Western Graduate&PostdoctoralStudies

Western University
Scholarship@Western

Electronic Thesis and Dissertation Repository

11-23-2012 12:00 AM

Evaluating the Impact of Two Different Methods of Diabetes Self-management Education on Knowledge, Attitude, and Behaviours of Patients with Type 2 Diabetes Mellitus

Laura B. Briden
The University of Western Ontario

Supervisor
Dr. Alicia C. Garcia
The University of Western Ontario

Graduate Program in Foods and Nutrition
A thesis submitted in partial fulfillment of the requirements for the degree in Master of Science
© Laura B. Briden 2012

Follow this and additional works at: https://ir.lib.uwo.ca/etd

Part of the Cardiovascular Diseases Commons, Endocrinology, Diabetes, and Metabolism Commons, International and Community Nutrition Commons, Other Nutrition Commons, Public Health and Community Nursing Commons, and the Public Health Education and Promotion Commons

Recommended Citation

Briden, Laura B., "Evaluating the Impact of Two Different Methods of Diabetes Self-management Education on Knowledge, Attitude, and Behaviours of Patients with Type 2 Diabetes Mellitus" (2012). *Electronic Thesis and Dissertation Repository*. 972.
https://ir.lib.uwo.ca/etd/972

This Dissertation/Thesis is brought to you for free and open access by Scholarship@Western. It has been accepted for inclusion in Electronic Thesis and Dissertation Repository by an authorized administrator of Scholarship@Western. For more information, please contact wlswadmin@uwo.ca.

EVALUATING THE IMPACT OF TWO METHODS OF DIABETES SELF-MANAGEMENT EDUCATION ON KNOWLEDGE, ATTITUDE AND BEHAVIOURS OF PATIENTS WITH TYPE 2 DIABETES MELLITUS

(Spine title: Impact of Diabetes Self-Management Education on T2DM Patients)

(Thesis format: Monograph)

by

LAURA BETH BRIDEN, RD

Graduate Program in Foods and Nutrition

A thesis submitted in partial fulfillment
of the requirement for the degree of
Master of Science in Foods and Nutrition

The School of Graduate and Postdoctoral Studies
Western University, London, Ontario Canada

© Laura Beth Briden, RD 2012

Western GraduateStudies
School of Graduate & Postdoctoral Studies

CERTIFICATE OF EXAMINATION

Supervisor

Dr. Alicia C. Garcia

Supervisory Committee

Dr. Colleen Gobert

Examiners

Dr. Len Piché

Dr. Marita Kloseck

Dr. Colleen Gobert

The thesis by

Laura Beth Briden

entitled:

Evaluating the impact of two methods of Diabetes Self-Management Education on knowledge, attitudes and behaviours of patients with type 2 Diabetes Mellitus.

is accepted in partial fulfillment of the
requirements for the degree of
Master of Science in Food and Nutrition

Date

Dr. Sharareh Hekmat
Chair of the Thesis Examination Board

ABSTRACT

This study compared the effectiveness of diabetes self-management education (DSME) methods by examining changes in knowledge, attitude, and behaviour (KAB) after receiving education. Participants from a convenience sample were randomized into two groups, one receiving education through conversation maps and the other through traditional group education. Participants' knowledge and attitude changes were measured by using a repeated measures pre-test/post-test design and changes in Hb A1c were observed. Focus groups were conducted after education was received to obtain perceptions and self-reported behaviour changes. Significant knowledge and attitude score changes were observed in the conversation map group after education. When comparing the difference in attitude score changes between groups, significant improvements in attitude scores were observed in the conversation map group directly and at three months after education. These changes may lead to improved diabetes self-management, reducing the development of costly health complications related to poorly controlled diabetes. Insight was gained on how DMSE influences changes in KAB.

KEY WORDS

Type 2 diabetes mellitus, group education, group intervention, diabetes self-management education, conversation maps, knowledge, attitude, behaviours, hemoglobin A1c, glycemic control, focus groups

ACKNOWLEDGEMENTS

I would like to thank Dr. Alicia C. Garcia, my thesis advisor, for her guidance, support and encouragement throughout the last two years of my life. She is truly an inspiration and her accomplishments encourage me to strive for excellence in my own educational career. I would also like to thank Dr. Colleen Gobert for being a part of my thesis advisory committee. Her knowledge, skills, and expertise were greatly valued throughout the writing process of this research.

Thank you to the staff of the Guelph Family Health Team and Diabetes Care Guelph who supported me throughout my research study, especially Sam Marzouk, Sarah Micks, and Candice Duguay.

Thank you to my wonderful mother Jan Briden, my loving family, and my best friend Danielle Modolo for always believing in me and supporting my dreams.

A special thank you to my husband, Mark Adam, for supporting me and keeping me on track with my research while finishing my degree and simultaneously planning our wedding.

Finally, this thesis is dedicated to my father, Bob Briden, without whom I would have not developed a passion for researching diabetes education and its impact on people's lives.

TABLE OF CONTENTS

CERTIFICATE OF EXAMINATION ……..……. ii

Abstract and Key Words ……..... iii

Acknowledgements ……..….. iv

Table of Contents ……... v

List of Tables ……. ix

List of Abbreviations ……. x

CHAPTER 1: INTRODUCTION ……..….. 1

1.1 Study Objectives …….. 4

1.2 Definition of Terms …….. 5

1.3 Rationale for the Study ……. 6

CHAPTER 2: LITERATURE REVIEW …….. 8

2.1 Diabetes Self-management Education ……. 8

2.2 Principles of Adult Diabetes Education ……... 10

2.3 Theoretical Background in Adult Learning ……. 11

2.3.1 The Stages of Change Model …… 12

2.3.2 The Health Belief Model ……..... 12

2.3.3 The Common Sense Model …….. 14

2.3.4 The Social Cognitive Theory …… 15

2.4 Delivering Diabetes Education …… 17

2.5 Group Education Teaching Methods ……... 19

2.6 Diabetes Conversation Maps ……... 21

CHAPTER 3: RESEARCH DESIGN AND RESEARCH METHODS …… 24

3.1 Research Questions …….. 24

3.2 Research Design ……... 25

3.2.1 Pre-recruitment of Patients ……..... 25

3.2.2 Recruitment ……... 26

3.2.3 Inclusion and Exclusion Criteria …….. 27

3.2.4 Ethical Considerations of Research ..……. 28

3.2.5 Scientific Validity of the Study Design ..…… 28

3.2.6 Pre-intervention Procedures …..……. 30

3.2.7 Intervention Procedures ……. 30

3.2.8 Data Collection of Hemoglobin A1c ……..... 33

3.2.9 Data Analysis of Knowledge and Attitude Scores 33

3.2.10 Focus Groups …… 34

3.2.11 Analysis of Focus Groups ……... 34

3.2.12 Memo Writing ……. 35

3.2.13 Reflexivity ……... 36

CHAPTER 4: RESULTS …..…… 37

4.1 Characteristics of Participants …….. 37

4.2 Hemoglobin A1c Results …… 40

4.3 Knowledge Scores ……... 41

4.4 Attitude Scores ……. 44

4.5 Focus Groups ……...…..…….. 54

4.5.1 Common Themes ……...…..……. 56

4.5.2 Additional Conversation Map Themes …….. 59

4.5.3 Additional Traditional Education Theme ..……. 63

CHAPTER 5: DISCUSSION …….. 66

5.1 Research Participation …….. 66

5.2 Changes in Hemoglobin A1c …… 67

5.3 Changes in Knowledge …..…….. 69

5.4 Changes in Attitudes ……. 70

5.5 Focus Groups ……..... 73

5.5.1 Common Themes …… 73

5.5.2 Conversation Map Themes ……. 76

5.5.3 Traditional Education Theme ……..... 80

5.6 Strengths and Limitations of the Study …… 81

5.7 Value of Conversation Maps in DSME ……..... 83

CHAPTER 6: RELEVANCE AND IMPLICATIONS FOR PRACTICE …… 85

6.1 Relevance and Implications ……... 85

REFERENCES ……. 88

APPENDICES ……. 94

A. Poster Advertisement ……. 95

B. Letter of Information ……. 96

C. Screening Questionnaire …….....…. 99

D. Consent Form …… 100

E. Ethics Approval Notice ……..... 101

F. Demographic Questionnaire …….. 102

G. Coded Knowledge Questionnaire …….. 103

H. Attitudes Questionnaire ……. 105

I. Conceptual Framework …… 109

J. Diabetes Attitude Questionnaire Formulae …….. 110

K. Focus Group Interview Guide …….…….. 111

L. Focus Group Letter of Information …..…… 114

M. Focus Group Consent Form …….. 116

N. Image of the Conversation Map Provided by Diabetes Care Guelph …….. 117

O. Traditional Education Method PowerPoint Presentation …….. 118

P. Association of Family Health Teams of Ontario Presentation on Preliminary Research Findings Presented October 15, 2012 132

Q. Speaker Agreement for Presenting Research at 2013 Dietitians of Canada Regional Conference ……..…… 149

R. Abstract for 2013 Dietitians of Canada Regional Conference .. 151

CURRICULUM VITAE …… 152

LIST OF TABLES

Table 1.	Components of a Conversation Map ……..	22
Table 2.	Diabetes Self-Management Education Topics ……...	32
Table 3.	Characteristics of Participants ……...…	39
Table 4.	Mean Hemoglobin A1c Concentrations before and after DSME ……	40
Table 5.	Changes in Knowledge Scores (Conversation Map) ..…..	42
Table 6.	Changes in Knowledge Scores (Traditional Education)…	43
Table 7.	Changes in Attitude (Conversation Map) …….	48
Table 8.	Changes in Attitude (Traditional Education) ……	49
Table 9.	Pre-test vs Post-test 1 Knowledge and Attitude Score Differences Between Groups …….	50
Table 10.	Pre-test vs Post-test 2 Knowledge and Attitude Score Differences Between Groups …….	52
Table 11.	Major Themes from Focus Groups ……	55

LIST OF ABBREVIATIONS

Abbreviation	Meaning
Hb A1c	Hemoglobin A1c
KAB	Knowledge, attitudes, and behaviors
CM	Conversation Map
TE	Traditional education method
HBM	Health belief model
DCG	Diabetes Care Guelph
DSME	Diabetes Self-Management Education
DKT	Diabetes Knowledge Test
MDRTC	Michigan Diabetes Research and Training Center
DAS-3	Diabetes Attitude Scale

CHAPTER 1

INTRODUCTION

The prevalence of diabetes is increasing (1). Research findings suggest that between 2010 and 2030, there will be an estimated 69% increase in the number of adults with diabetes in developing countries and a 20% increase in developed countries (1). The Public Health Agency of Canada (PHAC) reported approximately 2 million Canadians aged one and older were living with diagnosed diabetes in 2007. Furthermore, PHAC reported that 199,471 individuals were newly diagnosed with a form of diabetes, including Type 1, Type 2 or gestational diabetes (2). According to the 2009 Canadian Diabetes Surveillance System results, 6.2% of the Canadian population has diabetes. Of Canadians diagnosed with diabetes, about 90% have type 2 diabetes mellitus. The Ontario prevalence of diabetes is 8.8% of the population, which exceeds the national average (2). Projections indicate that by 2016 more than three million Canadians will be living with diabetes (3).

Type 2 diabetes mellitus is more commonly diagnosed over the age of forty; however, the number of cases being diagnosed in children and adolescents continues to rise. Type 2 diabetes mellitus comprises 75 - 90% of diagnosed cases of diabetes in the world (1). Researchers believe that factors such as diets high in saturated fat and refined carbohydrate, decreased physical activity, and increased longevity are the main contributors in the dramatic increase of type 2 diabetes mellitus (2). The risk of developing diabetes will increase as the baby boom generation enters the older age groups and the prevalence of obesity in these age groups continues to rise (2).

Based on random practice searches using electronic medical record data mining conducted by the Guelph Family Heath team in 2011, Guelph's population with diabetes can be estimated at around 7%. In 2011, Diabetes Care Guelph enrolled 1781 patients into the diabetes education program. Patient enrollment for 2012 is estimated to be higher than 2011.

Diabetes mellitus is a metabolic disorder characterized by the presence of hyperglycemia due to defective insulin secretion, insulin action or both (4). Type 2 diabetes mellitus may range from predominant insulin resistance with relative insulin deficiency to a predominant secretory defect with insulin resistance (4). Type 2 diabetes mellitus carries a risk of multiple, life-threatening, yet potentially preventable complications (5). Poorly controlled type 2 diabetes mellitus can result in chronic hyperglycemia, which is associated with damage, dysfunction and failure of various organs – especially the kidneys, eyes, nerves, heart and blood vessels (4). Diabetes increases the risk of cardiovascular disease. People with diabetes are two to four times more likely to develop cardiovascular disease than people without diabetes, making it the most common complication of diabetes (4). Diabetes is also a leading cause of blindness, end-stage renal failure, and limb amputation (4). The United Kingdom Prospective Diabetes Study, the largest clinical research study of diabetes to date, has provided evidence that complications of type 2 diabetes mellitus can be reduced by optimizing blood glucose control to sustain a Hb A1c less than 7%, and controlling blood pressure levels to target systolic blood pressure values less than 120 mmHg (6).

The adoption of self-management skills by a person with diabetes has been recognized as necessary step in managing diabetes (4). Diabetes self-management refers to all of the activities in which patients engage to care for their illness, promote health,

augment physical, social and emotional resources and prevent the long- and short-term effects from diabetes (7). Self-management is defined as the tasks patients need to undertake to live well with a chronic disease such as diabetes (7). It includes the knowledge, skills, ability, and confidence to make daily decisions, select and make positive behavior changes and cope with the emotional aspects of their disease within the context of their lives (7). Self-management is the primary goal of diabetes interventions, as costs and complications associated with the management of diabetes are largely preventable when glycemic control is attained (Hb A1c less than 7%) (4). People who have diabetes mellitus provide at least 99% of their own care for the disease through self-management (8).

Diabetes self-management education (DSME) has been considered a cornerstone of diabetes clinical management since the 1930s (9). The Canadian Diabetes Association's 2008 Clinical Practice Guidelines emphasize that DSME, incorporating knowledge and skills development as well as cognitive-behavioural interventions, should be implemented for all individuals with diabetes mellitus (4). Patients' knowledge, attitudes, and behaviours (KAB) are parameters that can be influenced by the delivery of education and ultimately can affect clinical outcomes such as glycemic control (10).

1.1 STUDY OBJECTIVES

The purpose of this study was to compare the effectiveness of two diabetes self-management education methods by examining changes in patients' knowledge, attitude, and behaviour after receiving education using the delivery method of conversation maps or traditional methods of group education.

The research objectives of this study were:

1. To determine self-management knowledge and attitude of patients with diabetes before and after diabetes education intervention,
2. To evaluate the impact of conversation maps and traditional group education on knowledge and attitude of patients,
3. To compare patients' knowledge and attitude after receiving education,
4. To compare changes in patients' Hb A1C pre- and 3- months post intervention, and
5. To determine behaviour changes and compare patients' perceptions of the education delivery methods.

The hypotheses of this study were as follows:

1. Participants who received education through conversation maps method would show a greater decrease in Hb A1c concentrations three months after receiving education compared to those who received education using traditional methods.

2. Participants who received education through conversation maps method would show greater improvements in knowledge, attitude and behaviour scores than participants who attended traditional education.
3. Participants who received education through conversation maps method would report more positive perceptions of the education delivery method than participants who attended traditional education.

1.2 DEFINITION OF TERMS

The following definitions were used in this study:

Traditional group education: a series of two one hour and forty-five minute PowerPoint presentations, presented by a registered nurse and a registered dietitian. These PowerPoint presentations include all appropriate self-management topics required in a diabetes education program as defined in the 2008 CDA guidelines (4).

Diabetes Conversation Maps: a series of images and symbols on a tabletop display and serve as a tool to engage people in conversations about clinical, behavioural and psychosocial issues in order to facilitate learning within a group setting. The conversation maps include all appropriate self-management topics required in a diabetes education program as defined in the 2008 CDA guidelines (4).

Diabetes educator: a health care professional such as a registered dietitian, registered nurse, or certified diabetes educator who provides diabetes education.

Diabetes self - management education (DSME): the ongoing process of facilitating the knowledge, skills and abilities necessary for diabetes self – care.

Education: a combination of providing knowledge and interactive experiences.

Instructional curriculum: a deliberate arrangement of conditions, written

content, to promote actions towards an intentional goal.

Learning: An active goal - directed process, transforming skills, knowledge and application of values into new observable behavior.

Teaching: a system of actions to bring about learning, both theoretical and applied.

1.3 RATIONALE FOR THE STUDY

Diabetes Care Guelph (DCG), a diabetes education centre in Guelph, Ontario, is currently transitioning to a new delivery method for diabetes education for individuals with type 2 diabetes mellitus. From 2008 to April 2010, a traditional group education method was used to educate patients with type 2 diabetes mellitus which consisted of two one hour and forty-five minute PowerPoint presentations presented by a registered nurse and a registered dietitian. These PowerPoint presentations include all appropriate self-management topics required in a diabetes education program as defined in the 2008 CDA guidelines (4). After attending the International Diabetes Federation conference in November 2009, DCG began investigating the use of a new education delivery method that was displayed at the conference called conversation maps. The difference compared to traditional diabetes education is the delivery method. In March 2010, DCG staff received training on how to use the conversation maps with their patients. In May 2010, DCG began using conversation maps for diabetes education in the centre. Currently, there is limited published research that compares the impact of different diabetes self-management group education methods. There is also very little research examining the use of conversation maps in diabetes education. As healthcare budgets become tighter around the world, evaluating the performance and effectiveness of different education methods is necessary for determining best-practice approaches (11). Therefore, this

research examined the impact of conversation maps compared to traditional group education methods through assessing changes in patients' KAB in the following areas: blood glucose monitoring, lifestyle management including nutrition and physical activity, and medication management. The patients' perceptions of the education delivery methods were also determined.

CHAPTER 2

LITERATURE REVIEW

This chapter presents the results of reviewing 48 publications from 1955 to 2009 including journal articles and reviews from the following publications: Diabetes Care, Canadian Journal of Diabetes, Diabetes Spectrum, The Cochrane Collaboration, and Diabetologia. The topics include a brief description of DSME, principles of adult diabetes education, the theoretical bases of adult learning in diabetes education, delivery methods, and a brief description of both group education methods and the newer conversation maps.

2.1 DIABETES SELF-MANAGEMENT EDUCATION

Diabetes education has been referred to as the foundation of effective diabetes care (12). Research has established that the practice of diabetes self-management education (DSME) is critical to the care and management of people with diabetes, and that measurable behaviour change is the distinctive outcome of working with a diabetes educator (13). DSME is a comprehensive patient education structure that involves a multidisciplinary team to help achieve the necessary metabolic outcomes and improve the quality of life of those living with diabetes (10, 14). Improvements in metabolic parameters such as blood glucose, blood lipids and blood pressure in diabetes care are best achieved with healthy lifestyle approaches alone or in combination with oral anti-hyperglycemic agents if needed to aid in glycemic control (4). According to the 2008 Canadian Diabetes Association Clinical Practice Guidelines, DSME that includes skills training, coping strategies, problem-solving and case management, has been

demonstrated to improve the individual's ability to engage in effective self care, lower Hb A1c levels and enhance quality of life (4).

The essential components of DSME include: education tailored to individual needs and circumstances; a group setting with others who share the same condition; feedback following an intervention; psychological emphasis in the intervention; and involvement of medical providers in providing the intervention (15). Skill training during DSME should include self-monitoring of blood glucose (SMBG), making dietary choices, incorporating an exercise regimen, using medications as recommended and possible medication adjustments if needed (4). The partnership between the diabetes educators and the patient is an essential component in effective DSME. The process involves ongoing interactive and collaborative education that engages an individual with diabetes in therapeutic decision-making (14). DSME is obtainable throughout the lifetime of an individual with diabetes and enables ongoing reassessment of self-management goals (14). DSME has been shown to result in improved ability to handle the physical and emotional demands of self-care and in improved short- and long-term clinical outcomes (4).

Diabetes has been identified as a progressive disease in which the clinical manifestations change throughout a patient's lifetime (16). DSME approaches are typically adjusted as a patient's lifestyle changes and as their disease progresses (14, 17). A variety of methodologies and delivery options exist to support people with diabetes to achieve healthier outcomes such as one-to-one individual education and group education. Although people with diabetes vary in age, type and duration of diabetes, the essential components of DSME remain constant (4, 10, 17).

2.2 PRINCIPLES OF ADULT DIABETES EDUCATION

Research on diabetes education programs has adequately demonstrated increased participant knowledge and corresponding improvements in glycemic control following education (18, 19). The optimal approaches in DSME delivery that are associated with improved outcomes focus on patient-centred behavioral strategies, encouraging active engagement of patients, building self-empowerment, and are evidence-based where possible (10).

Diabetes education is regarded as the first step in preparing individuals with diabetes to make necessary lifestyle modifications. Typically, health care professionals teach patients information that they believe is necessary; however, research shows that most information shared by a health care professional with patients is forgotten soon after an appointment. The Diabetes Attitudes, Wishes, and Needs (DAWN) study indicated that while 50% of persons with type 2 diabetes mellitus receive DSME, only 16.2% reported adhering to the recommended self-management activities (20). The DAWN study identified important goals that need to be achieved to improve outcomes: reducing barriers to therapy; promoting self-management; improving psychological care; and enhancing communication with health care providers. To engage patients and improve the retention of information, it is imperative that educators recognize the need to involve patients in determining how to prioritize education (18).

Research shows that retention of information by people with diabetes is not enough to help them change their behavior. The quality and quantity of effective communication between health care professionals and people with diabetes is the most critical indicator of successful DSME (18). Adults learn most effectively when information is practical and relevant to their interest. DSME has been shown to be most

effective when the educator acts as a facilitator, presenting opportunities to discuss experiences and help set goals around application of skills (21).

Best practices and theories have been shown to promote patients' knowledge retention, commitment, and improved self-care outcomes. These include facilitation, empowerment, motivational interviewing, behavioral goal -setting, behavioral and psychosocial strategies, and ongoing support (8, 22–27). The process allows for the patients to talk about their perspective of diabetes, acknowledge their commitment and determine their self-management priorities. The expectation is that by identifying what is practical and achievable, patients ultimately own their own commitments and will be more likely to accomplish the requisite lifestyle changes (24, 28, 29).

2.3 THEORETICAL BACKGROUND IN ADULT LEARNING

Theories in adult learning strengthen an educator's technique for delivering effective diabetes education (4). The theoretical basis in diabetes education includes the Transtheoretical Model (Stages of Change theory), the Health Belief Model, the Common Sense Model, the Social Learning Theory and the Social Cognitive Theory (21, 30–32) . These commonly utilized theories in diabetes education allow for advantageous interaction with patients through fostering effective listening, relationship building and creating an environment of trust and respect (21, 30, 31). The theories also suggest approaches utilized to promote a meaningful dialogue for a wider variety of individuals, regardless of age, gender or ethnicity (21, 31, 32).

2.3.1 The Stages of Change Model

Learning and making lifestyle changes is a process of defining and adjusting goals. Prochaska ’s Stages of Change Model outlines the predictable process of change as patients not only learn what they are ready to learn, but also understand the reasons behind the need for change and strategies (33). The Stages of Change Model illustrates five stages in a continuum of behavior change: pre-contemplation, contemplation, preparation, action, maintenance and relapse (33). Each stage has an important role in supporting an evolutionary process whereby learners recognize the need for change, act, evaluate and react. To progress through the early stages, people apply cognitive, affective, and evaluative processes. As people move toward action and maintenance, they rely more on commitments, conditioning, contingencies, environmental controls, and support (34). Diabetes educators can help patients increase their realization of importance of change, confidence, and readiness by asking meaningful questions about the importance of change. Educators can also assist individuals with decisional balance which is defined as developing awareness that the advantages of changing outweigh the disadvantages of current behaviour (33).

2.3.2 The Health Belief Model

The Health Belief Model (HBM) is a psychological framework that outlines predictable health related behaviors (32). Patients’ life experiences and exposures to past events shape their perceived severity of the condition, perceived susceptibility or vulnerability to the disease process, perceived benefits (belief in efficacy), costs/ barriers, and cues to action, which may be internal (symptoms) or external (health education, illness of family or friend). A meta-analysis on The Health Belief Model and health self-care was

conducted Janz and Becker in 1984. The research found perceived barriers to self-care to be powerful in compromising behavioural change. Perceptions of susceptibility were influential in promoting preventative self-care behaviours (31). Another meta-analysis conducted by Harrison *et al.* in 1992 also looking at health self-care concluded that although the principal dimensions of the model significantly influenced behaviour, the amount of variance in measured behaviour accounted for by the main domains (perceived susceptibility, severity, benefits and costs) was small (<10%) (35). In research directly observing the relationship between the HBM and diabetes self-management, results have been inconsistent. Perceived benefits correlate with adherence to diabetic regimen in adolescence (36). In adults, benefits and vulnerability were related to diabetes regimen adherence (37). The emotional response to illness may influence this relationship, in that perceived severity can lead to better adherence or to denial, but the Health Belief Model does not directly include emotional response (38).

HBM is widely used in research to gain a better understanding of human health behaviour; however, this model has the disadvantage of only focusing on factors in a motivational phase and neglects the volitional phase where action is planned, performed and maintained (39). The process of diabetes education should allow for an effective discussion and exploration of beliefs which are needed to promote perceived susceptibility, severity, benefits and costs associated with diabetes self management; however, diabetes education should also incorporate other theories in adult learning.

2.3.3 The Common Sense Model

The theoretical framework of the Common Sense Model is based on the balance of danger and fear control (37). This theory implies that people will not self - regulate unless there is a significant and relevant understanding of the condition, cause, disease timeline, consequences, curability and controllability. The internal cognitive representation of the illness is balanced by emotions that require effective coping skills and appraisal. The first component of the five assumptions in the theory is that the patient identifies the condition. The second is the patient's perception of what actually caused the condition. The third consideration is of a timeline and how long the patient thinks that the condition is going to last. The fourth component of the Common Sense Model is the patient ' s understanding of the consequences of the disease and how it will affect their future. The fifth component relates to the patient 's perception of treatment effectiveness (32).

Research suggests that perceived vulnerability to complications related to diabetes is more significant among patients who have witnessed severe complications among people they know, such as family members or loved ones (40). Furthermore, a meta-analytic review on the Common Sense Model and illness representation shows that overall perceptions of a strong illness identity were significantly and positively related to the use of coping strategies of avoidance and emotion expression (41). Perceived controllability of the illness was significantly associated with cognitive reappraisal, expressing emotions and problem-focused coping strategies (41). Learning coping strategies and witnessing other patients with diabetes in a group setting with varied levels of diabetes complications can introduce others to the necessary steps to control their diabetes more effectively.

2.3.4 The Social Cognitive Theory

The foundation of the group education session is a discussion among patients that allows them to learn from one other. The Social Cognitive Theory, otherwise called the social learning theory, outlines the social context necessary for role modeling. It also asserts that the inspiration and support generated by group interaction help patients change their behaviors (36). Both social interactions and psychological factors influence learning. According to Bandura (42), learning a skill is not enough, individuals should also develop confidence in the skills that they are learning. Bandura's Social Cognitive Theory believes that success is not necessarily based on the possession of the necessary skills for performance; it also requires the confidence to use these skills effectively.

Self-efficacy is a central concept in Bandura's Social Cognitive Theory (42). Bandura describes self-efficacy as people's judgment of their capabilities to organize and execute courses of action required to attain designated types of performances. Self-efficacy is not of a general nature, but related to specific situations. Individuals can judge themselves to be very competent in a specific field and less competent in another field. In the Social Cognitive theory, it is supposed that people have self-motivating, self-reflecting, creative and self-steering possibilities, which enable them to have some control over their thoughts, feelings and actions. In this context, people's self-efficacy beliefs influence the choices they make, their aspirations, the amount of exertion they put in to reach certain goals, how long they can persevere in case of setbacks, their thinking patterns, the experienced amount of stress and their susceptibility to depression (42, 43). Many international studies investigating self-efficacy in patients with diabetes mellitus, show that self-efficacy positively influences the health behaviours and the outcomes of these behaviours in patients with diabetes (44–47).

In terms of an educator's role, four characteristics can be derived from the Social Cognitive Theory (43). These four categories can illuminate the behaviors seen within the group education session. The first characteristic is the role of the facilitator who creates an environment for a successful experience. The second is role modeling through various experiences whereby the educator observes others' performance. An example of role modeling would be the facilitator asking an individual to demonstrate a healthy meal using food models. The educator would then observe this act. The third is verbal persuasion, where the facilitator skillfully summarizes the information, acknowledges the situation and participants' beliefs, indicating that the problem can be managed. The facilitator actively encourages people to be verbally explicit when elaborating on their management and future choices. The final aspect involves physical and affective state of identification of physical and emotional sources of symptoms. The facilitator acknowledges and/or responds to emotional utterances by the participants (43). The process of learning from other people's behavior, is the central idea of social cognitive theory that can be applied to facilitation of group DSME (34).

Productive diabetes education strategies utilize all theories in adult learning and behavioural change and allows for engagement in discussions that could promote learning through other's experiences. Without a meaningful learning experience, patients may dismiss presented information. Effective learning activities for adults should involve participants in the learning process, motivate, promote self-determination, meet the learning needs, allow the sharing of personal knowledge and experiences, promote competence, reinforce positive behaviors and help adults identify consequences of behaviors (8). Overall, these theories support the belief that adults learn best in social circumstances rather than classroom settings (43).

2.4 DELIVERING DIABETES EDUCATION

There are many educational approaches that are utilized by diabetes educators to help patients acquire knowledge, skills and commitment to self-care behaviors necessary for effective diabetes care, such as individual one-to-one education or group education (14). Evidence indicates that group diabetes interventions can be more cost-effective, patient-centered and provide interactive learning with a compatible level of patient satisfaction compared to individual interventions (48). The existing best practice approach in a group education setting indicates that the best outcomes are produced with an empowerment approach, which focuses on when and what patients want to learn (48). Problem-based, culturally-tailored approaches that include psychosocial, behavioral and clinical issues relevant to the patients ' needs and readiness to learn have resulted in improved outcomes (48). Research shows that effective diabetes group education approaches use facilitation instead of traditional didactic teaching to produce effective learning (23, 24, 48). The health care professional is responsible for managing the group dynamics and the scope of the group's conversation. Participants are responsible for addressing issues of relevance to their diabetes management and developing strategies to care for themselves better. Although research has identified group education and facilitation as two key ingredients in successful adult learning, the educational delivery method used in group DSME differ among diabetes educators and diabetes education centres (49). Therefore, further research is needed to determine which educational delivery method utilized by diabetes educators contributes to effective teaching that produces the best clinical outcomes in adults with type 2 diabetes mellitus.

Currently, many different DSME curricula and tools exist, mostly developed by different diabetes education centres. Some tools act as a complementary tool to the existing DSME curriculum or can be used as a stand-alone approach (22). However, most of the curricula have not been validated with sound research and studies (22). In a study by Kulzer *et al*. (22), the efficacy of three diabetes educational methods and their effect on clinical indicators were tested. The three educational approaches were:

1. A didactic method involving four sessions of 90 minutes in a group setting with a focus on knowledge acquisition, skill and information;
2. A group education with a non-didactic focus on self-management and empowerment that addressed the emotional side, the cognitive side and motivational interviewing to promote learning within 90 minutes over 12 sessions; and
3. The same empowerment focus as the second method but conducted as individual interventions for half of the 12 sessions and as a group for the other half.

The study included 181 patients with type 2 diabetes mellitus, non-insulin treated, body mass index (BMI) above 26.7 kg/m ^{2}, no acute psychiatric illness and the ability to read and speak German. The results indicated no change in Hb A1c for the didactic group. There was a significant improvement in Hb A1c in the second group at three months and 15 months after baseline. The third intervention group resulted in an initial improvement in Hb A1c at three months, but was not sustained for the duration of the study, indicating that individual intervention to deliver empowerment had no superior effect compared to group intervention. The results of this study build on the patient-centered educational assumptions that effectively facilitated group diabetes education produces superior clinical and behavioral outcomes than individual interventions. Also,

patient-centered approaches and an empowerment focus in education produced better outcomes than a didactic curriculum.

2.5 GROUP EDUCATION TEACHING METHODS

A number of studies have examined the effectiveness of group diabetes education programs, usually comparing them to usual care rather than comparing them to different group education materials and methods (50, 51). However, group education approaches can vary. The majority of studies that reported successful outcomes in group DSME programs have not included a detailed description of the theoretical approach or of the intervention itself, including the specific strategies utilized (52). As a result, the literature on group DSME lacks coherence. One example of a group DSME program that is described in the literature is the Lifelong Diabetes Management program (53). The goal of the program was to help patients sustain and improve diabetes self management gains they have achieved through previous short-term DSME programs. Therefore, patients were required to have received a basic level of diabetes education either from a patient education course or from individual education within the past 3 years. Sessions were structured with the five components, including reflecting on relevant experiences, discussing the role of emotion, engaging in systematic problem solving, answering clinical questions, and providing feedback. Patients raised issues and challenges they faced, and the group leader facilitated a process of problem solving with other group members (53). A randomized controlled trial conducted in Sweden by Sarkadi and Rosenqvist (2004), evaluated a group educational program led by specially trained pharmacists, assisted by a diabetes nurse specialist on the first two occasions (54). The research study measured Hb A1c at zero, six, 12, and 24 months and a questionnaire was

administered at baseline and final follow-up The educational materials that were used in this form of group education included a video on how to “live well” with diabetes, exemplifying lifestyle changes made by those interviewed; a dice game where questions had to be answered by negotiating answers with other players; and a booklet or guide on “how to manage your diabetes” (54). The booklet also contained logs of imaginary people who had some typical faults in their diet or treatment and were used to stimulate discussion of more appropriate routines. The book further included information about diabetes and a personal plan for follow-up visits (54). Their findings indicated that participating in the intervention programme significantly decreased HbA1c by 0.4% at 24 months after baseline. Initial HbA1c, satisfaction with own diabetes-related knowledge, and treatment were found directly related to glycemic outcomes. The intervention group exercised more in order to lower blood-glucose levels and was also more able to predict current blood-glucose levels before measuring it. Experience-based group education was effective in decreasing participants' HbA1c one year after completing intervention (54). There is a need for further research comparing different forms of DSME programs to establish evidence indicating which theoretical approaches and strategies used in group education are most effective in the short and long terms (48).

2.6 DIABETES CONVERSATION MAPS

An example of a curriculum that is based on a collection of the evidence - based approaches but not validated as an independent strategy is the Diabetes Conversation Map ™ program. In an effort to increase the availability of DSME to adults with T2DM, Healthy Interactions Inc. collaborated with the Canadian Diabetes Association (CDA) to develop the Canadian Diabetes Conversation Map ® tools and on a global market with

the International Diabetes Federation (IDF) to develop the Diabetes Conversations program.

Conversation maps (Appendix M) are visual tools with content based on current clinical practice guidelines that represent the best intervention approaches and national standards for DSME (55). The tools are designed to be utilized in small (n= 3-10), interactive group sessions, where participants learn key topics in diabetes (55, 56). The conversation maps utilize important components to create meaningful discussions about diabetes between participants, that are patient-focused and help formulate behavior change goals and intend to improve behavioral, clinical and metabolic markers (55, 56). These components are outlined in Table 1.

Table 1. Components of a Conversation Map

Session Component	Description
The Diabetes Conversation Map	A 3ft x 5ft colorful, table-top visual tool which serves as a focal point during the education session. Map topics include facts about diabetes, self-monitoring of blood glucose, diabetes complications, healthy eating, physical activity, and goal-setting.
Question and Discussion Cards	Read by the facilitator to prompt participants' discussion and interaction throughout the session. Examples of these cards include: i) Definitions cards - key topics in diabetes which are read out loud; as a group and with the assistance of the facilitator, participants decide what each definition means in layman's terms. ii) "Myth" vs. "Fact" cards are used to prompt group discussion and explore prior knowledge and attitudes about diabetes.
The Facilitator	A trained educator who guides the group discussion to engage participants and promote interactive learning
The Participants	Small groups of individuals (n= 3-10) who are interested in learning about diabetes
Other Resources	Hard copy of the training manual and mini Conversation Map education tool

There have been many research studies conducted comparing different delivery methods of DSME. A systematic review by Norris (2002) evaluated 72 studies and found short-term (less than six months) positive effects of self-management on knowledge, frequency and accuracy of self-monitoring blood glucose, self-reported dietary habits, and glycemic control (19). A meta-analysis conducted more recently by Deakin et al. (2005) assessed the short-term and long-term effects of group-based (six or more people) compared to routine care on a one-to-one basis (49).The research found that group-based diabetes education programs resulted in the greatest reduction in Hb A1c in four to six months after intervention (1.4%; 95% confidence interval, $p< 0.00001$) and in two years after intervention (1.0%; 95% confidence interval, $p< 0.00001$). The significance is attributable to longer term interventions with a shorter duration between the end of the

intervention and the follow-up evaluation point with a multidisciplinary team approach; however, further research in this area is needed to support these research findings.

Future research should focus on the comprehensive, ongoing and complex interventions education methods (54). To date, no research has been published comparing conversation maps to other forms of DSME delivery methods, nor evaluating the impact of conversation maps on patients' KAB. Thus, the present research study aims to examine the impact of Conversation Maps compared to traditional group education methods through assessing changes in patients' KAB.

CHAPTER 3

RESEARCH DESIGN AND METHODS

This research used a mixed methods approach (pre-test/post-test design and focus groups) to compare the impact of two different diabetes self-management education interventions, which were similar in content but used different methods of delivery, on patients' knowledge, attitude and behaviours related to diabetes. The study also assessed patients' perceptions of the education delivery methods through focus groups.

3.1 RESEARCH QUESTIONS

Under each of the research objectives enumerated in Chapter 1, the following questions are posed:

Objective 1. To determine self-management knowledge and attitudes of patients with diabetes before and after diabetes education intervention

1. Are there differences in patient knowledge and attitude related to diabetes after receiving DSME compared to pre-education test scores?

Objective 2. To evaluate the impact of conversation maps and traditional group education on patients' knowledge and attitudes related to diabetes

2. What impact do conversation maps have on changing knowledge and attitude scores at one month and three months after receiving education?
3. What impact does traditional delivery of education have on changing knowledge and attitude scores at one month and three months after receiving education?

Objective 3. To compare patients' knowledge and attitude toward diabetes after receiving education

4. Is the Conversation Map method of delivering DMSE more effective than traditional education methods at changing patients' knowledge and attitude scores at one month and three months after receiving education?

Objective 4. To compare changes in patients' Hb A1c

5. What impact does traditional delivery of education have on patients' Hb A1c three months post intervention?
6. What impact do conversation maps have on patients' Hb A1c three months post intervention?
7. Does the conversation map delivery method have a greater impact on Hb A1c compared to the traditional method of education

Objective 5. To determine behavior changes and compare patient perceptions of the conversation map compared to the traditional method

8. Using qualitative data collected through focus groups, do participants who attend conversation maps DSME report more behavioural changes and perceive their education experience differently than those who attended the traditional method of DSME?

3.2 RESEARCH DESIGN

3.2.1 Pre-recruitment of Patients

Clients in the Diabetes Care Guelph clinic were informed of this diabetes self-management education research study by posting signage at the site (Appendix A, Poster Advertisement). In addition, all clients enrolled at Diabetes Care Guelph were verbally informed of the research study when attending routine visits at the clinic. To advertise the study to individuals who were not currently enrolled in Diabetes Care Guelph, signage

was posted in Guelph family physicians' offices and clients were asked to contact the clinic for more information if they were interested in participating (Appendix A, Poster Advertisement). As part of routine care, before their initial appointment at Diabetes Care Guelph, clients were contacted by telephone after being referred to the clinic through either a self-referral or physician referral. When contacted, clients were asked their name, phone number and mailing address. Diabetes Care Guelph then sent them a letter to remind them of the date and location of their initial appointment as per regular clinic practice, and informed them about the diabetes education research project (Appendix B, Letter of Information). Patients were also asked to complete a 3- day food record, an intake assessment form, and to bring a medication log from their pharmacy to their first appointment as per clinic protocol, but these forms were not included as part of this study. A mailed package sent to patients included the Letter of Information (Appendix B, Letter of Information) to inform patients about the research as a pre-recruitment initiative.

3.2.2 Recruitment

At their initial appointment (visit 1), individuals were informed of the diabetes education program and the option to participate in this research study. This research compared two diabetes education delivery methods that are currently practiced at Diabetes Care Guelph, conversation maps and a traditional PowerPoint presentation. After listening to a short description of this research study, interested individuals were invited to complete a Screening Questionnaire (Appendix C, Screening Questionnaire) to confirm their eligibility to participate. For those individuals who did not wish to participate or did not meet the eligibility criteria, the current standard of care was provided. For those individuals who were interested in participating in this study, they

were asked to review the study's Letter of Information (Appendix B, Letter of Information) and provide written informed consent (Appendix D, Consent Form) to participate in the study.

3.2.3 Inclusion and Exclusion Criteria

Participants were included in the study if they were between the ages of 19 to 65 years of age, had received a diagnosis of type 2 diabetes mellitus by a licensed practicing physician within five years leading up to the research, had not received any form of diabetes education from a diabetes education centre prior to this study, and were able to read, write and speak English.

Participants were excluded if they were diagnosed with a mental or psychosocial health condition (i.e., schizophrenia, bi-polar disorder, clinical depression), were unable to provide written consent to participate in the study, and/or had less than an eighth grade education level.

After evaluating the conversation map education tool for reading level, it was determined that the conversation map had a sixth grade reading level in most areas; however, because of the medical terminology used in the maps, the reading level on resources such as the definition cards was calculated at a grade 10 reading level. To accurately assess the map, we excluded patients who did not have a full primary education.

3.2.4 Ethical Considerations of Research

The Western University Health Sciences Research and Ethics Board approved the protocol of this study (Appendix E: Ethics Approval Notice). The questionnaires did not

include any invasive or controversial content. To participate in this study, informed consent was required. Before participating in the study, patients were required to complete consent forms. These consent forms were collected by the research administrator and stored with the completed questionnaires in secure, locked premises at the researcher's (LB) place of work.

3.2.5 Scientific Validity of the Study Design

Construct validity refers to the degree to which an instrument measures the characteristic being investigated (57). To ensure construct validity in quantitative test measures, both the knowledge and attitude questionnaires were adapted from previously validated versions of the Diabetes Knowledge Test (DKT) and the Diabetes Attitude Scale (DAS 3) developed by the University of Michigan Diabetes Research and Training Centre (MDRTC) (58, 59). The adaptations were minor and included converting units of measurements to a metric system. Pilot testing of the adapted versions of both the DKT and the DAS 3 was conducted among 10 DCG patients meeting the inclusion criteria for the study to determine the average time needed to complete the questionnaires and to ensure the questionnaires were easily understood.

Response set bias is a potential source of internal invalidity in studies that rely solely on self-report pre/post-tests to determine the effectiveness of an intervention or training (60). By pilot testing the knowledge and attitude questionnaires, questions were identified as being clear, precise and relatively short to support participants in interpreting the questions in the same way. In the questionnaires, there was no use of leading or loaded questions that could have invoked a negative response from participants regardless of content. Furthermore, the questionnaires did not include double-barreled questions or

used double negatives. In the attitude questionnaire, the Likert scale used reverse wording in some questions, thus, limiting the tendency for a participant to answer a series of questions in a certain direction regardless of content. By including a qualitative focus group design, this study evaluated perceptions and behavior changes through a series of open-ended questions that further supported some quantitative outcomes.

Participants were selected using convenience sampling due to interest in a specific population and geographic constraints. Selection bias was diminished through random assignment of participants from the convenience sample into intervention groups. Randomization was conducted by coding participants with a three digit code assigned using a random numbers table. Assignment to intervention groups was achieved by drawing these codes for participants from a hat. Concealment of this process was ensured through randomization done at Diabetes Care Guelph, a central location. All information from eligible patients was recorded in patient charts as per clinic practice. Patients enrolled in this study were given the option of withdrawing from the study at any point during the research.

3.2.6 Pre-intervention Procedures:

Once written informed consent was obtained, participants were randomly assigned to intervention group 1 or intervention group 2 using a coding system. Patients randomly assigned to intervention group 1 received education through conversation maps and those assigned to intervention group 2 received education through the traditional group education method. Patients were informed of the time and date of their education sessions at the end of Visit 1.

3.2.7 Intervention Procedures:

All patients participating in the study returned to the clinic approximately 2 weeks after Visit 1 to participate in the first 2-hour education session (Visit 2). The size of each intervention group ranged from four to seven participants. When patients arrived at the clinic, they were asked to answer a baseline demographic questionnaire (Appendix F, Demographic Information Questionnaire) which took them approximately 5 minutes to complete. Study participants were then asked to answer two pre-test questionnaires:

1. A 20-item knowledge questionnaire adapted from the University of Michigan Diabetes Research and Training Center (Appendix G, Coded Knowledge Questionnaire);
2. A 33-item attitude questionnaire using a five-point Likert scale adapted from a diabetes attitude questionnaire from the University of Michigan Diabetes Research and Training Center (Appendix H, Attitude Questionnaire)

Both questionnaires were previously piloted in the clinic's population. The questionnaires took approximately 20-25 minutes to complete. After completing the questionnaires, participants received the first of two DSME classes. Group 1 received education through the conversation map, while group 2 went through a traditional education method. Both education methods contained the same educational topics in diabetes management. These educational topics are presented in Table 2. Both education methods were approximately two hours in duration per session and participants attended two sessions. The group sizes of four to seven participants per session were consistent between the two groups. Both education interventions were conducted in the same education room, at a similar time of day, on a similar day of the week (mid- afternoon on Wednesdays). The time and day used in the study was determined by usual practice at the

diabetes clinic. The difference between the groups was the education delivery method. The conversation map method involved facilitated learning using the conversation map as a visual tool to help guide the learning process. This method of learning relied largely on group interaction and discussion. The traditional education method was a lecture style PowerPoint presentation with a question and answer component that was more didactic in nature compared to the conversation map. A conceptual framework to outline the intervention procedures is presented in Appendix I.

Table 2. Diabetes Self-Management Education Topics

Diagnostic criteria of diabetes
Definitions of types of diabetes
Basic physiology of type 2 diabetes
Goals for control (blood glucose, blood pressure, and cholesterol target ranges)
Emotions and stress management
Nutrition management
Activity/ exercise
Pharmacological therapies
Self-Monitoring blood glucose
Hemoglobin A1c – definition, target range, monitoring
Signs, symptoms, and treatment of hypoglycemia
Hyperglycemia and sick day management
Short term and long term complications of diabetes
Goal setting

Approximately 2 weeks after the first education session, participants returned to Diabetes Care Guelph to receive the final 2 hour education session (Visit 3). Participants were asked to answer the questionnaires again after the final education class was completed (Post-test 1). Approximately 3 months after the education sessions were completed, participants attended a routine follow-up appointment at the clinic (Visit 4), where they were asked to complete the questionnaires for a third time (Post-test 2).

3.2.8 Data Collection of Hemoglobin A1c

Hb A1c lab values were obtained from each participants' electronic patient record at baseline (Visit 1) and 3 months after receiving diabetes education (Visit 4). The current standard of practice at Diabetes Care Guelph includes obtaining Hb A1c laboratory values every 3 months, therefore Visit 1 and Visit 4 lab measures were approximately 3 months apart.

3.2.9 Data Analysis of Knowledge and Attitude Scores

The knowledge questionnaire was a multiple choice design where participants were given the score of one for each correct answer. Incorrect answers received a score of zero. The scores for each answer were then totaled to a final score out of 20 for each participant (Appendix G, Coded Knowledge Questionnaire).

The attitude questionnaire was a Likert scale design. A score of one to five was given for each question depending on the response provided (Appendix J, Diabetes Attitude Questionnaire Formulae). A total attitude score was calculated to give a score out of 165 for each participant. These scores were then broken down into five attitude subscales and mean subscale scores out of five were calculated.

Data obtained from the questionnaires were analyzed using SAS version 9.2 (SAS Institute Inc, Cary, North Carolina) computer software, and included descriptive statistics. Analysis of covariance was used to ascertain whether demographic information such as age, gender, marital status, education, or duration of diabetes influenced responses. Unpaired t–tests were used to compare pre-test and post-test 1 scores as well as pre-test and post-test 2 scores within group 1 and group 2. Overall mean differences between pre-test and post-test 1 scores as well as pre-test and post-test 2 scores were analyzed using

unpaired t-tests between groups. Significance was tested at a 95 per cent confidence interval.

3.2.10 Focus Groups

In addition to the quantitative measures analyzed in this study, two focus groups were conducted to compare patients' perceptions of the education delivery methods used in the study (Visit 5). Four participants per intervention were selected at random and asked to participate in the focus groups. A semi-structured interview guide (Appendix K, Focus Group Interview Guide) was used to facilitate exploring patients' perceptions of the intervention and its effects on knowledge, attitude, and behaviour. These focus groups were considered homogenous with regard to the research topic because all participants received information on the same education topics, but using two different methods of delivering this information.

Those participants included in the focus groups reviewed the Focus Group Letter of Information (Appendix L, Focus Group Letter of Information) and signed written informed consent (Appendix M, Focus Group Consent Form) to participate.

3.2.11 Analysis of Focus Groups

The contents of the discussions were examined and meanings and relevant implications for the research questions were explored. All focus group interviews were recorded (with informed consent) and transcribed verbatim. Following transcription of the two focus groups, QSR International's NVivo 9 (Melbourne, Australia) 2012 data analysis software was used to assist in coding and the development of a common theme

template. In addition, all coding and analysis was triangulated with another member of the research team.

Qualitative elements such as concurrent data collection and analysis, data saturation, and a constant comparative method were used to guide the research analysis (61). The goal was not theory development, but rather the collection of information that could assist in evaluating different diabetes education delivery methods.

Focus group data was analyzed for emerging themes and recurrence of responses. To compare responses among participants who received diabetes education through conversation maps to those who received diabetes education with the traditional PowerPoint presentation method, NVivo 9 was used to construct a table outlining all responses for each question and topic area. Similar responses were grouped under a theme heading. After several reviews, the data was further refined and categorized.

3.2.12 Memo Writing

Memo writing is an important piece of qualitative analysis. It enables the researcher to think conceptually, logically, and efficiently (62). During this research, memo writing occurred immediately after each focus group meeting by one of the research collaborators (SM) who facilitated the focus groups. Field notes were handwritten and observation notes for participants were summarized in table format.

3.2.13 Reflexivity

Throughout the focus group portion of this research, the researcher (LB) consciously reflected on her own thoughts, approaches, assumptions, and predispositions

(61). This process allowed the examination of how the researcher's own experience, values, and background could potentially affect the research process and conclusions.

CHAPTER 4

RESULTS

In this chapter, the results comparing the effectiveness of two DSME methods (conversation maps or traditional methods of group education) by examining changes in patients' KAB after receiving DSME, using a repeated measures pre-test/post-test design, are presented. Through focus groups, a comparison of patients' perceptions of the two different DMSE methods used in this study is described.

4.1 CHARACTERISTICS OF PARTICIPANTS

One hundred patients with type 2 diabetes mellitus were screened to participate in the study. Of all patients screened, 65 patients did not meet the inclusion criteria for participation. The main reasons for exclusion were having type 2 diabetes for more than five years, receiving diabetes education from a different diabetes education centre previous to the initial appointment at Diabetes Care Guelph, and being >65 years of age. Of the individuals screened, 35 patients consented to participate in the study; however, fourteen (40%) of those who consented withdrew from the study. The reason for study withdrawal was a reported lack of time to commit to completing the study. The 21 participants who remained were randomized to one of two groups. Ten participants were randomized to conversation maps (group 1), five males and five females. The age range was from 20 to 65 years (mean age = 46.8, SD± 11.9). In group 1, five participants reported being married, two separated, one common law, and two single. All participants had at least an eighth grade education, with three participants holding high school diplomas, four holding trade/college diplomas, and three holding university undergraduate degrees. Of the ten participants in group 1, six had been diagnosed with

type 2 diabetes in the previous six months and four participants had diabetes for greater than 6 months.

Eleven participants were randomized to traditional education method (group 2), six males and five females. The ages of the participants ranged from 47 to 64 years (mean age = 56.2, SD± 6.0), seven participants reported being married, two divorced, and two single. All participants had at least an eighth grade education, with five participants holding high school diplomas, four holding trade/college diplomas, and two holding university graduate degrees. Of the 11 participants, seven had been diagnosed with type 2 diabetes in the previous six months and four participants had diabetes for greater than six months. The demographic information for participants is summarized in Table3.

Table 3. Characteristics of Participants

	Conversation map intervention group	Traditional education intervention group
Number of participants(n)	10	11
Age (years)		
Mean ± SD	46.8 ± 11.86	56.18 ± 6.05
(Range)	(20 to 65)	(47 to 64)
Language (%)		
English	100	100
Gender (%)		
Male	50	60
Female	50	40
Marital Status (%)		
Married	50	64
Separated	20	0
Divorced	0	18
Common Law	10	0
Single	20	18
Education Level (%)		
High school	30	46
Trade school/college diploma	40	36
University undergraduate degree	30	0
University graduate degree	0	18
Duration of diabetes (%)		
• 6 months	60	64
> 6 months	40	36

Note: SD = standard deviation, % = percent. Data are means ± SD or % as indicated. Percentages are rounded to add up to 100%.

4.2 HEMOGLOBIN A1C RESULTS

Baseline Hb A1c levels were retrieved from participants' electronic medical records at baseline and 3 months after the education intervention to compare improvements in blood glucose control. Both groups had significant decreases in Hb A1c concentrations. In group 1 (n=10), Hb A1c levels were significantly decreased following the intervention with a mean decrease in Hb A1c of 1.2% ($p < 0.05$) while group 2 participants (n=11) had a mean decrease in Hb A1c of 0.76% ($p < 0.05$); however, the change in Hb A1c was not significant between groups at three months. The Hb A1c information for all participants is presented in Table 4.

Table 4. Mean Hemoglobin A1c Concentrations before and after DSME

	Conversation Map Group	**Traditional Education Group**	**Unpaired t-test between groups**
Number of participants (n)	10	11	
Baseline			
Hb A1c (%) †	8.74 ± 2.83	8.54 ± 2.24	ns
(Range)	(6.50 to 14.00)	(6.30 to 13.80)	
3 months post intervention			
Hb A1c (%) †	7.45 ± 1.40	7.78 ± 1.32	ns
(Range)	(6.20 to 10.90)	(6.30 to 11.00)	

*ns = no statistically significant difference 95% CI ($p>0.05$)
† Data presented as mean ± SD

4.3 KNOWLEDGE SCORES

Before the education intervention, a pre-test knowledge questionnaire was distributed to participants to collect baseline knowledge scores using a standardized, self-administered knowledge questionnaire adapted from the University of Michigan Diabetes Research and Training Center (58, 59).

In group 1, the mean pre-test knowledge score was 15.2 ± 3.43. In group 2, the mean pre-test knowledge score was 14.73 ± 2.41. Following the education interventions, there was a significant increase in overall knowledge scores in Group 1 with a mean score of 18.10 ± 1.60 (p=0.0023). In Group 2, there was a marginal increase in knowledge scores with mean score of 16.18 ± 1.40 (p=0.06). There was no significant difference in the change of diabetes knowledge scores between groups (difference 1.45; 95% CI 0.63 to 3.52; p= 0.161).

To evaluate knowledge retention three months after receiving the education intervention, a second diabetes knowledge questionnaire was completed and knowledge scores obtained from each group. There was a significant retention of diabetes knowledge in group 1, with a mean score of 17.9 ± 1.79 (p= 0.008) three months after the conversation map education intervention. In group 2, the mean knowledge score after receiving the traditional method of education using a power point presentation was 15.82 ± 1.60 (p=0.17). There is no significant difference in the change of diabetes knowledge scores between groups 3 months after education was received (difference 1.6; 95% CI 0.62 to 3.84; p= 0.15).

When adjusting for age using analysis of covariance, participants in the study aged less than or equal to 60 years scored significantly higher in attitude score in the need for special training (p=0.015), seriousness of type 2 diabetes mellitus (p=0.021), and

psychosocial impact of the disease (p=0.033) three months after education than participants older than 60 years of age.

Descriptive statistics for participants' knowledge scores are presented in Tables 5 and 6.

Table 5. Changes in Knowledge Scores (Conversation Map)

	Knowledge Scores	**Unpaired t-test ***
Number of participants (n= 10)		
Conversation Map pre-test		
Mean ± SD (Range)	15.20 ± 3.43 (9.00 to 19.00)	
Conversation Map post-test 1		
Mean ± SD (Range)	18.10 ± 1.60 (15.00 to 20.00)	p= 0.0023 (pre-test vs post-test 1)
Conversation Map post-test 2		
Mean ± SD (Range)	17.9 ± 1.79 (10.00 to 20.00)	p= 0.008 (pre-test vs post-test 2)

* Statistical significance at 95% CI, p>0.05

Table 6. Changes in Knowledge Scores (Traditional Education)

	Knowledge Scores	**Unpaired t-test ***
Number of participants(n= 11)		
Traditional Education pre-test		
Mean ± SD	14.73 ± 2.41	
(Range)	(10.00 to 19.00)	
Traditional Education post-test 1		
Mean ± SD	16.18 ± 1.40	ns
(Range)	(13.00 to 18.00)	(pre-test vs post-test 1)
Traditional Education post-test 2		
Mean ± SD	15.82 ± 1.60	ns
(Range)	(13.00 to 18.00)	(pre-test vs post-test 2)

*ns = no statistically significant difference 95% CI ($p>0.05$)

4.4 ATTITUDE SCORES

Before the education intervention, a pre-test attitude questionnaire was distributed to participants to collect baseline attitude scores utilizing a standardized, adapted attitude Likert scale questionnaire that was self-administered (58, 59). To score the questionnaire, questions were divided into five categories which assessed the:

(i) participant's attitude regarding the need for health care professionals who care for patients with diabetes to have special training in teaching, counseling, and behaviour change techniques.

(ii) participant's attitude about the seriousness of type 2 diabetes.

(iii) participant's attitude as to whether the potential benefit of blood glucose control is justified in terms of the cost to the patients.

(iv) participant's attitude toward the psychosocial impact of diabetes on the lives of people with the disease.

(v) participant's attitudes as to whether patients should be the primary decision makers regarding the daily self-management of their diabetes.

In the group receiving the conversation map education, the mean pre-test score for attitude toward the need for specific training to aid diabetes management was 4.14 ± 3.43, whereas in group 2, the mean pre-test score was 4.29 ± 0.58. Following the education interventions, there was a significant increase in attitude toward the need for specific training to aid diabetes management in group 1 with a mean score of 4.51 ± 0.50 (p= 0.024). In Group 2, there was no significant change with a mean score of 4.34 ± 0.54 (p=0.61). However, there was no significant difference between groups (difference 0.32; 95% CI 0.047 to 0.67; p= 0.08). To evaluate changes in attitude toward the need for specific training to aid diabetes management three months after receiving the education

intervention, a second diabetes attitude post-test was conducted and attitude scores were obtained from participants in each group. The change in attitude toward the need for specific training of diabetes in the conversation map group remained significantly improved, with a mean score of 4.74 ± 0.35 (p= 0.001) three months after the receiving education. In the traditional education group, the mean score was 4.40 ± 0.54 (p=0.43). There was a significant difference between groups (difference 0.49; 95% CI 0.14 to 0.84; p=0.0082).

In the conversation map group, the mean pre-test score for attitude toward the seriousness of diabetes was 3.84 ± 0.53. The mean pre-test score in the traditional education group was 3.92 ± 0.71. Following the education interventions, there was a significant increase in group 1 with a mean score of 4.51 ± 0.44 (p< 0.05). In group 2, there was no significant change with a mean score of 4.14 and a SD of 0.53 (p=0.20). There was a significant difference between groups (difference 0.45; 95% CI 0.022 to 0.88; p= 0.04). Three months after receiving the education intervention, attitude toward the seriousness of diabetes were evaluated in the second post-test. The change in attitude toward the seriousness of diabetes in the conversation map group improved, with a mean score of 4.61 ± 0.48 (p=0.0002). In the traditional education group, the mean attitude score toward the seriousness diabetes was 4.14 ± 0.54 (p=0.20). There was a significant difference between groups (difference 0.55; 95% CI 0.11 to 0.98; p=0.015).

In the conversation map group, the mean pre-test score for attitude toward the value of blood glucose control was 3.97 out of 5.00 ± 0.59. The mean pre-test score in the traditional education group was 4.10 out of 5.00 ± 0.56. Following the education interventions, there was a significant increase in group 1 with a mean score of 4.46 ± 0.41 (p=0.002). In group 2, there was no significant change with a mean score of 4.17 ± 0.58

(p=0.68). There was no significant change between groups (difference 0.41; 95% CI 0.004 to 0.82; p= 0.25). Three months after receiving the education intervention, attitude toward the value of blood glucose control were evaluated in the second post-test. The change in attitude toward the value of blood glucose control in the conversation map group improved, with a mean score of 4.53 ± 0.44 (p=0.0015). In the traditional education group, the mean attitude score was 4.20 ± 0.54 (p=0.57). There was a significant difference between groups (difference 0.45; 95% CI 0.029 to 0.87; p=0.038).

In the conversation map group, the mean pre-test score for the psychosocial impact of diabetes was 3.45 out of 5.00 ± 0.62. The mean pre-test score in the traditional education group was 3.97 out of 5.00 ± 0.61. Following the education interventions, there was a significant increase in the scores in group 1 with a mean score of 4.06 and ± 0.66 (p=0.012). In group 2, there was no significant change with a mean score of 4.06 ± 0.64 (p=0.64). There was a significant change in the between group scores (difference 0.52; 95% CI 0.049 to 0.98; p= 0.032). Three months after receiving the education intervention, attitude toward the psychosocial impact of diabetes were evaluated. The change in attitude in the conversation map group improved, with a mean score of 4.33 ± 0.71 (p=0.0046). In the traditional education group, the mean score was 4.12 ± 0.66 (p=0.22). There was a significant difference in the between group scores (difference 0.73; 95% CI 0.18 to 1.27; p=0.012).

In group 1, the mean pre-test score for patient autonomy was 3.59 ± 0.78. The mean pre-test score in the traditional education group was 3.97 ± 0.64. The education intervention had a significant impact on patient autonomy scores in group 1 with a mean score of 4.15 ± 0.53 (p= 0.030). In group 2, there was no significant change with a mean score of 3.80 ± 0.66 (p=0.29). There was no significant change in the between group

scores (difference 0.42; 95% CI 0.10 to 0.48; p=0.11). Three months after receiving the education intervention, the change in attitude toward patient autonomy in the conversation map group improved, with a mean score of 4.20 ± 0.49 (p=0.012). In the traditional education group, the mean score was 3.82 ± 0.70 (p=0.34). There was no significant difference in the between group scores (difference 0.05; 95% CI 0.03 to 0.05; p=0.59).

A summary of the participants' attitude scores are presented in Tables 7 and 8. The differences in knowledge and attitude scores compared between groups directly after education (pre-test vs. post-test 1) are presented in Tables 9. The differences in knowledge and attitude scores compared between groups three month post after education was received (pre-test vs. post-test 2) are presented in Table 10.

Table 7. Changes in Attitude (Conversation Map)

	Pre-test	Post-test 1	Unpaired t-test (pre-test vs post-test 1) *	Post-test 2	Unpaired t-test (pre-test vs post-test 2)*
Number of participants (n=10)					
Attitude Score Overall					
Mean ± SD	123.80 ± 15.88	143.30 ± 13.38	p= 0.0003	146.60 ± 13.18	p= 0.0001
(Range)	(97.00 to 150.00)	(124.00 to 159.00)		(127.00 to 160.00)	
Attitude- Need for special training					
Mean ± SD	4.14 ± 0.422	4.51 ± 0.50	p= 0.024	4.74 ± 0.35	p= 0.0001
(Range)	(3.40 to 4.80)	(3.50 to 5.00)		(4.00 to 5.00)	
Attitude- Seriousness of type 2 diabetes					
Mean ± SD	3.84 ± 0.53	4.51 ± 0.44	p=0.0004	4.61 ± 0.48	p= 0.0002
(Range)	(2.86 to 4.71)	(3.71 to 5.00)		(3.71 to 5.00)	
Attitude- Value of blood glucose control					
Mean ± SD	3.97 ± 0.59	4.46 ± 0.41	p= 0.002	4.53 ± 0.44	p= 0.0015
(Range)	(3.14 to 4.86)	(3.86 to 5.00)		(3.86 to 5.00)	
Attitude- Psychosocial impact of diabetes					
Mean ± SD	3.45 ± 0.62	4.06 ± 0.66	p= 0.012	4.33 ± 0.71	p=0.0046
(Range)	(2.67 to 4.80)	(2.67 to 4.80)		(2.83 to 5.00)	
Attitude- Patient Autonomy					
Mean ± SD	3.59 ± 0.78	4.15 ± 0.53	p= 0.030	4.20 ± 0.49	p= 0.012
(Range)	(2.13 to 4.75)	(3.38 to 4.88)		(3.28 to 4.88)	

* Statistical significance at 95% CI ($p<0.05$)

Table 8. Changes in Attitude (Traditional Education)

	Pre-test	Post-test 1	Unpaired t-test (pre-test vs post-test 1)*	Post-test 2	Unpaired t-test (pre-test vs post-test 2)*
Number of participants: n	11	11		11	
Attitude Score Overall					
Mean ± SD (Range)	131.27 ± 13.86 (109.00 to 158.00)	134.63 ± 13.19 (109.00 to 153.00)	ns	135.55 ± 12.99 (109.00 to 154.00)	ns
Attitude- Need for special training					
Mean ± SD (Range)	4.29 ± 0.58 (3.20 to 5.00)	4.34 ± 0.54 (3.20 to 5.00)	ns	4.40 ± 0.54 (3.20 to 5.00)	ns
Attitude- Seriousness of type 2 diabetes					
Mean ± SD (Range)	3.92 ± 0.71 (2.28 to 4.71)	4.14 ± 0.53 (3.29 to 4.88)	ns	4.14 ± 0.54 (3.29 to 5.00)	ns
Attitude- Value of blood glucose control					
Mean ± SD (Range)	4.10 ± 0.56 (3.14 to 5.00)	4.17 ± 0.58 (3.42 to 5.00)	ns	4.20 ± 0.54 (3.43 to 5.00)	ns
Attitude- Psychosocial impact of diabetes					
Mean ± SD (Range)	3.97 ± 0.614 (2.83 to 4.83)	4.06 ± 0.64 (2.83 to 5.00)	ns	4.12 ± 0.66 (2.83 to 5.00)	ns
Attitude- Patient Autonomy					
Mean ± SD (Range)	3.65 ± 0.64 (2.63 to 4.75)	3.80 ± 0.66 (2.63 to 4.75)	ns	3.82 ± 0.70 (2.63 to 5.00)	ns

*ns = no statistically significant difference at 95% CI (p>0.05)

Table 9. Pre-test vs Post-test 1 Knowledge and Attitude Score Differences Between Groups

	Conversation Map Pre-test	Traditional Education Pre-test	Conversation Map Post-test 1	Traditional Education Post-test 1	*Unpaired t-test between group differences
Number of participants (n)	10	11	10	11	
Knowledge Score					
Mean ± SD	15.20 ± 3.43	14.73 ± 2.41	18.10 ± 1.60	16.18 ± 1.40	ns
(Range)	(9.00 to 19.00)	(10.00 to 19.00)	(15.00 to 20.00)	(13.00 to 18.00)	
Attitude Score Overall					
Mean ± SD	123.80 ± 15.88	131.27 ± 13.86	143.30 ± 13.38	134.63 ± 13.19	p=0.0011
(Range)	(97.00 to 150.00)	(109.00 to 158.00)	(124.00 to 159.00)	(109.00 to 153.00)	
Attitude- Need for special training					
Mean ± SD	4.14 ± 0.422	4.29 ± 0.58	4.51 ± 0.50	4.34 ± 0.54	ns
(Range)	(3.40 to 4.80)	(3.20 to 5.00)	(3.50 to 5.00)	(3.20 to 5.00)	
Attitude- Seriousness of type 2 diabetes					
Mean ± SD	3.84 ± 0.53	3.92 ± 0.71	4.51 ± 0.44	4.14 ± 0.53	p=0.040
(Range)	(2.86 to 4.71)	(2.28 to 4.71)	(3.71 to 5.00)	(3.29 to 4.88)	

*Note.** Statistically significant at 95% CI $p<0.05$

Table 9. Pre-test vs Post-test 1 Knowledge and Attitude Score Differences Between Groups (continued)

	Conversation Map Group Pre- test	Traditional Education Group Pre-test	Conversation Map Group Post- test 1	Traditional Education Group Post –test 1	*Unpaired t-test between groups
Number of participants: n	10	11	10	11	
Attitude- Value of blood glucose control					
Mean ± SD	3.97 ± 0.59	4.10 ± 0.56	4.46 ± 0.41	4.17 ± 0.58	ns
(Range)	(3.14 to 4.86)	(3.14 to 5.00)	(3.86 to 5.00)	(3.42 to 5.00)	
Attitude- Psychosocial impact of diabetes					
Mean ± SD	3.45 ± 0.62	3.97 ± 0.614	4.06 ± 0.66	4.06 ± 0.64	p= 0.032
(Range)	(2.67 to 4.80)	(2.83 to 4.83)	(2.67 to 4.80)	(2.83 to 5.00)	
Attitude- Patient Autonomy					
Mean ± SD	3.59 ± 0.78	3.65 ± 0.64	4.15 ± 0.53	3.80 ± 0.66	ns
(Range)	(2.13 to 4.75)	(2.63 to 4.75)	(3.38 to 4.88)	(2.63 to 4.75)	

Note. * Statistically significant at 95% CI $p<0.05$

Table 10. Pre-test vs Post-test 2 Knowledge and Attitude Score Differences Between Groups

	Conversation Map Pre-test	Traditional Education Pre-test	Conversation Map Post-test 2	Traditional Education Post-test 2	*Unpaired t-test between group differences
Number of participants (n)	10	11	10	11	
Knowledge Score					
Mean ± SD	15.20 ± 3.43	14.73 ± 2.41	17.9 ± 1.79	15.82 ± 1.60	ns
(Range)	(9.00 to 19.00)	(10.00 to 19.00)	(10.00 to 20.00)	(13.00 to 18.00)	
Attitude Score Overall					
Mean ± SD	123.80 ± 15.88	131.27 ± 13.86	146.60 ± 13.18	135.55 ± 12.99	p=0.0006
(Range)	(97.00 to 150.00)	(109.00 to 158.00)	(127.00 to 160.00)	(109.00 to 154.00)	
Attitude- Need for special training					
Mean ± SD	4.14 ± 0.422	4.29 ± 0.58	4.74 ± 0.35	4.40 ± 0.54	p=0.0082
(Range)	(3.40 to 4.80)	(3.20 to 5.00)	(4.00 to 5.00)	(3.20 to 5.00)	
Attitude- Seriousness of type 2 diabetes					
Mean ± SD	3.84 ± 0.53	3.92 ± 0.71	4.61 ± 0.48	4.14 ± 0.54	p=0.015
(Range)	(2.86 to 4.71)	(2.28 to 4.71)	(3.71 to 5.00)	(3.29 to 5.00)	

Note. * Statistically significant at 95% CI $p<0.05$

Table 10. Pre-test vs Post-test 2 Knowledge and Attitude Score Differences Between Groups (continued)

	Conversation Map Pre-test	Traditional Education Pre-test	Conversation Map post-test 2	Traditional Education post-test 2	*Unpaired t-test between group differences
Number of participants (n)	10	11	10	11	
Attitude- Value of blood glucose control					
Mean ± SD	3.97 ± 0.59	4.10 ± 0.56	4.53 ± 0.44	4.20 ± 0.54	p= 0.038
(Range)	(3.14 to 4.86)	(3.14 to 5.00)	(3.86 to 5.00)	(3.43 to 5.00)	
Attitude- Psychosocial impact of diabetes					
Mean ± SD	3.45 ± 0.62	3.97 ± 0.614	4.33 ± 0.71	4.12 ± 0.66	p=0.012
(Range)	(2.67 to 4.80)	(2.83 to 4.83)	(2.83 to 5.00)	(2.83 to 5.00)	
Attitude- Patient Autonomy					
Mean ± SD	3.59 ± 0.78	3.65 ± 0.64	4.20 ± 0.49	3.82 ± 0.70	ns
(Range)	(2.13 to 4.75)	(2.63 to 4.75)	(3.28 to 4.88)	(2.63 to 5.00)	

Note. * Statistically significant at 95% CI $p<0.05$

4.5 FOCUS GROUPS

The focus groups provided insight into the perceptions of patients receiving diabetes education using the conversation map approach versus the traditional PowerPoint presentation. Analysis of transcripts from the focus groups revealed major themes, some of which are common to both education groups and some are only found in either one of the groups. Common themes that emerged from both types of education methods included the benefits of early education uptake, the need for specialized education, and education encouraging multiple lifestyle management behaviour changes. Additional themes that emerged only from the conversation map group included experiential learning environment, self-directed approach to learning, feelings of social support, and visualization of specific diabetes management needs. An additional theme found only in the traditional education group was low group interaction. The themes are summarized in Table 11 and sample quotes from participants are included in the subsequent descriptions to support these themes.

Table 11. Major Themes from Focus Groups

Conversation Map	**Traditional Education**
Benefits of Early Education Uptake	Benefits of Early Education Uptake
The Need for Specialized Education	The Need for Specialized Education
Education Encouraging Multiple Lifestyle Management Behaviour Changes	Education Encouraging Multiple Lifestyle Management Behaviour Changes
Experiential Learning Environment	Low Group Interaction
Self-Directed Approach to Learning	
Feelings of Social Support	
Visualization of Specific Diabetes Management Needs	

4.5.1 Common Themes

Analysis of the transcripts of both the conversation map and the traditional education focus groups identified common themes which included: benefits of early education uptake, the need for specialized education, and education encouraging multiple lifestyle management behaviour changes. These themes are summarized in the following section. A code (in brackets) follows each quote. For the individual participants, the acronym for their group (i.e., TE for traditional education, CM for conversation maps), their sex (i.e., F for females, M for males) are coded, followed by the number of the participant.

Benefits of Early Education Uptake

All participants in both focus groups expressed the importance of receiving diabetes education early in their diagnosis in order to succeed in managing their diabetes as well as ongoing education after diagnosis to support their management skills. One participant who was diagnosed with type 2 diabetes only 3 months before enrolling in this study said:

> *I really think that if I'd been given this right at the start of my journey with diabetes, it would have been very beneficial… because I was piecing together the thing (diabetes knowledge) by myself… so I definitely think it's (diabetes education) a benefit from someone who have been just diagnosed. (TEM1)*

Another participant with a nursing background, who was diagnosed with diabetes a month before receiving education, expressed the following:

I think my education experience (conversation map) reinforced what I didn't know and reminded me of a few management strategies that I had forgotten about. In a couple years, it's probably a good idea to come back and revisit this again. (CMF1)

Need for Specialized Training

When told of the diagnosis of diabetes by a primary health care physician, many participants agreed that the doctors have a short window of time during the appointment to discuss details of diabetes management. Many participants spoke of the need for diabetes educators who are specialized in providing diabetes education. The following quote by a participant who attended the traditional education refers to her experience at her doctor's appointment when she was diagnosed with type 2 diabetes:

I went to my doctor, and she gave me a form to come to Diabetes Care Guelph. For me, that was the best thing because the doctors don't have time to discuss this (type 2 diabetes) with you. (TEF2)

Education Encouraging Multiple Lifestyle Management Behaviour Changes

Many participants from both focus groups expressed that receiving diabetes education, no matter what delivery method is utilized, encourages behavioural change. One participant reported the following:

So, you know, it helps you, I guess modify your behaviour, you know, throw away all those old habits that you had which were not so good…

At least for me… it helped me realize yeah I got to stop those particular things that were not so good. (TEM2)

The participants who attended the conversation map as well as participants who attended the traditional education seemed to have succeeded at setting and achieving lifestyle management goals in the areas of nutrition, medical management, blood glucose management, and physical activity. One participant spoke of setting a nutritional goal around eating smaller meals and said:

> *I eat smaller amounts of food a little more frequently and now test more often during the week. (CMF1)*

Another participant spoke of possible nutrition changes:

> *Nutritionally, I'm not afraid to have sugar now. One of the things you think with the diabetes, is that you can't have any sugar at all. Food is very important. It's realizing that you can have these foods, but smaller amounts. It's eating more regularly. The meat portion being the size of a deck of cards was the sort of the thing I think we took that home with us. (CMM2)*

A participant reported feeling more confidence in reading nutrition labels:

> *…carefully reading labels, I was more looking at ingredients and now I am looking at the nutritional information. (TEF2)*

When probing about goals for physical activity, participants felt comfortable setting physical activity goals after attending the conversation map and viewed physical activity as an important piece of type 2 diabetes management. One participant shared his own physical activity goal:

> M*y goal was to sometime this month get back into a routine of 3 times a week back at the gym … I've had a gym membership for years. We had children... … a 1 ½ yr old and a 4 yr old. So of course that puts it down the toilet, because you don't have any time; but I've pretty much realized, gotta do it, went home and had*

a conversation with my spouse and said you know this is important, I'm going to have to make a concerted effort to do this. Yeah, that certainly influenced me to try and get there every day. (CMM1)

When probed about frequency of testing blood glucose readings, one participant explained:

The class got me to start checking my blood and actually recording it. (TEM2)

4.5.2 Additional Conversation Map Themes

In addition to the common themes presented above, analysis of the transcripts of the conversation map focus groups revealed four other accompanying themes: experiential learning environment, self-directed approach to learning, feelings of social support, and visualization of specific diabetes management needs.

Experiential Learning Environment

The conversation map education method integrated participants' personal experiences and stories with diabetes into the educational process so that learning was based on the sharing of knowledge, attitude, and behaviours. One participant summed up the general consensus of the experience by stating:

I guess the only thing I want to stress again that it was held together with a group of people that all had a common issue and that would be vocal and participate together to get answers and share answers for questions they had. (CMM1).

This method of education was favoured by those who attended and expressed feelings of acknowledgement with expertise developed after living with diabetes. A participant spoke of his feelings of acknowledgement when he said:

If people had questions, it would be opened up to the group to discuss. I could jump and share my own experience, which was nice... The interaction part of it is far superior to a lecture. (CMM2)

Besides formal learning, participants reported an even greater amount of learning that can result from discussing everyday experiences. One participant who was experiencing symptoms of hypoglycemia expressed the following:

I found out I'm not the only one that has that problem. It doesn't make sense to me, but I learned from others' experiences with it. (CMF1)

Self-Directed Approach to Learning

Although the same materials were covered in both education groups, many participants reported taking away different pieces of information from the conversation map based on their learning goals going into the education session. One participant spoke of his experience in the class:

We actually went around the table addressing each person's particular issue... Everyone had a very equal opportunity to get at the bottom of whatever it was they wanted to know. (CMM1)

When asked specifically about the conversation map approach to providing education, one participant spoke about self-directed learning, which he defined as having some control over the topics discussed through facilitation rather than a teaching/learning approach. He said:

I think the PowerPoint presentation is a great way to get things across, but if there is not engagement of the people in the room, then really they just take in what's on

the presentation and go home with it and I think they're probably missing out on some good information they could have gotten. (CMM2)

Another participant spoke of how the conversation was directed to an area that interested her during the education session, which was on medication-dosing specific to her shift work schedule. She said:

> *We addressed my problem of shift work and trying to keep things on a routine. I've had to space my medication a bit differently that ball park hours. My knowledge for medications did increase. (CMF1)*

Feelings of Social Support

Most participants felt that the conversation map created an environment that was conducive to social learning. Some participants felt that individuals with type 2 diabetes were socially supported. This feeling of social support acknowledged the patients' understanding of the psycho-social impact of diabetes. One participant described his experience having diabetes, and feeling a type of bond with the other individuals in the conversation map group setting:

> *It's good [to know] you are not alone. (CMM2)*

When asked about how hearing other's experiences changed their attitude toward diabetes, another participant said:

> *It confirms the things I've observed anyway which is you can live a very normal life. You can live well. (CMM1)*

Hearing other's experiences with diabetes seemed to change participants' feelings of isolation to feelings of social acceptance. This appeared to encourage people to interact more with one another, as one participant said:

Well, it definitely was safe (the environment) and it was nice to talk about a problem we all have in common… it's just not something you do. (CMF1)

Visualization of Specific Diabetes Management Needs

Most participants who attended the conversation map education reported that the map helped them visualize strategies that they were not using in their own diabetes management. One participant thought:

I think the map reinforced what I didn't know (CMF2)

Another participant said:

… the picture that sticks to my head is the picture of the plate, which is you know half the plate of vegetable and a quarter of starchy food… just a quarter and that was a big thing for me to visualize. When I saw that I thought yeah I'm not doing that. (CMM2)

Participants reported that the map prompted them to formulate questions. One participant was quoted discussing how the map helped her ask questions about diabetes management:

The conversation map opens it up and gives you clues and reminders if you will about what questions you may have and as things are discussed with this, it comes up that there are more points covered and it's not like 'oh I meant to ask about that'. (CMF1)

Participants felt that the conversation map tied all management strategies together, presented them in a way that was not overwhelming, and made easier to identify their own areas of concern. One participant stated:

> *The visualization of a lot of the topics really helped for me. Right away my eyes were drawn to things I didn't quite understand- A1c, which I should have understood. I have known the term but I didn't recall what it meant. I think it was easier for me to identify things that I wasn't that familiar with and to make sure to pursue that when we started to get answers. (CMM1)*

Another participant said:

> *It was kind of interesting to see everything in front of you. It's kind of childish with the pictures, but it works. In my opinion this worked because you don't want to overwhelm people that are coming in to learn about this, that you have to look after it, or you are going to lose your toes, or kidney function. This didn't overwhelm anyone. (CMF1)*

In summary, the participants had strong positive comments about the use of conversation maps in patient education.

4.5.3 Additional Traditional Education Theme

The traditional education focus group found only one additional theme during their session. This additional theme was defined as low group interaction.

Low Group Interaction

All individuals who participated in the traditional education focus group commented about low group interaction and lack of participation. When asked about group participation, a participant shared:

> *We didn't really have very much interaction, it was more of questions if you had any. (TEM1)*

Another participant reported a low interaction level as well, but felt that she had an opportunity to ask her questions:

> *I thought there wasn't much interaction... I don't generally talk a lot in a group; but the subject matter was too important not to ask questions so I felt a comfort in doing that. (TEF2)*

One participant felt uncomfortable asking questions during the slideshow presentation. When probed as to why he felt this way, he stated:

> *To open up, you need to feel like they (the other participants and the facilitators) are on your side. I didn't know the group or feel comfortable. (TEM2)*

When probed further and asked what would have made him feel more at ease participating in the group, he responded:

> *I would want the lifelines in front of me and explained rather than put on slides. (TEM2)*

Another participant from the same focus group shared his insight as to why there may have been low participation:

> *I think when you get to our age, it's not telling us these vegetables are good for us. I know what is good and I know what is not good. I want to create conversation and discuss my struggles with others and know that I'm not alone. The information you were trying to give is valued but the lesson plan needs to be revised. The powerpoint presentation from the television, was more guided toward high school or grade school. (TEM1)*

One participant reported the slides were distracting her from participating:

> *I was more focused on what the presentation was going to be, than on how it applied to me. It (the presentation) was more of absorbing or learning. When I'm*

getting the information and trying to process it, it was time for the next slide. I didn't even think about asking questions until after the slideshow was over, and by then I couldn't think of any questions. (TEF1)

In summary, patients learned some self-management information on their own from the PowerPoint presentation; however, there was an overall feeling that the group could have learned more from each other had they been given the opportunity to discuss coping and self-management strategies openly in a group setting.

CHAPTER 5

DISCUSSION

Determining if conversation maps are more effective than a traditional group education method in improving knowledge, attitudes, and behaviours associated with diabetes self-management is essential in order to evolve diabetes education techniques, and contribute to evidence-based research. In this chapter, the results of this research are discussed in relation to relevant findings from other studies.

To the researchers' knowledge, this is one of the few studies examining the effects of conversation maps and the only study that evaluates changes in patient knowledge, attitude, and behaviours when using this tool compared to traditional group education (using a PowerPoint presentation design) in an adult diabetes population. Thus, most of the comparisons are based on existing studies using other forms of adult diabetes group education and their effects on patient knowledge, attitude, and behaviour changes. A description of the strengths and limitations of the present study is included. In addition, this chapter looks at the themes uncovered in the focus groups in more detail and where possible compare these to findings from similar studies reported in the literature.

5.1 RESEARCH PARTICIPATION

The total number of people screened to participate in the present study was 100. Those who did not fit the inclusion criteria for participation were classified as screen fails. Of the total number of people screened, 65 people were screen fails. The main reasons for screen fails included having diabetes for more than 5 years, receiving diabetes education from a different diabetes education centre previous to the appointment, and

being >65 years of age. Out of the 35 people who enrolled in the research study, 21 participants completed the study. The 14 people that withdrew from the study all reported withdrawing due to lack of time to commit to attending education groups. Our retention rate of 60% was consistent with outcomes found in other studies examining diabetes group education (63).

5.2 CHANGES IN HEMOGLOBIN A1C

In the present study, apart from looking at the effectiveness of two different DSME delivery methods on changes in KAB, a secondary objective was to examine differences in changes in Hb A1c. Although Hb A1c improved significantly in both groups, the method of diabetes education did not have a significant difference on the short-term changes in participants' Hb A1c scores between groups. The mean change in Hb A1c from baseline to 3 months did not differ significantly between the conversation map education group and the traditional method of education group (1.3% and 0.8% respectively; $p = 0.59$). Thus, hypothesis 1 as stated in Chapter 1 is negated and this finding is supported in the literature. A study in 2002 by Holtrop found no difference in changes in Hb A1c at six months between an intervention and control group, where the intervention group received diabetes group education and the control group received routine individual face-to-face follow-up appointments only (64). In Holtrop's study, there was no change in mean Hb A1c concentrations from baseline to six months for participants in the control group, whereas participants that were assigned to received education through a group program had a mean reduction of 0.4% in Hb A1c (64). Another study by Rickheim (2002) observed significant changes in Hb A1c for adults receiving group education compared to individual education used as the control (51). The

study found no difference in Hb A1c six months after intervention between the intervention and control groups, although the intervention group had a significantly higher Hb A1c at baseline. The mean Hb A1c change from baseline to six months for participants in the intervention group was 2.5% reduction compared to the control group's mean reduction of 1.7%. The research found that the difference in Hb A1c improvement was marginally greater in subjects receiving group versus individual education (p =. 05) (51). A majority of the improvement in Hb A1c was achieved by 3 months in each educational setting (51). In the present study, there was no significant difference in Hb A1c changes between groups using different educational delivery methods. One reason for insignificant changes in Hb A1c concentrations (through education intervention) is that improvements in Hb A1c concentrations in both groups may have been due to pharmacological interventions, diet, or exercise changes during this research. Observing pharmacological, diet, and exercise changes for the duration of this study through the use of a medication and activity log and food record would have been advantageous for running comparisons to determine the impact of these confounding variables on changes in Hb A1c. Associating changes to different education methods utilized would be difficult, since no controls were in place for diabetes medication, diet or exercise changes. Further research is needed to identify if different methods of education could have an impact on Hb A1c levels in the long term with controls in place for changes in diabetes medication, diet or exercise.

5.3 CHANGES IN KNOWLEDGE

Managing diabetes properly in accordance with clinical practice guidelines and making behaviour changes are largely influenced by knowledge, attitudes, and practices.

Using a coded knowledge evaluation form (Appendix G, Coded Knowledge Questionnaire), knowledge of participants in both groups studied was compared at pre-test and at 3 months after education was received. The overall pre-test knowledge scores at baseline were low, with a mean score of 15.20 in the conversation map group and a mean score of 14.73 in the traditional education group. When adjusting for age using analysis of covariance, participants in the study aged less than or equal to 60 years scored significantly higher in attitude score in the need for special training ($p=0.015$), seriousness of type 2 diabetes mellitus ($p=0.021$), and psychosocial impact of the disease ($p=0.033$) three months after education than participants older than 60 years of age. No other research was found in the literature showing similar results. One potential reason for the greater attitude changes in the participants less than or equal to 60 years of age could be that they have more comfort level with facilitated non-didactic learning approaches. DSME was once didactic in nature and did not always focus on facilitation of learning (4). Participants over the age of 60 may be used to receiving health care information with a lecture-style learning approach. More research needs to be conducted in this area to ascertain why participants less than or equal to 60 years of age showed significant improvements in attitude scores.

With regards to research evaluating knowledge changes after receiving different methods of DSME, a meta-analysis review identified four studies that measured knowledge changes four to six months after education was received (48). Three out of the four studies showed a significantly greater knowledge score in the intervention groups which received group education compared with the control group which included participants receiving either individual education or were on a waiting list to receive education. The fourth study found no significant knowledge score changes between the

intervention group which received seven hours of group education compared to a control group which received five hours of education through individual appointments. In all of these studies, the educators were dietitians and nurses (49). Similar to the studies focused on knowledge improvements in group education, this study showed significant improvements in knowledge scores of the conversation map group at post-test 1 and post-test 2. The significant findings further illustrate the usefulness of a DSME method that is directed by participants, focused on application, and provides opportunities for learners to seek new information. The traditional method also showed marginal knowledge improvements; however, the changes were not significant (65). The effectiveness of group education in providing information to patients with diabetes is apparent in clinical research. Therefore, in this current study which compared two methods of group education, it is not surprising that both forms were effective at increasing knowledge scores, neither one more significant than the other when compared at pre-test nor at three months after receiving education. Again these findings negate hypothesis 2 stated in Chapter 1.

5.4 CHANGES IN ATTITUDES

The diabetes attitude questionnaire that was adapted for this study was broken down into five subscales: need for special training, seriousness of diabetes, value of blood glucose control, psychosocial impact of diabetes, and patient autonomy. When attitude scores were compared directly after education was received (post-test 1), two subscales showed significantly improved attitude scores in the conversation map group: seriousness of diabetes and psychosocial impact of diabetes. The conversation map intervention did not have a significant impact on the three other subscales right after

receiving education. However, three months after education was received, four out of the five attitude subscales showed significant improvements in attitude scores, with the exception of patient autonomy (i.e., a measure of the patient's interest in being an autonomous decision-maker regarding diabetes care), which showed no significant improvement. The finding of no between group difference in patient autonomy either at pre-test or three months after receiving education paralleled a study conducted by Anderson et al. in 1995 (66) which showed that in a group of educated people, most possessing post-secondary education, the pre-test mean score for patient autonomy was 4.14 on an attitude Likert scale ranging from 5 (strongly agree) to 1 (strongly disagree). In the present study's findings, the mean pre-test score for patient autonomy in the conversation map group was 3.59 and in the traditional group was 3.65 based on a similar Likert scale scoring technique (Appendix J, Diabetes Attitude Questionnaire Formulae). The participants in both the conversation map group as well as the traditional education group were well educated, with all participants having at least a high school education, and most some form of post-secondary education. Results from the conversation map participants shared another similarity with the findings from Anderson et al.'s study (66), where attitude concerning the psychosocial impact of diabetes showed modest improvements. However, Anderson et al.'s intervention was a six-week group education program which did not use conversation maps and had a wait list of patients as the control group (66).

Obtaining post-test 1 data right after education was received may have been a limitation of the study. Participants may not have had adequate time in the two-week period between education sessions to practice setting goals and changing self-management behaviours relevant to diabetes. They may neither have seen the value in

making behaviour changes nor associated those changes to positive outcomes in managing blood glucose control. Perhaps this is a reason for only two out of five attitude subscales showing significant change in the conversation map group. Interestingly, at post-test 2 which is measured three months after education was received, four out of five attitude subscales showed significant improvements in the conversation map group when measuring significant differences between the two groups. This may indicate that conversation maps have more impact on participants' abilities to set goals and change self-management behaviours than traditional education. One reason conversation maps may have a greater impact on changing attitudes toward diabetes is their ability to address more learning domains than traditional methods of education. Both methods of education seem to capture participants' abilities to learn, comprehend, and critically think about applying learned knowledge into self-management strategies. The conversation map method seems to go beyond stimulating this learning domain, and also addresses the affective domain of learning by allowing participants to share stories of their diabetes experiences and connect on an emotional level, relating to one another's stories of trials and tribulations when managing their diabetes. By sharing stories, they perhaps attach value to managing blood glucose levels by learning from others' experiences and values. Others' beliefs perhaps influence changes in their own behaviours, and over time cultivate changes in their attitude toward managing their disease.

5.5 FOCUS GROUPS

Focus groups were conducted to compare perceptions of DSME methods and determine behaviour changes. The focus groups were transcribed and themes were identified. These themes support the quantitative findings of this research and are

discussed in this section. In particular, the quotes described in the results (Chapter 4) support hypothesis 3 which states that participants (more so from the conversation map group) had positive perceptions of the education delivery methods.

5.5.1 Common themes

Common themes were identified for both DSME methods. When participants were asked about the usefulness of the education content in both groups, perceptions around the importance of knowledge uptake, the need for diabetes education, and behavioural outcomes as a result of the educational experience were discussed.

Common Theme 1: Benefits of Early Education Uptake

Many participants spoke of the diabetes education being provided "just in time" and recognized the importance of some form of diabetes education being helpful regardless of the delivery method of education they received. This is similar to the findings from a study conducted in 2003 using focus groups to uncover type 2 diabetes patients' perceptions on diabetes education, which illustrated that patients identified the need for early education intervention following diagnosis (67).

Common Theme 2: The Need for Specialized Education

In both conversation map and traditional education groups, participants felt a need for, and found value in, health care professionals and diabetes educators. They seemed to recognize their role in self-management as the learner and the decision maker regarding their disease. After receiving education from diabetes educators, participants felt that they were provided with the tools to manage their diabetes and felt more confident about

the cause and controllability of the disease. This finding leads us to believe that both forms of DSME supported the common sense model of adult learning regardless of the delivery method of education. Participants using conversation maps were encouraged to discuss and acknowledge diabetes health risks 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 disease. 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. This method of learning reflects the common sense model which suggests that beliefs about health threats are explained by integrating subjective illness ideology with current state of disease (i.e. signs of disease) to make sense of symptoms. Representations are cumulative, formed and developed based on information received and experienced (39).

Common Theme 3: Education Encouraging Multiple Lifestyle Management Behaviour Changes

All participants in both focus groups made behavioural changes between the time education was received to the time focus groups were conducted which was approximately 3 months in duration. It appeared that in the conversation map group, participants tended to make more than one lifestyle change when it came to their diabetes self-management compared to the traditional education group. A reason for this may be associated with participants speaking of being able to identify and direct their learning to

areas that actively interested them. Perhaps being able to identify the need for change and discuss the readiness for change allowed more goals to be set and accomplished. Both methods of education delivery support the stages of change model in that there is information around the need for lifestyle changes in managing diabetes. However, the discussions provoked by the conversation map perhaps increased patient confidence to make changes through feeling socially supported. In the conversation map group, participants seemed to achieve more goals that would result in improved glycemic control, such as increasing exercise and using controlled portion sizes at meals. According to the theory of change model, these would be examples of participants acting on a specific goal to achieve a desired outcome (33). These participants would have progressed from contemplation, through preparation, and into the action stage of achieving a goal. In the traditional method group, there was more discussion around preparing to set goals. Some participants reported goals about discussing potential changes and benefits of these changes with their family. Although setting a goal to encourage discussion shows improvement in perceptions of social acceptance, these goals would be classified as steps toward preparing to set behavioural goals. Therefore, the traditional education group seemed to progress through the contemplation phase into the preparation phase, with fewer participants fully committing to a behavioural action. For example, participants set goals around discussing the potential benefits of a behaviour change, such as the benefits of checking blood glucose levels with a glucometer, rather than actually checking blood glucose reading. More research on moving patients from one stage to the next (e.g., from preparation to action) is needed.

5.5.2 Conversation Map themes

Some themes were only identified in the conversation map group. The facilitation of learning seen in the use of conversation maps allowed participants to direct their own learning while they gathered more information as they shared their own experiences. Perhaps participants being more involved in the learning process through facilitation can lead to further themes being uncovered.

Conversation Map Theme 1: Experiential Learning Environment

Discussion around personal stories and experiences seemed to be a prominent piece and distinguishing factor in the conversation map education group. This method of learning was favored by participants as a creative way of sharing stories, knowledge, attitude, and previous behavioural change. Hearing others' stories of experiences with diabetes, whether these were stories of their own journey with diabetes, or those of another friend or a family member's journey, seemed to increase participants perceived vulnerability to the disease and supported the common sense model (32). For example, one participant in the conversation map group stated that they had heard of hypoglycemia before, but never took the opportunity to learn more about it because they never thought it would happen to them. After hearing another person's experience in treating a hypoglycemic episode, they found this information more relevant stating "if it could happen to them, it could happen to me". According to Bandura's social cognitive theory, social interactions can influence learning and confidence in skills performance (42). During the conversation map focus groups, participants spoke of being involved in discussions and interacting with others during their education sessions. Having the diabetes educator play the role of facilitator rather than instructor, participants were able to teach others by sharing their own experiences, such as the appropriate way to treat a

hypoglycemic episode that worked for them or another family member in the past or how they used the plate method to help balance their breakfast meal which they used to omit. By allowing others to share and educate one another on their own experiences, skills, and current knowledge of diabetes, the conversation map empowered the participants and created an environment of experiential learning. All of these could be reasons for significant attitude improvements in the conversation map group. One research study described experiential learning as a point in learning where the power relations between patient and heath professional are challenged when patients also develop relevant knowledge. By being together in their learning environment, the patients transformed their once passive role into an active leadership role (67). In this research we observed that during experiential learning, participants were empowered to take on roles of both teacher and learner interchangeably during the education session. This was such a significant experience for them, which may have triggered their desire to achieve more behavioral changes. Participants in the conversation map group shared their experiences, knowledge, attitudes, and skills and discussed best practices for completing tasks. This theme relates to the social learning theory. The interaction with other participants becomes part of the learning, and knowledge is shared in the form of experience.

Conversation Map Theme 2: Self-Directed Approach to Learning

Participants who attended the conversation map education intervention felt that the educational topics focused on during the education were driven by their desire to learn more about these topics. Extra time was spent discussing specific beliefs, and situations that applied to participants' lives, as well as addressing questions specific to their own diabetes self-care. The approach to learning was directed by the participants in

this education group. The conversation provoked discussion around beliefs, perceived susceptibility and severity, and uncovered benefits and costs associated with individual diabetes self-management, all of which are the underlying keys to the theories of the health belief and common sense models (39).

Conversation Map Theme 3: An Attitude of Feeling Socially Supported

In the conversation map group, another theme that emerged was group cohesiveness and feeling socially supported. Participants identified the ability to relate to one another and empathize with stories they had shared. One participant described 'feeling that you are not alone', implying that the education intervention provided a group equality where participants felt like allies bonded together by their diabetes.

The conversation map method provided participants with opportunities to discover more about their attitudes toward diabetes. Perhaps this is another reason for the improved attitude scores in the conversation map group. The conversation map method seemed to create an environment where participants could 'safely' think about their current their behaviours and analyze their level of motivation for change. Participants were able to actively evaluate their own readiness for change, a step that is part of the stages of change model (33), with others actively supporting them on this journey, an application of Bandura's social cognitive theory (42).

Conversation Map Theme 4: Visualization of Specific Diabetes Management Needs

Visualizing specific topics of diabetes self-management is quite unique, as it is not a common theme found in other research. Using the conversation map method, participants described the tool as taking on a 'road map' effect during the education

session. The map acted as a point of reference presented visually to the participants. At any point during the education session, participants felt comfortable jumping from one topic to another, and if needed, returned to a topic to answer additional questions. The map engaged participants to ask questions about topics of diabetes self-care by providing images of the topics. For example, an image of a healthy plate was presented to encourage discussion around balanced eating. Another example was goal setting, represented as a bicycle built for more than just one person. This reinforces that at most times, it takes the assistance of others around you to set and meet your goals. One participant did make a comment that could be interpreted in a negative way about the map seeming childish with pictures and images. However, the participant went on to clarify that this seems to be a positive strategy and it works because it is a less intimidating way of presenting diabetes management. No other literature could be found on conversation maps that parallel this emerging theme of visualization of specific topics. Further qualitative research on conversation maps is needed in this area.

5.5.3 Traditional Education Theme

In the traditional education group, a theme of low group interaction was uncovered. Perhaps the reason that fewer themes were identified was a resulting phenomenon of low group participation. The theme is perceived as a barrier in DSME and is discussed in this section.

Traditional Method Theme 1: Low Group Participation

A theme that emerged only in the traditional education method was low group participation. One participant stated that to ‘open up’ there needs to be a level of comfort

in a group. With low group participation, there may have been a lower comfort level in sharing information. If there was not enough trust created between the educator and the participants, perhaps participants did not feel comfortable to ask questions or share stories during the education session. Perhaps they did not have the same visual stimulation reported in the conversation map group. Patient autonomy scores were not significantly different between the two methods of education, so it can be presumed that participants did acknowledge responsibility for their diabetes self-care. However, the traditional education method did not significantly improve other subscales of patients' attitude toward diabetes. This negative perception of low group interaction in the traditional education group likely influenced participants' attitudes toward managing their diabetes. There is a need for further research to evaluate if the negative perceptions played a role in setting less goals and making fewer behavioural changes.

Using multiple focus groups allows the focus group researcher to assess the extent to which data saturation is reached (68). Data saturation is defined as the point at which no new data emerges (68). Determining the number of participants needed for data saturation in qualitative research is ultimately a matter of judgment and experience in evaluating the quality of the information collected against the uses to which it will be put, the particular research method and purposeful sampling strategy employed (69). Focus group sizes of four participants per group were determined by using the same definition of small groups (n=3-10) as referenced and defined in this research study. Focus group participant demographics were not recorded; therefore it is difficult to ascertain homogeneity of the focus groups. In conducting future research, it would be beneficial to have focus group participants complete a demographics questionnaire.

5.6 STRENGTHS AND LIMITATIONS OF THE STUDY

One strength of this study is the researchers' training and background in diabetes education. The researchers who taught the education interventions were a registered nurse and registered dietitian and both were certified diabetes educators. Both researchers also had training in facilitating conversation maps. These credentials support the researchers' abilities to effectively and efficiently provide these education interventions. Another strength was the use of a scripted manual when conducting the conversation map education. This training manual, previously referred to in Table 1, was used by the facilitators of the conversation map to ensure all topics of education were discussed. The traditional education method's power point slides acted as a guide presenting all topics one slide at a time to ensure all topics were discussed.

A limitation of this study was the small sample size of participants. Perhaps using a larger sample size of participants may provide more insight into patients' perceptions of different DSME methods. Additionally, running focus groups both at short term (after 3 to 6 months) and long term (after 12 to 14 months) intervals may provide additional information on patients' wants and needs in a DSME program.

Not controlling for changes in pharmacological treatment, diet or exercise is an additional limitation of this study. Other research findings support that the presence of oral agent therapy was a significant predictor of Hb A1c improvement independent of education settings (68). In future research, educators should document any potential confounding variables that could affect changes in Hb A1c concentrations such as medication, diet or exercise changes. Another limitation of this study was only measuring Hb A1c three months after education interventions. If participants waited a period of time to set goals and make behaviour changes, the outcomes of the changes would not be

observed fully in only one HbAlc reading as it would measure average blood glucose concentration for the previous three months. For example, if participants did not set and achieve behaviour goals to improve glycemic control until the study neared completion, only a few days of improved glycemic control would not have contributed to the overall average Hb A1c reading. If they continued with these goals, measuring Hb A1c concentrations at six months may show more significant improvements in Hb A1c outcomes. In future research, it is recommended to compare repeated Hb A1c tests at three, six, and twelve to fourteen months as other researchers have done in their studies (50,70). This timeline was not realistic in the present study.

The short-term attitude improvements demonstrated in this study may not be sustained long term. Other studies have suggested that longer term behaviour change may require longer term interventions (71–73). Further research is required to evaluate the effects of conversation maps on the long term knowledge, attitude, and behaviour outcomes.

Finally, as with most research studies, there is a possibility that the study may not truly represent the adult population with type 2 diabetes in a community. In general, people who volunteer to take part in research studies tend to be motivated and committed (49). Having motivated participants did not affect the results of the present study as both groups of participants were part of the same motivated subgroup; however, it may affect the ability to generalize the results. Because all participants in the present study were able to read, write and speak English, the results may only be applicable to other populations with similar characteristics.

5.7 VALUE OF CONVERSATION MAPS IN DSME

As shown in this study, the intrinsic value of conversation maps lies in its ability to create a safe environment for experiential learning, self-directed learning, and social support which are associated with improved attitudes toward type 2 diabetes mellitus. The conversation map DSME method has elements of different theoretical frameworks built into the learning process which support adult learning. Participants from the conversation maps group shared and compared their knowledge, skills and experience in self-management and self-care behaviours. The value and reward of self-management, such as improved glycemic control that was illustrated in this study, supports the social learning theory. Another model that the conversation map supports is the Health Belief Model. This model suggests discussion around perceived barriers, benefits, self-direction, and cues to action should be done. The conversation map seems to support this adult learning theory by exploring participants' feelings, perceptions, attitudes, and beliefs related to diabetes and its self-management. Another model that is supported by the conversation map DSME method is the trans-theoretical model of change whereby behaviour change is identified by stages of readiness for change and the learner's ability to change, act, evaluate, and react. Conversation maps support the stages of change by helping participants recognize the need for change, enabling personal strategies for adopting change, and providing an action plan for implementing change. Many educational interventions in diabetes lack reported theoretical frameworks in their development (74). Considering the theoretical underpinnings of conversation maps, this research suggests that the conversation map tool improves patient attitude and perceptions of education because it follows principles of adult learning. Using conversation maps encourages behaviour change by improving the chances of providing

meaningful education that may lead to sustained improvement in outcomes, such as glycemic control, for people with diabetes.

CHAPTER 6

RELEVANCE AND IMPLICATIONS FOR PRACTICE

This chapter discusses the relevance of evaluating DSME strategies such as conversation maps and includes opportunities for further research on the use, effectiveness and efficiency of this new method.

6.1 RELEVANCE AND IMPLICATIONS

Although group education is supported in the literature to have a significant impact on improving Hb A1c levels, diabetes knowledge, and attitudes toward diabetes, many diabetes education centres continue to use traditional methods of education which involve a more didactic teacher/learner approach, whereby the educator lectures about DSME rather than facilitates the learning process. This is slowly changing as more research is conducted on education programs that work toward promoting attitude and behavioural changes .

In the present study, we observed that different diabetes education methods can affect outcomes in participants' attitudes toward diabetes. This study also showed that there is a need for further research on the use of conversation maps as an effective and efficient group education method. There is also a need to develop evidence-based best practices to guide diabetes group education. Participants who received education through conversation maps showed improved attitude scores on four out of five subscales after education was received. Although we did not use a structured instrument to measure diabetes self management changes in behaviour, we asked participants in focus groups about the changes they had made to their diabetes management. Participants in both the conversation map and traditional education method focus groups made at least one

behavior change since attending the education sessions. However, the conversation map focus group participants reported more than one self-reported behaviour change. Using education tools that support principles of adult learning, such as conversation maps, may lead to greater behavioural change and more control of their type 2 diabetes.

Group education is equally as effective as individual education at improving patient knowledge, therefore many standards recommend group education both nationally and internationally (39). In the current economy where health care costs are escalating and individuals with type 2 diabetes mellitus are increasing, providing group education is more financially viable. Providing group education more often where applicable rather than individual education would save the time and resources of health care providers, especially if this education is provided on a longer term basis. Long term diabetes self-management improvements would help reduce the financial burden associated with the long-term costs of chronic diabetes complications. There remains little research that compares different delivery methods of group education and the qualitative research that examines patient perceptions of group education is limited.

In comparing the impact of different methods of delivering DSME, the present study was able to uncover that both forms of diabetes group education had positive impacts on improving patients' KAB. Both DSME methods were associated with improving Hb A1c levels after three months, although we cannot conclude that improved Hb A1c levels were direct results of the diabetes education alone. When conducting between group analyses, the conversation map method had a greater impact than the traditional method of education on improving attitudes toward the need for special training, the seriousness of diabetes, the value of blood glucose control, and the psychosocial impact of diabetes three months after education was received. The present

study highlights the importance of evaluating the effects of different DSME delivery methods on patient's KAB as well as gathering qualitative data on patient perceptions of DSME as these measurements can provide important data that may support future DSME program development. This research also articulates the importance of including adult learning principles and theoretical models in DSME program. Examining the long-term impact of the conversation map on knowledge, attitude, and behaviour changes as well as clinical outcomes such as Hb A1c is highly recommended for future research. Specifically, more research on intent to change behaviors through action plans and measuring actual behavior changes realized from these action plans as a result of DSME strategies or programs would be valuable to assist in reducing potential escalating health care costs that would arise from not managing the chronic complications of the disease.

REFERENCES

1. Shaw JE, Sicree RA, Zimmet PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. Diabetes Research and Clinical Practice. 2010 Jan;87(1):4–14.

2. Government of Canada PHA of C. Report from the National Diabetes Surveillance System: Diabetes in Canada, 2009 [Internet]. 2009. Available from: http://www.phac-aspc.gc.ca.proxy2.lib.uwo.ca:2048/publicat/2009/ndssdic-snsddac-09/index-eng.php

3. A. Ohinmaa, P. Jakobs, S. Simpson, J. Johnson. Projection of Prevalence and Cost of Diabetes in Canada 2000-2016. Canadian Journal of Diabetes. 2004;28(2):00.

4. The Canadian Diabetes Association. 2008 Clinical Practical Guidelines. 2008;32(Suppl 1):S25–28.

5. Turner RC, Holman RR, Cull CA, Stratton IM, al et. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). The Lancet. 1998 Sep 12;352(9131):837–53.

6. Adler AI. Association of systolic blood pressure with macrovascular and microvascular complications of type 2 diabetes (UKPDS 36): prospective observational study. BMJ. 2000 Aug 12;321(7258):412–9.

7. Barlow J, Wright C, Sheasby J, Turner A, Hainsworth J. Self-management approaches for people with chronic conditions: a review. Patient Education and Counseling. 2002;48(2):177–87.

8. Funnell MM, Anderson RM. Empowerment and Self-Management of Diabetes. Clinical Diabetes. 2004 Jul 1;22(3):123 –127.

9. Edward E. B. Historical glimpses of patient education in the United States. Patient Education and Counseling. 1986 Jun;8(2):135–49.

10. International Diabetes Federation (IDF), editor. International Standards for Diabetes Education [Internet]. International Diabetes Federation; 2009 [cited 2011 Oct 4]. Available from: http://www.idf.org/node/1684

11. Gerstein H, Miller M, Byington R, Goff DJ, Bigger J, Buse J. Effects of Intensive Glucose Lowering in Type 2 Diabetes. New England Journal of Medicine. 2008 Jun 12;358(24):2545–59.

12. Norris SL, Lau J, Smith SJ, Schmid CH, Engelgau MM. Self-Management Education for Adults With Type 2 Diabetes. Diabetes Care. 2002 Jul 1;25(7):1159 – 1171.

13. Mulcahy K, Maryniuk M, Peeples M, Peyrot M, Tomky D, Weaver T, et al. Diabetes Self-Management Education Core Outcomes Measures. The Diabetes Educator. 2003;29(5):768 –803.

14. Funnell MM, Brown TL, Childs BP, Haas LB, Hosey GM, Jensen B, et al. National Standards for Diabetes Self-Management Education. Diabetes Care. 2010 Jan;33(Supplement_1):S89–S96.

15. Chodosh J, Morton S, Mojica W, Maglione M, Suttorp M, Hilton L, et al. Metaanalysis: chronic diseases self-management programs for older adults. Annals of Internal Medicine. 143(6):427.

16. American Diabetes Association. Standards of Medical Care in Diabetes--2009. Diabetes Care. 2009 Jan 1;32:S13–S61.

17. International Diabetes Federation (IDF), editor. International Curriculum for Diabetes Health Professional Education [Internet]. International Diabetes Federation; 2008 [cited 2011 Oct 4]. Available from: http://www.idf.org/international-curriculum-diabetes-health-professional-education

18. Gary TL, Genkinger JM, Guallar E, Peyrot M, Brancati FL. Meta-Analysis of Randomized Educational and Behavioral Interventions in Type 2 Diabetes. The Diabetes Educator. 2003;29(3):488 –501.

19. Norris SL, Nichols PJ, Caspersen CJ, Glasgow RE, Engelgau MM, Jack Jr L, et al. The effectiveness of disease and case management for people with diabetes: A systematic review. American Journal of Preventive Medicine. 2002 May;22(4, Supplement 1):15–38.

20. Funnell MM. The Diabetes Attitudes, Wishes, and Needs (DAWN) Study. Clinical Diabetes. 2006 Oct 1;24(4):154 –155.

21. Fain JA, Nettles A, Funnell MM, Prochownik DC. Diabetes Patient Education Research: An Integrative Literature Review. The Diabetes Educator. 1999;25(6 suppl):7 –15.

22. Kulzer B, Hermanns N, Reinecker H, Haak T. Effects of self□management training in Type 2 diabetes: a randomized, prospective trial. Diabetic Medicine. 2007;24(4):415–23.

23. Yamaoka K, Tango T. Efficacy of Lifestyle Education to Prevent Type 2 Diabetes. Diabetes Care. 2005 Nov 1;28(11):2780 –2786.

24. Funnell MM, Anderson RM. Patient Empowerment: A Look Back, A Look Ahead. The Diabetes Educator. 2003;29(3):454 –464.

25. Vég A, Rosenqvist U, Sarkadi A. Variation of patients' views on Type 2 diabetes management over time. Diabetic Medicine. 2007;24(4):408–14.

26. Welch G, Rose G, Ernst D. Motivational Interviewing and Diabetes: What Is It, How Is It Used, and Does It Work? Diabetes Spectrum. 2006 Jan 1;19(1):5 –11.

27. Akimoto M, Fukunishi I, Kanno K, Oogai Y, Horikawa N, Yamazaki T, et al. Psychosocial Predictors of Relapse Among Diabetes Patients: A 2-Year Follow-Up After Inpatient Diabetes Education. Psychosomatics. 2004 Aug 1;45(4):343–9.

28. Mensing CR, Norris SL. Group Education in Diabetes: Effectiveness and Implementation. Diabetes Spectrum. 2003 Apr 1;16(2):96 –103.

29. Trento M, Passera P, Borgo E, Tomalino M, Bajardi M, Cavallo F, et al. A 5-Year Randomized Controlled Study of Learning, Problem Solving Ability, and Quality of Life Modifications in People With Type 2 Diabetes Managed by Group Care. Diabetes Care. 2004 Mar 1;27(3):670 –675.

30. Padilla GV, Bulcavage LM. Theories used in patient/health education. Seminars in Oncology Nursing. 1991 May;7(2):87–96.

31. Janz NK, Becker MH. The Health Belief Model: A Decade Later. Health Education & Behavior. 1984 Mar 1;11(1):1 –47.

32. Cameron LD, Leventhal H, (PhD.) HL. The self-regulation of health and illness behaviour. Routledge; 2003.

33. Prochaska JO, DiClemente CC, Norcross JC. In search of how people change: Applications to addictive behaviors. American Psychologist. 1992;47:1102–14.

34. Glanz K, Rimer B, Viswanath K. Health Behaviour and Health Education: theory, research, and practice. 4th ed. San Francisco: Jossey-Bass; 2008.

35. Harrison JA, Mullen PD, Green LW. A meta-analysis of studies of the Health Belief Model with adults. Health Educ. Res. 1992 Mar 1;7(1):107–16.

36. Bond GG, Aiken LS, Somerville SC. The health belief model and adolescents with insulin-dependent diabetes mellitus. Health Psychology. 1992;11(3):190–8.

37. Brownlee-Duffeck M, Peterson L, Simonds JF, Goldstein D, Kilo C, Hoette S. The role of health beliefs in the regimen adherence and metabolic control of adolescents and adults with diabetes mellitus. Journal of Consulting and Clinical Psychology. 1987;55(2):139–44.

38. Harvey JN, Lawson VL. The importance of health belief models in determining self□care behaviour in diabetes. Diabetic Medicine. 2009 Jan 1;26(1):5–13.

39. Diefenbach MA, Leventhal H. The common-sense model of illness representation: Theoretical and practical considerations. Journal of Social Distress and the Homeless. 1996 Jan;5(1):11–38.

40. Harrison TA, Hindorff LA, Kim H, Wines RC., Bowen DJ, McGrath BB, et al. Family history of diabetes as a potential public health tool. American Journal of Preventive Medicine. 2003 Feb;24(2):152–9.

41. Hagger MS, Orbell S. A Meta-Analytic Review of the Common-Sense Model of Illness Representations. Psychology & Health. 2003;18(2):141–84.

42. Bandura A. Social learning theory. Prentice Hall; 1977.

43. Bandura A. Health Promotion by Social Cognitive Means. Health Education & Behavior. 2004 Apr 1;31(2):143 –164.

44. Hurley AC, Shea CA. Self-Efficacy: Strategy for Enhancing Diabetes Self-Care. The Diabetes Educator. 1992 Apr 1;18(2):146–50.

45. Littlefield CH, Craven JL, Rodin GM, Daneman D, Murray MA, Rydall AC. Relationship of Self-efficacy and Binging to Adherence to Diabetes Regimen Among Adolescents. Dia Care. 1992 Jan 1;15(1):90–4.

46. Bijl J van der, Poelgeest-Eeltink A van, Shortridge-Baggett L. The psychometric properties of the diabetes management self-efficacy scale for patients with type 2 diabetes mellitus. Journal of Advanced Nursing. 1999;30(2):352–9.

47. Maibach E, Murphy DA. Self-efficacy in health promotion research and practice: conceptualization and measurement. Health Educ. Res. 1995 Mar 1;10(1):37–50.

48. Tang TS, Funnell MM, Anderson RM. Group Education Strategies for Diabetes Self-Management. Diabetes Spectrum. 2006 Apr 1;19(2):99 –105.

49. Deakin TA, McShane CE, Cade JE, Williams R. Group based training for self□management strategies in people with type 2 diabetes mellitus. 2005;2:CD003417.

50. Trento M, Passera P, Tomalino M, Bajardi M, Pomero F, Allione A, et al. Group Visits Improve Metabolic Control in Type 2 Diabetes A 2-year follow-up. Dia Care. 2001 Jun 1;24(6):995–1000.

51. Rickheim PL, Weaver TW, Flader JL, Kendall DM. Assessment of Group Versus Individual Diabetes Education. Diabetes Care. 2002 Feb 1;25(2):269 –274.

52. Brown SA. Interventions to Promote Diabetes Self-Management: State of the Science. The Diabetes Educator. 1999 Nov 1;25(6 suppl):52–61.

53. Tang TS, Gillard ML, Funnell MM, Nwankwo R, Parker E, Spurlock D, et al. Developing a New Generation of Ongoing Diabetes Self-management Support Interventions A Preliminary Report. The Diabetes Educator. 2005 Jan 1;31(1):91–7.

54. Sarkadi A, Rosenqvist U. Experience-based group education in Type 2 diabetes: A randomised controlled trial. Patient Education and Counseling. 2004 Jun;53(3):291–8.

55. Belton AB. Conversation Maps in Canada: the First 2 Years. Diabetes Spectrum. 2008 Apr 1;21(2):139 –142.

56. Healthy Interactions | Using the *Conversation Map*™ Education Tools [Internet]. [cited 2011 Oct 10]. Available from: https://diabetes.healthyi.com/public/usingTools.faces

57. Cronbach LJ, Meehl PE. Construct validity in psychological tests. Psychological Bulletin. 1955;52(4):281–302.

58. Fitzgerald JT, Funnell MM, Hess GE, Barr PA, Anderson RM, Hiss RG, et al. The Reliability and Validity of a Brief Diabetes Knowledge Test. Dia Care. 1998 May 1;21(5):706–10.

59. Anderson RM, Fitzgerald JT, Funnell MM, Gruppen LD. The Third Version of the Diabetes Attitude Scale. Dia Care. 1998 Sep 1;21(9):1403–7.

60. Howard GS. Response-Shift Bias A Problem in Evaluating Interventions with Pre/Post Self-Reports. Eval Rev. 1980 Feb 1;4(1):93–106.

61. Mills J, Bonner A, Francis K. The Development of Constructivist Grounded Theory. International Journal of Qualitative Methods. 2008 Nov 24;5(1):25–35.

62. Birks M, Chapman Y, Francis K. Memoing in qualitative research Probing data and processes. Journal of Research in Nursing. 2008 Jan 1;13(1):68–75.

63. Norris SL, Engelgau MM, Narayan KMV. Effectiveness of Self-Management Training in Type 2 Diabetes A systematic review of randomized controlled trials. Dia Care. 2001 Mar 1;24(3):561–87.

64. Holtrop JS, Hickner J, Dosh S. “Sticking to it--Diabetes mellitus”: a pilot study of an innovative behavior change program for women with type 2 diabetes. American Journal of Health Education [H.W. Wilson - EDUC]. 2002 Jun;33(3):161–6.

65. Reaney M, Eichorst B, Gorman P. From Acorns to Oak Trees: The Development and Theoretical Underpinnings of Diabetes Conversation Map Education Tools. Diabetes Spectr. 2012 Mar 31;25(2):111–6.

66. Anderson RM, Funnell MM, Butler PM, Arnold MS, Fitzgerald JT, Feste CC. Patient Empowerment: Results of a randomized controlled trial. Dia Care. 1995 Jul 1;18(7):943–9.

67. Cooper HC, Booth K, Gill G. Patients' perspectives on diabetes health care education. Health Education Research. 2003 Apr 1;18(2):191 –206.

68. Sandelowski MJ. Justifying qualitative research. Research in Nursing & Health. 2008;31(3):193–5.

69. Sandelowski M. Sample size in qualitative research. Research in Nursing & Health. 1995;18(2):179–83.

70. Brown SA, Garcia AA, Kouzekanani K, Hanis CL. Culturally Competent Diabetes Self-Management Education for Mexican Americans The Starr County Border Health Initiative. Dia Care. 2002 Feb 1;25(2):259–68.

71. Wing RR. Behavioral Treatment of Obesity: Its application to type II diabetes. Dia Care. 1993 Jan 1;16(1):193–9.

72. Perri MG, Sears SF, Clark JE. Strategies for Improving Maintenance of Weight Loss: Toward a continuous care model of obesity management. Dia Care. 1993 Jan 1;16(1):200–9.

73. Fisher EB, Thorpe CT, DeVellis BM, DeVellis RF. Healthy Coping, Negative Emotions, and Diabetes Management A Systematic Review and Appraisal. The Diabetes Educator. 2007 Nov 1;33(6):1080–103.

74. Sigurdardottir AK, Jonsdottir H, Benediktsson R. Outcomes of educational interventions in type 2 diabetes: WEKA data-mining analysis. Patient Education and Counseling. 2007 Jul;67(1-2):21–31.

APPENDICES

Appendix A. Poster Advertisement

EVALUATING THE IMPACT OF TWO DIFFERENT FORMS OF DIABETES SELF-MANAGEMENT EDUCATION ON KNOWLEDGE, ATTITUDE AND BEHAVIOURS OF PATIENTS WITH TYPE 2 DIABETES MELLITUS

Researchers from Brescia University College and the University of Western Ontario in collaboration with Diabetes Care Guelph are completing a research study evaluating the impact of the delivery method of diabetes education.

You are invited to participate in this research which examines the effectiveness of two different methods of diabetes self-management group education, conversation maps and a traditional group education approach. In this study, we will examine the changes in patients' knowledge, attitudes and behaviours after receiving one of the different education methods.

If you would like to be in the study, and can answer **YES** to the following questions, we would like to hear from **YOU**!

1. **You are between the ages of 19 and 65 years of age.**
2. **You have received a diagnosis of type 2 diabetes mellitus within the last five years.**
3. **You are able to read, write, and speak the English language.**
4. **You have the equivalent to an eighth grade education or higher.**

For more information, or to enroll in this study,
please inquire at:

Diabetes Care Guelph
Telephone: 519- 840-1964

Appendix B. Letter of Information

Letter of Information

Title of Research Study: Evaluating the impact of two different forms of diabetes self-management education on knowledge, attitude and behaviours of patients with type 2 diabetes mellitus

Researchers:
Dr. Alicia Garcia, PhD, RD, CFE, Director, Professor in Foods and Nutrition
Dr. Isabelle Giroux, PhD, RD, PHEc
Laura Briden RD, MScFN (candidate 2012)

Division of Food and Nutritional Sciences
1285 Western Road,
London, ON N6G 1H2
Brescia University College, UWO

Collaborators:
Sam Marzouk, MD, MBA
Candice Duguay, BScN, RN
Sarah Micks, BScN, RN

83 Dawson Road
Guelph, ON N1H 1B1
Diabetes Care Guelph

Purpose of the Study: You are invited to participate in a research study examining the effectiveness of two different methods of diabetes self-management group education, conversation maps and a traditional group education approach. Conversation maps are a series of images and symbols on a tabletop display that serve as a tool to engage people in conversations about diabetes in order to facilitate learning within a group setting. Diabetes conversation maps include all appropriate self-management topics required in a diabetes education program. The traditional diabetes education is a series of lectures provided by a nurse and a dietitian with the assistance of a PowerPoint presentation. The difference between diabetes conversation maps compared to traditional diabetes education is the delivery method. In this study, we will examine the changes in patients' knowledge, attitudes and behaviours after receiving one of two different education methods.

 Participant Initials ____

Objectives of the Study:

1. To determine self-management knowledge, attitudes and behaviours of patients with type 2 diabetes mellitus before and after diabetes education intervention.
2. To evaluate the impact of conversation maps on knowledge, attitudes and behaviours.
3. To evaluate the impact of traditional group education on knowledge, attitudes and behaviours.
4. To compare patients' knowledge, attitudes and behaviours after receiving diabetes self-management education through conversation maps versus traditional group education.
5. To determine patients' perceptions of diabetes self-management education using conversation maps compared to traditional group education.

Your Participation: If you agree to participate in this study, you will randomly assigned to one of two groups using a blocked design for randomization. One group will receive diabetes self-management education utilizing conversation maps. The other group will receive diabetes self-management education using a more traditional group education approach. Each group will receive the same educational topics in accordance with the Canadian Diabetes Association Clinical Practice Guidelines 2008. After being assigned into an educational intervention, you will receive two, 2-hour educational sessions approximately 2 weeks apart. Participants will be asked to complete a 20-item knowledge questionnaire and a 33-item attitudes and behaviours questionnaire prior to the first educational session. The questionnaires will take 20-25 minutes of your time. After the second education session, you will be asked to complete two questionnaires that will take 20-25 minutes of your time. As part of data analysis, your routine HbA1C values will be included in the research. Some of you from each intervention group may be asked to participate in a focus group approximately three months after the initial educational session is received. If asked to participate in a focus group session, the session will take approximately an hour of your time. If you choose not to participate in this study, you will receive diabetes self-management education as per current clinic protocol. Your decision will not affect the education or care you receive from Diabetes Care Guelph.

Your Rights: Your participation in this study is voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the study at any time with no effect on your current involvement with Diabetes Care Guelph. You are encouraged to answer the questions as completely as possible. All information provided is strictly confidential and will be compiled in a such a way that individual responses cannot be indentified. You can withdraw from the study at any time; however, because diabetes self-management education is part of regular clinic treatment, at Diabetes Care Guelph, your withdrawal from this study will be recorded by Diabetes Care Guelph.

Confidentiality: Your research records will be stored in a locked cabinet in a secure office and will be destroyed after 5 years. The questionnaires completed by participants will be coded to ensure all participants remain anonymous. The researchers involved in this study will be the only people to view the questionnaires that you complete. If the

results of this study are published, your name will not be used and no information that discloses your identity will be released or published.

Risks/Benefits: There are no known risks associated with this research. Receiving diabetes self-management education will be the only direct benefit to you. Your participation may help the researchers gain new knowledge that may benefit how diabetes education is provided in the future.

There will be approximately 140 participants (70 per intervention group) recruited through a convenience sample from Diabetes Care Guelph patients and within the Guelph community.

If you agree to participate in this study and sign the consent form, you will be notified of the dates of your education sessions as well as whether you've been selected to participate in a focus group in approximately 3-4 weeks from today. You do not waive any legal rights by signing the consent form.

For More Information:

1. Contact Laura Briden
2. If you have any questions about your rights as a research participant or the conduct of this study you may contact the Office of Research and Ethics

Thank you in advance considering to participate in this research study. Your participation may help researchers better understand patient perceptions of diabetes self-management education methods.

This letter is yours to keep.

 Participant Initials ____

Appendix C. Screening Questionnaire

Screening Questionnaire

Title of Research Study: Evaluating the impact of two different forms of diabetes self-management education on knowledge, attitude and behaviours of patients with type 2 diabetes mellitus

Circle "Yes" or "No" for all of the following that apply to you:

1.	You are between the ages of 19 and 65 years of age.	**YES**	**NO**
2.	You have received a diagnosis of type 2 diabetes mellitus by a license practicing physician (doctor) within the last five years.	**YES**	**NO**
3.	You have received a form of diabetes education from a diabetes education centre prior to this study.	**YES**	**NO**
4.	You are able to read, write, and speak the English language.	**YES**	**NO**
5.	You have the equivalent to an eighth grade education or higher.	**YES**	**NO**
6.	You have been diagnosed with a mental or psychosocial condition (i.e. schizophrenia, bi-polar disorder, clinical depression).	**YES**	**NO**
7.	You are able to provide written informed consent today to participate in this research.	**YES**	**NO**

Appendix D. Consent Form

Consent Form

Title of Research Study: Evaluating the impact of two different forms of diabetes self-management education on knowledge, attitude and behaviours of patients with type 2 diabetes mellitus

I have read the letter of information, have had the nature of the study explained to me and I agree to participate. All questions have been answered to my satisfaction.

_____

Patient's Printed Name

_____

Patient's Signature _____ Date

_____

Printed Name of Person Obtaining Consent

_____

Signature of Person Obtaining Consent _____ Date

☐ Please place a √ in the box provided if you wish to receive information about the overall results of the study.

Appendix E: Ethics Approval Notice

Western Research

Research Ethics

Use of Human Participants - Ethics Approval Notice

Principal Investigator: Dr. Alicia Garcia
File Number:100609
Review Level: Delegated
Approved Local Adult Participants:140
Approved Local Minor Participants:0
Protocol Title: Evaluating the impact of two different forms of diabetes self-management education on knowledge, attitude and behaviours of patients with Type 2 diabetes mellitus (REB #17849)
Department & Institution: Brescia\Nutrition and Food Sciences,Regional Mental Health Care London
Sponsor:
Ethics Approval Date: August 23, 2012 **Expiry Date:**December 31, 2012
Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
Revised Study End Date		

This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced revision(s) or amendment(s) on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the University of Western Ontario Updated Approval Request Form.

Members of the HSREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.

The Chair of the HSREB is Dr. Joseph Gilbert. The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

Ethics Officer to Contact for Further Information

This is an official document. Please retain the original in your files.

Appendix F. Demographic Questionnaire

CLIENT CODE: _____
Pretest ☐
Posttest 1 ☐
Posttest 2 ☐

Demographic Questionnaire

Study Title: Evaluating the impact of two different forms of diabetes self-management education on knowledge, attitude and behaviours of patients with type 2 diabetes mellitus

1. In what year were you born? _____

2. Are you male or female?
   ☐ Male ☐ Female

3. When were you diagnosed with Type 2 Diabetes Mellitus?
   _____

4. What language to you speak in your household?
   ☐ English
   ☐ French
   ☐ Other (Please list): _____

5. What is your marital status?
   ☐ Married ☐ Separated
   ☐ Divorced ☐ Single (never married)
   ☐ Common law relationship ☐ Widowed

6. What is the highest level of education that you have completed?
   ☐ Elementary school ☐ University undergraduate degree
   ☐ Some high school ☐ University graduate degree
   ☐ Finished high school
   ☐ Trade school/ college diploma

Appendix G. Coded Knowledge Questionnaire

CLIENT CODE: _____

Pretest ☐
Posttest 1 ☐
Posttest 2 ☐

Knowledge Questionnaire

1. The diabetes diet is:
a. the way most people eat
*b. a healthy diet for most people
c. too high in carbohydrate for most people
d. too high in protein for most people

2. Which of the following is highest in carbohydrate?
a, Baked chicken
b. Swiss cheese
*c. Baked potato
d. Peanut butter

3. Which of the following is highest in fat?
*a. Low fat milk
b. Orange juice
c. Corn
d. Honey

4. Which of the following is a "free food", meaning is contains little to no available carbohydrate?
a Any unsweetened food
b. Any dietetic food
c. Any food that says "sugar free" on the label
*d. Leafy green vegetables

5. Glycosylated hemoglobin (hemoglobin A1c) is a test that is a measure of your average blood glucose level for the past:
a. day
b. week
*c. 3 months

6. Which is the best method for testing blood glucose?
a. Urine testing
*b. Blood testing
c. Both are equally good

7. What effect does unsweetened fruit juice have on blood glucose?
a. Lowers it
*b. Raises it
c. Has no effect

8. Which should <u>not</u> be used to treat low blood glucose?
a. 5 hard candies
b. 3/4 cup orange juice
*c. 1 cup diet soft drink
d. 1 tbsp of honey

9. For a person in good control, what effect does exercise have on blood glucose?
*a. Lowers it
b. Raises it
c. Has no effect

10. Infection is likely to cause:
*a. an increase in blood glucose
b. a decrease in blood glucose
c. no change in blood glucose

11.The best way to take care of your feet is to:
*a. look at and wash them each day
b. massage them with alcohol each day
c. soak them for one hour each day
d. buy shoes a size larger than usual

12.Eating foods lower in fat decreases your risk for:
a. nerve disease
b. kidney disease
*c. heart disease
d. eye disease

Knowledge Questionnaire continued

13.Numbness and tingling may be symptoms of:
a. kidney disease
*b. nerve disease
c. eye disease
d. liver disease

14.Which of the following is usually <u>not</u> associated with diabetes:
a. vision problems
b. kidney problems
c. nerve problems
*d. lung problems

15.Signs of low blood glucose include:
a. shakiness
b. sweating
c. hunger
*d. all of the above

16. If you are sick with the flu, which of the following changes should you make?
a. Take less medications
b. Drink less liquids
c. Eat more proteins
*d. Test for glucose more often

17.If you are beginning to experience a low blood glucose, you should:
a. exercise
b. lie down and rest
*c. drink some juice
d. take insulin

18.Low blood glucose may be caused by:
*a. vigorous exercise
b. too little insulin
c. too much food
d. too little exercise

19.High blood glucose may most likely be caused by:
*a. eating a meal high in carbohydrates
b. skipping meals
c. delaying your snack
d. large ketones in your urine

20.Which one of the following will most likely cause an insulin reaction:
*a. heavy exercise
b. infection
c. overeating
d. not taking your insulin

* Correct Answer

ADAPTED FROM: Diabetes Knowledge test; Diabetes Research and Training Center © University of Michigan, 1998

Appendix H: Attitudes Questionnaire

CLIENT CODE: _____

Pretest ☐
Posttest 1 ☐
Posttest 2 ☐

Attitudes Questionnaire

Below are some statements about diabetes. Each numbered statement finishes the sentence "In general, I believe that..." You may believe that a statement is true for one person but not for another person or may be true one time but not be true another time. Mark the answer that you believe is true most of the time or is true for most people. Place a √ in the box below the word or phrase that is closest to your opinion about each statement. It is important that you answer every statement.

Note: The term "health care professionals" in this survey refers to doctors, nurses, and dietitians.

In general, I believe that:	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
1. ...health care professionals who treat people with diabetes should be trained to communicate well with their patients.					
2. ...people who do not need to take insulin to treat their diabetes have a pretty mild disease.					
3. ...there is not much use in trying to have good blood sugar control because the complications of diabetes will happen anyway.					
4. ...diabetes affects almost every part of a diabetic person's life.					

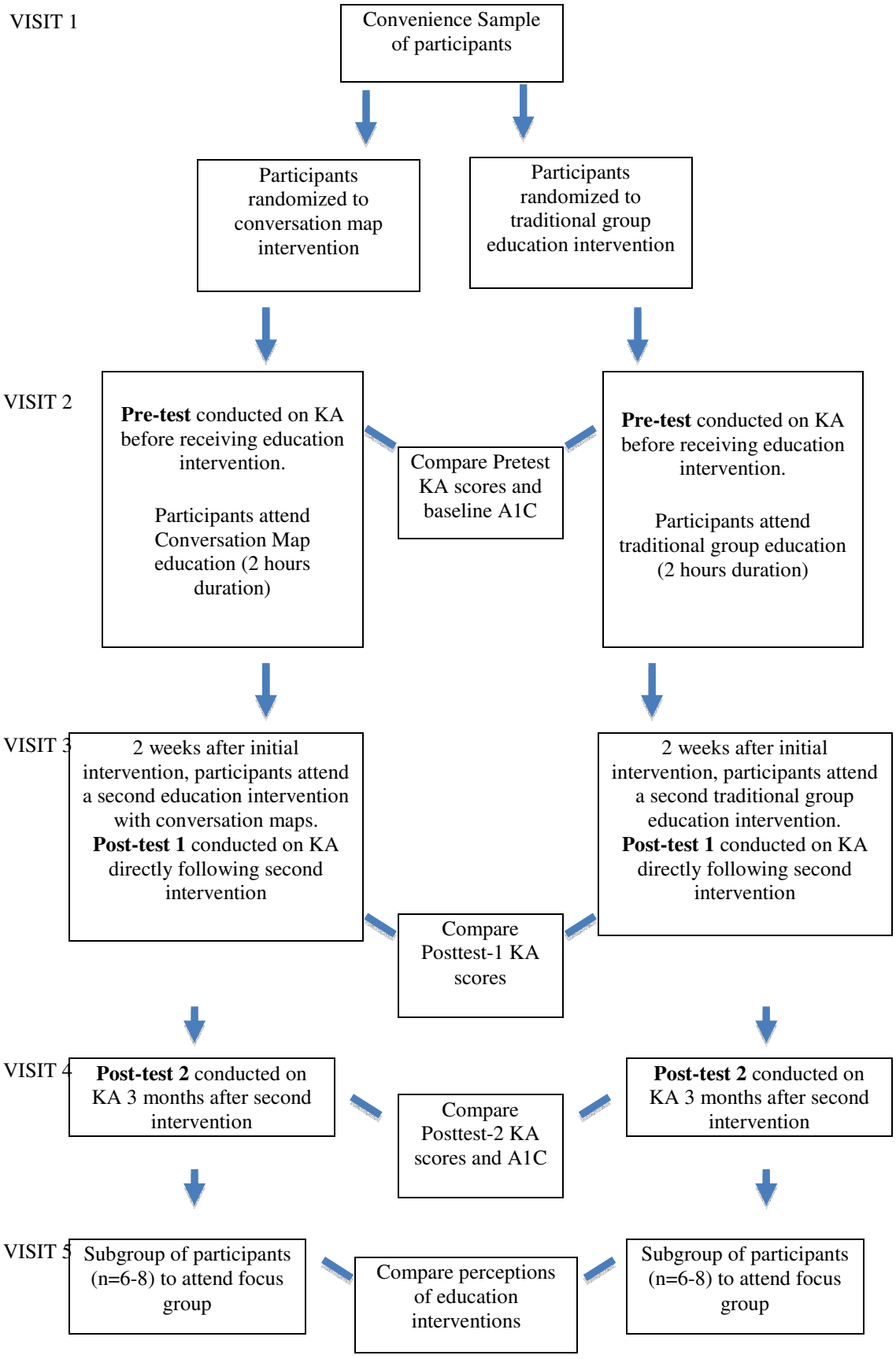
In general, I believe that:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
5. ...the important decisions regarding daily diabetes care should be made by the person with diabetes.					
6. ...health care professionals should be taught how daily diabetes care affects patients' lives.					
7. ...older people with Type 2 diabetes do not usually get complications.					
8. ...keeping the blood sugar close to normal can help to prevent the complications of diabetes.					
9. ...health care professionals should help patients make informed choices about their care plans.					
10. ...it is important for the nurses and dietitians who teach people with diabetes to learn counseling skills.					
11. ...people whose diabetes is treated by just a diet do not have to worry about getting many long-term complications.					
12. ...almost everyone with diabetes should do whatever it takes to keep their blood sugar close to normal.					
13. ...the emotional effects of diabetes are pretty small.					
14. ...people with diabetes should have the final say in setting their blood glucose goals.					

In general, I believe that:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
15. ...blood sugar testing is not needed for people with Type 2 diabetes.					
16. ...low blood sugar reactions make tight control too risky for most people.					
17. ...health care professionals should learn how to set goals with patients, not just tell them what to do.					
18. ...diabetes is hard because you never get a break from it.					
19. ...the person with diabetes is the most important member of the diabetes care team.					
20. ...to do a good job, diabetes educators should learn a lot about being teachers.					
21. ...Type 2 diabetes is a very serious disease.					
22. ...having diabetes changes a person's outlook on life.					
23. ...people who have Type 2 diabetes will probably not get much payoff from tight control of their blood sugars.					
24. ...people with diabetes should learn a lot about the disease so that they can be in charge of their own diabetes care.					
25. ...Type 2 is as serious as Type 1 diabetes.					

In general, I believe that:	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
26. ...tight control of blood glucose levels is too much work.					
27. ...what the patient does has more effect on the outcome of diabetes care than anything a health professional does.					
28. ...tight control of blood sugar makes sense only for people with Type 1diabetes.					
29. ...it is frustrating for people with diabetes to take care of their disease.					
30. ...people with diabetes have a right to decide how hard they will work to control their blood sugar.					
31. ...people who take diabetes pills should be as concerned about their blood sugar as people who take insulin.					
32. ...people with diabetes have the right <u>not</u> to take good care of their diabetes.					
33. ... support from family and friends is important in dealing with diabetes.					

ADAPTED FROM: DAS3; Diabetes Research and Training Center © University of Michigan, 1998

Appendix I. Conceptual Framework



Appendix J. Diabetes Attitude Questionnaire Formulae

Scale Name	Equation	Special Instructions
Need for Special Training	• (Q1, Q6, Q10, Q17, Q20) / Number of non-missing item	
Seriousness of Type 2 Diabetes Mellitus	• (Q2, Q7, Q11, Q15, Q21, Q25, Q31) / Number of non-missing items	Reverse scores for Q2, Q7, Q11, and Q15
Value of Good Control	Σ (Q3, Q8, Q12, Q16, Q23, Q26, Q28) / Number of non-missing items	Reverse scores for Q3, Q16, Q23, Q26, and Q28
Psychosocial Impact	Σ (Q4, Q13, Q18, Q22, Q29, Q33) / Number of non-missing items	Reverse scores for Q13
Patient Autonomy	Σ (Q5, Q9, Q14, Q19, Q24, Q27, Q30, Q32) / Number of non-missing item	

Note: Strongly Agree = 5, Agree=4, Neutral = 3, Disagree=2 and Strongly Disagree=1.

Note: If 50% of the items of a scale are missing, the scale should be considered as missing.

Appendix K. Focus Group Interview Guide

Focus Group Interview Guide

Study Title: Evaluating the impact of two different forms of diabetes self-management education on knowledge, attitude and behaviours of patients with type 2 diabetes mellitus

Introduction: Thank you for coming today to share with us your perceptions about the delivery method of diabetes self-management education. In this interview, we will ask you for your opinions about the style by which diabetes self-management education information was delivered and how the delivery method impacted your knowledge, attitude, and behaviours regarding type 2 diabetes mellitus. Each person will have a chance to talk. Your input is very valuable in helping us better understand the appropriateness of the type of education delivery method you received, as well as to answer the research question: Does the method of diabetes self-management education impact patients' knowledge, attitudes, and behaviours? Please help yourself to refreshments at any time.
Do you have any questions before we get started?

A. Discussion Guidelines

We would like the discussion to be informal, so there's no need to wait for us to call on you to respond. In fact, we encourage you to respond directly to the comments other people make. If you don't understand a question, please let us know. We are here to ask questions, listen, and make sure everyone has a chance to share their opinion.

We may interrupt you from time to time and if you aren't saying much, we may call on you to share your views. This is a way of making sure that everyone's perspective and opinion is included. If you are asked a question and do not feel comfortable sharing a response, please feel free to say so.

We do ask that we all keep each other's identities, participation and remarks private. We hope you'll feel free to speak openly about your views.

As discussed, we will be tape recording the discussion, because we don't want to miss any of your comments. No one outside of this room will have access to these tapes and they will be destroyed after our report is written.

(If assistants present) Helping are my assistants _____ and _____. They will be taking notes and be here to assist me if I need any help.

B. Icebreaker

introductions

Let's begin. Let's find out some more about each other by going around the room one at a time. Tell us your name and something interesting about you.

C. Questions

We would like to know your opinions about your group education experience and how the delivery method was helpful or not helpful for you in increasing your diabetes knowledge, changing attitudes or improving your diabetes self-management behaviours.

1. How did the delivery method of conversation map or traditional education help/not help you in increasing your diabetes knowledge?

Probe:
Was it easy or difficult to comprehend the information about how diabetes works?

Was it easy or difficult to comprehend the information about risk factors and complications associated with diabetes?

Was it easy or difficult to comprehend the information about medication management?

Was it easy or difficult to comprehend the information about lifestyle changes to assist with diabetes management?

2. How did the delivery method help/not help you in changing your attitude toward diabetes?

Probe:
How did group interaction affect/not affect your attitude toward diabetes?

3. How did the delivery method help/not help you in changing your diabetes self-management behaviours?

Probe:
How did the education sessions affect your ability to identify diabetes self-management behaviours?

   a. Diet and nutrition (e.g., food choices, portion control)
   b. Exercise/physical activity level
   c. Your attitude toward the ability to self-manage your diabetes

4. Please tell us how you found the education delivery method in terms of the following:
   a. Did you find the length of each education session to be too long/too short?
   b. Was there too little/too much group interaction?

5. What are some of the changes you have made in the day-to-day management of your diabetes?

To Member Check:
Facilitator will provide an oral summary of the focus group themes and then ask: Is this an adequate summary of what we discussed today? Once participants have given their feedback on this, move to closing.

Closing: Thank you so much for your participation today. Before you leave, we have a brief demographic questionnaire that we would like you to complete. Also, as a token of our appreciation for your time and participation in the study, we will give each one a $10 gift card for your local grocery store.

Appendix L. Focus Group Letter of Information

Focus Group Letter of Information

Title of Research Study: Evaluating the impact of two different forms of diabetes self-management education on knowledge, attitude and behaviours of patients with type 2 diabetes mellitus

Purpose: You are invited to participate in a focus group as part of a research study examining the effectiveness of two different methods of diabetes self-management group education: conversation maps and a traditional group education approach. The purpose of running focus groups is to help us understand your experience and perceptions about the delivery method of diabetes self-management education either with conversation maps or traditional group education. Conversation maps are a series of images and symbols on a tabletop display that serve as a tool to engage people in conversations about diabetes in order to facilitate learning within a group setting. Diabetes conversation maps include all appropriate self-management topics required in a diabetes education program. The traditional diabetes education is a series of lectures provided by a nurse and a dietitian with the assistance of a PowerPoint presentation. The difference between diabetes conversation maps compared to traditional diabetes education is the delivery method.

Objective of conducting Focus Groups:
To determine patients' perceptions of diabetes self-management education they receive using either a conversation map or traditional group education.

Your Participation: The focus group session will take approximately one hour of your time. During this hour, you will be asked questions to stimulate discussion by a trained focus group facilitator. The facilitator will be following a focus group interview guide with pre-generated questions assembled by the research team regarding your experience with the education sessions you attended. Each focus group session will be recorded on audiotape.

If you choose not to participate in the focus group this study, this will not affect the education or care you receive from Diabetes Care Guelph.

Your Rights: Your participation in the focus group is voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the focus group at any time with no effect on your current involvement with Diabetes Care Guelph. All information provided is strictly confidential and will be compiled in such a way that individual responses cannot be indentified.

 Participant Initials ____

Confidentiality: Your audiotape records will be stored in a locked cabinet in a secure office and will be erased after 5 years. The researchers involved in this study will be the only people to hear or view the discussions from your focus group. Focus group members are asked to keep everything that they hear confidential and not to discuss it outside of the meeting. However, we cannot guarantee that confidentiality will be maintained by group members. If the results of this study are published, your name will not be used and no information that discloses your identity will be released or published.

Risks/Benefits: There are no known risks associated with participating in the focus group. Your participation may help the researchers gain new knowledge that may benefit how diabetes education is provided in the future.

There will be approximately 12-16 participants (6-8 per intervention focus group) randomly selected to participate in the focus groups.

If you agree to participate in a focus group and sign the consent form, you will be notified of the date of your focus group in approximately 2-3 weeks from today. You do not waive any legal rights by signing the consent form.

For More Information:

1. Contact Laura
2. If you have any questions about your rights as a research participant or the conduct of this study you may contact the Office of Research and Ethics

Thank you in advance for considering to participate in this research study. Your participation may help researchers better understand patient perceptions of diabetes self-management education methods.

This letter is yours to keep.

 Participant Initials ____

Appendix M. Focus Group Consent Form

Focus Group Consent Form

Title of Research Study: Evaluating the impact of two different forms of diabetes self-management education on knowledge, attitude and behaviours of patients with type 2 diabetes mellitus

I have read the letter of information, have had the nature of the focus group explained to me and I agree to participate. All questions have been answered to my satisfaction.

_____

Patient's Printed Name

_____

Patient's Signature _____ Date

_____

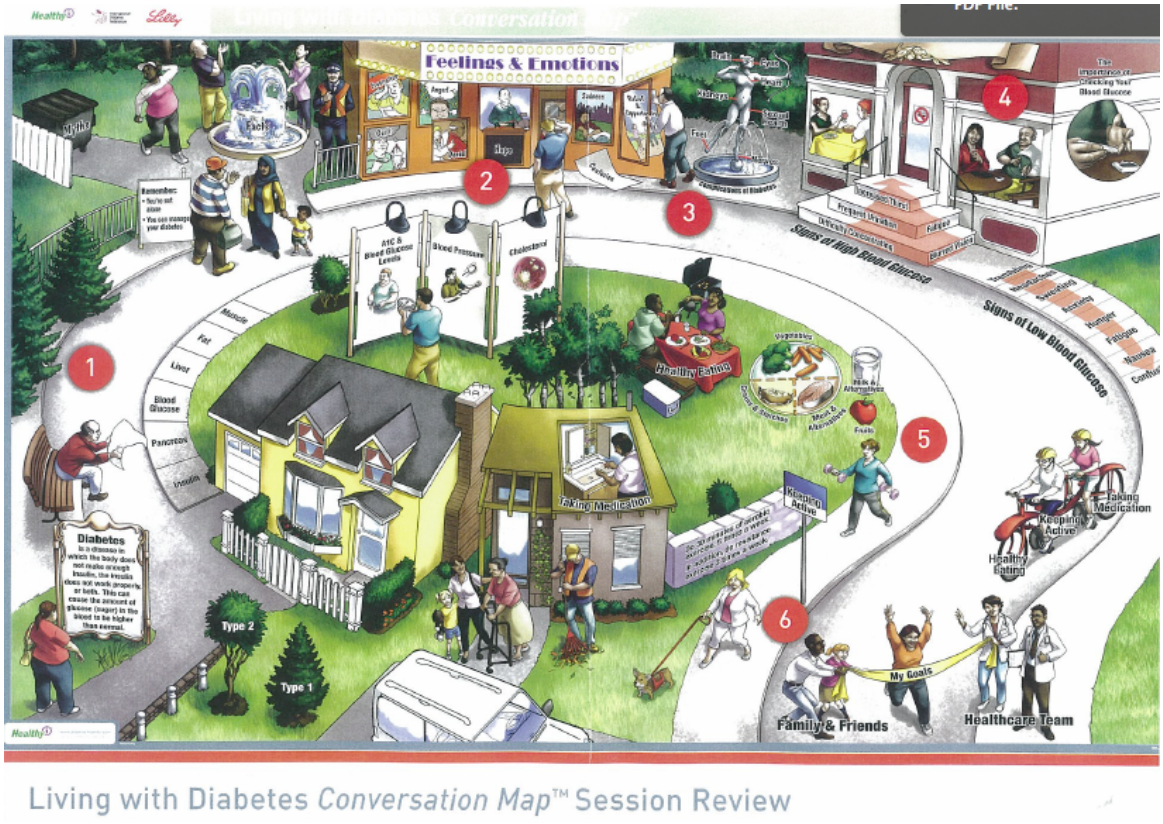
Printed Name of Person Obtaining Consent

_____

Signature of Person Obtaining Consent _____ Date

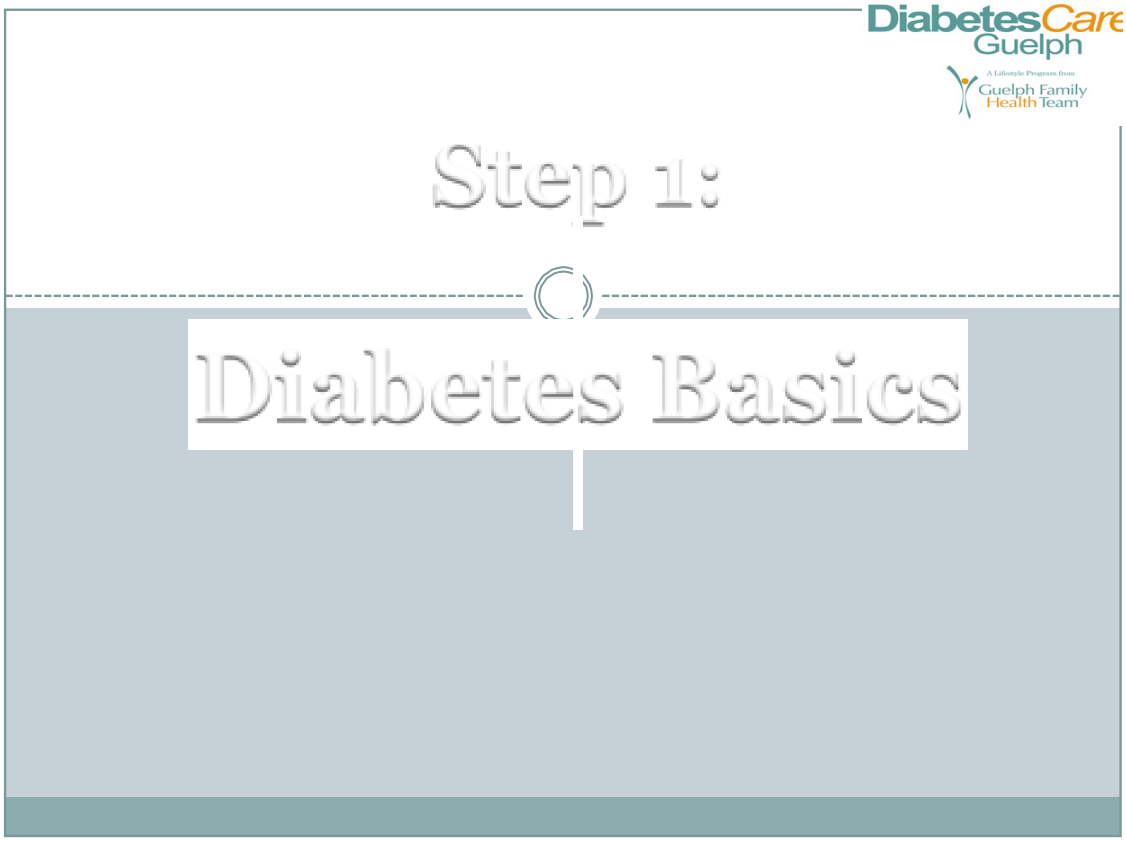
☐ Please place a √ in the box provided if you wish to receive information about the overall results of the study.

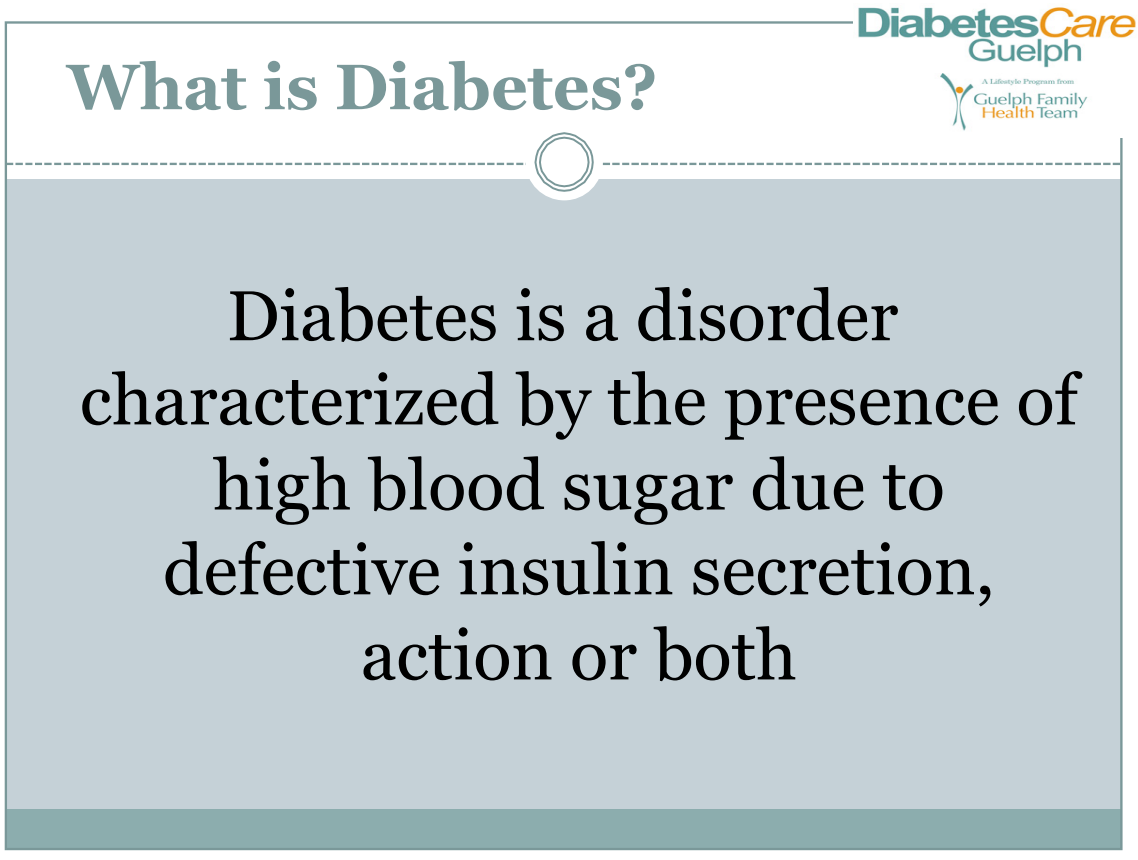
Appendix N. Image of the Conversation Map Provided by Diabetes Care Guelph



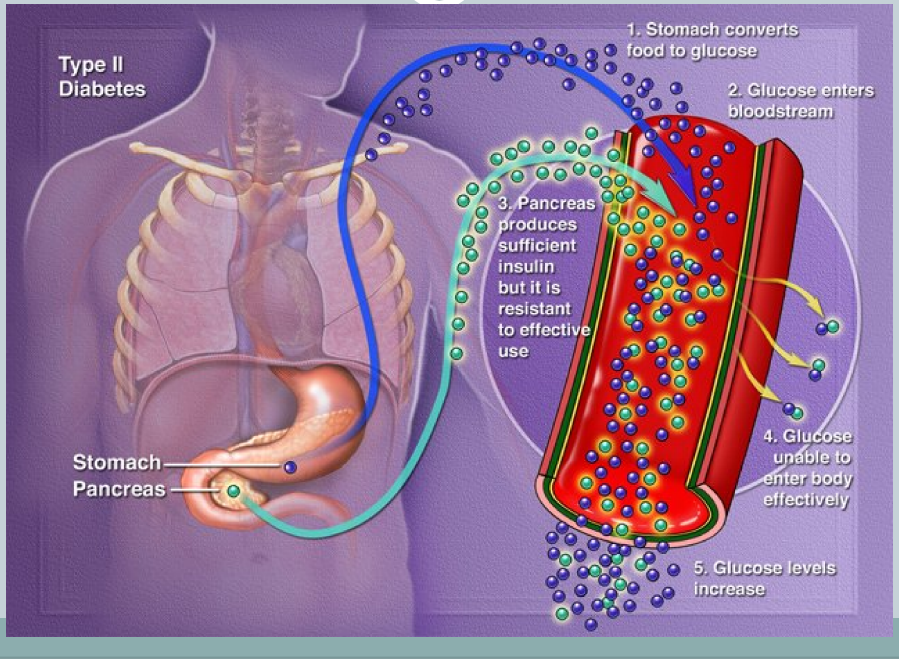
Living with Diabetes *Conversation Map*™ Session Review

Appendix O. Traditional Education Method PowerPoint Presentation





DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team



DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team

Types of Diabetes

Type 1

- Usually young children
- No insulin production
- Treatment is Insulin

Type 2

- Usually adults
- Obesity or abdominal overweight
- Treatment varies

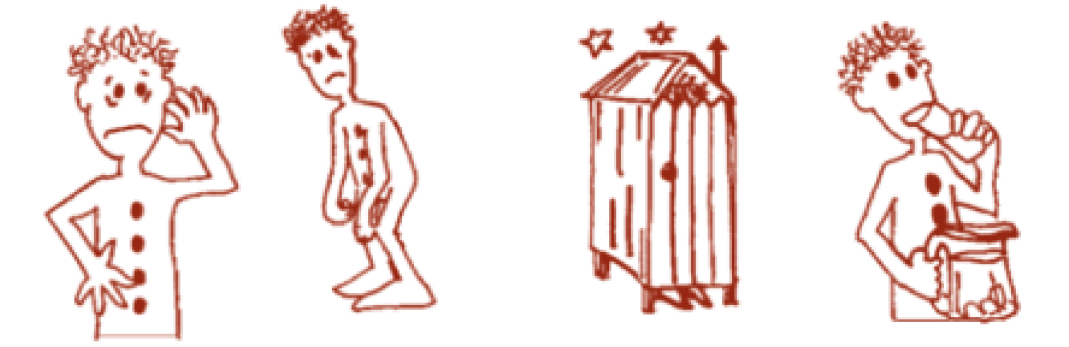
Diabetes – Risk Factors

DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team

Uncontrollable	Controllable
Family History	Smoking
Over age 40	Weight
	Exercise
	Annual check-ups
	Healthy, well balanced meals

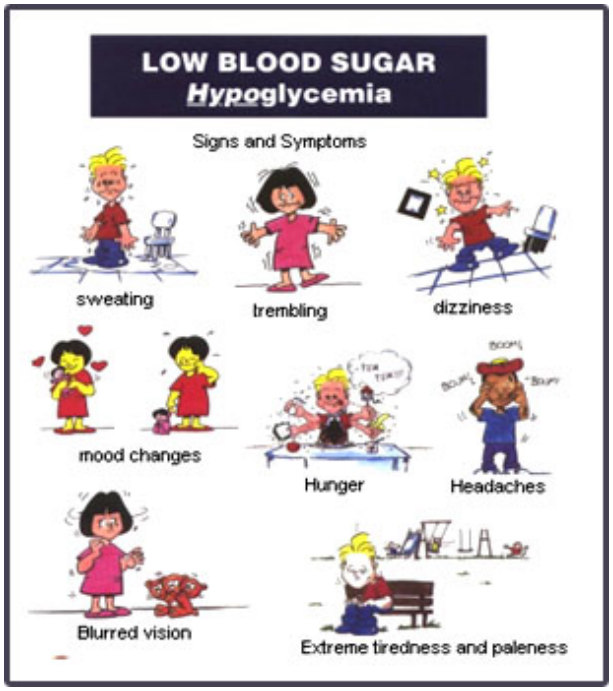
Hyperglycemia

DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team



How To Treat Symptoms

- Check Sugar
- ¾ cup (175ml) of Orange Juice or Regular pop
- 6 Lifesavers
- 1 Tbsp honey
- 5 hard candies
- Re-check blood sugar after 15min. If still low – treat again
- Eat snack/meal

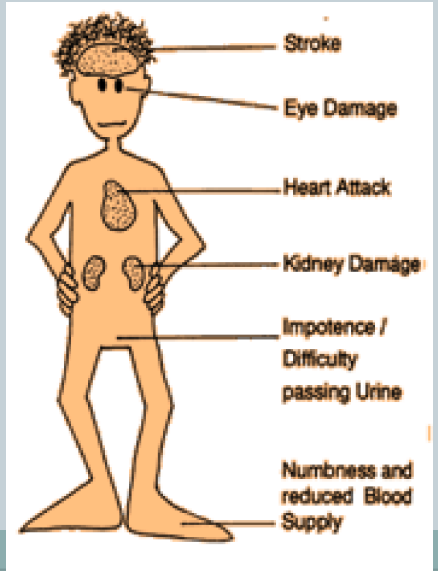


DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team

Diabetes is Progressive

long-term affects of high blood sugar!!!

Complications:



Taking Control!!

Self Management Skills…

- Meals
- Monitor
- Movement
- Medications

Monitors

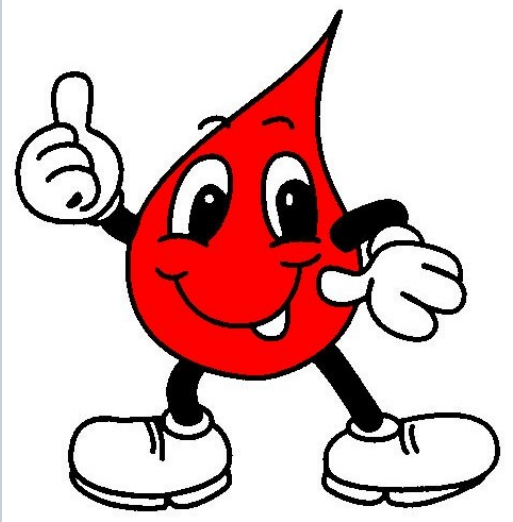
How do I get one?

- Purchase from pharmacy
- Prescription from Doctor
- Promotions through pharmacy – Buy strips get meter free
- Drug Plans

Blood Sugar Monitoring

Based On:

- The individual
- Type of diabetes
- Current treatment
- Need for information about blood sugars



Target Blood Sugar Values

Fasting Blood Sugar Value	2 Hours After Meals
• 4 – 7mmol/L	• 5 – 10mmol/L • 5 – 8 mmol/L (tighter control)

Lab Tests

DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team

HbA1C

- Every 3 – 6months

Lipid Profile

- Annually

Kidney Function

- Annually and/or as necessary

Liver Function

- Annually and/or as necessary

Screening

DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team

It is also recommended:

Eye Exams – annually

Dental check up/cleaning – every 6-9 months

Footcare – weekly inspection and toenail care; annually by healthcare provider

Movement

Moderate physical activity of 150min/wk

5-7 % weight loss (about 15 pounds)

- Reduces blood sugars
- Reduces insulin resistance
- Reduces risk of heart disease
- Improves cholesterol
- Weight loss

Stress and Coping

Stress hormones affect your blood sugar levels !!

Identify your stress

Accept what is beyond your control

Recognize what you can control

G FOR DIABETES MANAGEMENT

DiabetesCare Guelph

A Lifestyle Program from Guelph Family Health Team

DiabetesCare Guelph

A Lifestyle Program from Guelph Family Health Team

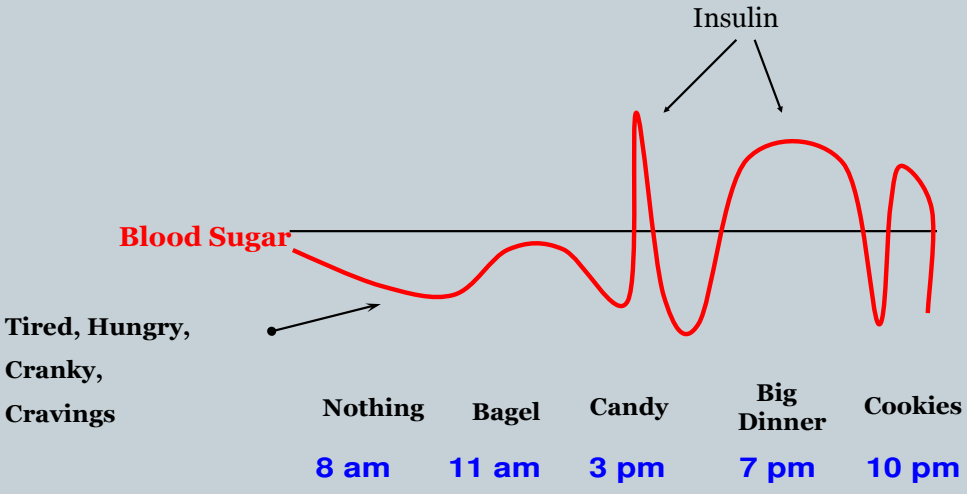
Planning Meals & Snacks

Meal Timing is Key

DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team

Food Energy Connection

DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team

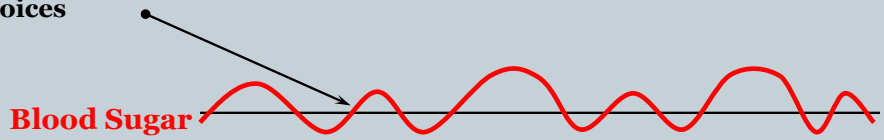


DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team

Space Meals 4 to 6 Hours Apart

Happy,
Energized
Good food choices

Frequent small meals and snacks



Breakfast	Snack	Lunch	Snack	Small Dinner	Snack
7am	10am	12 pm	3pm	6pm	9pm

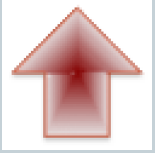
DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team

What are Carbohydrates?

CARBOHYDRATES = SUGAR = ENERGY = FUEL

Forms of Carbohydrates:

1. Sugars
2. Starches



RAISE BLOOD SUGARS

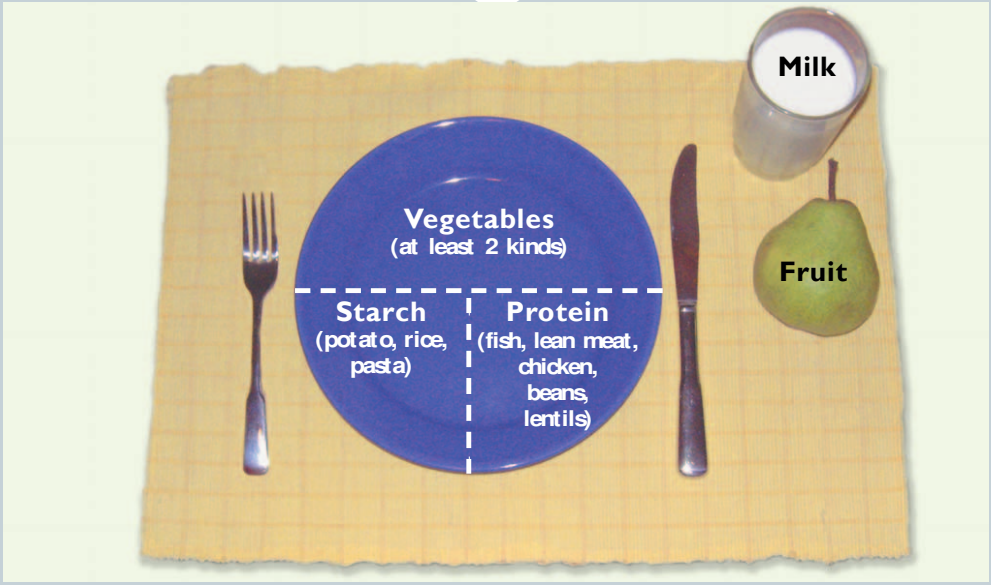
Where are Carbohydrates Found?

DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team

- Grains and Starches
  (including corn, potatoes)
- Fruits and fruit juice
- Sweet Vegetables
  (peas, parsnips, squash)
- Milk and Alternatives
- Sweet Foods and Snacks

Balanced Meals

DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team



Consistent amounts of carbohydrate foods at meals and snacks

DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team

Balanced Snacks

CARBOHYDRATE SOURCES *(choose whole grains, limit sugars and sweets)*		PROTEIN SOURCES *(choose lower fat options for heart health)*
Fresh fruit (1 medium apple)		Low-fat cheese (1oz) (<20%MF)
Whole-grain crackers (4-6)		Tuna (¼ cup)
Low fat yogurt (¾ cup) (artificially sweetened)		Almonds (8-10)
1 slice whole wheat bread		Peanut butter (1 tbsp)

DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team

Healthy Weight

- Regular exercise
- Healthy eating environment
- Appropriate portions
- Eat fibre-rich foods
- Healthy beverage & snacks

DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team

Golden Rules

1. Eat consistent amounts of carbohydrate at meals and snacks.
2. Space meals 4-6 hours apart.
3. Include protein with meals and snacks.
4. No fruit on its own.
5. Limit unhealthy fat intake.

DiabetesCare Guelph
A Lifestyle Program from Guelph Family Health Team

Thank you!

Questions?

Appendix P. Association of Family Health Teams of Ontario Presentation on

Preliminary Research Findings Presented October 15, 2012

Guelph Family Health Team

Evaluating the impact of two methods of diabetes self-management education on patients' knowledge, attitude and behaviours

Laura Briden RD MSc (cand) CDE
October 15, 2012

Acknowledgements

Dr. Alicia C. Garcia, PhD RD CFE

Brescia University College

Collaborators at Diabetes Care Guelph

Guelph Family Health Team

Agenda

- Background
- Research objectives
- Study design & methodology
- Preliminary results
- Concluding thoughts
- Implications for practice
- Questions

Guelph Family Health Team

Prevalence of Diabetes

- By 2016, a predicted 3 million Canadians are expected to be living with diabetes
- Current prevalence of diabetes
  - Canada: 6.2%
  - Ontario: 8.8%
  - Guelph: 7%

based on Guelph FHT random practice searches (EMR software)

Public Health Agency of Canada, Diabetes Surveillance, 2009

Guelph Family Health Team

Incidence of Diabetes

- 2006-07 newly diagnosed cases of diabetes
  - 211,168 aged 1 year and older
  - Lower rates in children
  - Rising steadily after 45 years, peaking at 70 to 74 years
- Every 10 seconds, 2 people are diagnosed with diabetes in the world (International Diabetes Federation)

Public Health Agency of Canada, Diabetes Surveillance, 2009

Guelph Family Health Team

Background

Education Goal:

- Patient Self-Management
  - Ability to make independent, informed decisions
- Self-management recommended goals:
  - Glycemic control (HbA1c < 7%)
  - Blood pressure (<130/80)
  - LDL cholesterol (< 2.00 mmol/L)

Holman et al. N Engl J, 2008

Saydah et al. JAMA, 2004; Resnick et al. Diabetes Care, 2006

Guelph Family Health Team

Background

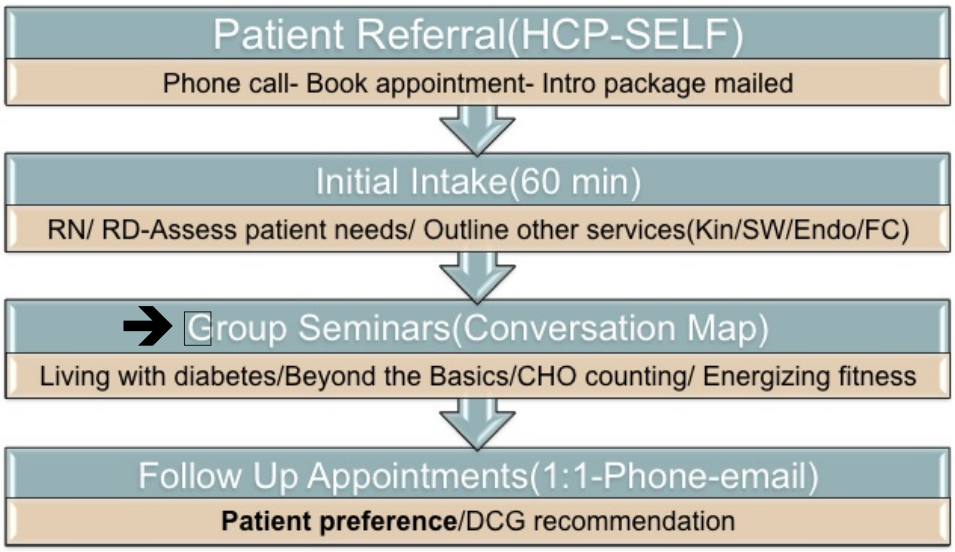
Domains of learning:

1. Cognitive (abstract, knowledge)
   - Lectures and self-learning manuals
2. Psychomotor (skill)
   - Demonstration and practice
3. Affective (feeling, attitudes, beliefs)
   - Group discussion, brainstorming, and values clarification

Redman BK, The practice of patient education 9th ed., 2001

Guelph Family Health Team

Diabetes Care Guelph



Guelph Family Health Team

Conversation Maps

- Tool to engage people in conversations in order to facilitate learning
- Opportunity to share experiences with others; Educators act as facilitators

Why Study Conversation Maps?

- A large number of people do not achieve recommended self-management goals
- No research to date that examines the impact of conversation maps on patients in diabetes self-management education

Purpose of Research

- Study the effectiveness of conversation maps compared to traditional methods of group education:
  - ➢ Scored Knowledge and Attitude questionnaires
  - ➢ Pre-test/post test design
  - ➢ Focus groups
    - Patient perceptions
    - Reported behaviour changes

Guelph Family Health Team

Definitions

- Conversation Maps
  - ➢ Table top display to facilitate learning
- Traditional Education
  - ➢ Powerpoint presentation with question and answer period

Guelph Family Health Team

Research Objectives

Objective 1. To determine self-management knowledge and attitudes of patients with diabetes before and after diabetes education intervention

Objective 2. To evaluate the impact of conversation maps and traditional group education on knowledge and attitudes of patients

Objective 3. To compare patients' knowledge and attitude scores between groups after receiving education

Guelph Family Health Team

Research Objectives

Objective 4. To compare changes in patients' glycosylated hemoglobin (HbA1c)

Objective 5. To determine behavior changes and explore patient perceptions using focus groups

Guelph Family Health Team

Study Design

- Participants randomly assigned to 2 intervention groups
- Pretest/ posttest questionnaire
  - Adapted from Michigan Diabetes Research and Training Center
  - 20-item Knowledge questionnaire (MC)
  - 33-item Attitude questionnaire (Likert scale)
- Focus Groups - 3 months post intervention

Guelph Family Health Team

Participants

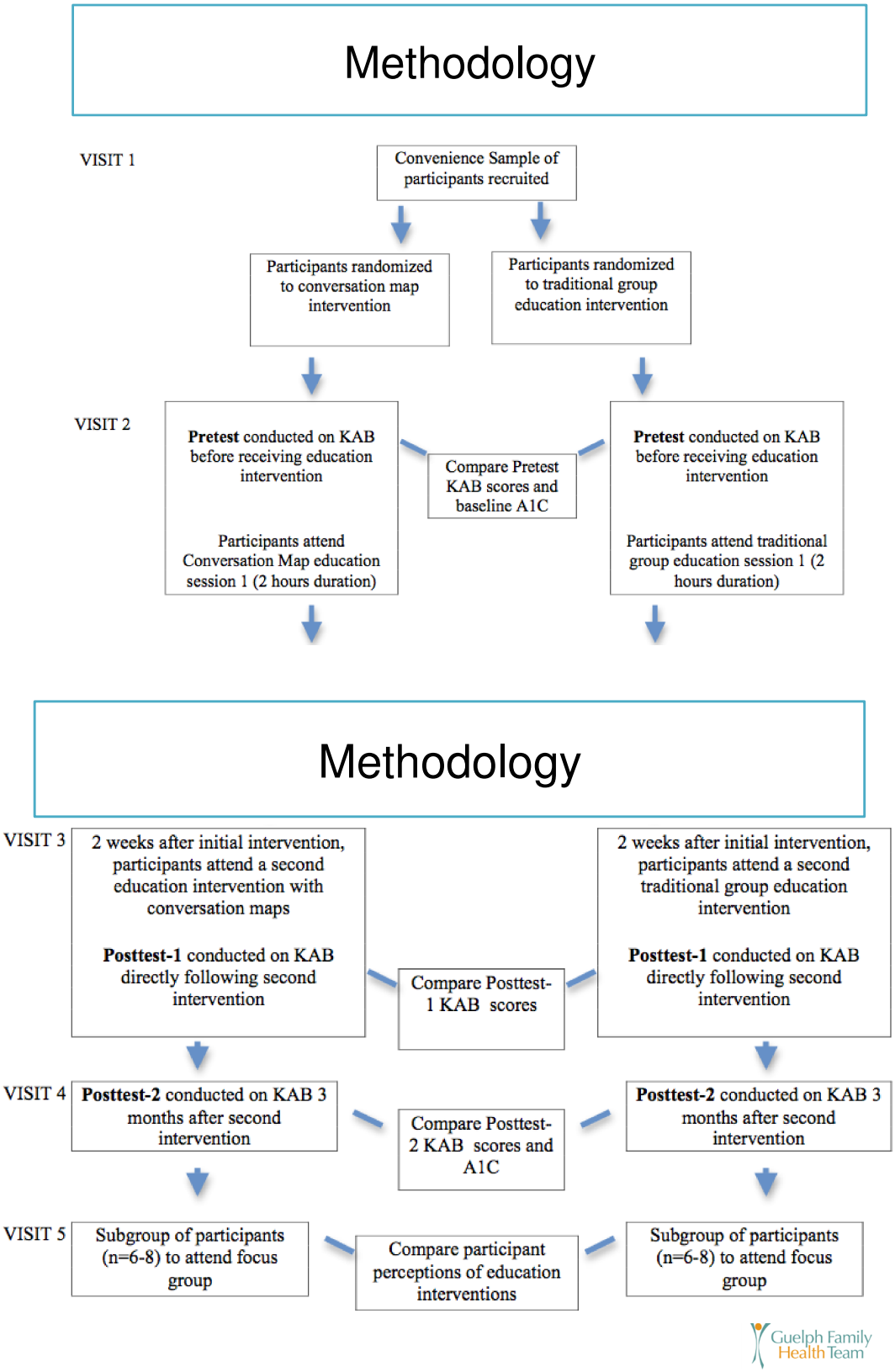
Inclusion

- 19 to 65 years of age
- Diagnosis of type 2 diabetes within previous five years
- No previous diabetes education
- Read, write and speak the English language

Exclusion

- Diagnosed with a mental or psychosocial health condition that is not stable
- Unable to provide written consent
- Have less than an 8th grade education

Guelph Family Health Team

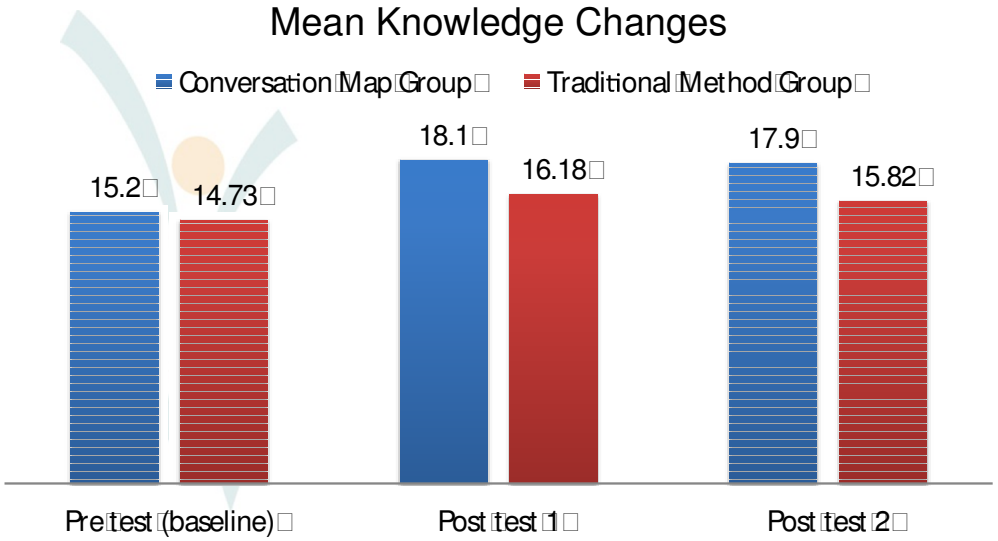

Methodology
VISIT 1
Convenience Sample of participants recruited
Participants randomized to conversation map intervention
Participants randomized to traditional group education intervention
VISIT 2
Pretest conducted on KAB before receiving education intervention
Participants attend Conversation Map education session 1 (2 hours duration)
Compare Pretest KAB scores and baseline A1C
Pretest conducted on KAB before receiving education intervention
Participants attend traditional group education session 1 (2 hours duration)
Methodology
VISIT 3
2 weeks after initial intervention, participants attend a second education intervention with conversation maps
Posttest-1 conducted on KAB directly following second intervention
Compare Posttest-1 KAB scores
2 weeks after initial intervention, participants attend a second traditional group education intervention
Posttest-1 conducted on KAB directly following second intervention
VISIT 4
Posttest-2 conducted on KAB 3 months after second intervention
Compare Posttest-2 KAB scores and A1C
Posttest-2 conducted on KAB 3 months after second intervention
VISIT 5
Subgroup of participants (n=6-8) to attend focus group
Compare participant perceptions of education interventions
Subgroup of participants (n=6-8) to attend focus group
Guelph Family Health Team

Baseline Characteristics

	Conversation map intervention group	Traditional education intervention group
Number of participants: n	10	11
Age		
Mean ± SD	46.8 ± 11.86	56.18 ± 6.05
(Range)	(20 to 64.9)	(47 to 64)
Language (%)		
English	100	100
Gender (%)		
Male	50	60
Female	50	40
Marital Status (%)		
Married	50	64
Separated	20	0
Divorced	0	18
Common Law	10	0
Single	20	18
Education Level (%)		
Finished high school	30	46
Trade school/college diploma	40	36
University undergraduate degree	30	0
University graduate degree	0	18
Duration of diabetes (%)		
≦6 months	60	64
> 6 months	40	36

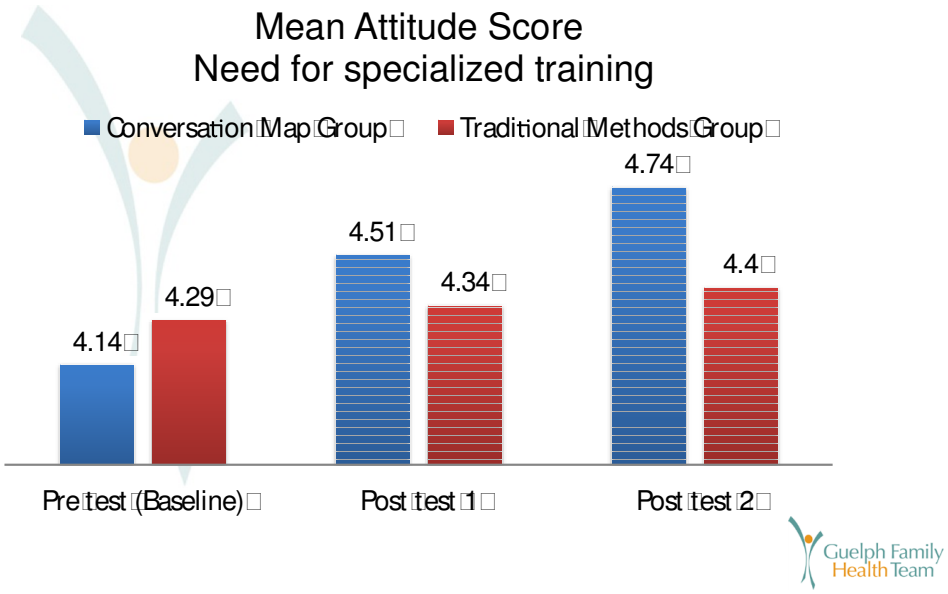
Guelph Family Health Team

Preliminary Results

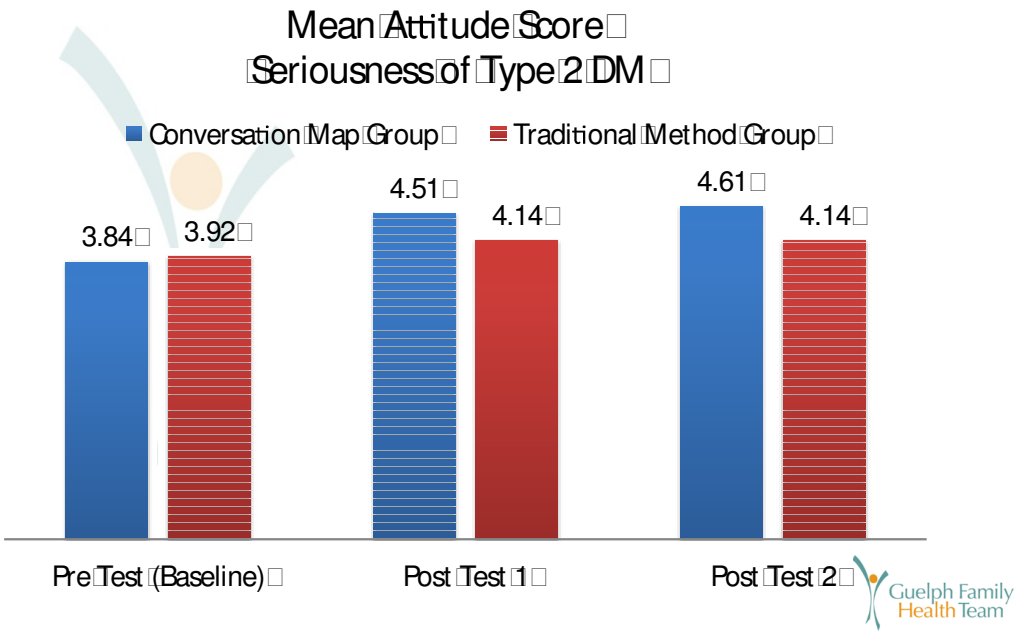


Guelph Family Health Team

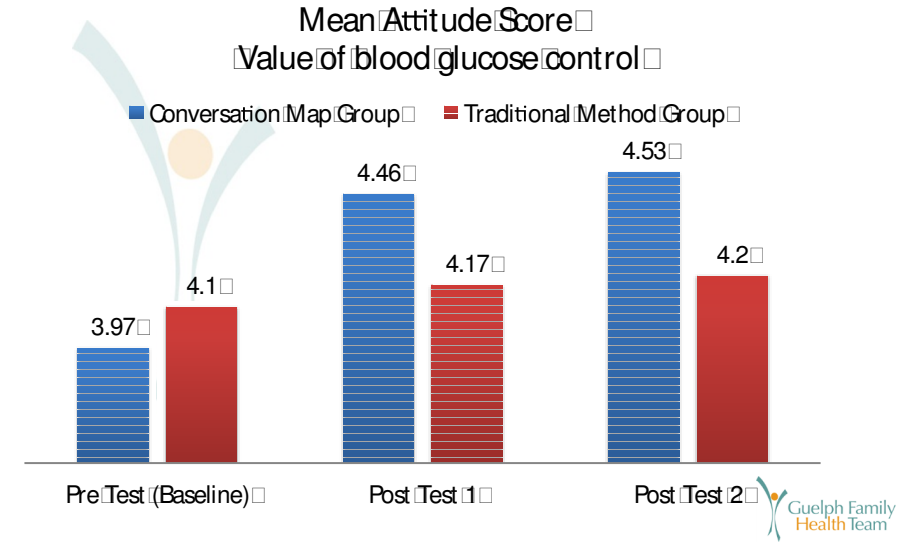
Preliminary Results:



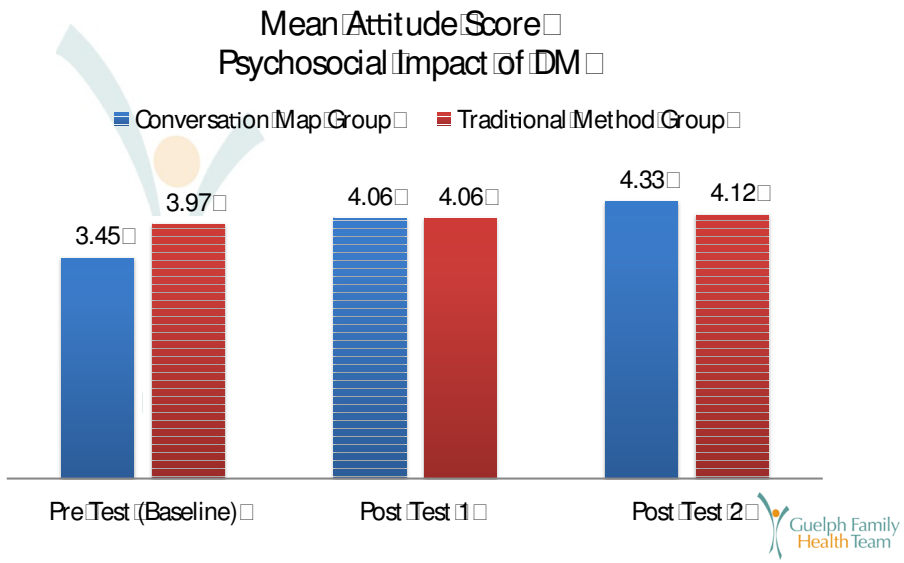
Preliminary Results:



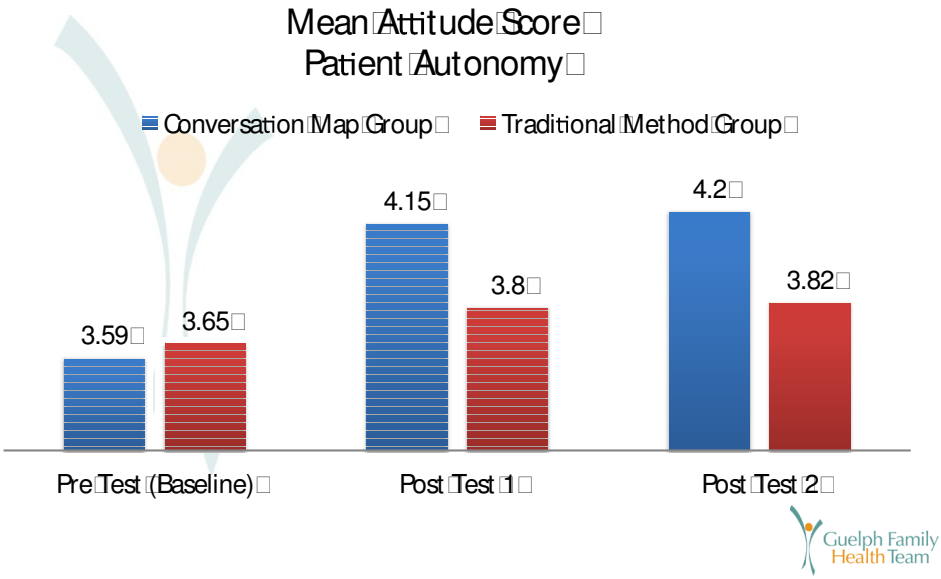
Preliminary Results:



Preliminary Results



Preliminary Results



Preliminary Results

Between group differences	Post Test 1	Post Test 2
Knowledge	ns	ns
Need for special training	ns	p<0.05
Seriousness of type 2 DM	p<0.05	p<0.05
Value of blood glucose control	ns	p<0.05
Psychosocial impact of type 2 DM	p<0.05	p<0.05
Patient Autonomy	ns	ns

ns = no statistical significance

Guelph Family Health Team

HbA1c Results

- Conversation Map Group
  - ➢ HbA1c levels were significantly decreased mean difference 1.2%, p <0.05
- Traditional Education Group
  - ➢ HbA1c levels were significantly decreased mean difference 0.76%, p < 0.05
- No significant difference in HbA1c changes between groups

Guelph Family Health Team

Focus Group Results

Common Themes	• Benefits of Early Education Uptake • The Need for Specialized Education • Education Encouraged Multiple Lifestyle Management Behaviour Changes
Conversation Map	• Experiential Learning Environment • Self-Directed Approach to Learning • An Attitude of Feeling Socially Supported • Visualization of Specific Diabetes Management Needs
Traditional Education	• Low Group Participation

Guelph Family Health Team

Conversation Map Themes

- Experiential Learning Environment
- Self-Directed Approach to Learning
- An Attitude of Feeling Socially Supported
- Visualization of Specific Diabetes Management Needs

Traditional Education Theme

- Low Group Participation

"I think when you get to our age, it's not telling us these vegetables are good for us. I know what is good and I know what is not good. I want to create conversation and discuss my struggles with others and know that I'm not alone. The information you were trying to give is valued but the lesson plan needs to be revised."

Concluding Thoughts

- Conversation maps are an effective way of providing diabetes education
  - ➢ Effective at improving patient knowledge and supporting knowledge retention, and creating behaviour change
  - ➢ Results indicate CM may have a greater impact on patient attitudes toward diabetes than traditional methods

Guelph Family Health Team

Implications to Practice

- Practice-based evidence for future program development
- Platform for further research in diabetes education

Guelph Family Health Team

Guelph Family Health Team

THANK YOU

QUESTIONS?

Appendix Q: Speaker Agreement for Presenting Research at 2013 Dietitians of Canada Regional Conference

Dietitians of Canada
Les diététistes du Canada

Central & Southern Ontario Conference

March 1, 2013

Speaker Agreement

Dear Laura:

Thank you for agreeing to speak at our upcoming Dietitians of Canada *Regional Conference, Central and Southern Ontario* to be held on *Friday March 1, 2013* in Toronto. This speaker agreement describes the terms and conditions of your agreement to speak at the event, to be held at:

Metro Toronto Convention Centre
North Building, 255 Front St.
Toronto ON

Please read this agreement carefully and sign, indicating your agreement to these terms. Fax or scan and email a signed copy to the fax/email below. Retain a copy for your reference.

Dietitians of Canada, attn: Frances Scovil
Fax: 416-596-0603
E-mail: frances.scovil@dietitians.ca

You agree:

- that the information you will present is accurate, to the best of your knowledge.
- that the information you will present is your own original work and will not infringe on any personal or property rights of any other person or organization.
- that the information you will present is based upon current, scientific evidence.
- not to include advertising or promotion of specific products or services as this contradicts DCs mandate to provide high quality professional development and is prohibited under this agreement.
- that the session may be recorded for future posting on the Dietitians of Canada website.
- to provide electronic handouts that delegates can download in advance of the event.
- to make your own travel arrangements as per the attached DC Expense Policy.
- to submit expenses adhere to the expense and travel procedures as outlined in the Expense Policy to ensure proper reimbursement; include receipts for all travel and meals.

Dietitians of Canada will provide the following speaker benefits:

- HONORARIUM/FEE of $250 CDN
- COMPLIMENTARY FULL REGISTRATION
- TRAVEL and MEAL EXPENSES – in accordance with the Expense Policy.

Cancellation

In the event that your speaking session is cancelled, any non-refundable expense for airline tickets purchased at our instructions would be reimbursed. However, DC would not be liable for any further expenses, costs, or damages incurred by you in connection with the event. If any emergency requires your cancellation, you will agree to provide cancellation notification prior to the event. This agreement is nontransferable.

I have read and agree to comply with the above guidelines.

Signature Date

Appendix R. Abstract for 2013 Dietitians of Canada Regional Conference

Title of Presentation: Evaluating the impact of two different forms of diabetes self-management education on knowledge, attitude and behaviours of patients with Type 2 diabetes mellitus

Researchers: Laura Briden RD MSc(cand) CDE, Alicia C. Garcia PhD RD CFE, Diabetes Care Guelph

Program: Diabetes Care Guelph, The Guelph Family Health Team

Abstract: Research was conducted examining different delivery methods of diabetes self-management education. Adult patients with type 2 diabetes mellitus were selected from a convenience sample, randomized and exposed to two education delivery methods, one group receiving education through conversation maps and the other through a traditional Powerpoint presentation. A pre-test/ post-test design assessed changes in participants' knowledge and attitudes. Focus groups were conducted to explore participant's perceptions of the different education delivery methods and gain qualitative information on behavioural changes. The study indicated that the conversation map is a more effective delivery method compared to traditional group education.

Curriculum Vitae

Name:	Laura Beth Briden
Post-secondary Education and Degrees:	University of Guelph Guelph, Ontario, Canada 2002-2006 B.A.Sc. London Health Sciences Comprehensive Dietetic Internship Program 2007-2008 R.D. Certified Diabetes Educator Certification 2010 C.D.E The University of Western Ontario London, Ontario, Canada 2010-2012 M.Sc.F.N.
Honours and Awards:	Dr. Patricia Giovannetti Graduate Studies Award 2010
Related Work Experience	Teaching Assistant Brescia University College, The University of Western Ontario 2010-2011 Registered Dietitian, Diabetes Educator Diabetes Care Guelph The Guelph Family Health Team 2008- present