medical clinic with 2 full-time and 2 part-time physicians. It is located in a small “rust-belt” city that has a community college and many active churches and civic organizations. EMC physicians have clinical privileges at Oak Bridge Hospital, the city’s only hospital.

Currently, the mean age of the clinic’s patients is 46 years, reflecting the fact that many recent high school and community college graduates have left the town in search of better opportunities. The approximate racial and ethnic composition of the patient population is as follows: 60% non-Hispanic white, 25% African-American, 25% Hispanic white, and 5% other. Many of the patients in the “other” group are Cambodians who immigrated to the US in the last 25 years and often have limited English proficiency.

Most of the families served by the clinic identify themselves as belonging to the working class or lower middle class, and 11% of adults are presently unemployed. The city’s major employers are the hospital and the community college. Until it closed in 2006, a large paper mill had provided most of the jobs, and many of the clinic’s patients are retirees from the mill.

With regard to their current primary insurance coverage, 53% of the clinic’s patients are privately insured, 30% are covered by Medicare, 10% are covered by Medicaid, and 7% are uninsured.
In 2008, EMC treated 287 adults with diabetes—269 with type 2 diabetes and 18 with type 1 diabetes.

A quality audit of processes of care revealed that a substantial proportion of these patients had not received recommended preventive care during the prior year. Only 65% of patients had received at least 2 A1C tests, 63% had received a foot examination, 61% performed daily SMBG, and 58% had been referred for an eye exam.

Similarly, a review of intermediate outcomes showed that many patients were not at goal for important parameters. With regard to glycemic control, only 54% of patients had an A1C of less than 7% and 12% of patients had an A1C of more than 10%. With regard to other intermediate outcomes, only 47% met the blood pressure goal of less than 130 mmHg for systolic blood pressure and less than 80 mmHg for diastolic blood pressure. Only 49% of patients had an LDL cholesterol level of less than 100 mg/dL.

Once again, note that the revised general blood pressure goal recommended by the ADA in 2013 is <140/80 rather than <130/80.1

Deciding to Implement the CCM at EMC

- Processes of care and intermediate outcomes were also suboptimal for patients with other chronic illnesses
- Dr. Hernandez, a part-time physician with experience at a clinic that had adopted the CCM, recommended its implementation
- Two physicians and many other staff members were skeptical about the feasibility of implementation
- The decision was finally made to gradually adopt some features of CCM
- Dr. Hernandez was switched from half-time to three-quarter-time employment to oversee transition

The 2008 quality audit undertaken at EMC revealed that processes of care and intermediate outcomes were also suboptimal for patients with other chronic illnesses, such as coronary heart disease and arthritis.

Dr. Maria Hernandez, a part-time physician at the clinic, had worked in a primary clinic that had adopted the CCM while she was completing her family practice residency. She strongly championed adopting the CCM and offered to spearhead its implementation.

Two of the physicians and many other staff members at the clinic were very skeptical about the feasibility of implementing the CCM. Although they, too, were concerned about the quality of chronic care that EMC was providing, they were also concerned about increasing the workload of people who were already very busy and also doubted that major operational changes would be financially feasible.

After several months of episodic discussions, a decision was finally made to gradually adopt some features of the CCM. Dr. Hernandez, who had originally requested half-time employment while she was caring for her 2 small children, agreed to switch to three-quarter-time employment to oversee the transition. Two nurses who had worked at the clinic for many years enthusiastically offered their assistance.

EMC’s experience in deciding to adopt the CCM is typical of that reported in the literature.\textsuperscript{1,2} Implementing the CCM usually requires at least 1 very strong champion at the practice site. Arguments about the feasibility of implementing the model are common.

In the CCM, self-management support is a core element at the practice level.\(^1\) The goal of self-management support is to empower and prepare patients to manage their own health and health care.\(^1\) Effective self-management support can help patients cope with the challenges of living with and treating their diabetes and reduce its symptoms and complications.\(^2\) Self-management support makes use of many proven strategies, including assessment, goal setting, action planning, problem solving, and follow-up.\(^2\)

Self-management support for adults with diabetes is provided in various contexts, including individual conversations with health care providers who have received training in motivational interviewing or other counseling strategies,\(^3\) DSME classes,\(^4\) and support groups facilitated by a certified diabetes educator (CDE) or other health care provider.\(^4\) These educational interventions may be supplemented by print materials that are consistent with the patient’s literacy and health literacy levels,\(^5\) automated telephone calls,\(^6\) or e-mails.\(^6\)

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Self-management support at EMC had 2 major components. First, physicians worked with each patient with diabetes to create a collaborative treatment plan. This plan reflected information gathered from other members of the health care team. One part of this collaborative plan was a self-management plan that the patient negotiated with the physician. Included were specific, measurable actions the patient chose to take to improve his/her health. For example, a sedentary patient might decide to walk at a moderate pace for 30 minutes, 3 days per week.

Secondly, patients who had not recently completed a DSME program were scheduled for on-site diabetes education. This free program consisted of a series of classes and individualized appointments taught by a certified diabetes educator or dietitian who came from the local hospital. These sessions were complemented by a monthly support group that was facilitated by a certified diabetes educator or dietitian. They focused on topics of general interest, such as foot care and portion control.
Practice Level: Delivery System Design

• Goal is to assure the delivery of proactive, effective, efficient, team-based clinical care

• Roles are clearly defined and tasks are distributed among health care team members

• Patient visits are carefully planned and structured; shared medical appointments may be used

• Regular follow-up by the health care team is standard procedure

• The team ensures that patients receive care that they understand and is consistent with their cultural background


Delivery system design is another core element at the practice level of the CCM. The goal of delivery system design is to assure the delivery of proactive, effective, efficient team-based clinical care.

In contrast to the traditional model of physician-centered care, CCM-based care emphasizes a team approach in which care is shared by other health care providers, such as nurses, medical assistants, CDEs, dietitians, and social workers. To ensure that the team functions efficiently and effectively, roles are clearly defined. Delegation of responsibility across the team fosters a sense of collective responsibility for success. The team meets together regularly to ensure that resources are used in the most appropriate way.

Patient visits are carefully planned and structured. When a patient needs to meet with more than one health care provider, back-to-back appointments are arranged to make the process as convenient as possible for the patient. Shared medical appointments may also be used. Following a patient visit, regular follow-up by a member of the health care team is standard procedure.

The team is cognizant of the patient’s levels of literacy and health literacy and ensures that patients receive care that they understand. The team also strives to provide care that is consistent with the patient’s cultural background.

A shared medical appointment (also called a group visit) is a method incorporated into the CCM to maximize efficiency. Kirsh et al performed a study at a primary care clinic located at a tertiary care academic medical center. Patients, who had an elevated risk of cardiovascular disease because of an A1C above 9%, SBP above 160 mmHg, and/or LDL-C above 130 mg/dL were invited to participate in shared medical visits with up to 8 participants. Each participant interacted with a prepared practice team consisting of a general internist, a nurse practitioner, a PharmD, a clinical health psychologist, and a nurse. A facilitator reviewed goals for intermediate outcomes and moderated a discussion about how self-management skills can improve these outcomes. By exchanging personal experiences, participants helped each other to understand consequences of uncontrolled diabetes. Participants attended up to 8 shared medical appointments.

By the end of the intervention, mean A1C, SBP, and LDL-C levels had dropped significantly from their baseline levels. Mean decreases were 1.4% for A1C, 16.0 mmHg for SBP, and 14.8 mg/dL for LDL-C. There were also increases in the proportions of patients who met ADA target values at endpoint: from 16.7% to 52.4% for A1C, from 18.2% to 43.2% for SBP, and from 69.4% to 83.3% for LDL-C. Adherence to the treatment regimen increased markedly in some participants.

The investigators concluded that shared medical appointments comprised an efficient, feasible system redesign that may have improved patient outcomes.

As EMC started implementing the CCM, several changes in delivery system design were made. For example, medical assistants assumed responsibility for identifying adult patients with diabetes who had not had a monofilament foot examination within the last year. They provided the office staff with the names of these patients so that they could be invited to come in for an examination. Medical assistants also took responsibility for performing these foot examinations. Similarly, the clinic’s medical assistants ensured that adults with diabetes received annual flu vaccinations and other immunizations at the recommended intervals.

A senior member of the office staff assumed responsibility for interfacing with professional medical interpreters and a medical translator. She ensured that a professional interpreter was present when a patient with limited English proficiency was scheduled for an examination. She also interfaced with a professional Cambodian medical translator affiliated with the local hospital so that up-to-date information sheets about insulin administration and oral glucose-lowering therapy could be translated into the Khmer language.

The mutual responsibilities of team members were reinforced at weekly team meetings, during which progress on process and outcome measures was reviewed.
Practice Level: Decision Support

- Goal is to base patient care on current, authoritative, evidence-based clinical practice guidelines.\(^1\)
- Guidelines are available to health care providers and patients\(^2,3\)
- Providers receive education about new guidelines\(^3\)
- IT enables providers to receive guideline-based reminders or feedback when clinical decisions are made\(^4\)
- The process of obtaining specialist support is simplified (e.g., through shared care, real-time telephone consultation, or e-mail exchanges)\(^3\)

Practices that have implemented the CCM ensure that patient care is based on current, authoritative, evidence-based clinical practice guidelines.\(^1\) This is described as “decision support.” Clinicians working in these practices have convenient access to the latest guidelines, such as those developed by the ADA.\(^2\) Furthermore, guidelines—either in their original form or in an abbreviated form that presents the key points—are made available to patients.\(^3\) Educational sessions are held when an important new guideline is released so that the health care team can become familiar with its content and decide how to integrate it into daily practice.\(^3\)

Advances in information technology and the widespread adoption of electronic health records (EHRs) have greatly simplified the process of integrating guidelines into daily practice.\(^4\) Today, health care providers can receive guideline-based reminders or feedback while they are making clinical decisions. For example, a clinician who accesses a patient’s EHR might be reminded that the patient is due for an A1C test. In keeping with current ADA guidelines, a provider who does not prescribe a statin for a nonpregnant patient with diabetes and overt cardiovascular disease might receive a prompt suggesting that statin therapy should be considered.

Primary care practice sites that have implemented the CCM simplify the process of obtaining specialist support.\(^3\) Alternatives to the traditional pattern by which a primary care provider refers a patient to a specialist and eventually receives a report can be replaced by shared care, real-time telephone consultation, or e-mail exchanges.

While they were implementing the CCM, the staff at EMC made several changes in the decision support area. As soon as a major clinical practice guideline pertaining to chronic care was issued, the members of the health care team met to familiarize themselves with its content and decided how to implement its new recommendations. For example, when the ADA and the European Association for the Study of Diabetes (EASD) issued its position statement on a patient-centered approach to the management of hyperglycemia in type 2 diabetes in the spring of 2012,¹ the team decided that each EMC patient with type 2 diabetes should have an individualized A1C target that was documented in his or her EHR, and that each patient would have an individualized target within 3 months.

EMC makes the content of major guidelines available to patients in 2 ways. First, the clinic’s website includes links to the guidelines. Second, physicians and nurse practitioners at EMC divide the responsibility for producing a 1-page summary of each important guideline. These are given to patients during their office visits and are also available online.

EMC has streamlined the process of specialty support by making a consultation agreement with a clinical endocrinologist at the local hospital. In situations when an expert’s opinion is needed but a traditional referral to endocrinology is not warranted, EMC clinicians consult with the endocrinologist by telephone or e-mail.

The goal of the clinical information system element of the CCM is to organize patient and population data to encourage effective, efficient care. Summarized data for individual patients can be used to track and plan care. At the population level, compilation of a diabetes registry can identify patients who need additional guideline-based care, such as treatment with an ACE inhibitor or an angiotensin receptor blocker.

Clinical information systems can also be used to facilitate communication at various levels of complexity between patients and the medical practice. Many systems can simplify the performance of basic tasks, such as making appointments. Sophisticated systems that permit secure access to electronic health records (EHRs) can enable patients who are at home to review parts of their EHR with their health care provider, focusing on challenging issues such as insulin dosing or neuropathic pain management.

A clinical information system can also be used to monitor the performance of the health care team, thus promoting quality improvement efforts.

As they implemented the CCM, the health care team at EMC recognized the need to identify groups of patients who might not be receiving guideline-based care. For example, Dr. Hernandez wanted to identify all patients with type 2 diabetes who were receiving monotherapy with an oral glucose-lowering agent, did not have a contraindication to metformin, and were not taking metformin. However, neither Linda Boyer, the office administrator who was responsible for IT, nor the technical service representative from EMC’s medical software provider could show the team how to obtain answers to this type of query. To address this issue, the EMC staff agreed on the types of information they wanted to be able to obtain from their information system and set a budget for a system upgrade. With assistance from the local hospital, they identified and hired a consultant who helped them improve their system’s functionality. Linda received intensive training in using the upgraded system and other members of the EMC staff received less extensive training. Consistent with the published literature, many members of the staff thought that the process of transitioning to a more functional system was difficult.\(^1\) As indicators of patient care began to improve, however, they decided that the effort had been worthwhile.

In preparation for their planned visits, patients with Internet access could transmit their health status questionnaire, blood glucose log, and exercise log to EMC electronically. To monitor their patients’ outcomes, members of the health care team received bimonthly reports listing the names of their patients with diabetes who were not at their individual A1C target, had blood pressure readings of 130/80 mmHg or above, or had an LDL-C value of 100 mg/dL or above.

The impact of clinical information systems in improving the care of patients with diabetes was demonstrated by an observational study published in October 2012.¹ The study enrolled almost 170,000 patients with diabetes who received care at one of 17 outpatient clinics belonging to Kaiser Permanente Northern California, an integrated delivery health system.

During the study, the health network was implementing a commercially available EHR system in a staggered fashion. Consistent with the concepts underlying the CCM, this system provided diabetes-specific decision support and secure messaging between providers and patients. The investigators compared data for patients treated in clinics that had or had not yet implemented an EHR system.

The study showed that adoption of an EHR system was associated with improvements in processes of care and intermediate outcomes. EHR system use led to statistically significant improvement in treatment intensification when patients’ A1C and LDL-C values were out of range. Adoption of the EHR system also resulted in an increased rate of 1-year A1C and LDL-C testing for all patients. However, the presence of the system did not lead to unnecessary testing. In fact, the rate of 90-day A1C and LDL-C testing decreased for patients whose values were at goal. Furthermore, EHR system implementation was associated with statistically significant reductions in A1C and LDL-C levels, especially for patients with the least rigorous control at baseline.

The investigators concluded that a comprehensive EHR system may be a powerful tool to help clinicians deliver well-targeted, high-quality care for diabetes and improve patient outcomes.

The accurate statement is: __________.

a. the goal of the self-management support element of the CCM is to ensure that all patients with diabetes take DSME classes
b. according to the delivery system design element of the CCM, all patients should receive physician-centered care
c. the decision support element of the CCM assumes that too many misunderstandings occur when patients have access to clinical practice guidelines
d. the clinical information system element of the CCM focuses on the organization of both patient and population data
The correct answer is d.

The clinical information system element of the CCM focuses on the organization of both patient and population data.
The health care organization element of the CCM reflects the fact that practices have relationships to other, larger organizations that can support and enhance high-quality, well-coordinated chronic illness care.\(^1\)

When practices are closely linked to a larger health care organization, innovation at the practice level is unlikely to take place unless the organization’s leaders view chronic care as a priority.\(^2\) Additionally, the organization needs to adopt proven quality improvement strategies, such as providing financial and non-financial incentives based on quality of care.\(^3\) Effective organizations try to prevent future patient errors and problems by reporting those that occur, studying the context in which they occurred, and making appropriate changes to their systems.\(^3\)

Autonomous practices should develop agreements that facilitate the coordination of care and the provision of safe, high-quality care.\(^3\) For example, an independent practice should work closely with local hospitals, the visiting nurses’ service, and social service agencies in an open, coordinated manner.\(^3\)

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During the years after EMC began to implement the CCM, it developed a closer relationship with Oak Bridge Hospital. The relationship between the clinic and the hospital began to change when patients who had become accustomed to EMC’s culture of self-management support were admitted to Oak Bridge. Patients who had become accustomed to playing an active role in their own care often felt frustrated when they realized that many of the health care providers they encountered at the hospital were accustomed to dealing with passive patients who rarely questioned providers’ instructions.

When Dr. Hernandez became aware of this situation, she and other members of the health care team at EMC took every possible opportunity to speak about the CCM at the hospital’s continuing education forums. Impressed by the improved outcomes that EMC was reporting, the hospital gradually began to adopt aspects of the CCM that seemed especially useful in an inpatient setting.

Oak Bridge Hospital also served as a valuable educational resource for EMC. For years, Oak Bridge had a very effective program, called “Always Ask, Always Report,” that focused on quality improvement issues, especially the avoidance of medical errors. EMC’s medical staff, who had a growing appreciation of the importance of error avoidance, participated in “Always Ask, Always Report” training sessions at the hospital. With the encouragement of hospital administrators, they modified some of Oak Bridge’s training manuals and error reporting forms for use at EMC.

In addition to serving as an educational resource for EMC, the hospital served as a financial resource. A grant from the Oak Bridge Hospital Foundation helped EMC to upgrade its clinical information system and teach clinic staff how to use it.
Linkages between the ambulatory care practice and community resources can play important roles in the management of chronic illness.¹

Practices can enhance patient care and avoid needless duplication of effort by becoming familiar with effective community programs and resources and encouraging patients to use them.² For example, a provider might encourage a patient with severe neuropathic pain to join a chronic pain support group sponsored by a local hospital. A clinic might distribute literature on low-fat meal options for people on a limited budget that was developed by the state department of health.

Additionally, a medical practice should form partnerships with community organizations to support and develop interventions that fill service gaps.² For example, a practice might partner with a local senior center so the center can expand its roster of exercise programs.

Health care organizations should also advocate policies that will improve patient care.² Beneficial policy changes might involve local or state regulations, insurance benefits, or civil rights legislation for people with disabilities.

Although community linkages are important for all practices, they are especially helpful for small practices with limited resources.³

Since EMC is a small autonomous medical practice, clinic staff knew that making the fullest use of community resources was important for optimizing their patients’ health. Dot Ballard, a lifelong resident of the city, offered to take responsibility for identifying existing resources and suggesting additional resources to address unmet needs. As Dot reported her findings to the staff, additional resources and needs were suggested.

In the area of resources, the staff encouraged older patients to take advantage of “Senior Wednesdays,” when older adults can use the community college fitness center for free. To help their Cambodian patients to prevent or manage chronic illness, a nurse practitioner from the clinic collaborated with a Cambodian nurse to offer a series of Khmer-language classes on healthy eating and exercise at the Cambodian community center.

The staff also worked with other concerned citizens and municipal officials to make some small but significant policy changes that had the potential to improve the well-being of their patients and other city residents. For example, staff helped to streamline the process by which senior citizens and disabled individuals can obtain a pass for free transportation on city buses. This change made it easier for low-income patients to come to the clinic for planned visits. The staff also helped to change the municipal budget so that unsafe sidewalks could be replaced. In addition to preventing injuries, sidewalks with even, intact surfaces encouraged patients to get more physical activity by walking in their neighborhoods.
The Impact of the CCM
These graphs show changes in selected processes of care and intermediate outcomes among patients with diabetes at EMC immediately before the start of CCM implementation in 2008 and 4 years later.

Substantial improvements were noted in all 4 processes of care, and the increase in the percentage of patients who had a foot examination—from 63% to 82%—was especially noteworthy.

There was also considerable improvement in 4 key intermediate outcomes. Analysis of A1C categories revealed a marked increase in the proportion of patients whose A1C was below 7% and a marked decrease in the proportion of patients whose A1C was above 10%. Impressive improvements were also noted for the proportions of patients whose blood pressure and LDL-C values were at goal.
The lessons learned by the EMC staff during the process of implementing the CCM were similar to those reported in the literature. At the beginning of the process, the champions of the CCM underestimated the difficulty of radically changing the attitude, behavior, and organization.

In retrospect, Dr. Hernandez realized that implementation could have been expedited if additional outside funding had been obtained to pay for more consultant services. For example, involving an IT consultant at an earlier stage could have simplified the process of designing a more functional computer system.

The EMC staff also came to understand that being more proactive during initial discussions with Oak Bridge Hospital might have reduced patient frustration. EMC staff also realized that the community linkages that were gradually formed were extremely fruitful and should have been pursued sooner and more aggressively.

Despite these issues, EMC staff members feel that their patients’ improved intermediate outcomes are excellent compensation for the difficulties and stresses they experienced during the implementation process. Clinic staff continue to track their patients’ outcomes to determine whether adoption of CCM-based care will be associated with improvements in long-term care.
The medical literature shows that the CCM can improve patient care and outcomes in adults with diabetes who receive chronic illness care in many different types of ambulatory primary care settings. These include small privately owned clinics, clinics associated with a large HMO, clinics affiliated with an urban academic medical center, federally qualified community health centers in various types of communities, the safety net health system of an urban department of public health, and a military clinic.

Many studies have shown that implementation of the CCM results in improved processes of care for adults with diabetes. Adoption of the CCM often leads to an increase in the percentage of patients who have 2 or more A1C tests per year.\(^1\)–\(^3\) Furthermore, implementation of the CCM is associated with increases in the percentage of patients who have an annual blood pressure assessment,\(^4\) lipid assessment,\(^3\)–\(^5\) foot examination or referral to a podiatrist,\(^2\)–\(^5\) eye examination or referral to an ophthalmologist,\(^3\)\(,\)\(^4\) dental examination or referral to a dentist,\(^2\)\(,\)\(^3\) microalbuminuria assessment,\(^3\)–\(^5\) influenza immunization,\(^5\) or pneumococcal vaccination.\(^4\)

Adoption of the CCM also leads to increases in the percentage of patients who take daily aspirin or receive a recommendation to take aspirin.\(^2\)\(,\)\(^5\) In addition, clinicians who practice in facilities that have implemented the CCM also spend more time discussing the importance of exercise.\(^6\)

Research has also shown that many patients with diabetes who receive their care at a primary care practice that has adopted the CCM exhibit more positive self-management behaviors than patients who receive usual care. Studies have shown that implementation of the CCM is associated with an increased percentage of patients who have created an action plan\textsuperscript{1}, have set a self-management goal\textsuperscript{2}, perform SMBG\textsuperscript{3,4} and adhere to their medication regimen\textsuperscript{5}. Furthermore, patients who receive CCM-based care devote a greater amount of time per week to engaging in moderate-intensity physical activity\textsuperscript{1}.

A number of studies have also documented improved intermediate outcomes after adoption of the CCM. Studies have reported a reduction in the mean A1C value and an increase in the proportion of patients with an A1C of less than 7%. CCM implementation is linked to a decrease in mean blood pressure levels and an increase in the percentage of patients whose blood pressure is less than 130/80 mmHg. Studies have documented improvements in various lipid parameters, including LDL-C, total cholesterol, high-density lipoprotein cholesterol (HDL-C), non-HDL-C, and the ratio of total cholesterol to HDL-C. A reduction in the mean body mass index has also been reported.

The accurate statement is: __________.

a. the health care organization element of the CCM does not apply to small autonomous practices
b. according to the CCM, community health programs should be avoided because their quality is uneven
c. the CCM has not yet been assessed in clinics focusing on the needs of low-income patients
d. CCM implementation leads to an increase in the percentage of patients who receive ≥2 A1C tests annually
The correct answer is d.

CCM implementation leads to an increase in the percentage of patients who receive ≥2 A1C tests annually.
Until now, most research on the benefits of CCM implementation has focused on intermediate outcomes, such as improved A1C, blood pressure, and lipid levels. Almost nothing is known about whether adopting the CCM will affect longer-term outcomes, such as the development of chronic complications or diabetes-related mortality. An exception to this generalization is a controlled study performed by Vargas et al that examined the effect of CCM-based care on the reduction of CVD risk in patients with diabetes.¹

The investigators calculated the change from baseline in participants’ 10-year risk of cardiovascular disease after they received CCM-based care or usual care for 1 year. Risk was determined using a United Kingdom Prospective Diabetes Study risk engine score. There were 613 patients in the CCM group and 557 patients in the usual-care group.

As the graph shows, patients who received CCM-based care had a lower 10-year cardiovascular disease risk than those who received usual care. Compared to patients in the usual-care group, risk reduction was −2.1% for all patients in the CCM group, −4.1% for the highest-risk tercile of the CCM group, and −1.0% for the lowest-risk tercile of the CCM group.

Moving forward, it will be important to have access to data showing whether CCM-based care actually improves long-term outcomes.

As previously discussed, comorbidity is common in patients with diabetes, and depression and diabetes often occur together. Among the interventions that have been studied for patients with depression and other serious chronic illnesses is TEAMcare, a program that incorporates many aspects of the CCM. A randomized study compared 12-month and 24-month outcomes in patients who received usual care for all 24 months or TEAMcare for 12 months, followed by usual care. Patients had depression that co-occurred with diabetes, coronary heart disease, or both. The effectiveness of treatment for depression was assessed using the change from baseline in the mean score on the Symptom Checklist–20 (SCL–20), a questionnaire that includes the 20 depression items from the Symptom Checklist–90. A decrease in the SCL–20 score indicates improvement. The effectiveness of diabetes treatment was evaluated using the change from baseline in the mean A1C level.

The graphs on the slide show that TEAMcare was associated with statistically significant improvement in the SCL-20 mean score at 12 months, the endpoint of the intervention period, and at 24 months, the end of the postintervention period. TEAMcare was associated with a significant improvement from baseline in the A1C level at 12 months, but not at 24 months.

Since the CCM is a relatively new mode of care, limited data on its financial impact are currently available.\(^1\) Cost savings resulting from improved disease control take time to materialize and often accrue to insurers rather than practices.\(^1\)

CEOs of CHCs reported year 1 administrative costs of $6–$22 per patient\(^2\)

At a rural CHC, Medicaid claims were similar 1 year before and 1 year after implementation\(^3\)

In the 24-month analysis of TEAMcare, mean outpatient costs were $594 lower with TEAMcare than with usual care\(^4\)

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Financial Impact of CCM Implementation

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- CEOs of CHCs reported year 1 administrative costs of $6–$22 per patient\(^2\)
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Gilmer and colleagues performed a detailed analysis of CCM-related office systems and quality improvement strategies that affect the costs of care for adults with diabetes.¹ They studied 3-year data on the financial impact of the CCM at 84 primary clinics affiliated with a large Minnesota HMO that treated 1628 adults with diabetes. Patients’ mean age was 63 years, their mean A1C was 7.5%, and their mean duration of diabetes was 12 years. The mean per-patient health care cost over the 3-year study period was $24,134.

The investigators found that several office systems and quality improvement strategies had a significant impact on the cost of care for adults with diabetes. Three factors—clinicians meeting to discuss patient care problems, having a registry that indicates patients’ levels of cardiovascular risk, and quality improvement strategies focused on resource use—were associated with lower costs. On the other hand, using a database to systematically monitor laboratory values was associated with higher costs.

The investigators concluded by recommending that the mechanisms by which these office systems and quality improvement strategies affect costs warrant further study.

Implementing the CCM
Uniform, simultaneous implementation of all 6 core elements is optimal.\textsuperscript{1,2} However, experience has shown that few practices succeed in adopting all elements with equal intensity and at the same time\textsuperscript{2–4} This is the case because making the transition between usual care and CCM-based care typically requires radical changes in providers’ outlook and behavior.\textsuperscript{1,2,4}

Studies have shown that patient care and outcomes often improve even if only 1 or 2 elements are implemented successfully or if multiple elements are partially implemented.\textsuperscript{1,2,5,6} There is no consensus about which single element makes the greatest contribution to improved care.\textsuperscript{3,5–7} The clinical information systems element is often implemented first and with the greatest intensity,\textsuperscript{3} perhaps because its basic requirements are technical expertise and financial resources rather than dramatic shifts in patterns of thought and behavior. Community resources and policies usually receive the least attention.\textsuperscript{3}

The Patient Assessment of Chronic Illness Care (PACIC) is a validated questionnaire that measures specific actions or qualities of care, congruent with the CCM, that patients have experienced over the past 6 months.\(^1,2\) The PACIC includes 20 items, each of which is scored from 1 (indicating “almost never”) to 5 (indicating “almost always”), with higher scores indicating better care.\(^2\) Thus, the worst possible score is 20 and the best possible score is 100.

The survey assesses the 5 domains of chronic illness care shown on the slide.\(^2\) An example of an item from the patient activation section is: “I was asked for my ideas when we made a treatment plan.” A representative item from the delivery system design/practice design section is: “I was given a written list of things I should do to improve my health.” One of the items from the goal-setting/tailoring section is: “I was helped to set specific goals to improve my eating or exercise.” A sample item from the problem-solving/contextual section is: “I was sure that my doctor or nurse thought about my values and my traditions when they recommended treatments to me.” One of the items from the follow-up/coordination section is: “I was told how my visits with other types of doctors, like the eye doctor or surgeon, helped my treatment.”

The validated version of the PACIC is provided as an appendix to an article by Glasgow and associates that was published in *Medical Care* in 2005.\(^2\) A short version of the PACIC has been developed, although it has not been formally endorsed by the Improving Chronic Illness Care program.\(^3\)

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The Assessment of Chronic Illness Care (ACIC), is a validated survey that complements the PACIC. It gives members of a health care team the opportunity to assess the level of chronic illness care currently provided at a practice site. The ACIC was developed as a practical tool to help health care providers improve care for chronic illness, but is also used in research.

Two versions of the ACIC, 3.0 and 3.5, are currently available for free download at the Improving Chronic Illness Care website. As shown on the slide, both versions have 6 sections corresponding to the 6 core elements of the CCM. There are a total of 28 items in these sections. Version 3.5 has 6 additional items that address how well a practice team or organization integrates the CCM elements. In the integration section, for example, health care providers are asked about the extent to which community programs provide feedback to the practice site about patients’ progress in their programs.

The ACIC’s scoring system is coordinated so that the lowest possible rating on any item, subscale, or the overall score is 0, and the highest possible rating is 11. Scores between 0 and 2 indicate limited support for chronic illness care, between 3 and 5 indicate basic support for chronic illness care, between 6 and 8 indicate reasonably good support for chronic illness care, and between 9 and 11 indicate fully developed chronic illness care.

The Patient-Centered Medical Home

• The PCMH
  – Is intimately related to the CCM\(^1\)
  – Consists of a comprehensive model for reorganizing primary care practices to provide patient-centered, comprehensive, coordinated, and accessible care that is continuously improved through a systems-based approach to quality and safety\(^2\)
  – Has been proposed as a practical solution to the current primary care crisis\(^1\)

• Private insurers, major private and federal employers, provider organizations, Medicare, and state Medicaid agencies are currently rolling out demonstrations of different variants of the PCMH\(^3\)

Because the patient-centered medical home (PCMH) is intimately related to the CCM, we will discuss it briefly.\(^1\) The PCMH consists of a comprehensive model for reorganizing primary care practices so that they will provide patient-centered, comprehensive, coordinated, and accessible care that is continuously improved through a systems-based approach to quality and safety.\(^2\)

The PCMH has been proposed as a practical solution to today’s primary health care crisis in the United States.\(^1\) Therefore, private insurers, major private and federal employers, provider organizations, Medicare, and state Medicaid agencies are currently rolling out demonstrations of different variants of the PCMH.\(^3\)

The PCMH and the CCM

- The PCMH is a broader model than the CCM, since it focuses on providing primary care to all children, youth, and adults.¹
- The CCM is an essential component of the PCMH.²
- The PCMH represents a melding of²
  - The CCM
  - Core primary care principles
  - Relationship-centered patient care
  - Reimbursement reform
  - New information technology

The PCMH is a broader model than the CCM, since it focuses on providing primary care to all children, youth, and adults.¹

However, the CCM is an essential component of the PCMH.² The PCMH represents a melding of the CCM, core primary care principles, relationship-centered patient care, reimbursement reform, and new information technology.²


The PCMH embraces many key principles of the CCM.\textsuperscript{1} For example, office visits are planned well in advance. A member of the health care team follows up with high-risk patients between visits. The primary care practice arranges care with specialists and consultants. Decision support is based on practice guidelines. Patient registries are used to review performance data. The members of the health care team communicate closely with each other. Furthermore, cultural competence is a major priority for health care providers.

Today there are some important gaps in our knowledge of the impact of the CCM and effective ways to implement it. Long-term studies are needed to determine whether CCM-based care reduces the incidence of chronic complications.\(^1\) Additional research is needed to clarify the financial impact of the CCM on ambulatory care practices.\(^1,2\)

Furthermore, small practices and other practices with limited resources would benefit from studies identifying the most essential elements of the CCM.\(^3\) Since research has shown that practices are least likely to implement the community resources and policies element, additional practical guidance in this area would be welcome.\(^3\)

The accurate statement is: __________.

a. the Assessment of Chronic Illness Care is a survey used by patients to evaluate their recent care

b. both the CCM and the patient-centered medical home (PCMH) model emphasize the importance of planned visits

c. the PCMH is a care model whose underlying principles differ markedly from those of the CCM

d. clinical information systems is the one essential core element of the CCM
The correct answer is b.

Both the CCM and the patient-centered medical home (PCMH) model emphasize the importance of planned visits.
The CCM identifies the essential components of a system that encourages optimal chronic illness care.

The CCM is based on productive interactions between an informed, activated patient and a prepared, proactive practice team.

CCM-based care features integrated, guideline-driven care at the practice level, a collaborative relationship with the larger health care system, and strong community linkages.

Implementation of the CCM often results in improved processes of care, diabetes self-management, and patient outcomes.