Original Article

A study of rural clinical practice on efficiency of diabetes education

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Abstract

Introduction: Medication management to monitor blood glucose levels and reduce complications has been the focus of care for this disorder. In recent research, however, glycemic regulation enhancement and avoidance of long-term complications have been driven by self-care behavior.

Materials And Methods: This method was used to remove certain cases where diabetes screening was conducted using a single HbA1c test. This criteria may have contributed to the omission of such diabetes cases (i.e., people with diabetes who had not had an HbA1c test).

Results: The first two columns iden- tified the question number and a small description of the question. The table was divided by frequencies and percent correct pre-intervention and post-intervention answers.

Conclusion: This study had similar conclusions as previous research studies identified in the literature. A similar longitudinal design with a larger sample size has been recommended. Health care provider education serves as a foundation for maintaining and improving the health and well-being of persons with diabetes.

Keyword: diabetes education, rural clinical, effectiveness

INTRODUCTION

Insulin resistance and/or relative insulin deficiency2 characterize type 2 diabetes. In 2015, the International Diabetes Federation announced that 415 million adults worldwide were diagnosed with type 2 diabetes and that figure is projected to rise to 640 million by 2040. It is predicted that people who have knowledge of the disease and proper self-care would have improved glycemic control and a reduced risk of complications.[1]Type 2 Diabetes is a complex condition requiring continuous patient involvement and management by a healthcare professional team in clinical settings. Medication management to monitor blood glucose levels and reduce complications has been the focus of care for this disorder. In recent research, however, glycemic regulation enhancement and avoidance of long-term complications have been driven by self-care behavior. The purpose of self-care management is to prevent acute and chronic complications such as, visual impairment and, physical limitations.[3] Management of self-care varies from the normal treatment as it encourages patients to have the knowledge of their condition and emphasizes their role in the management and treatment of diseases1. If diabetes is diagnosed early and is well regulated, the health risks associated with type 2 diabetes can be avoided, deferred, or decreased. While there are many factors important to diabetes control, metabolic markers of poor diabetes control such as elevated blood glucose, blood lipids, cholesterol, and urinary albumin indicate increased risk of diabetic complications [4,5,6,7,8,9,10]. Interventions designed to impact on multiple risk factors in people with diabetes can reduce risk of diabetes complications [4,12]. However, achieving optimal population-level diabetes control remains difficult. In diabetes treatment, general practitioners (GPs), or primary care doctors, play a significant role. The National Clinical Practice Guidelines for General Practice define the criteria for blood lipid, HbA1c and urinary albumin testing in an attempt to improve diabetes management. [4,12]. For each of these metabolic measures, target thresholds are given and follow-up treatment is recommended if outcomes fall below these parameters [12]. Although the quality of an individual's diabetes treatment can not be measured by these metabolic markers, they provide key objective indicators of population-level diabetes management. While there were about 818,000 Australians diagnosed with diabetes in 2009 and 2010, it appears that a minority have received the recommended annual testing of metabolic markers [13].

MATERIAL AND METHOD

This makes it possible to evaluate the effect of the measures at a population level and to examine the findings relevant to diabetes treatment for individuals regardless of whether care has been obtained from one or more GPs within their group. Randomization by town may result in similar intervention effects even if patients change GPs within their town over the course of the study. Towns were randomised via a computer- generated stratified randomization scheme in SAS (Statistical Analysis Software). Allocation remained hidden in the study for all participants and all those determining outcomes. Consent from clusters or representatives of clusters was not necessary since the clusters were towns. Management of the various challenges associated with this design is addressed in the discussion. The two pathology companies used the

postcode of the treating physician for the two-year baseline duration to classify the possible cases in each study town. The criteria for a person to be classified as a possible case of diabetes was the presence of at least one HbA1c test. A study case was defined by having either a single HbA1c test where the result was greater than 7%, or two HbA1c tests within the study period. This method was used to remove certain cases where diabetes screening was conducted using a single HbA1c test. This criteria may have contributed to the omission of such diabetes cases (i.e., people with diabetes who had not had an HbA1c test). More extreme types of prejudice are, however, avoided because there was no request for provider approval or patient consent.

RESULTS:

The following staff test results from the Diabetes Knowledge Test (DKT) displayed below reflect pre-intervention results versus post-intervention results. The first two columns iden- tified the question number and a small description of the question. The table was divided by frequencies and percent correct pre-intervention and post-intervention answers. The pre-intervention score of 81% increased to 88% after three months (see Table 1).

Question		Pre-Intervention		Post-Intervention	
#	Description	Frequency Correct	Percent	Frequency	Percent Correct
1	Diabetes diet	15	93.8%	15	93.8%
2	Item highest in carbohydrate	12	73.8%	14	87.2%
3	Item highest in fat	9	53.8%	8	47.2%
4	“free food”	12	73.8%	13	81%
5	A1c measurement	15	93.8%	15	93.8%
6	Method of home glucose testing	16	100%	15	93.8%
7	Effects of unsweetened juice	10	61%	11	67.8%
8	Treatment for low blood glucose	11	67.2%	12	73.8%
9	Effect of exercise on blood glucose	14	87.2%	14	87.2%
10	Effect of infection on blood glucose	14	87.2%	14	87.2%
11	Foot care	14	87.2%	16	100%
12	Low-fat diet	15	93.8%	16	100%
13	Numbness and tingling symptoms	15	93.8%	16	100%
14	Not associated with diabetes	16	100%	16	100%
15	Signs of ketoacidosis	7	41%	12	73.8%
16	Effects of sickness	12	73.8%	13	81%
17	Rapid-acting insulin	14	87.2%	15	93.8%
18	Meal-time insulin use	10	61%	13	81%
19	Action to take with low glucose	15	93.8%	16	100%
20	Reason for low glucose	15	93.8%	16	100%
21	Morning insulin	13	81%	15	93.8%
22	Cause of high blood glucose	14	87.8%	15	93.8%
23	Cause of low blood glucose	13	81%	14	87.2%
Total score			82%		88%

The nursing staff and providers results revealed improvement in knowledge after DSME program implementation; however, the analyses were not statistically significant. The staff sample size was small. A decrease in the average patient HbA1c percentages from implementation to three months post implementation was statistically significant.

Table 2. Glycated hemoglobin (HbA1c) results

	February	August	November
n	191	234	190
Mean	5.98%	5.98%	5.79%
Min	5.2%	5.3%	4.8%
Max	13.9%	12.1%	13.7%

DISCUSSION

There were a number of challenges to consider in the execution and analysis of this type of study. A overview of some of the major challenges and how they were handled is given below. A case study was described as having either a single test of HbA1c where the outcome was greater than 7 percent or two tests of HbA1c within the study period. This method was used to remove certain cases where diabetes screening was conducted using a single HbA1c test. While this criterion resulted in the omission of some cases of diabetes (*i.e.*, those who had not had an HbA1c test), the scale of the study and

avoidance of participant bias was considered to compensate for any potential impact on generalizability of results. Some people may fly, obtaining their treatment from experts outside the chosen communities. However, between experimental and control populations, any such impact is likely to be identical. At the time of study commencement, the HbA1c test was not recommended as a screening test in Australia and does not attract Medicare reimbursement when used as a diagnostic test. Individuals with only one HbA1c test where the test result is below 7% will be excluded from the sample. Therefore, should the use of the HbA1c test as a screening tool have increased during the study period, it is unlikely to influence the study outcome. Should such a change occur, it will be possible to assess using interrupted time series analysis whether an overall increase in the use of one-off HbA1c tests has occurred over time, because the study data on HbA1c testing will provide a near-complete record of all HbA1c testing in the study communities over the five- year study period.HbA1c analysis results are subject to variation as a result of the type of equipment used, with the analysis method accounting for differences of up to 23% in the result [13,14]. Changes in the equipment and methods used for HbA1c analysis were monitored in the course of this study via contact with the two pathology companies to ascertain the need for sensitivity analyses to explore the size of any such effect. The two pathology companies independently provided de-identified unit record data for each 'case'. Therefore, the data was obtained as two independent data sets that were merged to provide a profile for all individuals in each town. To classify any person who might occur in both datasets and data was combined for that individual, gender and date of birth were used. In certain cases, higher cut-off points for glycaemic regulation may be recommended (e.g., 8 percent for HbA1c in older patients). The primary outcome analysis relates to changes in mean HcA1c levels and would, therefore, be relatively unaffected by this factor. Analyses relating to the proportion of cases of glycaemic control in each city which require research to apply different cut-off points with respect to age, but this adds an additional element of arbitrariness with regard to which age cut-offs are used.

CONCLUSION

The nursing staff and providers who completed the Diabetes Knowledge Test (DKT) demonstrated an increase in knowledge regarding general diabetes information and medication management. The aggregated HbA1c data demonstrated clinical and statistical significance from implementation to three months post-intervention. This study had similar conclusions as previous research studies identified in the literature. A similar longitudinal design with a larger sample size has been recommended. Health care provider education serves as a foundation for maintaining and improving the health and well-being of persons with diabetes. This is a unique opportunity to learn, offer new perspectives, seek alternative strategies, share creativity, and work together to evolve optimal learning strategies in serving the diabetes population.

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