How is the Effect of Peer Support on Type 2 Diabetes Mellitus Patients?
A Systematic Review

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Abstract: Diabetes mellitus is a complex disease that requires ongoing care with emphasis on multifactor risk reduction as a strategy to achieve glycemic control. Training and support can improve patient's ability to prevent Diabetes complications, but evidence is limited to provide information for practice and policy making. This systematic review was collect evidence based by previous research about the effects of Peer Support on Type 2 Diabetes Mellitus patients. The article search through electronic data base such as Scopus, Science Direct and Pro Quest with limit from 2012 until 2017. There were 1881 studies found using spesific keyword and 15 studies were selected based on the inclusion criteria. Results showed that Peer Support decreased HbA1c, fasting blood glucose, patient distress, and increased self-management behavior, self efficacy, knowledge and health status. Intervention was a good advice for makes policy on management of Type 2 Diabetes Mellitus patients in Indonesia that has variations in geographic and cultural areas, but further study is needed to determine the most effective Peer Support method to reduce variation in implementation.

1 BACKGROUND

Diabetes Mellitus is a chronic and complex disease that requires continuous caring and medical treatment by prioritizing the reduction of multifactor risk as a strategy to achieve glycemic control (American Diabetes Association, 2016). Diabetes is a growing worldwide health problem, of which about 300-350 million people are estimated will be Diabetes suffer by 2015 (Clark, 2010). In Indonesia, The International Diabetes Federation (IDF) estimates the increase in the number of people with DM from 9.1 million in 2014 to 14.1 million by 2035 (KONSESUS PERKENI, 2015).

To solve the increasing of Diabetes Mellitus cases, complex management was required. Diabetes patients need skill in assessing their disease control, apply health life behaviors and appropriately antidiabetic drugs (Funnel, 2012). Healthy behaviors that could be done such us: dietary change, exercise/physical activity, self monitoring and adherence to therapeutic regimens (Heisler, 2012).

Fourteen countries report to the World Health Organization (WHO) that they were not successful to implement self management behaviors for Diabetic patients (Boothroyd et al., 2010). The most efficient way to improve patient’s ability to prevent serious Diabetic complications is training and support (Netles & Belson, 2009). According to (Siminerio, Ruppert and Gabbay, 2013), the Diabetes Self Management Support (DSMS) is an important thing to give for patients as well as Diabetes Self Management Education (DSME). Support could be obtained from various parties, one of them is peer support.

Peer support is defined as the support from someone who has knowledge of experience about a particular behavior or stressor with the characteristics similar to the population target (Dennis, 2003). Peer support bridges the gap between clinical care and provide assistance in patients self management, and also providing low-cost care and flexible equipment to complement formal health support for chronic diseases such as Diabetes Mellitus (Heisler, 2011).

Peer support has a role to increase Diabetic patients interest for self management behavior, but the evidence is limited to provide information both for policy making and applied in practice (Dale,
Diabetes self management education that has been given by professionals, may need to be reviewed about appropriate policies and techniques which is relevant to apply for improving patient knowledge about Diabetes. One of them is by increasing social network support and education, including: family, friends, co-workers, neighbors, religious experts, and colleagues (Mousavi, 2011).

The purpose of this study was to collect evidence based on previous research result on the effect of peer group support on adult patients with Type 2 Diabetes Mellitus using systematic review method.

2 METHOD

The method used in this paper is a systematic review. The article search was using electronic data base such as: Scopus, Science Direct and Proquest. In the initial step, the keywords which used for article search are “Peer Group Support” AND “Adherence Behavior” AND “Diabetic Patient”, then the author modifies the keywords to “Peer Group Support” AND “Blood Glucose” OR “Diabetic Patient”. The search was done by limit from 2012 to 2017. The inclusion criteria made by authors are: (1) Explaining Peer Group Support Program, (2) All participants were diagnosed as Type 2 Diabetes Mellitus patient, (3) Patient age 18-75 years, (4) Quantitative studies with Non and Randomized Controlled Trial, Randomized Clinical Trial, Partial Randomized Study. The exclusion criteria were: (1) Patient age <18 years or >75 years, (2) Not yet diagnosed as Diabetes Mellitus, (3) Type 1 Diabetes Mellitus, (4) Qualitative Studies.

3 RESULTS

Picture 1 showed the results of search. On search engine found 1881 articles and then selection based on topics and 41 articles was accordingly. These articles then re-selection based on inclusion criteria then found 15 articles that are considered relevant. The next step was conducted critical appraisal to review the content and research methods.

Six studies (40%) were conducted in the United States, three studies (20%) were conducted in China, Two studies (13.2%) were conducted in India, while the other four performed one (6.7%) in Cameroon, one (6.7%) in Uganda, one (6.7) in Argentina and one (6.7%) in the Netherlands. Eight studies (53.3%) were conducted with randomized controlled trial design, four studies (26.6%) used randomized clinical trial, one (6.7%) using non-randomized controlled trial, one (6.7%) using quasi experiment, one (6.7%) using partial randomized study.

The sample size varied from 46 to 287 participants (mean 154.9). All studies focused on Type 2 Diabetes Mellitus patients with Peer Support interventions. There were several similarities from fifteen studies in the implementation of the intervention, where there are six studies ((Vries et al., 2014), (Deng et al., 2016), (Rashidi et al., 2016), (Long, 2012), (Gagliardino et al., 2013)) made the intervention by recruiting selected person in group who’s have better glycemic control status to be a peer educator/peer trainer. This person then will provide structured education to participants in studies.

Four studies combine structured education with communication and telephone support for once or twice a week ((Piette et al., 2013), (Yin et al., 2015), (Tang, 2015), (Baumann et al., 2015)). Two studies in a routine meetings form (Shaya et al., 2014), (Siminerio, Ruppert and Gabbay, 2013), two other studies a home visits form (Liu et al., 2012), (Nelson et al., 2014) and one study was compare peer support intervention with Yoga ((Sreedevi, Gopalakrishnan and Ramaiyer, 2017).

The most information and support provided through peer support programs is the Diabetes Self-Management Education (DSME) material, such as concepts and complications of diabetes, reduction of risk factors eg cigarettes and obesity, proper diet and nutrition, proper physical/exercise activities, adherence of medication, foot care, Blood Glucose Self-Monitoring and how to use blood glucose screening tools and administration insulin (Sreedevi, Gopalakrishnan and Ramaiyer, 2017), (Shaya et al., 2014), (Gagliardino et al., 2013), (Yin et al., 2015), (William & Bowyer, 2012).
Another form are experience sharing, motivation giving and suggestion session by peer educators and approach session between all participants using interactive communication (two-way) to improve self efficacy, and together making change plans of behavior to achieve the ultimate goal (Vries et al., 2014), (Long, 2012), (Rashidi et al., 2016). For interventions conducted in the community, support was directed at helping participants to access resources in the community such as how to take advantage of health facilities and health workers in the area of participants' residence (Liu et al., 2012), (Nelson et al., 2014).

Time for implementation and evaluation of measurement results varies, the shortest time is 4 weeks (Gagliardino et al., 2013), 3 months (Rashidi et al., 2016), (Shaya et al., 2014) (Shaya et al., 2014), (Tang, 2015), (Sreedevi, Gopalakrishnan and Ramaiyer, 2017), the most are 6 months (See the review table), and longest is 12 months (Nelson et al., 2014). Results also varied, at the table 1 has been described the dependent variable that have been measured and the results are HbA1c, fasting blood glucose, diabetes self management behavior, knowledge, blood pressure, lipid profile, self efficacy, self care, BMI (Body Mass Index), distress, health status.

The mostly variabel was evaluated is HbA1c. Thirteen studies used HbA1c as an indicator of glycemic control and results showed decreased significantly of HbA1c (69%), one study have no significant difference with the control group (8%), two studies did not show decreased (15%), and one study had not reported the final result (8%). Results of fasting blood glucose from six studies that did the measurement, five studies (83%) showed significant decreased, while one study (17%), does not showed significantly differences with the control group.

Results of Diabetes Self Management Behavior and Self Care behavior showed seven studies (87.5%) increased in self-care and diabetes management behaviors such as; dietary changes, weight control, foot care, physical activity, while one study (12.5%) has not reported results. Self efficacy variabel which was measured in three studies showed that all partisipans (100%) were improve in self efficacuy after Peer Support intervention. Lipid profile results which conducted measurement in five studies showed four (80%) studies were decreased in levels of HDL (High Density Lippoprotein), LDL (Low Density Lippoprotein), and TG (Triglyceride), but one study (20% ) has not reported the result.

Blood Pressure (BP) measurements (systolic and diastolic) also showed significant results. Five (83%) from six studies showed decreased in BP after Peer Support intervention and one study (17%) was not reported. At BMI measurements, four studies were measured, all partisipants (100%) showed significant decreased. Two studies which measure of knowledge show that knowledge increased in one study (50%), and the other one still not been reported. For health status measurement from three studies, two studies (67%) recorded participant had improved health status, and the other one still not been reported. In a single study (50%) of distress measurement, participants showed improvement and progression of condition, but the other one study was not reported.

4 DISCUSSION

Peer Support interventions showed significant results in some variables for the management of Diabetes Mellitus patients but studies were limited for measurements and variations, because not all studies focused on glycemic control or Diabetes Self Management Behavior. It is can found that fasting blood glucose measurement only occurred in six studies (40%), the measurement of Diabetes Self Management Behavior occurred in seven studies (47%). Measurement of patients self efficacy even more less, because only three studies (20%) found. Similarly, measurements on knowledge were found in only two studies (13%).

This limited measurement requires further evaluation because these variables are important to assess the success of Peer Support interventions. The most research methods or designs were RCTs (80%) (Randomized Controlled/Clinical Trial), and almost all of the studies used a control group (93%), either the control group without intervention, or the comparison group with different interventions. Only one study (7%) did not use the control group, but the study was a using pre-post design study that also compared results before and after intervention (Baumann et al., 2015).

In terms of time, Peer Support intervention is mostly done for of 3-6 months, which the shortest was 1 month and the longest was 12 months. This variation also made it difficult for evaluation, because in the shorter time intervention, the measurement result also showed decrease of HbA1c levels, blood glucose and blood pressure as well as
other longer-term studies (Gagliardino et al., 2013). The study with the longest period of 12 months, the results have not been reported (Nelson et al., 2014) which it was make difficulty for evaluation, too. It would be better if the evaluation was done periodically so can be seen the fluctuation in changes of measurement results as an analysis material.

Interventions are also varied, ranging from structured education which researcher recruit trainers or peer educators from peers of diabetic patients who have better glycemic control, then make a regular meetings sessions every each week/month, giving support through telephone, make small peer group that can give each other support by live meetings and calls with one designated peer leader. This variation is an innovation of each researcher, and there are even interventions made with home visits every month and evaluated after 12th months (Liu et al., 2012).

Varied terms of time was also related to duration of intervention evaluations. Interventions with weekly meetings are shorter than the one-month sessions. In addition, to select and train peer educators/peer trainers, also needed more longer time to implement the intervention, so its depending on how the Researcher makes the intervention model design. All intervention models are focused on how patients with Diabetes Mellitus led by peers can interact with each other (Shaya et al., 2014). Peer support within the group is also mutually motivating, and the patient were empowered to have self-management skills with positive coping mechanism to deal with chronic conditions due to his illness. Patients are also led to set goals and stress management so glycemic control as goal can be achieved (Yin et al., 2015).

Peer support intervention was significant in improving HbA1c levels, metabolic outcomes, anthropometric, and behaviors of diabetic patients due to the presence of communities formed in peer groups with an approach adapted to group cultural conditions will encourage communication, support and effective delivery in the group (Assah et al., 2015).

In the review of the fifteen studies above, the authors also found there are several studies compared to Peer Support intervention. One of them, Yoga Intervention. According to Sreedevi, Gopalakrishnan and Ramaiyer (2017), there is a decrease in fasting plasma glucose in the peer support and yoga groups, whereas HbA1c is only in the yoga group. Yoga and Peer Support intervention on blood glucose results was very good, but longer studies are needed to confirm the results.

Peer Support interventions are also provided in Diabetes Self Management Support (DSMS) form which interventions are provided as education and direct support by a trainer. Siminerio, Ruppert and Gabbay (2013), was comparing DSMS with trainers from professional educators, peers and practitioners, and results showed that in the DSMS group with peer trainers, the result of HbA1C change was the best than the other group.

Long, (2012) compares the motivational intervention using Financial Incentives that patients will obtain if they successfully lower Hb1Ac levels with motivational interventions by Peer Mentoring from peers by telephone to Diabetes patients. After 6 months intervention it was found that HbA1c levels decreased more in the peer-mentoring group than the Financial Incentives group. In peer mentoring, although intervention is only done by telephone, but it facilitates contact between the patient and the mentor. If patients should frequent visits to the health center only for consultation their health condition its will be more difficult and wasting more time. These interventions are very effective for patients living in villages or suburbs, but face-to-face introduction and sharing with mentors and patients still needed.

5 CONCLUSIONS

Peer Support is one of the interventions that can be applied to improve the behavior change of Type 2 Diabetes Mellitus patients with the ultimate goal of good glycemic control, which can be done with various methods such as structured education in sessions can be performed weekly or monthly, led by a peer mentor either in regular meetings or via telephone, can also be in the form of direct motivation and support to the patient through home visits and communication between peer mentor/trainer personally with the patient.

Variations in the provision of peer support interventions are equally effective in the 15 studies may even be modified by some type of intervention, eg. modification of peer support interventions with other interventions. The intervention interval duration is 4 weeks to 6 months, depending on which method and time of evaluation are desired. The division of peer support groups will be better if adapted to the cultural conditions, customs and habits of patients as well as the location of the patient’s residence so as to facilitate the patient to
follow-up. Effectively peer support interventions are conducted primarily in patients with poor glycemic control due to lack of motivation, chronic disease condition, and limited ability to communicate with health care center due to the condition of patients who are far from health facilities or limited staff.

From the fifteen journals reviewed, peer support intervention could improving glycemic control (HbA1c, fasting blood glucose), improving self-management and self-care behavior of Diabetes Mellitus patients, self efficacy, knowledge, health status and reducing distres of patients with Diabetes Mellitus. Peer Support interventions can give positive effect on care for Diabetes Mellitus patients. Further studies are needed to determine the most effective form of Peer Support implementation in order to reduce implementation variation. This intervention was a good suggestion for policy makers in the field of patient management with Type 2 Diabetes Mellitus to be applied in Indonesia that has variations in geographic and cultural areas.

REFERENCES


## APPENDIX

### Table 1: Summary of evidence studies

<table>
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<tr>
<th>Reference</th>
<th>Study design</th>
<th>Study population</th>
<th>Peer Support Form</th>
<th>Measure</th>
<th>Results</th>
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</table>
| (Assah et al., 2015) | Non RCT                               | 100 control group 96 intervention group Inclusion criteria:  
1. Adults with poorly controlled diabetes  
2. HbA1c > 7%                                                                 | Meeting group based on schedule, private meeting once a month for 5 months and by phone for 6 months. Peer support selected from those whom better glycemic control, adherence to clinical visit, and have experiences knowledge about DM better than others. | HbA1c, Fasting blood glucose, cholesterol, HDL, and Diastolic pressure, self care behavior | There was a significant decrease in HbA1c, fasting blood sugar, HDL, cholesterol and diastolic BP, as well as improved self-care behavior. |
| (Rashidi et al., 2016) | RCT with proportional stratified sampling | 30 control group, 30 intervention group Inclusion Criteria:  
1. Diagnosed Type 2 DM  
2. Aged 30-70 years  
3. DM >1 year  
4. Can read and write  
5. Have time to engage in studies  
6. Have no physical and mental disabilities  
7. No memory /neural disorders  
8. Not taking drugs that affect memory and awareness  
9. Never been involved in similar research | Supportive training by 10 trainers from fellow DM patients who has been trained at Diabetes clinic for 3 month | HbA1c and fasting blood glucose | The test results showed that there was a significant difference of HbA1c and Fasting blood glucose in the intervention group the third month from the beginning of the first month before the treatment began. |
<table>
<thead>
<tr>
<th>Study &amp; Year</th>
<th>Design</th>
<th>Control Group</th>
<th>Intervention Group</th>
<th>Inclusion Criteria</th>
<th>Outcomes</th>
<th>Summary</th>
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</thead>
<tbody>
<tr>
<td>(Vries et al., 2014)</td>
<td>RCT</td>
<td>76 control group</td>
<td>76 intervention group</td>
<td>Inclusion criteria: 1. Diagnosed Type 2 DM, 2. Age 50-70 years, 3. DM &gt; 3 years</td>
<td>Diabetes-related distress, health status quality, diabetes self-management behavior</td>
<td>Peer support is a way for patients to stay motivated and help each other to solve the stress experienced by Type 2 DM patients. Results will be measured one month in advance, and 6, and 12 months after intervention by a self-reported questionnaire</td>
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<tr>
<td>(Nelson et al., 2014)</td>
<td>RCT</td>
<td>142 Control Group</td>
<td>145 Intervention Group</td>
<td>Inclusion Criteria: 1. Patients with poor controlled diabetes, 2. Diagnosed Type 2 DM, 3. HbA1C levels 8% or higher in the last 3 months, 4. Income is less than standard, 5. Age 30-70 years, 6. Speak English / Spanish</td>
<td>HbA1C (primary), blood pressure, lipids, Health-related quality of life, Self efficacy, Self management behaviour Perceived stress, social support</td>
<td>Peer Support for Achieving Independence in Diabetes (Peer-AID), a home-based Community Health Workers (CHW) program which was give self-management intervention for 12 months. Results are still pending. Peer-AID recruited and enrolled a diverse group of low income participants with poorly controlled type 2 diabetes and delivered a home-based diabetes self-management program. If effective, replication of the Peer-AID intervention in community-based settings could contribute to improved diabetes control in vulnerable populations.</td>
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<tr>
<td>(Deng et al., 2016)</td>
<td>RCT</td>
<td>111 Control Group</td>
<td>97 Intervention Group</td>
<td>Inclusion Criteria: 1. Diagnosed Type 2 DM, 2. Age 25-75 Years, 3. Last receive the same intervention was 2 years or more, or never at all</td>
<td>Knowledge, HbA1C, Fasting blood glucose, sistolik blood pressure</td>
<td>Provision of training interventions provided by selected peer trainers from DM patients who suit with the criteria. Training was given to the intervention group for 4 months. There was no significant difference between two groups, all data showed decreased than the previous year, subjects in intervention group showed lower levels of HbA1c and systolic blood pressure. Education by peer educators trainer and continuous support can be successful and can use as alternative methods for areas with limited healthworker</td>
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<tr>
<td>(Gagliardino et al., 2013)</td>
<td>RCT</td>
<td>105 Control Group</td>
<td>93 Intervention Group</td>
<td>Inclusion Criteria: 1. Diagnosed Type 2 DM, 2. Age 25-75 Years, 3. Last receive the same intervention was 2 years or more, or never at all</td>
<td>Knowledge, HbA1C, Fasting blood glucose, sistolik blood pressure,</td>
<td>Provision of structured education interventions in Type 2 Diabetes, provided by peer and with control groups provided by educator professionals. Intervention was given for 4 weeks.</td>
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</table>
The routine care patient was notified of the initial HbA1c level and the recommended goal of HbA1c decline. Those in the peer group mentoring for 6 months were given African American peer mentor with controlled Diabetes. The mentor is asked to speak with the patient at least once a week. Patients in financial incentives group patients can earn $100 if HbA1c levels lower 1% and $200 by decrease 2% or achieve HbA1c rate of 6.5%.

HbA1c level decreased from 9.9% to 9.8% in the control group (usual care), from 9.8% to 8.7% in the peer mentor group, and from 9.5% to 9.1% at financial incentives. Peer mentoring improves glucose control in African American veterans communities.

Participants were randomized accordingly Age and encouraged to communicate with each other by phone at least once a week and share opinions about how diabetes self-management follows the guidebook which had been given and then routine exercise in the first, third and sixth month

HbA1c The mean value of HbA1c in the control group was higher (7.9%), with significant value of p = 0.09 compared to interventions group (7.6%, with significant value p = 0.03. peer support with phone calls is especially helpful for patients who lack social support

Patients are included in the "Train The Trainee" group Program guided by 1 peer support. Peer support will then call members 15-20 minutes every 2 weeks in the first 3 months, every month for the third 3 months and every 2 months for the last 6 months. Peer support will observe patient self-management skills in groups such as: medication adherence, healthy diet, regular exercise, foot care, glucose monitoring, sick day management. They also provide psychological support based on personal experience.

HbA1c, self care After 6 months there was no HbA1c change in the intervention group, but there was increasing in the control group. Self-care activities such as: diet adherence and foot care were increased in the intervention group but no change in the control group.

Patients in the intervention group formed some small groups and attended monthly diabetes session emphasizing peers. Evaluation is done after 3 months and 6 months.

HbA1c, blood glucose (primer point), blood pressure, weight, functional status, self-efficacy the intervention group decreased HbA1c and blood glucose were higher than the control group, in the secondary assessment found better results than the control group. Social group interventions show a large effect on HbA1c decline, blood glucose also increases behavioral changes
<table>
<thead>
<tr>
<th>Study Reference</th>
<th>Design</th>
<th>Participants</th>
<th>Intervention Details</th>
<th>Outcomes</th>
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<tr>
<td>(Liu et al., 2012)</td>
<td>RCT</td>
<td>89 control group, 119 intervention group</td>
<td>Patients in the intervention group received a 12-month group visit that provided self-educated DM patient management to help participants build confidence to adapt with Diabetes and increase motivation in managing diabetes. The intervention group showed increasing of aerobic exercise duration over 40 minutes a week, there was an increase in self efficacy to manage the diabetes, there was an increasing of ability to recognize signs of danger and measure systolic blood pressure.</td>
<td>Self-management behavior, self efficacy, health status</td>
</tr>
<tr>
<td>(Sreedevi, Gopalakrishnan and Ramaiyer, 2017)</td>
<td>RCT</td>
<td>124 adult woman with diabetes, 41 yoga intervention, 42 peer group intervention, 41 control group</td>
<td>Patients in the intervention group received a 12-month group visit that provided self-educated DM patient management to help participants build confidence to adapt with Diabetes and increase motivation in managing diabetes. The intervention group showed increasing of aerobic exercise duration over 40 minutes a week, there was an increase in self efficacy to manage the diabetes, there was an increasing of ability to recognize signs of danger and measure systolic blood pressure.</td>
<td>HbA1c, self-management behavior, self efficacy, health status</td>
</tr>
<tr>
<td>(Baumann et al., 2015)</td>
<td>Quasy Experiment</td>
<td>46 patients from the Diabetes Mityana clinic, a rural community in Uganda</td>
<td>Patients will attend one day diabetes education program and approve for contacts once a week for 4 months with each participant using the phone or meeting each other to assist management of daily activities, preparing social and emotional support and encouraging approaches with contact with health workers. There was decreased in fasting plasma glucose in the peer support and yoga groups, HbA1c is only in the yoga group. Yoga and Peer Support intervention on blood glucose results is very good, longer studies are needed to confirm the results.</td>
<td>HbA1c, self-management behavior, blood pressure</td>
</tr>
<tr>
<td>(Tang, 2015)</td>
<td>RCT</td>
<td>52 control group, 54 PLEASED group</td>
<td>Patients in the intervention group will be given a DSME program for 3 months and continue with 12 month group sessions once a week with supor support by phone. The PLEASED program has no glycem control effect on the adult population of African America. The Peer Support program had significant results in Systolic and diastolic blood pressure, LDL and BMI levels compared with the DSME program without peer group.</td>
<td>HbA1c, sistolik and diastolik BP, LDL, BMI</td>
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141 patients were divided into 4 groups, DSMS Educator group (38), DSMS Peer (36), DSMS Practice staff (35), DSMS usual education (32)

After receiving DSME (Diabetes Self Management Education), patients will be randomly assigned to receive DSMS (Diabetes Self Management Support) from a Trainer Support: Educator, Peer Educator, Practice Staff and Usual Education with 6 months observation.

HbA1c, Blood Pressure, lipid levels, weight, self-care and distress

In the DSMS educator group, the increase in HbA1c was the best, while the other DSMS also showed early development of the treatment. Patients showed increased glycemic control, lipid levels, body weight and self-care behavior as well as decreased blood pressure in all DSMS intervention groups. All participants showed satisfaction with the DSMS intervention. These results indicate the importance of the educator's role, but support from others is also necessary. Results also show that in patients with primary care DSME and DSMS are both needed.