ORIGINAL ARTICLE

DIABETES RISK EVALUATION AND MICROALBUMINURIA (DREAM) STUDIES: TEN YEARS OF PARTICIPATORY RESEARCH WITH A FIRST NATION’S HOME AND COMMUNITY MODEL FOR TYPE 2 DIABETES CARE IN NORTHERN SASKATCHEWAN

George Pylypchuk 2, Lloyd Vincent 1, Joan Wentworth 3, Alexander Kiss 1, Nancy Perkins 1, Susan Hartman 3, Laurie Ironstand 3, Jacqueline Hoppe 3, Sheldon W Tobe 1

1Sunnybrook Health Science Centre, Toronto, Ontario, Canada
2St. Paul’s Hospital, University of Saskatchewan, Saskatoon, Saskatchewan, Canada
3Miwayawin (formerly Battlefords Tribal Council Indian) Health Services, North Battleford, Saskatchewan, Canada

Received 16 April 2007; Accepted 10 December 2007

ABSTRACT

Objectives. To review the DREAM studies and the role of participatory research using a Home and Community Care model in treating First Nations diabetes.

Study Design. Population survey, pilot and prospective randomized trial

Methods. Review documented history of these studies since inception. Collation of all data from the DREAM studies from 1998 to the present, including interviews with all providers and many of the participants.

Results. The DREAM studies were a participatory process providing a needs assessment and became the foundation for this First Nation’s Home and Community Care team involvement in providing community-based chronic-disease management. The findings motivated the community to find a process that would lead to needed changes. This participatory research enabled a culturally tailored algorithm of evidence-based management of hypertension and disease management strategies for people with diabetes. These studies demonstrated that in this community the Home and Community Care team could work together with primary care physicians and specialists to prevent the complications of diabetes.
Conclusions. The DREAM studies demonstrated in the first controlled trial that with participatory research a systems change is possible; a chronic-disease management model utilizing a trained multidisciplinary Home and Community Care team and informed patients can lead to lower blood pressure in a Canadian First Nations population with diabetes.
(Int J Circumpolar Health 2008; 67(2-3):190-202)

Keywords: home care nursing, diabetes prevention, participatory research, Aboriginal health, systems change, hypertension, chronic disease management, end stage renal disease

INTRODUCTION

Type 2 diabetes is an ongoing, well-recognized epidemic among the Canadian Aboriginal population (1). In fact, the incidence of type 2 diabetes among this population is three to five times higher than in the general population (1-3) and the estimated prevalence rates are over 25% in some communities (4). While complications of diabetes are experienced in all populations, the impact has been particularly profound among First Nations peoples in Canada (5). Early age of onset and increased disease severity in these communities are likely linked to the severe long-term diabetic complications of blindness, limb amputations and skin wounds (6), cardiovascular disease (7-9) and a sevenfold greater risk of end-stage renal disease as compared with the general Canadian population (1,3,10,11). The Home and Community Care team is often required to help patients manage these complications at home.

Primary prevention is the ultimate goal for diabetes, yet despite current efforts (12-14), rates continue to rise (1). Until this goal is met, we must meet the challenge of managing the complications of diabetes and overcoming the barriers to care, which include geography, insufficient health human resources (10,15) and clinical inertia in adopting new evidence-based clinical practice guidelines (16). Until diabetes can be prevented, strategies to prevent both microvascular and macrovascular complications are required. Blood pressure control is the simplest of these strategies, as hypertension exacerbates and perpetuates target organ damage (17); blood pressure control is highly effective in preventing macrovascular outcomes such as stroke and cardiovascular disease and microvascular complications such as kidney and eye disease. In a cost analysis of the United Kingdom Prospective Diabetes Study, blood pressure intensification for people with diabetes was so highly cost effective that it was cost saving (17).

In Saskatchewan, the prevalence of type 2 diabetes mellitus among adults within the First Nations community has evolved from that of a rare condition prior to the 1950s to a condition affecting 10% of the population by the 1980s and then doubling in the following decade (10). In 1994 the relative risk of end-stage kidney disease due to diabetes in the Canadian
Aboriginal population was over fifteen times that in the non-Aboriginal population (10). In this paper, we review the DREAM studies and the role of participatory research using a Home and Community Care model in a First Nations community experiencing type 2 diabetes and hypertension.

MATERIAL AND METHODS

Information for this paper was gathered by reviewing all available data relevant to the DREAM studies, including unpublished documents since 1998, discussions with the academic and community researchers, and members of the Miwayawin Health Services’ Home and Community Care team. The collection of validated data in each successive project was designed to reinforce the existing database and information systems and to meet the strictest standards of data handling.

Respect of the community’s data is a central principle in the DREAM studies. All data were recognized to be the property of the communities involved. Data collection and analysis during the DREAM project were conducted using the principles of Good Clinical Practice, under the Research Ethics Boards of the Miwayawin Health Services and the universities involved, respecting at all times the protection of rights of communities and working within the OCAP structure (ownership, control, access and possession). No publications are submitted without prior review and approval of the Miwayawin Health Services. All data collected during the DREAM studies are to be used for the benefit of individual communities and be available to facilitate community needs.

The Diabetes Risk Evaluation and Microalbuminuria (DREAM) project and participatory research

The DREAM projects were initiated in 1998 at the request of the Battleford Tribal Council’s Miwayawin Health Services, located in the Battlefords region of northern Saskatchewan. In response to the needs of those living on reserve, the Home and Community Care team developed a diabetes focus in 7 communities with a total population of 4,121 in 1998, at the time of the DREAM project inception. The Miwayawin central office is located in North Battleford, serving as the central base for the delivery of community health services for the 7 communities, all of which are within 90 kilometres of the Battlefords. The average age of the population on reserve is 26 years. The average number of people employed is 26%, according to the 1996 Statistics Canada report, with 46.9% on social assistance and 12.5% on old age pension. The 1997 Eagle’s View, Saskatchewan Regional Health Study, Supplemental Report on the Battleford Tribal Council showed that 30% of respondents completed high school and at that time there was an 80% unemployment rate.

The community posed well-defined questions to try to understand the increasing number of First Nations peoples who required dialysis. This led to the formation of an ongoing collaborative model of participatory research involving the Home and Community Care team of the Miwayawin Health Services and researchers initially at the University of Saskatchewan and later at the University of Toronto. The Home and Community care team had developed front-line experience in implementing diabetes clinical practice guidelines in their community with the goal of reducing
DREAM studies and participatory research involving multidisciplinary home care

downstream morbidity from diabetes, the main underlying cause of adult home care referrals in the region. The DREAM studies were designed to obtain new knowledge from a multidisciplinary partnership between the Miwayawin Health Services’ Home and Community Care team and hypertension specialists from the university setting.

Each study began with the community identifying a need, which was later developed into a research question. The results of each successive research study were adapted into new processes, which could then be tested as new interventions in subsequent studies or applied directly in the community to help prevent or ameliorate long-term complications of diabetes. Thus, the research outcomes initiated a cycle of continuous quality improvement in patient care as well as empowerment and development of research expertise in the Home and Community Care team. The overall purpose of the DREAM project was to promote better health not only for individuals with diabetes but also for their families and their community. To meet the needs of the communities in a culturally sensitive manner, one nurse was assigned to each community by the Home and Community Care team in order for her/him to develop familiarity and trust with that community and to understand the particular beliefs and traditions of each. This was facilitated by the home health aide, who was always a local community member from that reserve. The Cree language predominates in that region and 9 staff members were fluent in Cree, many with a First Nations background.

The Diabetes Risk Evaluation and Microalbuminuria DREAM1 study was a population survey initiated by the Miwayawin Health Services in an effort to understand the rapid rise of kidney disease and the need for dialysis in their communities in northern Saskatchewan. The objective was to look for contributing factors that could be modified and to promote the attitude that each community did not have to remain passive in the face of the rising diabetes epidemic.

The survey included volunteers responding to notices of screening days being conducted on all the reserves. Six screening days were held from 26 January 1998 to 10 March 1998. Six hundred and one residents, representing approximately one-third of the adult population in the seven First Nations communities, were screened. Informed consent was obtained from all participants and, following an education session, reserve nurses administered a validated questionnaire to determine the prevalence of diabetes and cardio-renal risk factors suited to the study context. Measurements included blood pressure by mercury sphygmomanometer, weight, height, waist and hip circumferences as well as biochemistry done at the central lab and urine albumin levels determined by the Bayer Clinitek 500 and Multistix 8 SG strips at the point of care.

Among the 236 men and 365 women screened, the mean age was 42.3 (range 19–86 years). Diabetes was found in 22%, varying from 7.4% in those under age 30 to 50.4% in those aged 60 years and over (Fig. 1). High blood pressure, defined at that time as >140 mmHg systolic and/or >90 mmHg diastolic, was found in 30% of those with diabetes and 17% of those without known diabetes. Obesity was found in 74% of respondents, 65% were smokers, 48% had dyslipidemia and 24% of those with diabetes had microalbuminuria compared with 9% in those without diabetes.
The survey results were presented to the community leaders, Miwayawin Health Services and participating communities at community meetings, creating awareness and encouraging the feeling that change was possible. There was recognition that the survey was a volunteer sample, but it was felt to be fairly representative. While those who volunteered for the survey were more likely to have seen the health care team at some point for disease management, the team was also aware that those individuals who did not participate were more likely to access health care in emergency situations only and, thus, represented a pool of undiagnosed risk factors. Following the survey, team members noted that they felt that people were more likely to talk to them about diabetes, its management and how it affected them, allowing a more client-centred model of diabetes education that emphasized a proactive prevention-focused approach. Also, following the survey, the Home and Community Care team itself began to seek out new knowledge and skills in diabetes management.

![Figure 1. DREAM1 percentage of adults with type 2 diabetes by age group.](image)

**Table I.** Support and change initiatives undertaken for clients and the Home and Community Care team after the DREAM1 study to facilitate change.

| Client-related support and change initiatives          | Provider-related change initiatives                      |
|--------------------------------------------------------|--------------------------------------------------------|
| • Improved diabetes education program                  | • Diabetes education for the Home and Community Care nurses |
| • Proactive self-management of diabetes encouraged      | • Improved communication with local physicians          |
| • Educational group classes to increase awareness and improve life-style | • Shift of focus from glucose monitoring alone to an expanded program of diabetes management and life-style modifications |
as well as developing prevention strategies and research. This led to support and change initiatives that were undertaken (Table I).

Following the DREAM1 study, a pilot study the DREAM2 study was planned to attempt to address multiple risk factor modification. The DREAM2 study, completed by 2000, focused on achieving recommended risk factor targets for blood pressure, glycaemic control, dyslipidemia management and blockers of the renin-angiotensin aldosterone system in people with diabetes according to the 1998 Clinical Practice Guidelines (18). Additionally, participants received self-management education to empower them to take care of their own health. Forty-four patients with diabetes consented and were referred by the Home and Community Care team to their family physicians if their modifiable risk factors exceeded limits specified in the guidelines. Over two years, the mean systolic blood pressure of this group fell from 152 (17) to 130 (22) (mean±SD, mmHg). There were also trends showing lower levels of smoking and an improvement in healthy diet choices. The DREAM2 study, while only a pilot, demonstrated to the community that change was possible and that there was a great need for a community approach to life-style modifications, including increasing the opportunities for physical activity, smoke-free public places, reduction of saturated fats in food preparation and improved food choices in schools (Table II).

An Australian study published in 2000 demonstrated that direct contact with physicians alone for each step in controlling blood pressure is not required and that a Home and Community Care team, supervised remotely by hypertension specialists, could achieve blood pressure control in a large proportion of the population (19). After two years of blood pressure control, in this study of Australian Aboriginal patients with hypertension, there was an associated reduction in mortality and in renal failure requiring dialysis (19).

Combining the lessons from DREAM studies 1 and 2 with the above data from Australia, the DREAM3 study was developed to test whether the Home and Community Care team could achieve blood pressure control in people with type 2 diabetes (20). It was hypothesized that the Home and

| Table II. Support and change initiatives undertaken for patients and the Home and Community Care team after the DREAM2 study to facilitate change. |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| **Client-related support and change initiatives**                                                                                                                                             |
| • More opportunities to be physically active in the community (e.g., walking groups implemented)                                                                                           |
| • More smoke-free public areas                                                                                                                                                              |
| • Changes in food preparation for community events and in school cafeterias                                                                                                                   |
| • Community-based nutritional workshops and group classes                                                                                                                                     |
| **Provider-related change initiatives**                                                                                                                                                      |
| • Partnership between the First Nations and Inuit Health Branch and the Saskatchewan Division of the Canadian Diabetes Association formed to provide a continuing education program in diabetes education for the Home and Community Care team |
| • Increased hours of contracted dietitian time                                                                                                                                                |
| • Data collection with regular client follow-up                                                                                                                                                |
Community Care team, equipped with an evidence-based treatment algorithm, could provide more effective means of lowering blood pressure in hypertensive rural First Nations peoples with type 2 diabetes than their primary care provider alone.

In people with type 2 diabetes, blood pressure control is critical to preventing morbidity (21). This single surrogate outcome measure was chosen because it was easier to study the implementation of a disease management strategy in the First Nations community. Also, treatment of blood pressure by algorithm has been implemented successfully in the community setting on a large scale (22). Controlling blood pressure and ensuring appropriate use of medications in these populations can be challenging because of remote geography, reduced access to ambulatory care, as well as a hesitancy to embrace modern disease management strategies. The Home and Community Care team was thought to be a good means to bridge these barriers. In addition to providing culturally sensitive care to their own community, regular home care contact with this high-risk patient group was developed to overcome the challenges of geography.

The DREAM3 study was a randomized controlled trial to assess whether a systems change with the adoption of a chronic disease management strategy could lead to improvement in blood pressure in people with type 2 diabetes and hypertension in this First Nations population. Randomization was performed by means of opaque sealed envelopes using a permuted block design, stratified by the 7 reserves. Envelopes were opened by the home care nurse in the presence of the physician and patient at the end of the baseline visit. In addition to communicating blood pressure results, the home care nurse sent results of blood glucose and lipid testing along with the appropriate evidence-based treatment algorithms to the primary care physician. The drop in blood pressure at the end of the study compared with the baseline was statistically significant in both intervention and control arms. The systolic BP at the final visit was significantly lower in the treatment group (p=0.031) compared with the usual care group. However, the primary outcome measure, the change in systolic BP between the two treatment strategies over time, although 7.0 mmHg lower in the intervention group, did not achieve statistical significance (p=0.14) for the time by group interaction. Overall blood pressure targets (systolic BP < 130 mmHg and diastolic BP < 80 mmHg) were achieved in 48% of patients. Most of the patients in the control group had their BP medications titrated upward during the study by their primary care physicians. Interestingly, of those who did not achieve target blood pressure during the study, those in the treatment group achieved systolic blood pressures closer to target than those in the control group (Fig. 2). All subjects received healthy life-style advice, and one-quarter of participants who attended the life-style workshop changed the type of fat used for cooking and frying from lard-based choices to healthier options (oil or soft margarines). By the final visit, the use of healthier fats increased by an additional 7% to 12%, but no significant change was detected in the use of salt at meal times or in the levels of physical activity.
Participatory research and outcomes: The research process for the DREAM studies originated with the recognition by the community’s Home and Community Care team that the incidence and prevalence of end-stage renal disease and other complications of diabetes such as limb amputations and skin ulcers were on the rise. With a belief that an investment in secondary and tertiary prevention strategies could benefit the health of the community, the DREAM1 study was undertaken to understand the extent and breadth of the problem. The findings motivated the community to enable a process that would lead to needed changes.

Barriers to change: The providers’ needs that emerged were for specialist care in nephrology and hypertension and for better communication among primary care practitioners, the Home and Community Care team and their shared patients. Primary care practitioners were concerned that patients did not adhere to therapy and seemed to accept that the diagnosis of diabetes meant a quick and inevitable decline towards death that would only be complicated by medical therapy. Community members also expressed fear about diabetes and its complications, were unwilling to consider starting insulin and had nowhere to turn for advice on lifestyle adjustments that would be effective in the context of their lives on reserve. With too few primary practitioners for the burden of chronic-disease management caused by burgeoning diabetes rates, it was next to impossible to introduce changes to the status quo that might also have threatened existing practice patterns. Further, at that time, the primary care community was not familiar with a multidisciplinary care model or with the evidence-based medicine approach and felt threatened by attempts by the Home and Community Care team to introduce these concepts into practice.

![Figure 2. DREAM3 systolic blood pressure at final visit by treatment group and blood pressure response. Shows the mean systolic blood pressure achieved for those who reached the systolic BP target (<130 mm Hg) in the treatment and control group and the mean systolic blood pressure achieved in those who did not reach the systolic target (<130 mm Hg).](image-url)
Benefits of a research approach: The intent of the DREAM project was to build capacity within the community so as to enable a sustained systems change. The adoption of a research approach allowed a way of bypassing many of these barriers to change. A research project can bring additional resources to help manage the additional workload required for data collection and good clinical practice and can be designed to start as a temporary change, which is less threatening. By focusing on a shared concern – the rising incidence of end-stage renal disease that had been exacerbated by a lack of specialist resources – all the parties could work together towards a common goal. With specialist involvement, a sustained action for change was anticipated. Bringing in university-affiliated specialists for their specialty knowledge as well as for research purposes allowed them to work smoothly with other health care professionals in the community, particularly after organizing a series of continuing health education programs on the subject. Regular visits of the specialists to the community for the project was seen as a major win by the community, the Home and Community Care team and the local health care providers. Community members welcomed the additional time spent with them and appreciated the education programs about diabetes and its complications, and they soon became more engaged in their own care. Their primary health care providers echoed this change with feedback that their patients were more interested in their disease and more accepting of therapy. One comment was that after the DREAM3 study, providers were seeing their patients more frequently than in the past and each time for shorter visits, that they had more up-to-date patient information and that their patients were healthier.

Health human resource benefits: To upgrade the community’s own human health resources, efforts were initiated to improve providers’ education, cross-training and skill-mix changes. This was done as an interactive process that allowed an ongoing learning situation for both the researchers and the community. Over two-thirds of the Home and Community Care team, including home health aides, are Aboriginal in background. The involved Aboriginal nursing staff in the Miwayawin Health Services carried out the projects in their respective communities. These providers played key roles with both physical and intellectual inputs. All have made significant contributions to the identification of the project’s focus, implementation, delivery and evaluation. One of the Home and Community Care nurses was identified as the project champion whose responsibility was collecting the data and educating the other nurses about the project’s tools and procedures. This nurse was directly supported by her supervisor, both of whom are from Aboriginal backgrounds. One result was that the whole team became familiar with the research process and participated regularly in conference calls and project updates. Another and more rewarding result was that members of the team and the project champion made presentations about the project’s findings at conferences dedicated to Aboriginal health. This led to tremendous team satisfaction and capacity development. It also led to 8 team members training to become diabetes educators, with 6 completing the training and 4 becoming certified. Participant involvement was encouraged throughout and following the project. Presentations were made mid-way as well as at the final stages at meetings often attended by the specialists, with the focus being on the project’s partici-
pants and the community members. These meetings took place on each reserve and were also an opportunity for group teaching and demonstrations on healthy eating.

**Community benefits:** The participatory nature of the DREAM3 study might lead to long-term improvements in blood pressure management and possibly to benefits in progression of kidney disease as seen in the Australian studies. A follow-up survey has been conducted to look at this. This process may provide a mechanism to build both the capacity for research and improvements in health care outcomes for one of Canada’s most vulnerable populations (23). More specifically, the DREAM3 study has shown that the Home and Community Care team can play a major role in the management of hypertension in people with diabetes. This role is not independent of physicians but integrated into a multidisciplinary team using the strengths of each of the team members in a care model that is both effective and efficient. This strategy was able to overcome clinical inertia and deliver cutting-edge evidence-based therapy. New strategies and partnerships such as this are needed if evidence-based care is to be uniformly achieved in rural and northern settings, especially those lacking specialist care (24).

**Next steps:** Since the completion of the DREAM3 study, several steps (Table III) have been taken to sustain positive outcomes; for instance, blood pressure and clinical lab intermediate outcome indicators such as HbA1c and lipids are monitored at least every 6 months. The local effects include improved patient awareness, nurses feeling more empowered and patients expressing more of a desire to control blood glucose. These changes have occurred in one community; it is not possible, of course, to determine if they were linked to the DREAM studies or to evolution in care over time.

**Insights gained:** While the impetus for the DREAM project came from the community, each study had to be reviewed and approved independently by the community leadership represented by the Tribal Council. To maintain the trust of the community therefore required ongoing patience and a commitment in time. The Home and Community Care team were champions of the project and were willing to add the elements of hypertension management to their roles. All members of the team agreed that the focus of the project’s efforts were to be placed on taking steps to prevent the micro- and macrovascular complications of diabetes through management of blood pressure and through education about diabetes and its management. To successfully change and then sustain a behaviour alteration, participants require a supportive environment, community-based action and support of community leaders. A key to the success of the DREAM project has been the building of trusting relationships among patients, Home and Community Care team members and physicians. Furthermore, it is important to build credibility, safety and consistency into the projects. For the success of future studies intended to initiate change in such communities, it is important that they be inclusive of the local front-line health care providers, while being directed at the community itself. Also, planning for the long term is necessary and requires both the vision and patience for change. It is important to integrate the local
Table III. Regular support and change initiatives undertaken for clients and the Home and Community Care team after DREAM3 study to facilitate change.

**Client-related support and change initiatives**
- Annual programs of prevention and awareness, including pre-diabetes screening, exercise interactive displays and healthy living classes
- Ongoing awareness programs to promote community-based diabetes action prevention, including “diabetes month,” school presentations, quarterly newsletters and radio broadcasting (in both English and Cree)
- Individual and group counselling for those at high risk
- Community champions disseminating expert information in the community
- Presentations by Aboriginal champions at health conferences

**Physical activity**
- Individual and community counselling on exercise and fitness
- Wellness clinics attended by an exercise therapist
- Formation of community-initiated groups for community-initiated walking groups with pedometers for activity measurement
- Initiation of exercise therapy program with appropriate availability of exercise therapists for all communities
- Training for community members to become fitness instructors in each community

**Nutrition**
- Appointment of a full-time dietitian
- Healthy food and snack policy for schools and community
- Training provided on healthy food selection (with hands-on grocery store tours) and preparation
- Good food boxes made up from bulk purchases of healthy foods at reduced prices by community volunteers working together to plan, order and pack the boxes

**Patient care and treatment**
- Continuing community-based, individual and group diabetes education classes
- Dietitian services available for individuals and families with diabetes
- Education sessions in schools
- Screening for diabetes and its complications at monthly health care clinics
- Screening program for diabetic retinopathy and foot care assessment clinics
- Gestational diabetes clinics for antenatal management and treatment
- Management meetings with diabetics and relatives who have complex care needs

**Provider-related change initiatives**

**Health care provider professional development and education**
- Training of home care nurses to become diabetes educators
- Orientation to fitness equipment and education of the Home And Community Care team
- Maintenance of disease registry and outcomes data
- Integration of Home and Community Care team with primary care physicians at local CME events
and traditional Aboriginal practices with the logic and rationale of scientific research methods (25). The DREAM studies have been sensitive to Aboriginal interpretation of their illness experience and response to treatment regimens and have attempted to meet the highest standards of excellence in quality and to be initiated in partnership with the priorities of their communities (25,26). Future research in multiple communities is required to determine if chronic disease management care models using the insights learned in the DREAM studies can lead to long-term improvements in health outcomes.

Conclusions

Given the continued explosive growth of the type 2 diabetes epidemic and its complications in the Canadian First Nations communities, sustained outcomes focused on systems change with a chronic-disease management strategy is required. If all patients at risk are to derive the benefits of guidelines-based treatment then secondary and tertiary diabetes prevention programs to reduce cardiovascular and renal risk must be put into place while waiting for improvements in the determinants of health and primary prevention programs to eliminate the problem. The DREAM studies have demonstrated that systems change is possible. A chronic-disease management model that has focused on hypertension using a highly competent Home and Community Care team and informed patients has successfully lowered the blood pressure of its participants. This model should be adapted to deal with other risk factors and to help other communities achieve improved outcomes in this burgeoning high-risk population.

Acknowledgements

We would like to thank all the patients who took part in the DREAM studies for their efforts and for their willingness to give up their time. In addition, we thank the Chiefs and the council members of the Miwayawin Health Services. We specially thank the many DREAM1, 2 and 3 investigators from North Battleford (Dr. S. Ahmad, Dr. J.P. Hesselson, Dr. P. Holtzhausen, Dr. J.D. Johnson, Dr. M.C. Khurana, Dr. W.G.C. Lipsett, Dr. M. Mehboob, Dr. H.M. Moolla, Dr. D. Morton, Dr. W. Nabi, Dr. B.D. Selhi, Dr. J. Tootooosis, Dr. A. Van der Merwe, Dr. Howard Tripp, Dr. D. Kemp, Dr. A. Muller, Dr. A. Harding, Dr. L. Bloem), and the Home and Community Care team (Lorna Whitford, Lisa Nordstrom, Merna Sutherland, Gillian Gregoire, Rayann Steel, Elaine Sharp, Dale Desmarais, Jody Wilson, CherylAnn Wuttunee, Barbara Swindler-Poundmaker and Suzette Starr) who contributed to this study. We also especially acknowledge Martha Agelopoulos for maintaining the study database and Katie Hunter for helping to prepare the manuscript. The research was conducted at the University of Saskatchewan, the Battlefords Tribal Council Indian Health Services and Sunnybrook Health Science Centre, University of Toronto.

REFERENCES

1. Young TK, Reading J, Elias B, O’Neil JD. Type 2 diabetes mellitus in Canada’s first nations: status of an epidemic in progress. CMAJ 2000;163(5):561–566.
2. Mao Y, Moloughney BW, Semenciw RM, Morrison HL. Indian Reserve and registered Indian mortality in Canada. Can J Public Health 1992;83(5):350–353.
3. Harris SB, Gittelsohn J, Hanley A, Barnie A, Wolever TM, Gao J et al. The prevalence of NIDDM and associated risk factors in native Canadians. Diabetes Care 1997;20(2):185–187.
DREAM studies and participatory research involving multidisciplinary home care

4. Harris SB, Zinman B. Primary prevention of type 2 diabetes in high-risk populations. Diabetes Care 2000; 23(7):879–881.

5. Hanley AJ, Harris SB, Mamakeesick M, Goodwin K, Fiddler E, Hegele RA, et al. Complications of Type 2 Diabetes Among Aboriginal Canadians: prevalence and associated risk factors. Diabetes Care 2005;28(8): 2054–2057.

6. Lee JS, Lu M, Lee VS, Russell D, Bahr C, Lee ET. Lower-extremity amputation: incidence, risk factors, and mortality in the Oklahoma Indian Diabetes Study. Diabetes 1993;42(6):876.

7. Anand SS, Yusuf S, Jacobs R, Davis AD, Yi Q, Gerstein H, et al. Risk factors, atherosclerosis, and cardiovascular disease among Aboriginal people in Canada: the Study of Health Assessment and Risk Evaluation in Aboriginal Peoples (SHARE-AP). Lancet 2001;358(9288):1147–1153.

8. Macaulay AC, Montour LT, Adelson N. Prevalence of diabetic and atherosclerotic complications among Mohawk Indians of Kahnawake, PQ. CMAJ 1988;139(3):221–224.

9. Shah BR, Hux JE, Zinman B. Increasing rates of ischemic heart disease in the native population of Ontario, Canada. Arch Intern Med 2000;160(12):1862–1866.

10. Dyck RF, Tan L. Rates and outcomes of diabetic end-stage renal disease among registered native people in Saskatchewan. CMAJ 1994;150(2):203–208.

11. Ross SA, Flick GF. Insulin as a risk factor for diabetes complications. Diabetes 1991;40(Suppl 1):333A.

12. Ho LS, Gittelsohn J, Harris SB, Ford E. Development of an integrated diabetes prevention program with First Nations in Canada. Health Promot Int 2006;21(2):88–97.

13. Daniel M, Green LW, Marion SA, Gamble D, Herbert CP, Hertzman C, et al. Effectiveness of community-directed diabetes prevention and control in a rural Aboriginal population in British Columbia, Canada. Soc Sci Med 1999;48(6):815–832.

14. Macaulay AC, Paradis G, Potvin L, Cross EJ, Saad-Haddad C, McComber A, et al. The Kahnawake Schools Diabetes Prevention Project: intervention, evaluation, and baseline results of a diabetes primary prevention program with a native community in Canada. Prev Med 1997;26(6):779–790.

15. Tookenay VF. Improving the health status of aboriginal people in Canada: new directions, new responsibilities. CMAJ 1996;155(11):1581–1583.

16. Shah BR, Hux JE, Laupacis A, Zinman B, van Walraven C. Clinical inertia in response to inadequate glycemic control: do specialists differ from primary care physicians? Diabetes Care 2005;28(3):600–606.

17. UK Prospective Diabetes Study Group. Cost effectiveness analysis of improved blood pressure control in hypertensive patients with type 2 diabetes: UKPDS 40. BMJ 1998;317(760):720–726.

18. Meltzer S, Leiter L, Daneman D, Gerstein HC, Lau D, Ludwig S, et al. 1998 clinical practice guidelines for the management of diabetes in Canada. Canadian Diabetes Association. CMAJ 1998;159(Suppl 8):S1–S9.

19. Hoy WE, Baker PR, Kelly AM, Wang Z. Reducing premature death and renal failure in Australian aboriginals. A community-based cardiovascular and renal protective program. Med J Aust 2000;172(10):473–478.

20. Tobe SW, Pylypchuk G, Wentworth J, Kiss A, Szalai JP, Perkins N, et al. Effect of nurse-directed hypertension treatment among First Nations people with existing hypertension and diabetes mellitus: the Diabetes Risk Evaluation and Microalbuminuria (DREAM 3) randomized controlled trial. CMAJ 2006;174(9):1267–1271.

21. Zanchetti A, Hanson L, Menard J, Leonetti G, Rahn KH, Warnold I, et al. Risk assessment and treatment benefit in intensively treated hypertensive patients of the hypertension optimal treatment (HOT) study. J Hypertens 2001;19(4):819–825.

22. Shulman NB, Ford CE, Hall WD, Blaufox MD, Simon D, Langford HG, et al. Prognostic value of serum creatinine and effect of treatment of hypertension on renal function. Results from the hypertension detection and follow-up program. The Hypertension Detection and Follow-up Program Cooperative Group. Hypertension 1989;13(5 Suppl):180–193.

23. Reading J. The Canadian Institutes of Health Research, Institute of Aboriginal People’s Health: a global model and national network for Aboriginal health research excellence. Can J Public Health 2003;94(3):185–189.

24. Salisbury C, Fahy T. Overcoming clinical inertia in the management of hypertension. CMAJ 2006;174(9):1285–1286.

25. Reading J. The quest to improve Aboriginal health. CMAJ 2006;174(9):1233,1237.

26. Reading J, Nowgesic E. Improving the health of future generations: the Canadian Institutes of Health Research Institute of Aboriginal Peoples’ Health. Am J Public Health 2002;92(9):1396–1400.

Sheldon W Tobe, MD, FRCPC
Division of Nephrology
Sunnybrook Health Science Centre
Associate Professor of Medicine, University of Toronto
2075 Bayview Avenue, Room A240
Toronto, Ontario M4N 3M5
CANADA
Email: sheldon.tobe@sunnybrook.ca