AN EVALUATION OF A MULTIDISCIPLINARY PATIENT CENTRED TYPE 2 DIABETES SELF-MANAGEMENT EDUCATION PROGRAMME IN EDO STATE, NIGERIA

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ABSTRACT

Diabetes is on the increase globally, especially in African countries. Nigeria in particular has a high prevalence of diabetes type 2. There is evidence that improved type 2 diabetes outcomes are related to self-management and improved health education. The purpose of the research was to pretest whether a structured multidisciplinary patient centred self-management education programme for type 2 diabetes would improve selected primary and secondary diabetes outcome measures. The setting is diabetes outpatient clinics in one tertiary and one secondary health facility in Edo State, Nigeria. The study design is quasi-experimental, a two group before and after study. Two groups of participants (n=28) were selected using quota sampling from alternate day clinic attendances, 15 for the intervention group and 13 for the control group. A multidisciplinary patient centred diabetes self-management education programme was developed and implemented over 5 weeks in October 2014.

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The control group was exposed to normal clinic procedures while the intervention group was exposed to the education programme and normal clinic procedures. Outcome measures data for both intervention and control group were collected and compared. At baseline the intervention and control groups did not differ significantly with regard to outcome measures. After the intervention the intervention group had significantly lower Fasting Blood Sugar ($p = 0.01$) and BMI scores (.025) than the control group. BMI did not significantly differ between the two groups, but FBS did ($p = .012$). The introduction of a multidisciplinary patient centred self-management education programme improved key diabetes outcome measures for patients attending diabetes outpatient clinics at two hospitals. Self-management education programmes have the potential to improve diabetes outcomes but further studies need to be done to confirm this.

Keywords: diabetes type 2, self-management, education, evaluation

INTRODUCTION AND BACKGROUND INFORMATION

Globally, diabetes is a lifelong chronic illness that requires continuing medical care, health education and self-management to prevent complications and enhance a quality of life. It is an increasing global health problem with approximately 347 million people worldwide diagnosed with diabetes in 2008 compared with 157 million in 2004, with a projected increase of two-thirds by 2030 (WHO, 2012). The International Working Group on the Diabetic Foot report (2010) shows that African countries account for approximately 13.6 million cases of diabetes. Sub-Saharan Africa accounts for 7 million cases and by 2025 the region is projected to have 15 million cases. Nigeria has the highest number of people with diabetes in Africa with approximately 1.7 million people living with diabetes and an estimated 3.85 million with impaired glucose tolerance (International Working Group on the Diabetic Foot., 2010).

Type 2 diabetes is associated with an increased risk of morbidity and mortality due to various complications. These include chronic complications such as retinopathy, which is responsible for many thousands of cases of blindness yearly (Shome & Vadali, 2011); nephropathy, which is the leading cause of kidney failure (Dabla, 2010); and neuropathy, which results in foot ulceration and lower limb amputation (Kaleagasi, Aslan, Bozdemir & Tetiker, 2013). Diabetes increases the risk of developing cardiovascular diseases, especially arteriosclerosis and stroke (Bowden, Cox, Freedman, Hugenschimdt, Wagenknecht, Herrington, Agarwal, Register, Maldjian & Ng, 2010).These complications place a high economic burden on the patient, family and society in terms of care, hospitalisation and reduced productivity. They use at least two to three times the health care resources compared with people without diabetes, and care may account for up to 12% of health expenditure globally per person (Zhang, Zhang, Brown, Vistisen, Sicree & Shau, 2010).

Type 2 diabetes accounts for about 90% of diabetes cases and is found to be preventable through early lifestyle modifications and medications (Ali, Echouffo-Tcheugui & Williamson, 2012). Helping people with diabetes to acquire knowledge and skills to manage their own condition is central to their leading a full and healthy life. Self-management education is essential for ensuring attainment of glycaemic control and quality of life (Chinenye, Uloko, Ogbera, Ofoegbu, Fasanmade, Fasanmade & Ogbu, 2012) and educating patients about diabetes plays a pivotal role in motivating and empowering them to assume active responsibility for the day to day control of diabetes and becoming a manager of their health. In Nigeria, however, consumers' health knowledge is low, comprising information, education and level of awareness of their rights to quality health care, and so is their awareness to health obligations (Federal Ministry of Health Nigeria, 2005). Accessing health care is a challenge for people with diabetes, which is evident by increased number of patients with various diabetic complications and avoidable mortality (Chinenye et al., 2012). This was supported by studies that found only 43% of outpatients reported on understanding of good glycaemic control and 33% defaulted in taking medications (Nwaokoro, Okokon, Nwaokoro, Emerole, Ibe, Onwuliri, Oputa & Chukwuocha, 2014). Similarly, another study found that Nigerian diabetics had poor knowledge of diabetes, knowledge of diabetes diet, treatment of hypoglycaemia, and the average duration glycosylated haemoglobin (haemoglobin A1) test measure of blood glucose (Jasper, Ogundunmade, Opara, Akinrolie, Pyiki, & Umar, 2014).

STATEMENT OF THE RESEARCH PROBLEM

According to the World Health Organization (2012), there is an increase in the prevalence rate of diabetes type 2, which suggests there is a need to educate the public and patients with diabetes in order to address this growing problem (WHO, 2012). Diabetes type 2 is preventable and the complications could be averted or delayed through adequate education and self-management skills that enable patients to effectively manage and cope positively with the disease (WHO, 2012). Self-management is a recommended strategy in chronic diseases, and it has been shown to be an effective quality improvement strategy for patients with diabetes (Tricco, Antony, Ivers, Ashoor, Khan, Blondal, Ghassemi, MacDonald, Chen, Ezer & Straus, 2014). However, most patients do not have access to a structured self-management education programme, and where it is available, patients with diabetes frequently do not achieve optimal glycaemic control and lifestyle modifications after attending short programmes (Clifton, Coppell, Kataoka, Williams, Chisholm, Vorgers & Mann, 2010). In addition, nurses often lack sufficient knowledge about diabetes, diabetes management and innovative self-management programmes (Yacoub, Demeh, Barr, Darawad, Saleh, & Saleh, 2015).

Several studies carried out on type 2 diabetes in Nigeria have suggested the need for improvement in nurse-led patient education. Older patient education approaches are disease-centred with poor communication (Okolie & Osagie, 2000), resulting in the majority of patients lack basic knowledge of management of diabetes (Nwankwo, Nandy, & Nwankwo, 2010). A systematic review of the nurses' role in diabetes management in international studies showed that nurses are involved in diabetes education, individual care, patient safety, promotion of self-care, acquisition of physical skills and psychological support. It showed that improved glycaemic control, symptoms, cost-effectiveness and decreased length of hospital stay were the main benefits of nurse-led interventions in diabetes care (Carey & Courtenay, 2007). Following this trend, nurse-led diabetes education along with continuous assessment of diabetes-related knowledge has been advocated (Jasper et al., 2014; Raimi, Alebiosu, Adeleye, Balogun, Kolawole, Familoni, Ikem, Adesina, Odusan, Oguntona, Olunuga, & Ogunsemi, 2014). However, more recent evidence supports the use of multidisciplinary teams to maximise the care of individuals with diabetes (Ofori & Unachukwu, 2014).

Didactic group lectures are employed in Diabetes Education in Nigeria (Chinenye & Young, 2013). In Edo State, Nigeria, patients with type 2 diabetes historically have been given diabetes disease-centred education, which is generally prescriptive with a strict encouragement to comply. This education is not structured, nor tailored to meet patients' self-management needs. In order to comply with the view of WHO and American Diabetes Association on diabetes education, a structured multidisciplinary patient-centred diabetes self-management education programme (SHESMD) was developed and pretested for implementation. To assess the effectiveness of this programme, an evaluation was essential to determine the benefits of this new approach for diabetes education.

PURPOSE OF THE STUDY

The purpose of the research was to determine whether a structured multidisciplinary patient-centred diabetes self-management education programme (SHESMD) would improve selected primary and secondary diabetes outcome measures.

Definitions of keywords/concepts

Health education is a structured education that is comprehensive, flexible in content, responsive to an individual needs and adaptable to the educational and cultural background of patients with diabetes.

Self-management is a set of self-care skills to assist in coping positively with the disease.

Type 2 diabetes is a chronic disease characterized by high levels of glucose in the blood. It is common among adults of age 40 and above but can be found among younger adults and adolescents.

Patients with diabetes are individuals who have been diagnosed medically with diabetes type 2 and are receiving specialised care from a health care facility as an outpatient.

RESEARCH METHODOLOGY

This study was part of a bigger mixed method study to develop a multidisciplinary patient-centred diabetes self-management education programme. The overall study consisted of three phases. Phase 1 was a qualitative exploration of the state of current diabetic education conducted through qualitative patient interviews, focus groups with health professionals involved in the prevention and management of diabetes and the observation of health education sessions. Following the identification of core themes from phase 1, phase 2 focused on the development of a Structured Health Education for Self-Management of type 2 diabetes (SHESMD), using a 6-step programme development framework (intervention mapping). Phase 3 was an evaluation pre-test study using a quasi-experimental, two group before-and-after study to test the effectiveness of the emergent programme in the participating health facilities and to check the effectiveness of the programme in terms of key diabetes type 2 outcome measures. This last phase is the focus of this paper.

Setting

In Nigeria, the National Health Policy was revised in 2004 with the main aim of achieving health for all Nigerians and establishing a comprehensive health care system with strong primary health care provision. The primary health care services are yet to get properly involved in the care of patients with type 2 diabetes. The setting for the study included two services, a tertiary hospital, which is a federal government health institution, and a secondary hospital, which is a health facility owned by the state government. Secondary health facilities provide specialised services to patients referred from the primary health care level and are available at the district, divisional and zonal levels. Tertiary hospitals provide highly specialised services and consist of the teaching hospitals and other special hospitals. The Nigerian health care delivery system is generally weak and fragile (Saka, Isiaka, Akande, Saka, Agbana, & Bako, 2012) and at the primary level, preventive measures of educating the community is lacking (Dzikwi, Ibrahim & Umoh, 2012). Therefore the consequence is that preventable health problems are glossed over by the citizenry, leading to referrals of many cases at critical points to the tertiary health providers.

Design

The study design for the SHESMD programme was a simple quasi-experimental controlled, two group before and after design, comparing an intervention and a control group from two outpatient clinics in Nigeria for selected primary and secondary diabetes outcome measures.

Population and sampling

The population comprised patients attending consultants' outpatient clinics in the two hospitals. Participants were selected from the clinics using quota sampling with quotas taken from alternate days from the two sites. The sampling frame for the study was participants attending the diabetes clinics in a tertiary and a district hospital in Edo state Nigeria. Inclusion criteria for the study were: (i) both old and newly diagnosed type 2 diabetes patients across the social economic divide; (ii) patients should be able to take independent decisions; and (iii) patients should not show any sign of cognitive problems. Patients with type 1 diabetes and patients with cognitive diseases were excluded

The intervention group consisted of 15 patients of whom all 15 were available for the pre-measurements and 13 for the post-measurements, resulting in 13 pairs of data of which 7 were from the tertiary hospital and 6 were from the district hospital. Two participants were lost to follow up (Figure 1). The control group consisted of 13 patients of whom all 13 were available for the pre- and 10 for the post-measurements, resulting in 10 pairs, 5 from the tertiary hospital and 5 from the district hospital. Three participants were lost to follow up (Figure 1). The patients were all available for the five week intervention programme and both groups received routine usual clinic care and consultant visits. Allocation of patients to Intervention (I) and Control Groups (C) was done based on alternate days. Selection was done twice a week for a two week periods to allow for a sample size of 28, which would allow for a 0.5 effect size, alpha of 0.05 and power of 0.8 for a one-tailed t-test for matched p (Tshianaga et al., 2012). Allocation was concealed from the patients.

Intervention

The intervention mapping framework was used in the education programme development in collaboration with the relevant diabetic care health care professionals and two patients. The framework consisted of 6 steps, namely, needs assessment; definition of proximal programmes; use of theory for selection of practical strategies to change health related behavior; development of programme components; programme adoption; implementation and sustainability and evaluation of process and effect. Theories employed in programme development and validations were self-determination theory, social cognitive theory and the motivational interviewing

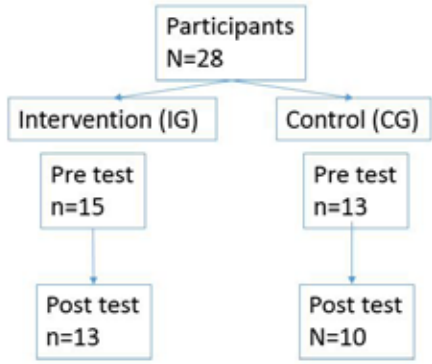

Figure 1: Sample selection and follow up

framework. A workshop was conducted to train staff members in motivational interviewing. This framework is supported by a systematic literature review, which identifies diabetes self-management education (DSME) features to improve diabetes education in type 2 diabetes (Gucciardi, Chan, Manuel & Sidani, 2013). The review examined success rates of intervention features based on effectiveness of improving glycemic control, anthropometrics, physical activity, or diet outcomes and found five intervention features had positive rate differences across at least three outcomes, namely, hospital-based interventions, group interventions, the use of situational problem-solving, frequent sessions, and incorporating dietitians as interventionists (Gucciardi et al., 2013).

The goal of the educational programme was to enhance their diabetes knowledge and self-management skills to assist type 2 diabetes self-management. The programme used the personal determinants of knowledge, self-efficacy skills, attitudes, expectations and outcomes to focus on self-management, diabetes knowledge, utilising locally available food in diet planning, increased physical activity, personal glucometer home blood glucose level monitoring, stress management, problem-solving techniques and actively managing diabetes through improved communication with health workers. There were five modules in the programme: overview of diabetes and management of hypoglycemia and hyperglycemia; self-management 1-dietary control, physical activity and weight management; self-blood glucose monitoring (SBGM) and care of the feet, stress management and coping behaviour; and communication with health care professionals.

The intervention was a five-week multidisciplinary education programme running from the 3rd of October to the 31st of October 2014. The programme was conducted from 1 to 3pm on Fridays in the tertiary health facility and in the secondary health facility on Fridays 9am-11am. The intervention took place on a different day from

patients' clinic day because the clinic hours could not accommodate the programme. The programme was done concurrently in the two facilities.The programme was delivered to the participants through weekly teaching by a multidisciplinary health care professional team, consisting of nurses, dietitians and medical social workers, in a collaborative mode utilising group discussions, individual counselling, multimedia teaching, motivational interviewing, telephone calls by nurses and goal-setting charts for feedback. Participants were given a glucose meter to enable them do the test at home and to chart the result in a log book given to them. Participants in the control group received the routine clinic care, which included health talks on diabetes and consultation with doctors. Neither group were aware of the other group's existence. Both groups were exposed to the usual clinic routines and their consultants' management throughout the intervention.

Instrument

The instrument was a log maintained by the researcher that included patient demographics, diabetes outcome measures including Fasting Blood Sugar (FBS mg/dL), Systolic and Diastolic BP (BP mmHg) and anthropometric measurements of height (cm) and weight (kg). Blood pressure was taken by the nurse in the clinics using a blood pressure machine. Weight and height were measured using a Sohenle patient weighing scale with a height rod. Height was measured to the nearest 0.5cm and the weight was measured to the nearest 0.1kg. Fasting Blood Sugar blood samples were obtained pre-intervention on the 26th of September and post-intervention on the 7th November. Fasting Blood Sugars were collected after 8 hours of fasting and tested in the local hospital laboratories.

Data collection and analysis

The primary diabetes outcome measures were FBS levels and the Body Mass Index (BMI). The secondary measures were mean blood pressure and mean weight loss. Blood pressure monitoring is a routine measurement for diabetic management in these clinics and was therefore included. Participants' Blood Pressure (BP in mmHg) and anthropometric measurements of height and weight were checked on the first day. Body Mass Index (BMI) was calculated using the standard formula of BMI=weight/(height)^2 (kg/m^2). Fasting Blood Sugar (FBS) results were recorded from the laboratory results.

Pre-test and post-test scores and anthropometric measures were compared using non-parametric tests (Related Samples Wilcoxon Signed Rank Test and Independent Samples Mann-Whitney U test). A Fasting Blood Sugar level less than 100 mg/dL was considered normal. A Fasting Blood Sugar level from 100 to 125 mg/d(l) was considered pre-diabetes and 126 mg/dL or higher on two separate tests as confirmed diabetes.

Ethical considerations

Approval for conducting this study was obtained from the Senate Research Committee of the Faculty of Health Sciences of the University of the Western Cape (No. 13/9/37). Permission was received from the health management boards in charge of the secondary health facility and from the research ethics committee of the tertiary health facility. Informed consent was obtained and confidentiality and anonymity of the participants were maintained by providing their records with unique anonymous identifiers. The purpose of the study was explained to the patients, including the timeframe for data collection, which was not exceeded. The patients' time of consultation was not encroached as intervention classes were held on a day agreed upon by the patients and the health care professionals; also the control group members were interviewed after their normal consultations and other routines in the hospital. Participants were informed of the likelihood of being contacted again for clarification of information or member checks and some of them were contacted during programme development. Participants who could not afford glucose meter were provided with meters to enable them to practice and master the skill of self-blood glucose monitoring at home and to prevent any added financial costs. Strips were also provided for all the patients throughout the period of the intervention programme to prevent and minimise unnecessary financial strain on the patients. Confidentiality and anonymity of the participants were addressed and adhered to by providing their records with unique identifiers such as pseudo names.

ANALYSIS

Patient demographics

There were 23 participants in the study. Five (5) participants were lost to follow up. The average age of the participants was 56.7 years (sd 6.6, range 41–64) with 11 males (39.3%) and 17 females (60.7%). Though there were more females (69.2%) in the control group compared with 53.3% in the experimental group, there were no significant differences between the two groups in terms of demographics.

Table 1: Demographic characteristics of the two groups

	Intervention (n=15)	**Control (n=13)**	**Test**	**p-value**
Age	55.5 (6.9)	56.3 (6.2)	U=0.7	p=.522
Male Female	7(46.7%) 8(53.3%)	4(30.8%) 9(69.2%)	X^2=0.8	p=.390
Education Senior Certificate	8 (53.8%)	8(61.5%)	X^2=0.8	p=.397
Years Diagnosis	8.4 (5.7)	8.7 (5.9)	U=0.1	p=.927

BMI	27.6 (sd 6.6)	29.7 (sd 5.5)	*U*=0.9	p=.387
Fasting Blood Sugar (mg/dL)	159.6 (sd 4.3)	159.9 (sd 55.3)	*U*=0.1	p=.964
Systolic BP (mmHg)	134.8 (sd14.5)	140.8	*U*=0.8	p=.467

*Independent Samples Mann-Whitney U Test (U) and Fisher Exact Chi-square Tests (X^2). *Significant p<.05*

Diabetes education outcome measures

No significant differences in Body Mass Index (BMI), Fasting Blood Sugar (FBS) and Systolic BP were found between the groups at the start of the study (Table 1). More than three quarters of the participants in the Intervention Group (n=10, 76.9%) and Control Group (n=8, 80%) had poor glycaemic control (FBS levels > 126 mg/dL) at the start of the education programme.

Before-and-after differences in BMI and FBS after the education intervention were found within the Intervention Group but not within the Control Group (Table 2). Similarly, the number of participants with poor glycaemic control (FBS levels > 126 mg/dL) at the post-measurement decreased from 10 to 3 (76.9% to 23.1%) in the Intervention Group compared with a decrease from 8 to 7 (80% to 70%) in the Control Group.

Table 2: Results in Intervention and Control groups after 5 weeks of education (mean sd)

Intervention (n=13)					
	Pre	**Post**	**Difference**	**Test**	**p-value**
BMI	27.2 (sd 7.0)	26.6 (6.5)*	0.6 (sd 0.7)	*W*=2.2	p=.025*
Systolic BP (mmHg)	130.8	128.5	2.3 (sd11.7)	*W*=0.8	p=.470
Fasting Blood Sugar (mg/dL)	159.1 (sd 45.4)	130.8 (12.6)*	41.3 (sd 35.2)	*W*=3.2	p=.001*
Control (n=10)					
BMI	30.0 (sd 6.2)	29.8 (6.3)	0.2 (sd 0.4)	*W*=1.8	p=.113
Systolic BP (mmHg)	138.8 (sd 23)	133.5 (15.7)	5.0 (sd10.8)	*W*=1.4	p=.157
Fasting Blood Sugar (mg/dL)	161.4 (sd 63.6)	147.4 (39.1)	14.0 (sd 32.7)	*W*=1.1	p=.221

*Related Samples Wilcoxon Signed Rank Test (W)*Significant p<.05*

The results showed that Fasting Blood Sugar and BMI outcomes improved in patients following educational interventions and there was also a significant difference between the Intervention Group and Control Group in Fasting Blood Sugar differences post-intervention (Table 3).

Table 3: Comparison of FBS and BMI pre- and post-difference between the two groups (mean sd)

	Intervention Group (n=13)	**Control Group (n=10)**	**Test**	**p-value**
BMI	0.6 (sd 0.7)	0.2 (sd 0.4)	*U*=1.7	p=.101
Fasting Blood Sugar (mg/dL)	41.3 (sd 35.2)	14.0 (sd 32.7)	*U*=2.5	p=.012*

**significant p<.05*

DISCUSSION OF RESEARCH RESULTS

The importance of evaluating these programmes is essential and this study aimed to pretest and evaluate a multidisciplinary patient-centred self-management diabetes type 2 education programme at a tertiary and a district hospital in Nigeria. The key diabetes outcome measures of FBS, BMI and BP were measured before and after the education programme for the experimental group, as well as for a control group without education.

The number of patients with glycaemic control at the baseline of this study (24.4%) seems to be comparable with the number (29%) suggested by an African cross-sectional, descriptive study of 2352 type 2 diabetes patients (mean age 53.0±16.0 years with 8.0±6.0 years known duration of diabetes) (Sobngwi, Ndour-Mbaye, Boateng, Ramaiya, Njenga, Diop, Mbanya & Ohwovoriole, 2012).

Good self-management in the intervention group as indicated by the key outcome measures improved significantly from the start of the study in comparison with the control group. It therefore seems that the intervention, which included a multi-disciplinary professional education programme, was effective in improving the key diabetes outcomes for the diabetic patients, though there may have been confounding due to the self-monitoring activities. Specifically the intervention seemed to significantly improve the glycaemic control of patients over time. Furthermore, the proportion of patients with uncontrolled diabetes decreased and the proportion of patients with glycaemic control increased. This study in Nigeria showed similar results to a study by Gill et al. (2008) in rural KwaZulu-Natal in South Africa with both studies finding significant changes in the primary outcome of glycaemic control. Similarities were also found to a Mexican-American study where a three-month education programme of weekly instructional sessions on

nutrition, blood sugar self-monitoring, exercise, and other self-care topics found significantly lower levels of Fasting Blood Sugar at 6 and 12 months (Brown, Garcia, Kouzekanani & Hanis, 2002). However, similar findings were not confirmed for a group education programme led by health promotors in Cape Town South Africa (Mash, Rhode, Zwarenstein, Rollnick, Lombard, Steyn & Levitt, 2014) and may be due to the resource intensive nature of the programme. This study is similar to an intervention programme carried out in Hong Kong that provided 12 months of care for all patients attending public consultants out-patients clinic by a multidisciplinary team of diabetologists, dieticians, advanced practice nurses, nurses and other allied health care professionals (Jiao, Fung, Wong, Wan, Dai, Kwok & Lam, 2014). The intervention led to improvement in HbA1c lipid control, decrease in BMI and lower incidence of cardiovascular events. This is similar to our study although they had a larger group of patients and for a longer time, but the results in both studies showed the significant impact of multidisciplinary education intervention programme (Jiao et al., 2014).

LIMITATIONS OF THE STUDY

The study had a number of limitations. The study had a small sample size, some loss to follow up, limited outcome measures, short follow-up time and limitations in the study design. There are challenges in implementing randomised controlled trials in these settings and quasi-experimental studies are the most commonly used designs in implementation studies where there are practical and ethical barriers to conducting randomised controlled trials (Grimshaw, Campbell, Eccles & Steen, 2000). This study filled the criteria for a two group before and after design, but possible selection bias may exist due to the lack of randomisation. This is countered by the alternate day selection of participants and that in this study, the intervention and control groups did not differ significantly with regard to baseline demographic characteristics and outcome measures. Between and within analysis was done for this study with significant differences found in the intervention study and between the groups, and it can be assumed that the differences may be due to the intervention. Attempts were also made to reduce bias by keeping the two groups separate and the possible confounding impact of the Hawthorne effect is acknowledged.

CONCLUSIONS

In conclusion, this study provides evidence that a structured multidisciplinary patient-centred diabetes self-management education programme improved the outcomes of diabetes for participants in selected tertiary and district hospitals.

RECOMMENDATIONS

This study should be followed up with a bigger, more rigorous evaluation study in different urban and rural settings to confirm the effectiveness of the nurse-led multidisciplinary patient-centred diabetes self-management education programme for consideration of wider implementation.

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