Diabetes care in remote northern Australian Indigenous communities

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ABSTRACT

Objective: To assess primary care processes and clinical characteristics of adults with diabetes in remote northern Australian Indigenous communities.

Design: Clinical audit from diabetes registers in 21 remote primary healthcare centres in the Torres Strait Health Service District ($n = 921$), three in Cape York, Queensland ($n = 252$), and three in the Northern Territory ($n = 194$), between September 2002 and February 2003.

Participants and setting: Aboriginal and Torres Strait Islander adults with diabetes who were receiving their routine diabetes care in these 27 centres.

Main outcome measures: Provision of regular checks for weight, blood pressure, glycaemia (HbA_{1c}), proteinuria, lipid levels, renal function, eyes and feet, influenza and pneumococcal vaccination. Weight, blood pressure and glycaemic control.

Results: Most routine diabetes checks were delivered according to recommended schedules, except for eye and foot checks in the NT. There were uniformly high rates of appropriate treatment for hypertension and albuminuria, but low rates of insulin treatment and self-monitoring despite a high mean HbA_{1c} level (8.9%). Vaccination rates were low in the NT. Torres Strait Islanders with diabetes were significantly heavier than Aboriginals, but had lower mean diastolic blood pressure (77.3 mmHg compared with 79.5 mmHg) and lower prevalence of albuminuria and smoking.

Conclusion: A high proportion of Aboriginals and Torres Strait Islanders requiring treatment for high blood pressure and proteinuria are receiving it. However, there is dissonance between the relatively high rates of routine checks and apparent lack of therapeutic action on glycaemia. More intensive management of glycaemia, including improved nutrition, exercise and (probably) insulin, is required to reduce microvascular complications.

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TYPE 2 DIABETES is increasing rapidly in Australia, following sharp rises in overweight and obesity in the general population.[1] It is contributing to a steep escalation in demand for expensive tertiary healthcare services which produce relatively small marginal health gains.[2,3] Diabetes is also frequently accompanied by chronic conditions such as depression, which significantly reduce quality of life.

Indigenous Australians have the highest prevalence of diabetes in the country and an excess of avoidable complications and early death.[4] Many of these complications can be reduced with appropriate community-based primary healthcare interventions. There is growing evidence that a structured approach to caring for people with chronic conditions can significantly improve patient satisfaction and quality of life, clinical outcomes and cost to the community.[5] However, structured approaches require a considerable change in the way primary care is organised, moving from a reactive, acute-care model to one in which early detection is important, care is planned with patients, registers and recall systems are linked to appropriate action, and there is a way of measuring quality and outcomes of care.[6]

We examined diabetes care processes and patient characteristics in 27 primary healthcare centres in far north Queensland and the Northern Territory.

METHODS

Sample selection

Twenty-seven remote Indigenous communities participated in a clinical audit, which was voluntary and formed the basis of an ongoing quality improvement process for diabetes care. This included all 21 primary care centres in Torres Strait, three in Cape York and three in the Northern Territory. The six mainland centres were included as they were already participating in a chronic disease quality improvement program. They are not different from other centres in their districts with respect to ethnicity, prevalence of diabetes, service model or remoteness.

The audit included all adults (aged 15 years and older) with diabetes who were on existing clinic-based registers in each participating community. Excluded were people receiving dialysis and people not receiving most of their care from that centre. The patients' clinical records formed the basis of the audit, and data were abstracted from the clinic file by a registered nurse according to a standard protocol, which has been reported elsewhere.[7] The audit was performed between August 2002 and February 2003.

The audit also attempts to describe any differences in patient characteristics between those attending for regular checks and those not attending.

Comparison data

For comparison with diabetes care in non-Indigenous people, we compared our results with data from the National Association of Diabetes Centres (NADC) Audit and Benchmarking study.[8] The NADC report summarises diabetes care for 2077 adults with type

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2 diabetes from 24 diabetes centres around Australia during 2002. It is a convenience sample and is not necessarily representative of all people with diabetes in Australia. In particular, the NADC sample is more likely to include patients whose diabetes is not managed well, or those referred with more complex or complicated diabetes.[8] We also compared the rate of glucose self-monitoring with data from the Queensland Health Diabetes Survey conducted in 2000,[9] as this information was not available from the NADC report.

Definitions

Diabetes was confirmed according to the 1991 World Health Organization (WHO) criteria,[10] or the American Diabetes Association criteria.[11] Patients were classified as hypertensive if they had blood pressure > 140/90 mmHg or had been prescribed antihypertensive medication. Patients were classified as having dyslipidaemia if they had total cholesterol level > 5.5 mmol/L or triglyceride level ⩾ 2.1 mmol/L or they had been prescribed lipid-lowering treatment. Macroalbuminuria was defined as urinary albumin/creatinine ratio > 34. Eye examination included retinal photography or funduscopy by a non-ophthalmologist.

Unless specified otherwise, current guidelines recommend these checks at least annually.[12]

Ethical approval

Ethical approval was obtained from the Cairns Base Hospital Ethics Committee and the Northern Territory Human Research Ethics Committee, with support from the relevant Indigenous bodies.

Statistical analysis

Data were abstracted from clinical records to MS Access files in the field. Univariate and multivariate analyses were performed using SPSS for Windows.[13] Means and proportions were compared using Student's t tests and χ^2 tests for normally distributed data, or F statistics otherwise. Stepwise logistic regression was used to estimate adjusted odds ratios and 95% confidence intervals.

RESULTS

Patient characteristics

There were 1367 adults with confirmed diabetes on registers in the 27 centres. The mean patient age was 52 years, and 59% were women. Reported mean duration of diabetes was significantly shorter in the NT (6.8 years) than in Queensland (7.9 years). Torres Strait Islanders were significantly heavier than Aboriginals. Reported smoking was lower among Torres Strait Islanders than for Aboriginal patients (Box 1).

Diabetes care processes

Patients who had been weighed in the previous 12 months were more likely to be older (mean difference, 2.17 years; 95% CI, 0.5–3.8 years; $P = 0.01$), female (OR, 1.3; 95% CI, 1.09–1.72) and had a slightly longer duration of known disease than those not weighed in the previous 12 months.

Patients who had had their HbA_{1c} level measured in the previous 6 months were similar in age and sex distribution to those who had not, but had been diagnosed for longer (mean duration of diabetes, 8.2 versus 6.9 years; mean difference, 1.2 years; 95% CI, 0.62–1.94 years; $P = 0.004$). Female and older patients were more likely to have had blood pressure checked in the previous 12 months (OR for women v men, 1.9; 95% CI, 1.32–2.78). There was no difference in age, sex or duration of diabetes in the likelihood of having urinary albumin/creatinine ratio measured in the previous 12 months.

Routine checks were generally done according to the recommended schedule, with lower rates in the NT, including apparently poorer access to specialist ophthalmology services (Box 2). In particular, there was good attention to blood pressure checks, and most patients with high blood pressure had been prescribed antihypertensive medication, with correspondingly relatively high rates of acceptable blood pressure control (< 140/90 mmHg). Similarly, nearly all patients with albuminuria had been prescribed angiotensin-converting enzyme (ACE) inhibitors. Vaccination rates were lowest in the NT.

Few patients self-monitored for glycaemia and HbA_{1c} level. Very few patients appeared to have been prescribed insulin treatment, either alone or combined, for hyperglycaemia, despite the very high HbA_{1c} levels (Box 2).

Intermediate clinical outcomes

Glycaemic control was poor overall (mean HbA_{1c} level, 8.9%) and the Torres Strait Islanders had the lowest proportion with good glycaemic control (HbA_{1c} level, < 7%). Diastolic blood pressure and albuminuria were significantly lower among Torres Strait Islanders (Box 3).

Despite having much lower mean weight and body mass index (BMI) than Torres Strait Islanders, Aboriginals had higher risk of hypertension and albuminuria, as well as higher rates of tobacco smoking. The excess risk for albuminuria among Aboriginals remained significant after controlling for age, sex, duration of diabetes, blood

1: Characteristics of people on diabetes registers in Northern Territory, Cape York and Torres Strait remote communities, 2002–2003

	Northern Territory	Cape York	Torres Strait
Number of patients	194	252	921
Number (%) women	115 (59%)	139 (55%)	553 (60%)
Number (%) Indigenous	186 (96%)	250 (99%)	909 (98%)
Mean (95% CI) duration of known diabetes (years)	6.8 (6.3–7.3)	8 (7.4–8.6)	7.9 (7.5–8.3)
Mean (95% CI) age (years)	51.8 (50.9–52.8)	50.9 (49.2–52.6)	52.4 (50.3–54.5)
Mean (95% CI) weight, men (kg)	88.9 (85.9–91.9)	85.7 (83.3–88.1)	97.4 (96.1–98.7)
Mean (95% CI) weight, women (kg)	79.7 (77.0–82.4)	76.8 (74.4–79.2)	87.6 (86.4–88.8)
Mean (95% CI) body mass index (kg/m^2)	31.1 (30.2–32.1)	29.9 (29.1–30.7)	32.9 (32.5–33.3)
Number (%) smokers	64 (33%)	74 (29%)	227 (25%)

pressure, HbA_{1c} level, smoking and weight (adjusted OR, 2.14; 95% CI, 1.36–3.36; $P = 0.001$). In this Indigenous population, albuminuria was also positively associated with male sex, blood pressure, HbA_{1c} level and duration of diabetes.

Comparison with non-Indigenous people

Our sample of Indigenous people were on average more than 10 years younger, more likely to be female, had similar or better blood pressure control, but much poorer glycaemic control and higher prevalence of albuminuria, than non-Indigenous people with diabetes reported from Australian diabetes centres.[8] These Indigenous people were much less likely to have been prescribed insulin, either alone or combined with oral treatment, despite much higher mean HbA_{1c} level (Box 4). In addition, they were much less likely to be self-monitoring for glucose level compared with a Queensland non-Indigenous sample in 2000.[9]

DISCUSSION

Our audit showed that diabetes checks are being routinely conducted in remote Aboriginal and Torres Strait Islander communities. Hypertension and albuminuria are being treated appropriately, but glycaemia is not well controlled in these populations. Torres Strait Islanders are heavier than Aboriginal people with diabetes and have poorer glycaemic control, but are more likely to be self-monitoring and receiving insulin treatment. Aboriginals are more likely to have albuminuria than Torres Strait Islanders. Those more likely to attend for routine checks in this sample were female, older, and had diabetes for longer than those who did not regularly attend.

Although all adults with diabetes on clinic registers in the Torres Strait District were counted in the audit, we included only three communities from Cape York and three from the NT, thus limiting generalisability for Aboriginal communities. However, the Aboriginal communities in the study were not different from others in their respective districts demographically or in the type of healthcare service model provided.

2: Diabetes-related checks and preventive care practices in Northern Territory, Cape York and Torres Strait remote communities, 2002–2003

	Northern Territory (n=194)	Cape York (n=252)	Torres Strait (n=921)
Weight recorded (%) in previous 12 months	107 (55%)	216 (86%)	602 (65%)
Height recorded (%) at any time	118 (61%)	177 (72%)	701 (76%)
Blood pressure recorded (%) in previous 12 months	126 (65%)	231 (92%)	711 (77%)
High blood pressure recorded (%)	110 (87%)	199 (79%)	631 (69%)
Antihypertensive medication prescribed	101 (92%)	188 (95%)	577 (91%)
Hypertension with good blood pressure control	63 (62%)	134 (71%)	402 (70%)
Lipid levels checked (%) in previous 12 months	122 (63%)	212 (84%)	642 (70%)
With dyslipidaemia (high cholesterol or triglyceride levels)	97 (50%)	172 (68%)	525 (57%)
Prescribed lipid-lowering medication	40 (41%)	117 (68%)	301 (57%)
Good lipid control (cholesterol level < 5.5 mmol/L)	24 (60%)	79 (67%)	138 (46%)
Urinary albumin/creatinine ratio checked (%) in previous 12 months	119 (61%)	209 (83%)	588 (64%)
Macroalbuminuria (albumin/creatinine ratio > 34)	42 (35%)	72 (34%)	134 (24%)*
Angiotensin-converting enzyme inhibitor prescribed	41 (98%)	64 (89%)	117 (85%)
Serum creatinine level checked in previous 12 months	149 (77%)	227 (90%)	706 (77%)
HbA_{1c} level checked in previous 6 months	108 (56%)	201 (80%)	519 (56%)
Self-monitoring glucose level	1 (0.5%)	16 (6.3%)	130 (14%)
Prescribed oral hypoglycaemic treatment only	149 (77%)	191 (76%)	543 (59%)
Taking insulin only	4 (2.1%)	11 (4.4%)	54 (6%)
Taking combined oral and insulin treatment	13 (7%)	19 (7.5%)	89 (10%)
Eye examination in previous 12 months	27 (14%)	185 (73%)	584 (63%)
Ophthalmologist review in previous 12 months	43 (22%)	122 (48%)	373 (41%)
Foot check in previous 12 months	67 (35%)	129 (51%)	544 (59%)
Influenza vaccination in previous 12 months	53 (27%)	180 (71%)	624 (68%)
Pneumococcal vaccination in previous 5 years	93 (48%)	208 (83%)	677 (74%)

*$P < 0.05$ compared with other two groups.

Also, as the NADC sample is probably biased more towards people with severe and complex diabetes than those who are not seen in diabetes centres, the differences between the Indigenous and national samples reported here would probably be greater if a more representative (and therefore probably more healthy) national comparison were used.

There is dissonance between the relatively high rates of routine checks and apparent lack of therapeutic action on glycaemia among Indigenous patients compared with general practice in New South Wales.[14,15]

Observational studies suggest that the level of glycaemic control is related to the progression of renal disease.[16] High rates of albuminuria have been reported in other Australian Indigenous groups, with and without diabetes, and are associated with rapid progression to end-stage renal disease. The variation in prevalence of albuminuria in different ethnic populations remains poorly explained by conventional risk factors and has been identified as a priority area for more research.[8] Treatment with ACE inhibitors has been shown to be effective in slowing progression of nephropathy,[17,18] and we found uptake of appropriate blood pressure and proteinuria treatment in the populations studied is quite high.

3: Intermediate clinical outcomes for patients with diabetes in Northern Territory, Cape York and Torres Strait remote communities, 2002–2003

	Northern Territory (*n*=194)	Cape York (*n*=252)	Torres Strait (*n*=921)
Mean (95% CI) HbA_{1c} level	8.7% (8.4%–9.2%)	8.7% (8.5%–9.1%)	9.0% (8.9%–9.1%)
HbA_{1c} level < 7%	28 (26%)	53 (26%)	116 (22%)
HbA_{1c} level < 9.5%	75 (69%)	129 (64%)	232 (45%)
Mean (95% CI) systolic BP (mmHg)	128.4 (125.8–131.0)	129.4 (127.2–131.6)	130.1 (128.8–131.4)
Mean (95% CI) diastolic BP (mmHg)	79.1 (77.4–80.8)	79.6 (78.2–81.0)	77.3 (76.6–78.0)
Median (interquartile range) urinary albumin/creatinine ratio	14 (2.9–86)	13 (2.2–62)	6.8 (1.7–32)

BP = blood pressure.

In contrast, hyperglycaemia is relatively neglected and may well now be the single most important contributor to continuing excessive rates of microvascular complications.

The evidence for better glycaemic control is compelling[19] and is highly cost-effective.[20,21] Recent trials suggest that regimens combining oral and insulin treatment are more effective than either agent alone, and newer insulin delivery devices make such options more attractive, even for people in remote areas.[22-24] However, uptake of recommendations for tighter glycaemic control by doctors has been slow.[25] Improving quality in diabetes care should emphasise earlier therapeutic changes, rather than more frequent testing in this population.

Responses from local treating clinicians in Queensland, when presented with these results to date, have tended to concentrate on compliance issues with oral hypoglycaemic agents. The problem of non-compliance with long-term treatments is not confined to Indigenous patients. It has been estimated that compliance with long-term therapy is less than 50% in developed countries.[26] In settings where Western-trained doctors work with Indigenous patients, cross-cultural communication issues further cloud the complex area of treatment negotiation; for example, there may not be a shared understanding of the need for ongoing medication.[27] Considerable debate has accompanied provider claims of non-compliant behaviour among people with diabetes, especially those with poor glycaemic control. Although we did not look directly at compliance with prescribed treatments, our data suggest that Indigenous patients are probably taking their blood pressure tablets regularly, perhaps with better compliance than their non-Indigenous counterparts. Therefore, we need to look at explanations other than non-compliance with treatment to explain high rates of glycaemia in these populations.

Explanations for the low rate of self-monitoring and insulin use rest in the notion of "therapeutic nihilism" on the part of some practitioners. Therapeutic nihilism occurs when there is a lack of confidence by doctors that existing treatment will be effective, so the doctors do not consider or offer potentially effective treatments.[28] The apparent slowness of doctors to follow clinical guidelines has been described elsewhere as "clinical inertia", and has been generally interpreted as a sign of low quality of care. Reasons given for clinical inertia include doctors' overestimating the care they actually provide, lack of time, and lack of appropriate training.[29]

Other complicating factors that may lead to the low rate of self-monitoring and insulin use are the persisting poor socioeconomic conditions of most Indigenous patients, for whom the availability and affordability of glucose monitors, good food and physical exercise is low, and competing demands of family circumstances make self-care difficult.[30] There is evidence that the fruit and vegetable intake among Indigenous adults in remote communities is particularly low; this is reflected in low serum red cell folate levels.[31]

Despite all these problems, it is urgent that we find more effective approaches to improving diabetes care, including self-care, for Indigenous patients in remote areas. This will most likely be a combination of better medical management, including more use of insulin in a form that can be conveniently taken by patients, and action to improve opportunities for self-care, including smoking cessation, nutrition and physical activity.

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4: Characteristics of three groups of patients with type 2 diabetes

	Aboriginals (Northern Territory and Cape York) (*n*=446)	Torres Strait Islanders (*n*=921)	Non-Indigenous Australians* (*n*=2077)
Mean age (years)	51.5	52.4	62.5
Proportion female	57%	60%	47.6%
Mean body mass index (kg/m^2)	30.9	32.9	31.5
Mean HbA_{1c} level	8.7%	9%	7.8%
"Good glycaemic control"†	26%	22%	38%
Blood pressure < 140/90 mmHg	66%	70%	40%‡
Macroalbuminuria	34.4%	24%	6.9%
Self-monitoring for glucose	4%	14%	58%
Insulin treatment, alone or combined	10.5%	16%	34.4%

* Data for non-Indigenous patients are from the National Association of Diabetes Centres (NADC) Audit and Benchmarking study,[8] except for glucose self-monitoring rate, which are from Queensland Health Diabetes Survey 2000.[9] † "Good glycaemic control" is defined as HbA_{1c} level < 7% in our study, and as HbA_{1c} level ⩽ 1% above upper limit of normal in the NADC study. ‡ Blood pressure results for the NADC sample are for patients older than 60 years.

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COMPETING INTERESTS

None identified.

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