Short communication

Predictors and effectiveness of diabetes self-management education in clinical practice

Baiju R. Shah [a,b,c,*], Gillian L. Booth [a,b,d]

[a] Institute for Clinical Evaluative Sciences, Toronto, Ontario, Canada
[b] Departments of Medicine and Health Policy, Management and Evaluation, University of Toronto, Toronto, Ontario, Canada
[c] Department of Medicine, Sunnybrook Health Sciences Centre, Toronto, Ontario, Canada
[d] Department of Medicine and the Keenan Research Centre in the Li Ka Shing Knowledge Institute, St. Michael's Hospital, Toronto, Ontario, Canada

ARTICLE INFO

ABSTRACT

Objective: To describe the demographic and clinical predictors of attendance at a diabetes education center (DEC) for self-management education, and to compare subsequent quality of care indicators between attendees and non-attendees.
Methods: DEC attendance in 2002 was determined from a written questionnaire completed by 781 adults with diabetes across Ontario, Canada. Predictors of attendance and quality of care indicators were defined from the questionnaire and from linkage with health care administrative data. A multivariate logistic regression model was built to find the independent predictors of attendance, while quality of care was evaluated using propensity score methods.
Results: 30% of survey participants reported attending a DEC in 2002. Independent predictors of attendance were shorter duration of diabetes, receiving regular primary care, receiving regular diabetes specialist care and single marital status. Attendees were more likely to receive a retinal screening examination in the following 2 years than non-attendees.
Conclusion: Receiving regular primary care was the strongest predictor of attending a DEC, suggesting that DECs are not substitute providers of diabetes care for people without a regular physician. Increased retinal screening among DEC attendees suggests that self-management education improved their self-efficacy to ensure adequate screening was performed.
Practice implications: The findings characterize the types of people who attend DECs, which may lead to identification and targeting of inequities in access. The findings also highlight the influence diabetes education can have on quality of care in real-world practice.

1. Introduction

Self-management is an essential component of care for people with diabetes, as with other chronic diseases [1]. Self-management education programs support patients with self-care behaviors and empower them to improve their self-efficacy. However, comparatively little research has examined how diabetes self-management education changes quality of care. Reviews of randomized trials have suggested that it can lead to improvements in knowledge, dietary habits, weight, glucose monitoring frequency and glycemic control [2–4]. However, most trials in these reviews had major methodologic flaws [2], so their generalizability to unselected patients in real-world clinical care is unknown.

We conducted a study to identify predictors of attendance at a diabetes education center (DEC) to receive self-management education. We then examined whether quality of care was influenced by DEC attendance.

2. Methods

2.1. Data sources and definitions

The study was conducted in Ontario, Canada's largest province. It used data collected from the Survey of Diabetes Services (SDS), which has been previously described in detail [5]. Briefly, a written questionnaire was completed by 781 adults with diabetes of ≥ 2

* Corresponding author at: Institute for Clinical Evaluative Sciences, G106 – 2075 Bayview Avenue, Toronto, Ontario, Canada M4N 3M5. Tel.: +1 416 480 4706; fax: +1 416 480 6048.
E-mail address: baiju.shah@ices.on.ca (B.R. Shah).

years' duration, most of whom were recruited by staff at participating pharmacies across Ontario. The questionnaire was administered between August 2003 and December 2004, but was not formally validated. It included 40 questions, most with dichotomous responses, that asked about participants' demographics, clinical history and health care utilization. Respondents' mean age was 2.2 years younger than the overall diabetic population of Ontario, and they had longer disease duration [5].

Survey responses were linked with health care administrative data, including (1) abstracts of hospitalizations and emergency department visits, and (2) physician and optometrist service claims. Because of the single-payer universal health care system in Ontario, these data comprehensively cover virtually all care for residents of the province. Individuals were linked between all data sources via a unique health card number.

DEC attendance was determined from the responses to the SDS question asking, "Did you go to a diabetes education center or program in 2002?"

DECs in Ontario are, in large part, government funded, and hence patients can access them without charge. Most centers accept patient self-referral in addition to referrals from physicians. Most diabetes education is delivered through structured group programs.

Eight potential predictors of DEC attendance were defined from self-report in the SDS: age, sex, marital status, education level, rural residence, diabetes duration, receiving regular primary care and receiving regular diabetes specialist (endocrinologist or internist) care. In Ontario, internists do not provide primary care.

Four quality of care indicators were defined. Capillary glucose testing was determined from self-report in the SDS. Testing was considered a quality of care indicator because Canadian practice guidelines recommend capillary glucose monitoring for virtually all people with diabetes [6]. Other indicators were defined from administrative data for 2003 and 2004. Retinal screening examinations were based on service claims from ophthalmologists or optometrists. Acute diabetes complications were defined as

hospitalizations or emergency department visits for hypoglycemia, hyperglycemia or soft tissue infections. Continuity of primary care was defined as claims for at least six ambulatory care visits from the same primary care provider during the 2-year period.

2.2. Statistical analysis

To determine the predictors of DEC attendance, logistic regression was used to model DEC attendance against all of the potential predictor variables [7].

To examine quality of care following DEC attendance, a propensity score model was constructed. The propensity score is defined as the predicted probability for each subject to have attended a DEC [8]. It is derived using logistic regression modeling DEC attendance against any potential confounding variables, including demographics (age, sex, rural residence), health service utilization (frequency of primary care visits, receipt of regular diabetes specialist care, receipt of cardiologist care), diabetes clinical features (duration of diabetes, insulin use), and other medical conditions (coronary artery disease, stroke, hypertension, dyslipidemia, cigarette smoking). An iterative structured approach was used to construct a non-parsimonious propensity score model [9,10]. Subjects were divided into quintiles of propensity score, and balance of the independent variables between exposure groups within each quintile was verified. The pooled relative risk across quintiles for each quality indicator between DEC attendees and non-attendees was calculated, with 95% confidence intervals [9]. Respondents who were missing values for any variables in the model were excluded.

3. Results

Of the 781 participants in the survey, 237 (30%) reported attendance at a DEC in 2002. Table 1 shows the predictors of DEC attendance. Recently diagnosed diabetes, receiving regular specialist care, receiving regular primary care and marital status were independent predictors of DEC attendance.

Table 1
Predictors of diabetes education center attendance

	DEC attendees (n = 239)	DEC non-attendees (n = 542)	Adjusted odds ratio (95% CI)	p-Value
Age (years)				0.1
20–39	22 (9%)	48 (9%)	Reference	
40–59	88 (37%)	220 (41%)	1.21 (0.64–2.29)	
60–79	122 (51%)	250 (46%)	1.74 (0.89–3.40)	
80 or older	7 (3%)	24 (4%)	1.09 (0.37–3.21)	
Male sex	122 (51%)	282 (52%)	1.00 (0.72–1.39)	1.0
Marital status				0.02
Single	29 (12%)	40 (7%)	Reference	
Married	167 (70%)	386 (72%)	0.42 (0.24–0.75)	
Divorced	18 (8%)	54 (10%)	0.31 (0.14–0.68)	
Widowed	25 (10%)	57 (11%)	0.44 (0.20–0.94)	
Education level				0.4
Less than high school	40 (17%)	113 (21%)	Reference	
Completed high school	70 (30%)	139 (26%)	1.51 (0.93–2.45)	
Some college/university	50 (21%)	114 (21%)	1.42 (0.85–2.39)	
Completed college/university	55 (23%)	115 (22%)	1.58 (0.93–2.70)	
Graduate degree	22 (9%)	53 (10%)	1.13 (0.58–2.20)	
Rural residence	61 (26%)	138 (25%)	1.19 (0.82–1.74)	0.4
Diabetes duration				0.0007
3 years or less	80 (33%)	121 (22%)	Reference	
4–8 years	51 (21%)	141 (26%)	0.50 (0.32–0.78)	
9 years or longer	108 (45%)	280 (52%)	0.50 (0.34–0.74)	
Regular primary care	238 (100%)	520 (96%)	13.2 (1.7–101.2)	0.01
Regular diabetes specialist care	114 (48%)	202 (37%)	1.79 (1.26–2.54)	0.001