

Résumé

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## L'éducation sur le diabète en milieu rural : gènère-t-elle des résultats?

Ann Bowman et Donna Epp

Cette étude transversale effectuée par voie d'enquête par correspondance a pour but d'évaluer les résultats de l'éducation sur le diabète, des soins et du soutien dispensés dans deux cliniques rurales du Manitoba, au Canada. Soixante dix huit répondants atteints de diabète de type deux, dont 51 personnes fréquentant les cliniques rurales et 27 qui n'en fréquentaient aucune (*âge moyen* = 68,5), ont été comparés sur les plans suivants : caractéristiques démographiques; sensibilisation et connaissance du diabète; efficacité de l'autogestion de la maladie; attitudes et comportements; qualité de vie; satisfaction quant aux soins; et utilisation des services de santé. Les personnes fréquentant les cliniques avaient plus de connaissances sur le diabète ( $P < 0,001$ ), affichaient des taux d'autogestion efficace plus élevés ( $P < 0,051$ ), et éprouvaient une plus grande satisfaction quant aux soins reçus ( $P < 0,001$ ), comparativement aux personnes qui ne fréquentaient pas les cliniques. Par ailleurs, une éducation plus accrue ne générât pas nécessairement de meilleures connaissances sur le diabète, ni de meilleurs comportements et attitudes. Une fréquentation des cliniques et une interaction soutenante avec les professionnels de la santé et les pairs peuvent aider les diabétiques de type deux à acquérir la confiance et les stratégies de rechange nécessaires pour gérer les problèmes de santé liés à cette maladie. Toutefois, une approche plus traditionnelle à l'éducation sur le diabète et aux soins associés favoriserait davantage l'atteinte des objectifs ciblés.

Mots clés : évaluation, rural, éducation sur le diabète

# Rural Diabetes Education: Does It Make a Difference?

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This cross-sectional study using a mailed survey evaluated outcomes of diabetes education, care, and support provided at 2 clinics in rural Manitoba, Canada. Seventy-eight respondents with type 2 diabetes, including 51 rural clinic attenders and 27 non-attenders (mean age = 68.5), were compared regarding demographic characteristics; diabetes education and knowledge; diabetes self-management efficacy, attitudes, and behaviours; quality of life; satisfaction with care; and health-care utilization. Attenders had more diabetes education ( $P < .001$ ), higher self-management efficacy scores ( $P < .051$ ), and greater satisfaction with diabetes care ( $P < .001$ ) than non attenders, but more education did not translate into greater diabetes-related knowledge, attitudes, or behaviours. While clinic attendance and supportive interaction with health professionals and peers may help equip people with type 2 diabetes with the confidence and alternative strategies to handle diabetes-related health problems, a more standard approach to diabetes education and care could improve the achievement of desired outcomes.

Keywords: evaluation, rural, diabetes mellitus, diabetes education

## Introduction

Type 2 diabetes mellitus has reached epidemic proportions, affecting 6% of individuals age 45 to 64 and 11% of people 65 years or older (Harris, 1998). Population studies suggest that the true prevalence of diabetes may exceed 7% (Dunstan et al., 2002; Leiter et al., 2001). Concerns about the epidemic stem from the high human and economic costs of diabetes and its complications: diabetes-related health-care expenditures in Canada in 1998 were estimated at between \$4.76 and \$5.23 billion (Dawson, Gomes, Gerstein, Blanchard, & Kahler, 2002).

Research has found that intensive diabetes management and support for people with type 2 diabetes can delay the onset and reduce the progression of diabetes complications, as well as reduce the onset of diabetes per se (Eriksson & Lindgarde, 1991; Knowler et al., 2002; Pan et al., 1997; Tuomilehto et al., 2001). Thus, ongoing diabetes education, support for self-care, and regular monitoring are requisite to reducing the personal and social impact of the disease.

While there is consensus on the benefits of intensive diabetes management, there has been little comprehensive evaluation of the usual care

received by people with type 2 diabetes living in rural areas, and the outcomes of such care. This gap in evaluation research is serious because of the scarcity of resources, limited access to specialists, and possible lack of standardization in diabetes program delivery in rural areas. The purpose of this study was to evaluate outcomes of diabetes care in two communities in rural Manitoba, Canada, served by the Marquette Regional Health Authority (MRHA).

### **Diabetes Education Clinics**

The target communities for the study are similar with respect to demographics, economic bases, resources, and health-care access. Diabetes education in these communities has been provided primarily by two diabetes clinics (Site 1 and Site 2) for approximately 20 years. These two clinics are the only rural diabetes clinics in Manitoba. Other than through these clinics and those in urban settings, diabetes education in Manitoba is available on an itinerant basis through diabetes outreach from urban centres, or through local health professionals. Occupational and physical therapists from the nearest urban centre, approximately 100 kilometres away, attend the clinics on an itinerant basis only. There has been higher client attendance at Site 1 (40–60) than at Site 2 (15–20). In addition, physicians are salaried at Site 1 and use fee-for-service billing at Site 2.

Bi-monthly diabetes care at the rural clinics has included foot inspection; assessment of weight and blood pressure; blood and urine tests; and physician follow-up. Monthly 1-hour nurse-led education sessions have been held on topics pertinent to diabetes management. A standardized program has not been implemented.

Clients with diabetes typically attend the diabetes clinic when scheduled for a physician visit for routine diabetes monitoring. However, attendance at educational sessions need not be associated with medical tests or physician follow-up. Thus, opportunities for supportive peer interaction as well as education have been regularly available. Education sessions have been routinely advertised through local newspapers, posters, and word-of-mouth. No formal recall system has been used.

In 1997 the MRHA assumed responsibility for the administration of health care and for providing health-care services from Manitoba Health (MH). Given that the region has had a higher incidence and prevalence of diabetes than the provincial rate (5.7/1,000 and 68.01/1,000 vs. 5.3/1,000 and 59.35/1,000), and given that the hospitalization rate for cardiovascular disease and stroke among persons with diabetes is more than five times greater than that for those without diabetes, the MRHA gives high priority to its responsibility to people with diabetes. It has been acknowledged that decisions concerning services for people with

diabetes in these communities should be based on research evidence (Epidemiology Unit and Diabetes Unit, Public Health Branch, Manitoba Health, 1997; Marquette Regional Health Authority, WESTARC Group, 1998).

With the involvement of a steering committee comprising representatives of the communities served by the MRHA and nurses and physicians from each clinic, we attempted to provide an evidence-based answer to the question of whether the two rural diabetes clinics have, under actual conditions, made a difference in diabetes-related health outcomes and health-care utilization among people with type 2 diabetes.

### **Literature Review**

Prerequisite to successful diabetes self-management and diabetes-related problem-solving is knowledge about the disease and effective coping strategies. Yet only 35% of people with diabetes have attended a class or program on diabetes at some point during the course of their disease; in addition, at least half of those with diabetes have deficits of knowledge and skills, and less than half of those with type 2 diabetes achieve ideal glycemic control (American Diabetes Association, 2000; Clement, 1995; Harris, Coonrod, & Betschart, 1994).

Unfortunately as well, outcomes of diabetes programs have not been well substantiated. Research on the effectiveness of diabetes education and management approaches has not been comprehensive in nature. Typically, it has been limited by its focus on cognitive or physiological outcomes. It has also been limited by its use of intensive interventions delivered under ideal conditions (Corabian & Harstall, 2001; Fain, Nettles, Funnell, & Charron, 1999; Glasgow, 1999a, 1999b; McLeod, 1998; Mulcahy, 1999; Norris, Engelgau, & Narayan, 2001). Research has also inadequately examined the efficacy and effectiveness of educational programs for long-term adherence, quality of life (QoL), morbidity and mortality outcomes, and health-care utilization (Brown, 1988, 1990; Fain et al.; Glasgow, 1999a, 1999b; Norris et al.; Padgett, Mumford, Hynes, & Carter, 1988).

Deficiencies in research on diabetes education and care have arisen from: lack of description of the representativeness of subjects and interventions; variability in types of interventions studied; use of interventions designed for ideal conditions with ideal resources; inconsistent and insufficient follow-up; and lack of use of validated, reliable measures. Deficiencies have also stemmed from minimal attention to variables such as risk reduction, lifestyle change, coping behaviours, self-efficacy, psychosocial functioning, and general QoL (Corabian & Harstall, 2001; Fain et

al., 1999; Glasgow, Toobert, & Hampson, 1994; McLeod, 1998; Mulcahy, 1999; Norris et al., 2001).

In addition, research findings concerning the outcomes of diabetes programs have not been consistent. Outcomes have varied by the nature of the intervention, the length of training, and the nature and length of follow-up (Corabian & Harstall, 2001). Overall, however, there appears to be consensus on the need to shift towards an outcomes-driven diabetes-care paradigm to achieve relevancy, efficiency, and effectiveness in the coming decades. Research must examine which types of programs, or which aspects of those programs, best promote ongoing self-management, for which types of patients. It should evaluate the cognitive and physiological outcomes of care and education, as well as the extent to which programs reach their target audience, achieve attitudinal and behavioural change, influence perceptions regarding QoL, and affect health-care utilization. Finally, research must examine how to achieve high-quality outcomes under actual conditions.

### Research Questions

This study posed three research questions: 1. *Do diabetes clinic attenders (Group A) and non-attenders (Group NA) differ with respect to demographic characteristics; diabetes education and knowledge; diabetes self-management efficacy, attitudes, and behaviours; QoL; and satisfaction with care?* 2. *Do Group A and Group NA differ in their utilization of health and medical services (emergency room visits, hospital admissions, physician and specialist visits)?* 3. *Do Group A and Group NA differ in terms of annual diabetes-related physiological measures from 1997 to 2000 on retrospective chart audit (to be reported separately).*

### Method

#### *Design and Procedure*

Approval from the Brandon University Ethics Committee and the Manitoba Health Information Privacy Committee was obtained prior to the study. A cross-sectional design using self-administered mailed surveys was used. Each mailing included a survey, covering letters from MH and the MRHA, a consent form, a lottery ballot form and a stamped envelope for its return to MH, and a self-addressed stamped envelope for return of the completed survey and the consent form. A second mailing was made 10 days after the first. A retrospective chart audit of diabetes-related health parameters for consenting respondents and MH service-utilization data (1997–2001) was also conducted and will be reported separately.

Provincial health personnel brokered the study. A sample of personal health insurance numbers (PHINS) of people with diabetes was computer-generated from the Provincial Diabetes Registry using postal codes for communities within the catchment areas of Sites 1 and 2. Registration of PHINS on the Diabetes Registry occurs with  $\geq 2$  physician visits within a 2-year period for diabetes, or  $\geq 1$  hospitalization(s) for diabetes, using the International Classification of Diseases, Ninth Revision, diagnostic code 250. PHINS were cross-referenced with death records and postal codes for institutional dwellings. The sample consisted of 278 PHINS. Only those with *type 2* diabetes were asked to complete surveys.

A trained research assistant collected physiological data. Data were entered into a database in the epidemiology department of a large university using double-entry procedures. The Statistical Package for Social Sciences (SPSS) 12.0 was used for data analysis (SPSS, 2003).

### **Measures**

The survey comprised subsets of questions from existing scales with established reliability and validity. It was reviewed and modified at several points by the MRHA steering committee for content and face validity. It was also reviewed by an expert in diabetes survey development and by five diabetes educators, for content validity, organization, wording, format, and length. Revisions involved simplification of wording and a reduction of response options to improve response potential. Following approval from the Brandon University Ethics Committee, the survey was piloted with 10 persons with diabetes and revisions were incorporated. The readability level of the survey was Grade 10 (McLaughlin, 1969).

The survey addressed (1) demographic characteristics, and (2) knowledge, behaviour, attitudes, quality of life, and medical-service utilization concerning diabetes. For ease of comparison, subscale scores were transformed to a 0–100 scale where possible. Higher scores indicate more education and knowledge; better self-management efficacy, attitudes, and behaviours; greater perceived understanding of diabetes self-management and satisfaction with diabetes care; higher QoL; and more perceived Problem Areas In Diabetes (PAID). The purpose, source, number, and type of questions, as well as reliability scores of the survey subscales obtained in this study, are summarized in Table 1.

**Knowledge about diabetes** was measured using questions adapted from the Canadian Diabetes Association's Portfolio for Diabetes Education Services Self-Assessment and Recognition Program (Canadian Diabetes Association [CDA], Diabetes Educator Section, 1996).

Table 1 <i>Measurement tools</i>			
Focus of assessment and type of questions	Tool	Number	Reliability Cronbach's alpha
1. Knowledge of diabetes, its causation, and self-management principles	Portfolio for Diabetes Education Services Self-Assessment and Recognition Program	17 multiple choice	.68
2. <i>Diabetes self-management</i>	Ipswich Diabetes Self-management Survey		
Attitudes		7	.32
Efficacy		5	.50
Behaviour		8	.23
3. <i>Diabetes-related</i>	Diabetes Care Profile		
Education		4 – Yes/no	.362
Understanding		10 – Likert scale	.850
Affect (problem areas)		20 – Likert scale	.947
Health-care satisfaction		4 – Likert scale	.779
Quality of life		12 – Likert scale and yes/no	.774
4. Assess QoL at present and in 5 years	Cantrill's Ladder of Life	2 (rank order)	
5. <i>Health-care utilization for diabetes</i>			
Family doctor visit		1	
Diabetes specialist visit		1	
Eye doctor visit		1	
6. <i>Health-care utilization for diabetes/heart disease</i>			
24-hour hospital stay		1	
ER visit		1	
Confined to bed for symptoms related to diabetes		1	
7. Diabetes education	Investigator developed	10 – Yes/no	.735

***Diabetes self-management attitudes, efficacy, and behaviours.*** These variables were measured using questions from the *Ipswich Diabetes Self-Management Survey* (McLeod, 1997), a composite measure based on questions from established scales that had good reliability and validity scores

drawn from existing scales (ATT39 [Dunn, Smart, Beeney, & Turtle, 1986]; QoL [Tupling, Web, Harris, & Sulway, 1981]; and Health Belief Scale [Harris, Linn, Skyler, & Sandifer, 1988]). Ipswich scale test-retest reliability was 0.82; internal consistency was 0.72.

**Diabetes Care Profile (DCP).** This measure consists of five subscales from the Michigan Diabetes Research and Training Center that collectively assess social and psychological factors related to having and managing diabetes (Fitzgerald et al., 1996). Cronbach's alphas of individual DCP scales were reported as ranging from .60 to .95 in one study and from .66 to .94 in another (Fitzgerald et al.). Subscales discriminated among patients with different disease severity levels and correlated with hemoglobin A<sub>1</sub>C (Hgb A<sub>1</sub>C) levels among individuals with diabetes and has predictive validity regarding glycemic control (Anderson, Fitzgerald, Wisdom, Davis, & Hiss, 1997). DCP subscales address: (a) receipt of basic education regarding diabetes, (b) beliefs regarding diabetes management, (c) perceptions of currently experienced problem areas in life associated with having diabetes (Joslin Diabetes Center, 2000), (d) satisfaction with diabetes care, and (e) QoL (Ware, Kosinski, & Keller, 1995).

**QoL** was also assessed using Cantrill's Self-Anchoring Scale (Cantrill, 1963). Respondents are asked to rate which step on the "ladder of life" they stand, keeping their health in mind. Respondents are asked to rate their QoL 5 years ago, currently, and 5 years hence.

**Health-care utilization.** Respondents were asked how many times in the previous year they had visited their physician, a diabetes specialist, and/or an eye or foot specialist. Using a five-point Likert scale (0 = no visits, 5 = more than 10 visits), respondents were asked *how many times* in the previous year they (1) had been admitted to hospital for a 24-hour stay for diabetes or a heart problem, (2) had used the ER for diabetes or a heart problem, (3) had been confined to bed due to diabetes-related symptoms.

## Results

### Sample Characteristics

Seventy-eight surveys were returned (response rate 28.1%); 51 respondents were in Group A (65%) and 27 were in Group NA; 38 Group As (74.5%) attended Site 1 and 13 attended Site 2. Respondents ranged in age from 43 to 89 years ( $SD = 11.3$ ). The mean age for Group A was 69.6 years, versus 66.5 years for Group NA, but the differences were not statistically significant (NS). The mean age for Site 1 respondents was higher (71.7;  $SD = 10.7$ ) than that for Site 2 respondents (63.5;  $SD = 11.6$ ) (Mann-Whitney  $U = -2.142$ ,  $P = .03$ ). There were more female

( $n = 48$ ) than male ( $n = 30$ ) respondents ( $\chi^2 = 4.154$ ;  $df = 1$ ,  $P = .04$ ) but no differences by gender.

The majority (89.7%) of respondents were Caucasian. Most (65.4%) were married or living with a partner, while 21.8% were widowed and 12.8% were never married/divorced. Approximately half (53.3%) of the respondents had at least some high-school education. Over half (56.2%) had a total annual household income of less than \$25,000. Nearly half (44.9%) were retired, while 20.5% were working and 34.7% were unemployed.

There was somewhat higher mean medication use among women (14.1;  $SD = 4.1$ ) than among men (4.0;  $SD = 3.3$ ) (Mann-Whitney  $U = -1.744$ ,  $P = .08$ ). However, there were no differences in total drugs used by attendance status or site. There was also no difference for the number of comorbid diseases between groups, but a greater proportion of Group A ( $n = 8$ ; 15.7%) than Group NA respondents ( $n = 0$ ) had thyroid disease (Mann-Whitney  $U = -2.158$ ,  $P = .03$ ).

<b>Variable</b>	<b>Group A</b>	<b>Group NA</b>	<b>Total</b>
<i>Self-report BMI (2002)</i>	$n = 49$	$n = 27$	$n = 76$
Range	13.9–51.8	22.3–40.3	13.9–51.8
Mean ( <i>SD</i> )	29.5 (6.4)	29.3 (4.4)	29.4 (5.7)
<i>Complications</i>	$n = 50$	$n = 27$	$n = 78$
Nephropathy	7 (14.0)	3 (11.5)	10 (13.2)
Retinopathy	11 (21.6)	6 (22.2)	17 (21.8)
Neuropathy	22 (43.1)	9 (33.3)	31 (39.7)
<i>Duration of diabetes</i>	$n = 48$	$n = 27$	$n = 75$
Range (years)	2.0–37.0	1.0–56.0	1.0–56.0
Mean ( <i>SD</i> )	13.2 (9.3)	12.0 (11.5)	12.8 (10.1)
<i>Diabetes treatment</i>	$n = 51$	$n = 27$	$n = 78$
Insulin	6 (11.8)	3 (11.1)	9 (11.5)
Pills	32 (62.7)	17 (63.0)	49 (62.8)
Insulin and pills	4 (7.8)	1 (3.7)	5 (6.4)
Exercise	30 (58.8)	17 (63.0)	47 (60.3)
Nutrition	39 (76.5)	16 (59.3)	55 (70.5)
None	3 (5.9)	0 (0.0)	3 (3.8)
<i>Smoke</i>	$n = 51$	$n = 27$	$n = 78$
Never	24 (47.1)	9 (33.3)	33 (42.3)
Ever	22 (43.1)	12 (44.4)	34 (43.6)
Current	5 (9.8)	6 (22.2)	11 (14.1)

Diabetes-specific characteristics of respondents are summarized in Table 2. No between-group differences were found for BMI, diabetes duration, smoking status, or number of diabetes complications. While not significantly different between groups, mean BMI for all groups was in the high-risk category for developing health problems ( $BMI \geq 30.0$ ) (CDA, Clinical Practice Guidelines Expert Committee, 2003). Also, nearly half of the respondents had  $\geq 1$  diabetes complication, and a greater proportion of Group NA than Group A had no diabetes-related complications (NS). Site 2 respondents were more often prescribed pills for diabetes than Site 1 respondents (Mann-Whitney  $U = -1.791$ ,  $P = .049$ ). Also, although smoking status did not differ by group, differences by gender were found: 80.0% of men versus 43.8% of women had ever smoked (Mann-Whitney  $U = -3.132$ ,  $P = .002$ ); and 23.3% of men versus 6.3% of women currently smoked (Mann-Whitney  $U = -2.181$ ,  $P = .029$ ).

### Survey Results

Table 3 summarizes DCP subscale scores, scores for diabetes knowledge, and scores for QoL.

Mean DCP education scores were significantly higher for Group A than for Group NA (Mann-Whitney  $U = -5.585$ ,  $P < .001$ ), but not by clinic site. Proportionately more Group A than Group NA respondents had received exercise education ( $c^2 = 3.354$ ,  $df = 1$ ,  $P = .067$ ) (NS).

To determine the extent of diabetes education received by respondents, questions about receipt of diabetes-specific education, *in addition* to DCP education questions, were posed, including whether respondents had received education regarding diabetes and over-the-counter medication use, coping with stress, managing diabetes when ill or when traveling, and skin care. Mean scores were higher for Group A than for Group NA (53.8,  $SD = 27.3$ ; 39.6,  $SD = 26.1$ , respectively), approaching statistical significance (Mann-Whitney  $U = -1.904$ ,  $P = .057$ ). Mean scores at Site 1 (52.2;  $SD = 28.5$ ) differed from those at Site 2 (57.7;  $SD = 24.9$ ).

DCP education, understanding, and PAID scores did not differ by group status, although PAID scores were somewhat higher for Group A than for Group NA. PAID scores differed by age level (Kruskal-Wallis  $c^2 = 19.160$ ,  $df = 3$ ,  $P < .001$ ), with the highest scores among respondents 43 to 59 years (26.0;  $SD = 26.3$ ) compared to those aged 60 to 69 (12.5;  $SD = 20.5$ ), 70 to 79 (10.8;  $SD = 9.0$ ), or 80 or older (7.5;  $SD = 10.3$ ). Mean PAID scores were also higher for women than for men (Mann-Whitney  $U = -2.603$ ,  $P = .009$ ). In addition, DCP Satisfaction with care was significantly higher in Group A than Group NA (Mann-Whitney  $U = -3.646$ ,  $P < .001$ ).

<b>Tool</b>	<b>Group A (n = 51) M (SD)</b>	<b>Group NA (n = 27) M (SD)</b>	<b>Total M (SD)</b>
Knowledge (N = 78)	48.9 (13.9)	45.6 (14.9)	48.3 (14.3)
DCP Education (N = 78)	<b>**</b> 84.3 (18.0)	56.5 (29.1)	74.7 (26.0)
DCP Understanding (N = 74)	53.9 (18.2)	53.4 (21.3)	53.8 (19.2)
DCP PAID Scale (N = 78)	15.8 (16.8)	10.5 (12.3)	14.0 (15.5)
DCP Satisfaction (N = 67)	<b>**</b> 73.3 (13.1)	58.9 (12.6)	68.6 (14.6)
DCP QoL (N = 62)	62.6 (19.0)	65.8 (20.5)	63.7 (19.4)
QoL (N = 71)			
5 years ago	7.3 (1.9)	7.2 (2.6)	7.3 (2.1)
Present	6.5 (1.9)	6.8 (1.7)	6.6 (1.8)
5 years from now	<b>*</b> 5.8 (2.5)	6.6 (2.3)	6.1 (2.5)
Ipswich Efficacy (N = 78)	<b>*</b> 64.5 (6.4)	55.9 (18.5)	61.5 (21.8)
Ipswich Attitude (N = 57)	62.6 (15.9)	66.2 (18.3)	64.0 (16.8)
Ipswich Behaviours (N = 57)	55.3 (12.7)	57.8 (16.8)	56.3 (14.3)
<b>* P &lt; .10; ** P &lt; .005</b>			

Mean DCP QoL scores did not differ by clinic or attendance status. Cantrill's Self-Anchoring Ladder QoL scores revealed that both Group A and Group NA respondents rated their mean QoL 5 years previously as higher (7.3/10) than at present (6.7/10); while not statistically significant, mean perceived QoL 5 years hence was somewhat higher in Group NA than in Group A ( $M = 6.6$  vs.  $M = 5.8$ ) (Mann-Whitney  $U = -1.827$ ,  $P = .068$ ).

Of the Ipswich efficacy, attitudinal, and behavioural subscales, only self-efficacy scores were found to differ by group: Group A had higher self-efficacy scores than Group NA ( $M = 64.5$ ,  $SD = 6.4$ , vs.  $M = 55.9$ ,  $SD = 18.5$ ) (Mann-Whitney  $U = -1.953$ ,  $P = .051$ ).

Tables 4 and 5 summarize health-care utilization results. Small numbers of both Group A and Group NA respondents had seen a podiatrist in the previous year, and proportionately more Group As had seen an endocrinologist ( $P = .107$ ) (NS). Approximately one third of respondents had not seen an eye doctor. With data grouped to compare zero visits with one to three visits and four or more visits, a greater proportion of respondents at Site 2 than at Site 1 had seen an eye doctor (Mann-Whitney  $U Z = -1.774$ ,  $P = .076$ ) or a podiatrist (Mann-Whitney  $U Z = -2.215$ ,  $P = .027$ ).

The small number of respondents who utilized hospital and ER services precluded the use of other than descriptive statistics. With regard to ER visits for all causes (data not shown), 67.4% of Group A and 54.2% of

<b>Table 4 Health-Care Utilization by Clinic Attendance</b>			
	<b>Group A (N = 51) M (SD)</b>	<b>Group NA (N = 27) M (SD)</b>	<b>Total (N = 78) M (SD)</b>
<i>Local doctor visit</i>			
None	1 (2.0)	0 (0.0)	1 (1.3)
1-3	15 (29.4)	6 (22.2)	21 (26.9)
4-6	15 (29.4)	9 (33.3)	24 (30.8)
7-10	8 (15.7)	10 (37.0)	18 (23.1)
> 10	12 (23.5)	2 (7.4)	14 (17.9)
<i>Endocrinologist visit</i>			
None	38 (74.5)	24 (88.9)	62 (79.5)
1-3	7 (13.7)	3 (11.1)	10 (12.8)
4-6	2 (3.9)	0 (0.0)	2 (2.6)
7-10	2 (3.9)	0 (0.0)	2 (2.6)
> 10	2 (3.9)	0 (0.0)	2 (2.6)
<i>Eye doctor visit</i>			
None	17 (33.3)	8 (29.6)	25 (32.1)
1-3	30 (58.8)	17 (63.0)	47 (60.3)
4-6	4 (7.8)	0 (0.0)	4 (5.1)
7-10	0 (0.0)	2 (7.4)	2 (2.6)
> 10	0 (0.0)	0 (0.0)	0 (0.0)
<i>Podiatrist visit</i>			
None	42 (82.4)	20 (74.1)	62 (79.5)
1-3	5 (9.8)	2 (7.4)	7 (9.0)
4-6	4 (7.8)	4 (14.8)	8 (10.3)
7-10	0 (0.0)	0 (0.0)	0 (0.0)
> 10	0 (0.0)	1 (3.7)	1 (1.3)

**Table 5 Health-Care Utilization for Diabetes or Heart Disease by Attendance Status**

	<b>Group A (N = 51) n (%)</b>	<b>Group NA (N = 27) n (%)</b>	<b>Total (N = 78) n (%)</b>
<i>≥ 24-hour hospital admission</i>	10 (19.6)	5 (18.5)	15 (19.2)
None	0 (0.0)	1 (4.0)	1 (1.3)
1–3	8 (15.7)	3 (11.0)	11 (14.1)
4–6	1 (2.0)	2 (7.0)	3 (3.9)
7–10	0 (0.0)	0 (0.0)	0 (0.0)
> 10	1 (2.0)	0 (0.0)	1 (1.3)
<i>ER visit</i>	5 (10.0)	5 (18.5)	11 (14.1)
None	0 (0.0)	1 (3.7)	1 (1.3)
1–3	4 (8.0)	3 (11.1)	10 (14.4)
4–6	1 (2.0)	2 (7.4)	3 (3.9)
7–10	0 (0.0)	0 (0.0)	0 (0.0)
> 10	0 (0.0)	0 (0.0)	0 (0.0)
<i>Bedridden</i>	6 (11.8)	4 (14.8)	10 (12.8)
None	41 (80.4)	21 (77.8)	62 (79.5)
< 1 week	4 (7.8)	2 (7.4)	6 (7.7)
1–2 weeks	1 (2.0)	1 (3.7)	2 (2.6)
3 weeks–1 month	0 (0.0)	0 (0.0)	0 (0.0)
> 1 month	1 (2.0)	1 (3.7)	2 (2.6)

Note: Totals reflect unavailable attendance status; data were unavailable for some respondents.

Group NA had no ER visits in the previous year, while 27.9% of Group A and 45.8% of Group NA had one to three visits. Approximately twice the proportion of Group NA compared to Group A had used the ER for diabetes or heart problems. Among attenders, a smaller proportion of those at Site 1 than at Site 2 used such services. The descriptive data also revealed a greater proportion of respondents in Group A (64%) than in Group NA (59.3%) had no hospital admissions in the previous year *for any condition*. Among those who had four or more admissions, 6% were Group As and 11.1% were Group NAs. Those hospitalized for diabetes or heart problems included larger proportions of Group NA than Group A and Site 2 than Site 1 respondents. Among Group As, 80% had one to three admissions, versus 60% of Group NAs, while 20% of Group As versus 40% of Group NAs had at least four admissions.

Confinement to bed for diabetes/heart problems was slightly higher among Group NA and Site 2 respondents. Inferences are not possible given the low numbers of respondents.

## **Discussion**

This exploratory study arose out of a need identified by the Marquette Regional Health Authority and physicians and staff of rural diabetes clinics for evaluation data upon which to make decisions about the provision of diabetes care and education. Collaborative evaluation projects, such as this, that bring researchers and other stakeholders together, essentially shift the emphasis in evaluation from specific research questions to the identification of meaningful information that may provide direction for planning and the use of resources. In this respect, the study achieved its purpose. A wide range of information about the outcomes of diabetes education and care for rural-dwelling Manitobans with type 2 diabetes was collected. The study provided data on the nature of individuals who utilize rural clinic services for diabetes, and enabled an estimation of the reach of the clinics to their target population. It also provided information on the efficiency and effectiveness of rural diabetes care and education through its comparison of individuals who do and do not use the services of the two clinics.

Descriptive statistics revealed that clinic attenders may have been more inclined to attend due to their greater prevalence of comorbid diseases and diabetes complications, longer duration of diabetes, use of more diabetes medications, and more problem areas in diabetes. Such factors, individually or collectively, could prompt the use of diabetes services. They are also reflective of the prevailing medical model of care, which directs attention and resources to individuals identified as having visible or recurrent health problems, or an evident deterioration in health status. This may suggest that proactive diabetes health-promotion and disease-prevention approaches may be underutilized in these communities.

The diabetes clinics appear to have provided valued services to community members with type 2 diabetes. Clinic attenders received more diabetes education, were more satisfied with the diabetes care they received, and had higher perceived self-management efficacy than non-attenders. Receiving information directly from health professionals, and having that information both reinforced by health professionals and endorsed as important by friends and other clients with diabetes, may be important in developing efficacy for self-management. Opportunities for receiving feedback, having wrong beliefs corrected, and having diabetes-related experiences examined at education sessions is also likely to have a positive effect on one's understanding of diabetes as a disease and, perhaps, aspects of its management. García and Suárez (1996) found that continuing interactive education through support groups improved patient coping and improved feelings of independence; this said, their respondents did not differ with regard to self-management attitudes or

behaviours. Irvine and Mitchell (1992) found that even intensive diabetes education did little to alter behaviour.

Interestingly, PAID scores were highest among the youngest respondents. Additional analysis revealed that among respondents under 65 years (35.3% As; 33.3% NAs) PAID scores were much higher for Group A than Group NA ( $M = 16$  and  $26$ , respectively). This suggests that clinic attendance among younger people may be driven by perceptions of ill health or difficulty with disease management. As well, older individuals may, because of their advancing age, have different expectations regarding their health. Alternatively, younger respondents may have been stimulated to attend through physician referral to clinic education, or, because they are generally more active, may have sought health advice and care in order to address their ill health.

It is also notable that, generally speaking, clinic attenders had received both more basic diabetes education and diabetes education covering a wider array of diabetes-relevant topics than non-attenders. This did not, however, translate to greater knowledge among clinic attenders. This finding may be explained by one or more of the following factors: a low “dose” of education received by attenders, insufficient reinforcement, time elapsed since attending, slightly older age and potential recall problems, literacy problems, or qualities of the instrument used to measure knowledge. Regular reinforcement of education could potentially alleviate this problem.

QoL scores were higher among participants in this study than those documented for people with type 2 diabetes (Ware, Snow, Kosinski, & Gandek, 1993). This finding may be attributable to the fact that the present participants were all rural-dwelling elderly, who may experience less stress and depression, and may have higher levels of physical activity, than urban-dwelling individuals with diabetes. With respect to QoL, the findings, although not statistically significant, also suggest that QoL 5 years hence tends to be rated lower in clinic attenders than in non-attenders, perhaps reflecting a somewhat more pessimistic view of the future. This could be accounted for by an interaction among factors more descriptive of attenders than non-attenders. Perceptions regarding future QoL among people with type 2 diabetes should be considered in future evaluation studies.

In terms of health-care utilization, non-attenders tended to use the ER (for all reasons) more than attenders (approximately 2:1) and had increased short-stay hospital utilization (for all conditions). García and Suárez (1996) found that continuing interactive education through support groups reduced hospital and ER admissions. The supportive nature of the clinics may have had a similar effect in this study.

Only a small proportion of ER visits and hospital stays was found to be related specifically to diabetes or heart problems. Further, no differences were found between groups with regard to the number of bedridden days in the previous year as a result of diabetes. Although the data were self-reported and the numbers of respondents small, the findings are encouraging. It may be that attenders, because of their diabetes education and care (and despite their being somewhat frailer than non-attenders), were equipped with both the alternative strategies and the self-confidence needed to handle emergent health problems that otherwise could have led to greater ER use and short hospitalizations.

A difference was also noted in the utilization of endocrinologists. Proportionately more clinic attenders had used this service. Given the advances being made in information about diabetes and its treatment, such referrals are essential as a preventative measure for all people with diabetes, at least on an intermittent basis.

### ***Limitations***

A major limitation of this study was its low response rate (28.1%). This, and the restriction of the evaluation to rural diabetes education, limits the generalizability of the findings. The low response rate may be attributable to several factors, including the advanced age of respondents and the fact that the survey was mailed during the summer, the peak season for travelling or, among those rural-dwellers remaining at home, for engaging in farming activities. Although a raffle for cash prizes was used to enhance response, this proved ineffective. Still, about one third of the respondents were non-attenders — an adequate number of individuals not reached by the clinics to allow for preliminary assessment of the efficiency and effectiveness of such services, and to permit comparisons on key variables between those who do and do not attend the clinics.

This study had other weaknesses that, while acknowledged, are not easily addressed. Limitations include those related to use of printed surveys and self-report data. Response bias, illiteracy, and poor recall could have affected both the response rate and the findings. Although the survey drew items from measures with established reliability and validity, and although the items were reviewed, simplified, and piloted, the potential for these problems remains. Another limitation was the higher number of female respondents, possibly a result of female survival advantage. At the same time, since the proportion of women to men between groups did not differ, study comparisons should not have been adversely affected.

### ***Implications for Nursing***

These data suggest that rural diabetes education has a positive effect on knowledge and management self-efficacy and a related small but positive

effect on the use of medical services. Planned opportunities for supportive peer interaction may have contributed to these effects. The findings also suggest that individuals who attend diabetes clinics may do so in part because of the combined effect of factors that point to challenged health status. While individuals with health challenges require diabetes care and support, a shift by providers from a medical paradigm perspective towards a health promotion approach could positively affect disease onset and progression among those at risk; a health promotion approach should be adopted by rural diabetes education programs. Further, similarity in diabetes knowledge among respondents may be related to the lack of standardization in educational programming in these rural education clinics. Standardized diabetes education programs should positively influence knowledge acquisition and diabetes-related attitudes among individuals who attend rural diabetes clinics.

A prospective study by Ryan, Todd, Estey, Cook, and Pick (2002) found that improvements in diabetes knowledge as well as diabetes behaviours (foot care and blood-glucose monitoring) occurred among participants in a formal education program delivered by a team of health professionals. Tankova, Dakovska, and Koev (2004) also found a decrease in depression, a significant increase in QoL, and improvement in glycemic control of participants 1 and 2 years after delivery of a structured education program. Further, a meta-analysis has revealed that interventions that include face-to-face delivery, a cognitive reframing teaching method, and exercise content are more likely to improve glycemic control than programs that do not involve these strategies (Ellis et al., 2004). Since glycemic control is related to higher health-related QoL (Wikblad, Leksell, & Wibell, 1996), structure, or standardization of programming, takes on greater significance.

Finally, since non-attenders had less efficacy for self-management despite similar knowledge, opportunities for supportive interaction with educators and peers should be made available at times and venues designed to attract non-attenders. Qualitative comments provided by non-attenders suggest that some of these individuals are in the workforce and perceive they cannot take time off work to attend education sessions.

This study considered a comprehensive set of variables essential to health-evaluation research. While evaluation studies frequently address several of these variables, this study gathered information on a large number of relevant parameters (e.g., cognitive, affective, behavioural, physiological, and program reach). The findings reveal that rural diabetes education *does* make a difference in the lives and health of people with type 2 diabetes, but the magnitude of this difference can be improved. Comprehensive prospective evaluation and follow-up of attenders and non-attenders of diabetes care and education programs can provide the

data necessary to produce needed improvements in self-care and in health-related quality of life.

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