Diabetes is one of the Western world’s most common chronic conditions, with global prevalence increasing rapidly. Type 2 diabetes constitutes ~ 85–95% of all diabetes cases in developed countries and accounts for an even higher percentage in developing countries. The primary goals of diabetes treatment are to achieve near-normal blood glucose levels over the long term and to reduce the risk of both micro- and macrovascular complications, without significant impairment of patients’ quality of life.

Since the turn of the 20th century, health care professionals (HCPs) specializing in chronic conditions such as diabetes have increasingly understood and used therapeutic patient education to empower their patients to make behavioral changes. In his 1918 book *A Diabetic Manual: for the Doctor and Patient*, Elliott P. Joslin described diabetes as a condition characterized by self-management. Consequently, patient education should be considered a vital component in the holistic management of the disease.

In the United Kingdom, the National Service Framework recently published recommendations for standards in diabetes care focusing on provision of information, structured education, and psychological support. However, there is little consensus on the “how,” “when,” and “what” of educational curriculums. There are now multiple published structured education programs designed for people with type 2 diabetes. These vary in scope, length, content, and approach but share the same goal: to improve knowledge and understanding of the condition and through this to empower people with type 2 diabetes to improve the management of their own condition and migrate along the continuum of care to achieve long-term improved clinical and health status. As the well-known 14th century proverb states, “Mighty oaks from little acorns grow.”

However, teaching methods and educational programs often are not tailored to, and at times conflict with, patients’ needs and learning abilities.

The American Diabetes Association (ADA), in conjunction with the American Association of Diabetes Educators, the International Diabetes Federation (IDF), and the National Institute for Health and Clinical Excellence in the United Kingdom has provided standards for structured self-management education. These standards promote a clear theoretical and empirical rationale for the content and process of self-management education, drawing on evidence that those educational programs with a theoretical basis are associated with improved outcomes.

However, in a systematic review, Deakin et al. echoed the findings of others authors and organizations that many diabetes educational interventions have been poorly described, without clear evidence of underlying psychological, behavioral, or educational theory integrated into the program syllabus and its delivery. The objective of this article, therefore, is to describe the theories considered, in addition to provider and patient input, in the conceptualization and development of the one diabetes...
educational intervention: the diabetes Conversation Map education tools (Healthy Interactions, Inc.), a resource designed to facilitate self-management of type 2 diabetes.

Diabetes Conversation Maps are patient-centered, conversation-based tools developed using the combination of best practices in learning methodology. Based on the understanding that, as Blaise Pascal wrote in 1670, “people are generally better persuaded by the reasons which they have themselves discovered than by those which have come into the mind of others.”27 Conversation Maps rely on facilitation, allowing people to discover for themselves what is meaningful and actionable to change a chosen behavior. A learner-centered approach directed by participant interests, leveraging participant experiences, and focusing on application, provides opportunities for learners to seek meaning in new information.

Each Conversation Map measures ~ 3 by 5 feet (Figure 1) and is used as a resource to engage small groups of 3–10 patients with an interactive verbal and visual learning experience.

Conceptual Development

The content for the diabetes Conversation Maps was developed through focus groups and interviews with HCPs and patients and extensively pilot-tested with groups of people with type 2 diabetes in the United Kingdom, Canada,28 France, Italy, Germany, Spain, Egypt, Japan, South Korea, China, India, Mexico, and Brazil (data on file and available from corresponding author). Adult-learning principles25,30 used to guide evaluation of the effectiveness of the Conversation Map tools included that participants should engage in a learning process tailored to meet their individual learning needs, that they should be allowed to share personal knowledge and experiences, that positive behaviors should be reinforced, that competence and self-determination should be promoted, and that consequences of behaviors should be identified and discussed.

Association partners such as ADA in the United States, Diabetes UK (DUK) in the United Kingdom, and IDF elsewhere approved the final clinical information offered in the education tools and its accuracy.

Theoretical Underpinnings

The Biopsychosocial Model of health and illness (BPS), which has been considered for many years as a cornerstone of good patient outcomes, guided the development of the visual stimuli and content of the curriculum used in Conversation Maps. The BPS posits that health care is optimized when its providers seek to understand individual patients’ unique combination of biological, psychological, and social factors that influence their health functioning. Multiple well-grounded and well-tested models of health behavior pertaining to the three components of the BPS were considered during the development of the education tools. These are explored in more detail below.

Self-efficacy theory.31 Self-efficacy refers to people’s belief about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives.32 Self-efficacy beliefs are the foundation for human motivation and a strong predictor of behavior. These beliefs influence the choices people make and the courses of action they pursue; partially determine how much effort, perseverance, and resilience people will display on an activity; and foster psychological well-being (both by enhancing positive feelings [e.g., happiness, self-esteem, and life satisfaction] and reducing negative ones [depression, anxiety, and distress]). The self-efficacy theory suggests that the beliefs people hold about their capabilities, in concert with other sociocognitive factors, are more predictive of their behavior than their actual capability.

Self-efficacy theory provides the foundation for much of the curriculum used for Conversation Maps, which allow participants to explore what is personally meaningful through identification of short- and long-term goals and support mechanisms. Self-efficacy theory is reflected in the active group dialogue throughout Conversation Map sessions. Patients are encouraged to consider their individual performance capacity by reflecting on their past experiences in self-care, changes in attitudes, and experiences in overcoming environmental and psychosocial barriers. Through active conversation, participants can measure their progress, hear other perspectives, identify what is meaningful to them, anticipate changes, learn how to get help, and celebrate their successes.

Health Belief Model.33 The Health Belief Model (HBM) identifies modifiable psychological correlates of health beliefs and illustrates that these beliefs mediate the effect of unmodifiable demographic variables in influencing behavior. There are six core constructs to the HBM: perceived susceptibility and perceived severity (collectively, beliefs about health threats), perceived barriers to behavior, perceived benefits of adopting behavior, perceived self-efficacy, and cues to action (external influences promoting desired behaviors).

In sessions using Conversation Maps, patients experience the six concepts of the HBM by exploring personal feelings, perceptions, attitudes, and beliefs related to diabetes and its self-management. These emotions are internalized through the normalization and peer validation that are inherent to the facilitated dialogue.

Common-Sense Model of Health and Illness Self-Regulation.34 According to this model (also known as the Illness Perceptions Model, the Illness Representations Model, the Self-Regulatory Model, the Parallel Process Model, or Leventhal’s Model), beliefs about health threats (one component of the HBM) are explained by subjective illness representations integrating with existing schemata to make sense of symptoms. Representations are cumulative, formed and developed based on information receipt and experiences. These representations guide behavior regarding coping procedures, action plans, and outcomes.

Participants in sessions using Conversation Maps are encouraged to discuss and acknowledge diabetes-related health threats as they perceive them, as well as their individual motives for making changes in their
self-care behaviors. By identifying their motives, they can proactively respond to potential consequences of the condition. By accurately perceiving threats to their health, patients can improve their self-care by responding to their symptoms and situations to minimize adverse outcomes. Through active conversation, participants explore what has worked well.

Social learning theory. Similar to the HBM, the social learning theory (SLT) posits that the likelihood of a behavior occurring is a function of expectancies and values. Behavior will take place if a reward or reinforcement is both anticipated and valued. SLT further suggests that a combination of environmental (social) and psychological factors influence these expectancies and values. Remembering certain health behaviors (retention), perceiving oneself as able to reproduce them (self-efficacy), and having good reason to want to adopt the behavior (motivation) are all necessary for the continuum of behavior change to occur.

Participants in sessions using Conversation Maps compare their experiences, knowledge, and approaches to health behaviors (diabetes self-management), discuss best practices for completing tasks, and accept responsibility for their daily self-care.

Transtheoretical Model. The Transtheoretical Model (TTM), or “stages of change” model, identifies six stages on a continuum of behavior change: pre-contemplation, contemplation, preparation, action, maintenance, and relapse. Each stage plays an important role in supporting an evolutionary process whereby learners recognize the need for change, act, evaluate, and react. As a 1- to 2-hour group intervention with active and sustained participation, a session using Conversation Maps supports the stages associated with recognizing the need for change, enables personally determined strategies for adopting change, and provides an action plan for implementing change and recovering from potential self-management missteps. Participants self-assess their willingness and ability to self-manage their condition effectively and discuss personal journeys through each stage of change related to self-care and their adaptation to changing needs.

Dual-processing theory. Dual-processing theory distinguishes between heuristic processing (in which patients are passive in listening to HCPs) and systematic processing (in which patients are actively involved in the learning process). The theory emphasizes the importance of systematic processing by proposing the provision of the least possible information from which to learn and encouraging dialogue to enhance knowledge and understanding.

Participants Conversation Maps practice situational problem-solving that is guided by a facilitator but includes dialogue initiated and determined by participants’ interests. Some of the activities focus on “un-learning” unhealthy behaviors and instilling beliefs among the participants that they can embrace change and self-discovery.

Evaluation of Diabetes Conversation Maps
Diabetes Conversation Maps were first launched in Canada in 2005 in partnership with the Canadian Diabetes Association. Diabetes Conversation Map programs have since been developed in partnership with global thought leaders for audiences of various races, ethnicities, and cultures. They have been available in the United States since 2007 in partnership with the ADA and have been used in the United Kingdom through DUK and in Europe, Asia, Australia, Latin America, and Africa through IDF since 2008 or 2009, depending on the specific country.

Since their launch, > 3 million people have participated in Conversation Map programs in > 90 countries. More than 25,000 diabetes educators have been trained as facilitators, delivering this resource in 31 languages worldwide. Educators’ experience with the maps in the United States and Canada has been mostly positive.

The Medical Research Council calls for evaluation of complex interventions such as educational initiatives, suggesting that trials are of increasing importance because of the drive to provide the most cost-effective health care. Trials evaluating educational interventions must address issues normally posed by randomized, controlled trials, such as sample size, inclusion and exclusion criteria, and methods of randomization, as well as the challenges of complex interventions.
such as how to separate the effects of education on clinical outcomes from the more direct effects of medical treatment.\textsuperscript{11,26} Multiple studies are underway in the United States and Europe comparing Conversation Maps to other forms of patient education (such as one-on-one discussion with a HCP) and/or structured syllabus-based education.

A European trial evaluating Conversation Maps has been designed with the aim of understanding and assessing the medium-term (6-month) impact of these tools compared to regular care in two European countries. Spain and Germany are participating to provide sites with a variety of different approaches to patient education. Adults 18–75 years of age with type 2 diabetes are eligible to participate if their physician considers them to show poor disease management (e.g., insufficient A1C control, poor medication adherence, or low levels of empowerment to carry out self-care) and to be in need of education or re-education.

This ongoing study has been designed in line with a report from Diabetes Australia\textsuperscript{11} that recommends that indicators for assessing diabetes education should be meaningful, feasible, and practical to measure and should focus on areas that are most directly influenced by education and least influenced by other aspects of care. The immediate objective of any form of education is to improve knowledge and understanding. Therefore, in this study, the impact of Conversation Maps among patients with type 2 diabetes will be evaluated primarily in terms of diabetes knowledge using the updated ADKnowl questionnaire,\textsuperscript{39} but also through validated questionnaire measurement of diabetes self-management behavior (self-care\textsuperscript{40} and empowerment\textsuperscript{41}) and physical and psychological wellbeing (health status\textsuperscript{42} and emotional distress\textsuperscript{43}). Satisfaction with care, goal attainment, and clinical outcomes (including A1C) are also being measured.

The U.S. diabetes Conversation Maps are being evaluated in a randomized, 12-month multicenter study (Interactive Dialogue to Educate and Activate [IDEA]; trial no. NCT00652509), conducted by researchers at HealthPartners Research Foundation and LCF Research. The study is evaluating the Conversation Maps in terms of patient satisfaction, behavioral and emotional outcomes, blood glucose, blood pressure, lipids, cost, and comorbidities compared to individual education (one-on-one sessions) and no formal diabetes education among patients with type 2 diabetes, A1C levels ≥ 7%, and no recent diabetes education.\textsuperscript{44}

Short-term results presented at the 2009 and 2010 ADA Scientific Sessions\textsuperscript{45,46} showed positive effects ($P < 0.05$; $\chi^2$ tests) of Conversation Map group education (four 2-hour sessions) and individual education (three comprehensive one-on-one sessions) compared to usual care as determined by the primary care provider. These effects included the following endpoints at 3 months post-randomization (total $n = 623$):

- Proportion of patients showing any improvement (i.e., survey score at 3 months higher than baseline survey score) in empowerment scores\textsuperscript{47} from baseline values: 47.7, 54.0, and 35.6% for Conversation Maps, individual education, and usual care cohorts, respectively
- Proportion of patients showing an improvement in understanding of diabetes self-care practices (one component from the diabetes care profile\textsuperscript{48}: 79.3, 78.7, and 63.9% for Conversation Maps, individual education, and usual care cohorts, respectively
- Proportion of patients showing a reduction in negative attitudes (a component of the diabetes care profile\textsuperscript{48} that includes fear of diabetes, difficulty believing one has diabetes, feeling unhappy or depressed because of diabetes, feeling not as good as others because of diabetes, and difficulty with self-care): 53.0, 54.0, and 35.6% for Conversation Maps, individual education, and usual care cohorts, respectively

The study groups did not differ significantly in changes in positive attitudes\textsuperscript{48} or overcoming barriers,\textsuperscript{44} and there were no statistically significant differences between Conversation Map group education and individual education on any of these outcomes.\textsuperscript{46} It should be noted that these are only interim 3-month results.

Interestingly, with data from all cohorts pooled (a subgroup of 339 patients at two of the participating health care systems), patients’ attitude towards diabetes (a component of the diabetes care profile\textsuperscript{48} that includes fears and feelings) at the randomization visit was moderately correlated with self-efficacy\textsuperscript{47} at the same visit (positive attitude and self-efficacy correlation coefficient 0.39 [P < 0.05]; negative attitude and self-efficacy correlation coefficient –0.35 [P < 0.05]).\textsuperscript{45}

**Conclusion**

Patient education can be considered a complex intervention because it is made up of various interconnecting parts.\textsuperscript{46} Although evidence exists regarding the ability of educational interventions to improve both knowledge and metabolic control in diabetes, the size of the effect depends on the nature of the measure, the length of the study, and other patient-related variables. It is unclear what contributes directly to this improvement and whether the components of educational programs, including content and delivery, would be efficacious if administered in isolation. It is also clear that not all improvements in knowledge are translated into metabolic control, and reasons for this apparent disconnect have not been explored in great detail in diabetes educational interventions.

Although researchers\textsuperscript{48} have argued the necessity to understand these interconnecting parts in greater detail, it is entirely possible that much of the explanation is based on the theoretical basis for the intervention. Consolidated Standards of Reporting Trials guidelines\textsuperscript{49} and the Transparent Reporting of Evaluations With Non-Randomized Designs statement\textsuperscript{50} specify information that should be included in evaluations of educational interven-
Consideration of the theoretical basis of health education resources such as the Conversation Maps and examination of the relationship between psychosocial and physiological outcomes may help us understand why these tools demonstrate efficacy, should they be shown to do so in clinical programs. This, in turn, may improve the chances of providing meaningful education and sustained improvement in patient outcomes for people with diabetes. However, the relative importance of the theory-based development on outcomes is unknown. Additional research is needed to understand this further.

References


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Note of disclosure: Mr. Reaney is an employee of Eli Lilly and Co., which sponsors Diabetes Conversation Maps outside of the United States. Barbara Eichorst and Peter Gorman are employees of Healthy Interactions, which manufactures Diabetes Conversation Maps.