

# The Effectiveness of Diabetes Conversation Map™ among Insulin Refusal Type 2 Diabetes Mellitus Patients

Mohd Tahir NS<sup>a</sup>, Zakaria R<sup>a,b</sup>, Zulkifli M<sup>a,b</sup>, Draman N<sup>a,b</sup>

<sup>a</sup>Department of Family Medicine, School of Medical Sciences, Universiti Sains Malaysia Health Campus, Kubang Kerian, Malaysia

<sup>b</sup>Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia

## ABSTRACT

**INTRODUCTION:** Majority of patients with type 2 diabetes mellitus (T2DM) will eventually need insulin therapy to optimise their blood glucose level. However, there is difficulties in initiating an insulin therapy due to high refusal rate among these patients. Diabetes Conversation Maps (DCM), a tool designed to educate patients with diabetes and their family members is available in Malay language since 2008. Although DCM has been used in certain centres in Malaysia, their effectiveness has not been evaluated. Thus, we have conducted a study to assess effectiveness of DCM compared to standard counselling therapy in T2DM patients who initially refused insulin therapy by assessing acceptance rate post intervention. **MATERIALS AND METHODS:** A randomized control study was conducted on 88 adults T2DM patients who initially refused insulin therapy in primary care clinics in Kelantan. A total of 44 patients received group based education using a Malay version DCM whereas another 44 patients received standard individual education. Results were analysed using a Chi-square analysis and the significant result was set at p value of <0.05. **RESULTS:** The response rate was 97.7% and there was a significant difference in insulin acceptance between these two groups. Eighty-six percent of T2DM patients in the intervention group education eventually accepted insulin initiation compared to only 11% in the control group (p<0.001). **CONCLUSION:** Group education using Malay Diabetes Conversation Map on insulin initiation is effective in increasing acceptance among patients who initially refuse insulin treatment in primary care. We recommend using DCM as part of educational module to improve patient diabetic management.

## Keywords

T2DM; acceptance; education intervention; insulin; educational module

## Corresponding Author

Dr. Rosnani Zakaria  
Department of Family Medicine,  
School of Medical Sciences,  
Universiti Sains Malaysia,  
16150, Kubang Kerian,  
Kelantan, Malaysia  
Email : rosnani@usm.my

Received: 9<sup>th</sup> Jan 2023; Accepted: 24<sup>th</sup> May 2023

Doi: <https://doi.org/10.31436/imjm.v2i3>

## INTRODUCTION

Patients with uncontrolled diabetes will have complications earlier than those with controlled diabetes.<sup>1</sup> A macrovascular complications leads to coronary artery disease, stroke and peripheral arterial disease,<sup>1</sup> whereas microvascular complications causes retinopathy, nephropathy and neuropathy.<sup>1</sup>

Haemoglobin A1c (HbA1c) level is the commonest, easy and accurate measurement of blood glucose level in a person with normal haemoglobin in the last two to three months.<sup>2</sup> HbA1c of 6.5% or less is the desired level whereas HbA1c level of less than 7 % is set as a goal for

controlled blood glucose level by American Diabetes Association (ADA).<sup>3</sup> Studies shown that increment of HbA1c by 1% increase risk for death and macrovascular complications by 38%; and microvascular complications by 40% (all p <0.0001).<sup>4</sup>

A study conducted in Malaysia in 2020, shown that uncontrolled T2DM patients in Malaysia is high as only 30.7% of these patients achieved target HbA1c level of ≤6.5%.<sup>5</sup> However, only 30.0% of T2DM patients in Malaysia were on insulin therapy.<sup>5</sup> Similar studies conducted in Hawaii and Pakistan shown high percentage

of uncontrolled diabetes; 38% (Hawaii) and 38.9% (Pakistan).<sup>6,7</sup>

Current guidelines recommended that insulin therapy should be initiated in T2DM patients with HbA1c level of 8% or more at the diagnosis; and in T2DM patients with HbA1c level far from <6.5% after 3 to 6 months on combination therapy of optimum oral medications.<sup>8</sup>

Lack of knowledge regarding insulin and poor perception toward it, are the main reasons for patients delayed insulin treatment.<sup>9,10</sup> Various educational tools have been developed to enhance the delivery of the knowledge. Among the educational tools that has been developed was Diabetes Conversation Map (DCM) which has been used to engage patients in a facilitated group education to help in making changes toward behaviour for good health.<sup>11</sup>

The Ministry of Health of Malaysia has been organising courses on using DCM as educational tool in diabetes management since 2000, and had trained around 900 diabetic nurse educators and other health professional in the country.<sup>12</sup> The English version was used during the early days until 2008 when the first Malay version was introduced by Eli Lilly® Company in 2008.<sup>12</sup> It is not until 2012, when the complete set was available in Malay language.<sup>12</sup> However the effectiveness of this educational tool has not being studied in our population as yet. DCM has been used both in primary and hospital-based diabetes care.<sup>12</sup>

We hypothesise that if we increase patients understanding toward insulin, this might increase patient acceptance toward insulin for better glycaemic control. We chose DCM as our counselling tools because it was widely available in our country and our trained diabetic educators were well versed with it.

In this study, Malay version of DCM on initiation insulin treatment was chosen to be our interventional tool, comparing it with standard care of giving individual counselling using standard protocol as per International Diabetes Federation module on diabetes education. We want to find out whether DCM is effective in improving acceptance among T2DM patients who initially refuse

insulin to accept insulin treatment.

## MATERIALS AND METHODS

We calculate our sample size by comparing two proportion using PS Software. We took our  $p_1$ =expected proportion of patients refused insulin after counselling=0.27 and  $p_0$ =proportion of patients accepted insulin after counselling=0.575 from Khan et al, 2008. We set Power at 0.8,  $m=1$ ,  $\alpha=0.05$ . We need 40 subjects for each group, hence a total of 80 subjects. Since we are using face to face method, we take 10% as our dropout, the final sample size was 88.

This is an open randomised control trial. A total of 88 uncontrolled T2DM patients with HbA1c > 8% who refuse insulin treatment completed this study. The study included T2DM patients age 18 years old and above with HbA1c > 8% and able to read and understand Malay language. Patients with an acute psychiatric disease, deaf and blind were excluded from this study. We used computer-generated block randomisation to assign patients into intervention and control group.

## Tools

We received the permission from Chris Hohenberger, the program developer to use the DCM that we had chosen as an interventional tool.

The DCM topic that we chose was on insulin treatment initiation by the Eli Lilly ® Company. It consists of a table top visual map of 3 feet by 5 feet size, with the contents display as pictures in an easy and informative ways and discussion and question cards that was called “myth” and “fact” cards.

As for the contents information of the cards, it started with what is insulin? its benefits, the side effects expected, the different types of insulin, target blood glucose level and other relevant information on insulin usage.

It was to be used as tool in a small group discussion of three to ten people.

## **Intervention group**

The groups consist of 8-10 participants with one trained facilitator (the only one) per time. The counselling room with suitable table, chairs and other amenities were chosen as the group consultation site. One session took about 60-90 minutes to complete.

The consultation started with the participants introduced to the other group members briefly. When all the participants were ready, the facilitator explored their baseline knowledge and their attitudes towards diabetes using the discussion and question cards on the topic.

The facilitator will read out loud the myth cards to stimulate a discussion. She then guided the participants to have an interactive discussion based on the cards contents and their own experience. She then presented the facts cards in a clear, proper and concise way. The session finished when all the myths and facts cards were discussed.

After the education session end, the participants in the intervention group were reviewed by the investigator in a consultation room in the clinic individually and their acceptance on insulin initiation were determined there and then. For those who accept insulin initiation, insulin was prescribed together with other medications and 1 month follow up were given to the participants for continuity of care. These participant will be counted as participant who accepted insulin treatment.

Those who refused insulin will be counted as participants who refuse insulin and even if they accept insulin later on, they would not be counted in this study as those who accepted insulin due to DCM intervention. They will be prescribed the medications that were appropriate to them and was given 1 month follow up as well.

During the 1 month follow up, the participants were reviewed for their well-being, acute problems, and side effects of medication especially hypoglycaemic symptoms for those who accepted insulin therapy, compliance of the medications, vital signs and capillary sugar level.

The participants who still refused insulin therapy were then again educated on insulin therapy individually and if still refuse will be referred to family medicine specialist for further management.

## **Control group**

For the control group, the participants were given a standard individual diabetes education module based on the International Diabetes Federation recommendation by the medical officer on their usual diabetes care follow up.<sup>13</sup> It was a standard diabetes education that should be provided to all diabetes patients as recommended by IDF and practised in primary health clinic in Malaysia.

After the consultation, they will be seen by the investigator to review on their insulin acceptance on the same day. Patient who accepted insulin therapy there and then will be considered as participant who accepted insulin treatment. Participants who accepted insulin therapy later on or at one month follow up will not be considered as those who accept insulin in this study. 1 month follow up were given to the participants to see the investigator for continuity of care.

During the 1 month follow up, the participants from the control group were reviewed as same as the intervention group for their well-being, acute problems, side effects of medication especially for those who accepted insulin therapy, compliance to medications, vital signs and capillary sugar level. Those participants who still refused insulin therapy were educated on insulin therapy individually and will be referred to family medicine specialist with appointment date taken.

## **The standardization of the individual education**

Each medical officer in our primary care clinic, was informed and given the International Diabetes Federation guideline module for diabetic patient education and were advised to adhere by it during patient consultation.<sup>13</sup>

The consultation started with discussion on the diabetes disease process, the need for insulin and treatment options available.

Topic that were discussed are, what is insulin? its role in T2DM management, important of controlling blood glucose level and diabetes complications, any other concern raised by the participants will be discussed as well. Duration taken for individual consultation is between 15-20 minutes per individual as per standard appointment time for counselling.

## Data Analysis

For analysis, we used Statistical Package for the Social Sciences (SPSS) statistic version 24.0 software (IBM Corporation, Armonk, NY, USA). All numerical variables were reported in mean with standard deviation (SD). Categorical variables were reported in frequency with percentage.

All variables with a low number of responses were collapsed into a combination of meaningful variable. To assess the effectiveness of DCM group education versus standard education in accepting insulin therapy, we used Pearson Chi square test with, p value of < 0.05 set as significant.

Our outcome variable was insulin acceptance, whereas our independent variables are a mixture of numerical and categorical variables.

## Ethical clearance

Human Research Ethics Committee of USM (USM/JEPeM/15030084) approved this study.

## RESULTS

A total number of 90 uncontrolled T2DM patients who fulfilled the criteria were recruited. 88 patients completed the study, with the response rate of 97.8%. Both intervention and control groups consist of 44 participants.

### Sociodemographic and medical characteristics of the participants

The age of the participants was between 41 to 60 years old. The mean (SD) age of the participants for control group

was 52.9(5.5) years and 54.2 (4.3) years for intervention group. Majority of the participants were females, with 61.4% in the intervention and 79.5% in the control groups. Both groups have almost similar characteristics, as shown (Table I).

**Table I:** Sociodemographic and medical characteristics of the participants

Variables	Control n=44 (%)	Intervention n=44 (%)	p-value
Age, years (mean±sd)	52.9 (5.57)	54.2 (4.31)	0.032 <sup>a</sup>
T2DM, years (mean±sd)	7.8 (1.89)	7.8 (3.13)	0.005 <sup>a</sup>
Occupation			
Employed	19 (43.2)	22 (50.0)	0.521
Unemployed	25 (56.8)	22 (50.0)	
Ethnic			
Malay	40 (90.9)	41 (93.2)	0.694
Non- Malay	4 (9.1)	3 (6.8)	
Education level			
Tertiary	4 (9.1)	3 (6.8)	0.694
Non-tertiary	40 (90.9)	41 (93.2)	
Gender			
Female	35 (79.5)	27 (61.4)	0.062
Male	9 (20.5)	17 (38.6)	
Marital status			
Married	36 (81.8)	37 (84.1)	0.777
Single	8 (18.2)	7 (15.9)	
Comorbid CKD			
Yes	4 (9.1)	2 (4.5)	0.398
No	40 (90.9)	42 (95.5)	
Category of BMI			
Underweight & Normal	18 (40.9)	19 (43.2)	0.829
Overweight & Obese	26 (59.1)	25 (56.8)	
Category of household income			
Low	2 (4.5)	7 (15.9)	0.135
Medium	24 (54.5)	25 (56.8)	
High	18 (40.9)	12 (27.3)	

SD = standard deviation

BMI=body mass index

CKD= Chronic Kidney Disease

<sup>a</sup>= independent t test

### Percentage of insulin acceptance

From this study, 38 participants (86.4%) in the intervention group accepted insulin compared to 5 participants (11.4%) in the control group, P-value <0.001, as shown (Table II).

**Table II:** Percentage of insulin acceptance between intervention and control group.

	Intervention n(%) n=44	Control n(%) n=44	p-value
<b>Acceptance on insulin</b>			
Accept	38(86.4%)	5(11.4%)	<0.001
Not Accept	6(13.6%)	39(88.6%)	
Total	44(100%)	44(100%)	

Characteristics of the participants based on insulin acceptance and insulin refusal are shown (Table III).

**Table III:** Characteristics of the participants based on insulin acceptance and insulin refusal

Variables	Accept n=43 (%)	Refuse n=45 (%)
Age, years (mean±sd)	53.4(4.51)	53.6(5.47)
T2DM, years (mean±sd)	7.44(2.96)	8.2 (2.09)
Occupation		
Employed	21(48.8)	26(57.8)
Unemployed	22(51.1)	19(42.2)
Ethnic		
Malay	39(48.1)	42(51.9)
Non- Malay	4(57.1)	3(42.9)
Education level		
Tertiary	4(9.3)	3(7.0)
Non-tertiary	39(90.7)	42(93.3)
Gender		
Female	28(65.1)	34(75.5)
Male	15(34.9)	11(24.4)
Marital status		
Married	35(47.9)	38(52.1)
Single	8(53.3)	7(46.7)
Comorbid CKD		
Yes	3(6.9)	3(6.7)
No	40(93.0)	42(93.3)
Category of BMI		
Underweight & Normal	19 (44.2)	18 (40.0)
Overweight & Obese	24 (55.8)	27(44.6)
Category of household income		
Low	12(27.9)	18(40.0)
Medium	24(55.8)	25(55.6)
High	7(16.3)	2(4.4)

\*Standard deviation

## DISCUSSION

From our study DCM is effective in increasing insulin acceptance among T2DM patients who initially refused insulin treatment. This is a very promising and encouraging result as we know that insulin treatment is ultimately needed in the management of diabetes mellitus.<sup>14</sup> Early initiation of insulin has been shown to improve glycaemic control earlier and effectively.<sup>15</sup>

Result from UKPDS data showed that a decrease in the risk of microvascular complications of 35% with every single point reduction in HbA1c level.<sup>1</sup> Insulin have been shown to be the only anti diabetic agent that is able to reduce HbA1c significantly throughout courses of the disease and without limit.<sup>16</sup>

Two studies, one by Polonsky et al., in 2005 and Wong et al., in 2011, despite being 6 years apart, concluded that T2DM patients with poor perception towards insulin due to lack of the knowledge about insulin itself were the one that delayed accepting insulin treatment.<sup>9,10</sup> Hence, having good and correct knowledge regarding insulin is crucial to improve the perception and eventually accepting insulin treatment timely.

A study by Giussipse, in Italy using DCM in 66 patients in a longitudinal study also concluded that DCM was effective in the management of T2DM in increasing the knowledge on diabetic therapy and foot care compared to standard care.<sup>17</sup>

Another study that used DCM to increase patients' knowledge about diabetes was conducted among Spaniards, it was concluded that when comparing DCM and regular care, DCM was superior in improving diabetes knowledge among its participants after 6 months.<sup>18</sup> A study among 193 Greeks by Merakou et al., 2015 used DCM in a primary care setting. It revealed that HbA1c level, lipid profile, and BMI at 6 months post-intervention were significantly better in the intervention group. Their conclusion was that DCM was superior to standard individual education in diabetes self-management.<sup>19</sup>

However, a study by Reaney et al., 2013 found that both DCM and regular care improved patients' diabetes knowledge in diabetic population in Spain and Germany but the effectiveness of the DCM was seen better in a place where no structured education in regular care was in place.<sup>20</sup> Their study however, found no significant statistical differences in the overall population with regards to these two educational methods.

DCM is currently widely accepted by T2DM patients worldwide and are easily accessible in multiple languages, hence its usage as a tool in improving diabetes mellitus management is valuable.<sup>21</sup>

### Limitation and recommendation

The study population was small and done at primary care clinic at tertiary hospital, therefore the result might not represent the T2DM population in our country. Majority of the participants recruited were Malays. Thus, this study infers to the Malays diabetic population of Malaysia which is the most prevalence ethnic group with T2DM. Most of our participants were from secondary school education or less; therefore, the results may not be generalized to a patient population with higher levels of education.

## CONCLUSIONS

Group education using DCM for people with uncontrolled T2DM who refused insulin was more effective in increasing insulin acceptance compared to standard individual education.

In view of this result, we proposed to use DCM education as one of our methods of handling patient who refused insulin initiation in our clinic and we planned to make a recommendation for this method of education to be used in other primary care centres as well.

## CONFLICT OF INTEREST

We declared no conflict of interest.

## ACKNOWLEDGEMENTS

We would like to thank Dr Siti Azrin Ab Hamid, USM, for her expert opinion in statistical analysis.

## REFERENCES

1. Fong DS, Aiello L, Gardner TW, King GL, Blankenship G, et al. Diabetic Retinopathy. *Diabetes Care*. 2003; 26(Suppl 1): s99-s102.
2. Jeffcoate, S. L. Diabetes control and complications: the role of glycated haemoglobin, 25 years on. *Diabetic Medicine*. 2004; 21(7):657-665.
3. Association, A. D. Standards of Medical Care in Diabetes. *The Journal of Clinical and Applied Research and Education*. 2017; 40( Suppl 1): 48-50.
4. Zoungas, S., Chalmers, J., Ninomiya, T., Li, Q., Cooper, M. E., Colagiuri, S., Fulcher, G., de Galan, B. E., Harrap, S., Hamet, P., Heller. (2012). Association of HbA1c levels with vascular complications and death in patients with type 2 diabetes: evidence of glycaemic thresholds. *Diabetologia*. 2012; 55(3): 636-643.
5. Ministry of Health Malaysia. 2021. National Diabetes Registry Report 2020. Disease Control Division. Ministry of health Malaysia. p. 1. Available from: [https://www.moh.gov.my/moh/resources/Penerbitan/Rujukan/NCD/Diabetes/National\\_Diabetes\\_Registry\\_Report\\_2020.pdf](https://www.moh.gov.my/moh/resources/Penerbitan/Rujukan/NCD/Diabetes/National_Diabetes_Registry_Report_2020.pdf)
6. Ko J, Delafield R, Davis J, & Mau MK. Characteristics of Patients with Type 2 Diabetes Mellitus in Two Rural, Medically Underserved Communities. *Hawai'i Journal of Medicine & Public Health*. 2013; 72(6): 191-196.
7. Siddiqui FJ, Avan BI, Mahmud S, et al. Uncontrolled diabetes mellitus: Prevalence and risk factors among people with type 2 diabetes mellitus in an Urban District of Karachi, Pakistan. *Diabetes Research and Clinical Practice*. 2014; 107(1):148-156.
8. Management of Type 2 Diabetes Mellitus. *Clinical Practice Guideline*. 6th Edition ed.: Ministry of Health Malaysia; 2020. p.70.
9. Polonsky WH, Fisher L, Guzman S, Villa-Caballero L. & Edelman SV. Psychological insulin resistance in patients with type 2 diabetes: the scope of the problem. *Diabetes care*. 2005; 28(10):2543-2545.
10. Wong, S., Lee, J., Ko, Y., Chong, M., Lam, C. & Tang, W. (2011). Perceptions of insulin therapy amongst Asian patients with diabetes in Singapore. *Diabetic Medicine*. 2011; 28(2) :206-211.
11. Belton, A. B. Conversation Maps in Canada: the first 2 years. *Diabetes spectrum*. 2008; 21(2):139-142.
12. Interactions, H. (2015). Conversation map tools.
13. International Diabetes Federation (IDF) World Diabetes Congress 2011. Medscape Diabetes & Endocrinology.
14. Owens D. R. Clinical evidence for the earlier initiation of insulin therapy in type 2 diabetes. *Diabetes technology & therapeutics*.2013;15(9):776–785.
16. Chaudhury A, Duvoor C, Reddy Dendi VS, Kraleti S, Chada A, et al. Clinical Review of Antidiabetic Drugs: Implications for Type 2 Diabetes Mellitus Management. *Frontiers in endocrinology*.2017; 8 (6).
17. Defeudis G, Khazrai YM, Di Rosa C. et al. Conversation Maps™, an effective tool for the management of males and females with type 2 diabetes and mildly impaired glycemic control. *Hormones*. 2018; 17: 113–117 (2018).
18. Penalba M, Moreno L, Cobo A, et al. (2014). Impact of “Conversation Map™” tools on understanding of diabetes by Spanish patients with type 2 diabetes mellitus: A randomized, comparative study. *Endocrinología y Nutrición (English Edition)*.2014; 61(10):505-515.

19. Merakou K, Knithaki A, Karageorgos G, Theodoridis D, Barbouni, A. Group patient education: effectiveness of a brief intervention in people with type 2 diabetes mellitus in primary health care in Greece: a clinically controlled trial. *Health Education Research*. 2015;30(2): 223-232.
20. Reaney M, Zorzo EG, Golay A, Hermanns N, Cleall S, Petzinger, et al. Impact of Conversation Map™ education tools versus regular care on diabetes-related knowledge of people with type 2 diabetes: a randomized, controlled study. *Diabetes Spectrum*.2013; 26(4);236-245.
21. Chinenye, S. & Young, E. E. (2013). Diabetes conversation map in Nigeria: A new socioeducational tool in diabetes care. *Indian journal of endocrinology and metabolism*.2013; 17(6):1009.