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Diabetes in general practice: Tongans in Tonga and South Auckland

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Abstract The aim of this study was to compare the management and treatment outcomes of Tongan diabetic patients in Tonga and South Auckland, New Zealand. This was achieved by comparison of Tongan diabetic patients within clinical audits from a general practice in Tonga (n = 124) with those from participating general practices in South Auckland (n = 168). Our results indicate that some measures of diabetes care and outcomes were similar or even better in Tonga, while some interventions were not available in Tonga. Control of weight, glucose, blood pressure and cholesterol remained difficult in both areas. Severe diabetic foot damage was more common among Tongan patients in Tonga (6.5% *vs* 1.8%, $P < 0.05$). This international comparison shows that Tongans in both Tonga and New Zealand remain at high-risk of complications independent of the health system under which care is being delivered. While barriers to implementation may differ in the two settings, improvements in the co-ordination of care are likely to be of benefit in both settings.

Key words: audit; diabetes care; diabetes; diabetic foot care; New Zealand; Tonga.

INTRODUCTION

Diabetes is a major and growing health problem in the South Pacific[1] and New Zealand in particular.[2] Polynesians in New Zealand have a high prevalence of Type 2 diabetes and diabetes-related complications.[2] The numbers with diabetes are likely to increase markedly over the next decade.[3] While diabetes itself is costly from both social and economic perspectives, diabetes-related complications contribute the bulk of the costs associated with the disease.[4] Prevention of such complications is now possible in the majority of cases with appropriate care.[5] However, 'appropriate care' is difficult to achieve with a variety of systems[6] and personal[7] barriers to implementation of quality care. Failure to implement such care is likely to be associated with increasing personal and societal costs, particularly among Polynesians and other ethnic groups at high and increasing risk of diabetes and its complications.

The Diabetes Care Support Service (DCSS) was established by the South Auckland Diabetes Project in South and West Auckland to assist general practitioners in identifying ways to enhance their care through an audit and feedback system.[8] Such systems have been shown to improve the monitoring of diabetes and some metabolic outcomes in New Zealand.[9] The DCSS was extended to a general practice in Tonga in 1996. We have compared the results to the Tongan audits in 1996 with those from Tongans in South Auckland in the same year in order to provide insight into the delivery of diabetes care in the two settings.

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METHODS

The Tongan general practice was based in Ha'ateiho on the main island of Tongatapu, and serves a population of about 75 000 (shared with six government clinics, one full-time and four part-time private clinics; patients tend to 'float' between practices). The general practice in this study has approximately 6700 patients who have attended at least once over the last 6 years. There is a fee for service which is set very low for those with diabetes to encourage regular follow-up; and no government subsidy. Many with diabetes attend the government hospital clinic which is free of charge.

A practice nurse undertakes the initial assessments: random or fasting blood glucose of capillary specimen by glucose metre, weight, blood pressure and urine (at six monthly intervals), and often gives dietary advice. They are then seen by the general practitioner (GP)

who examines the feet at least annually, and undertakes fundoscopy (annually).

Microalbuminuria testing is not yet available because of cost. Total cholesterol was available irregularly at the local laboratory during 1996; full fasting lipids testing has become available subsequently. Glycosylated haemoglobin (HbA1c) is sometimes available at the government diabetic clinic and this general practice has had difficulty getting this test done on its patients. No patient had a glucose meter for home use making insulin therapy difficult to initiate. Patients on insulin are more likely to be under the care of the hospital clinic.

The *modus operandi*, resources and issues related to the DCSS have been described previously.[8] All audits were manual, commencing with the identification of charts of diabetic patients and then the completion of the standardized audit. In South Auckland, the audit recorded all documentation including correspondence and results from other services (e.g. diabetes specialist services). In Tonga, the audit recorded only findings and results undertaken at the general practice, and very rarely results patients may have had recorded while visiting overseas. Patients are generally not referred back from the hospital clinic to the GP, although occasionally they may be transferred to the hospital (usually only after admission). Patients do not usually have patient-carried record cards. The Tongan audit was undertaken by the GP with the assistance of a member of the Diabetes Projects Trust. The South Auckland audit was undertaken by audit nurses and included all patients within a practice. Data collected from South Auckland did not include the duration of stay in New Zealand. The DCSS was overseen by a steering group of GP and diabetes specialists. Forms were coded and entered into a Dbase IV (Ashton Tate, Carmel, USA) database and analyses were undertaken using SPSS (Version 8, SPSS, Chicago, IL, USA). The DCSS was initially commenced as a research project with ethics approval, but was subsequently considered a service by the ethics committee.

RESULTS

In South Auckland, 168 patients from 33 GPs had been cared for over the previous 12 months. The GP in Tonga had cared for 124 patients. The characteristics of the patients in the two areas are shown in Table 1 and were comparable in terms of age, sex (60% female South Auckland, 70% female in Tonga; $P = 0.077$), duration of diabetes, anthropometric measurements and smoking history. Recording of blood pressure, anthropometric measures and foot examination were

Table 1. Tongan patients and their preventative treatment over last 12 months

	South Auckland (n = 168)	% measured	Tonga (n = 124)	% measured
Age (years)	56 ± 11		57 ± 10	
Duration (years)	6 ± 5		5 ± 4	
Smokers	8.9%		4.8%	
Feet examined last 12 months	47.0%		80.6%***	
Eyes examined last 12 months	55.4%		40.3%**	
BMI (kg/m^2)	33.3 ± 5.2	(45%)	33.0 ± 5.0	(88%)+++
Weight (kg)	93.8 ± 17.8	(78%)	91.5 ± 16.9	(97%)+++
Height (m)	1.67 ± 0.07	(54%)	1.66 ± 0.07	(88%)+++
Insulin therapy	10.1%		1.6%***	
Metformin therapy	61.3%	(54.8%)		
Sulfonylurea therapy	57.1%		73.4%**	
Random glucose (mmol/1)	12.1 ± 5.2	(88%)	12.7 ± 5.7	(99%)+++
HbAl c (%)	10.1 ± 2.4	(7%)	–	(0%)
Fructosamine (umol/1)	359 ± 91	(54%)	353± 75	(2%)+++
Anti-BP/ACE inhibition	38.1%/26.2%		29.8%/21.8%	
Systolic BP (mm Hg)	135 ± 19	(90%)	138 ± 17	(100%)+++
Diastolic BP (mm Hg)	82 ± 11	(90%)	85 ± 11 *	(100%)+++
Lipid lowering therapy	17.3%		0.8%***	
Total cholesterol (mmol/1)	5.8 ± 1.3	(49%)	5.8 ± 1.2	(31%)++
HDL cholesterol (mmol/1)	1.18	(31%)		(0%)+++
Triglycerides (mmol/1)	2.4 ± 1.5	(27%)		(0%)+++
UACR (%recorded)	5.74	(24%)	–	(0%)+++
Serum creatinine (mmol/1)	0.097	(59%)	0.098	(59%)

Figures are mean ± SD or geometric mean. * $P < 0.05$; ** $P < 0.01$, *** $P < 0.001$ Tonga *vs* South Auckland. Numbers in parentheses are proportion with results recorded ++ $P < 0.01$, +++$P < 0.001$ Tonga *vs* South Auckland. BMI, body mass index; HbA1c, glycosylated haemoglobin; Anti BP/ACE, antihypertensive agent/angiotensin converting enzyme inhibitor; BP, blood pressure; HDL, high-density lipoprotein; UCAR, urinary albumin:creatinine ratio.

higher in Tonga as was the recording of at least one glucose measurement. Eye examination, measurement of lipids, microalbumin and long-term measures of glycaemic control were more likely to occur (and at times only likely to occur) in South Auckland. Use of lipid lowering therapy was almost non-existent in Tonga, in spite of comparable levels of cholesterolaemia. Use of insulin therapy was lower and sulfonylureas higher in Tonga, with a non-significantly higher degree of random hyperglycaemia and comparable body mass index (BMI). Use of metformin, antihypertensive agents and angiotensin converting enzyme (ACE) inhibitors were similar although blood pressure control was worse in Tonga. Of those with results, random glucose was ≥10.0 mmol/L in 62.8% of Tongans in South Auckland and 66.7% of those in Tonga with blood pressure being above 140/90 mmHg (either being high) in 51.3% and 60.5%, respectively.

Table 2 shows that complication rates and use of medication for complications were comparable in the two areas except for foot ulceration and gangrene which were more likely to occur in Tonga. Hospital admissions were non-significantly higher in Tonga ($P = 0.107$). Referrals to dietitian, diabetes clinic and diabetes educator were higher in South Auckland. Referrals to the podiatrist were comparable in South Auckland and Tonga (3.6% *vs* 3.2%).

Table 2. Management of diabetes complications over previous 12 months

	South Auckland	Tonga
Referrals last 12 months		
Dietitian	16.1%	1.6%***
Diabetes clinic	27.4%	0.8%***
Diabetes educator	20.8%	0%***
Cardiovascular disease		
Aspirin therapy (any indication)	6.0%	8.1%
Anti-anginal medication	6.5%	9.7%
Anti-heart failure medication	4.8%	4.0%
Myocardial infarction/ cardiac intervention	1.2%	4.0%
Stroke/TIA	3.0%	3.2%
Peripheral vascular surgery	1.8%	0.8%
Foot ulcer/gangrene	1.8%	6.5%*
Amputation	0.6%	0.6%
Eye disease		
Blindness	2.4%	0.8%
Cataracts	11.3%	11.3%
Eye therapy (eg. laser)	4.2%	3.2%
End stage renal failure (on therapy)	1.2%	0%
Acute complications		
Hospital admission	5.4%	10.5%
Reported hypoglycaemia	0%	0%
Pregnancy complications		
Miscarriage/stillbirth (women ≤ 45 years)	1/17(5.6%)	1/16(6.3%)

Data were recorded if present in the chart, charts do not generally register if something has not occurred. *$P < 0.05$, ***$P < 0.001$. TIA, transient ischaemic attack.

DISCUSSION

This is one of the first international comparisons between care in New Zealand and elsewhere using the same methodology. Although the South Auckland population is by no means typical (with high rates of unemployment, highest proportion of Polynesians), we have previously found care to be similar to that in West Auckland and Manchester.[8] There is often an assumption that the overall care in the developed world will be superior to that delivered in developing countries: this was not the case and confirms that the delivery of diabetes care to populations is complex.

The structured approach to care in Tonga was associated with recordings of care (e.g. foot examination) and many intermediate outcome measures of care (e.g. cholesterolaemia) comparable or better than that in South Auckland. Many diabetes outcomes also appeared comparable in Tonga. However, access to microalbumin testing and lipid lowering therapy were clearly limited. The difference in attendance to the diabetes clinic and diabetes specialist services may reflect the 'capture' of patients once they attend as well as limited access opportunities.

Outcome measures were also hard to interpret. Differences in outcomes of hospital care could explain the similar cardiovascular events. Dialysis is essentially non-existent in Tonga. If eye examination occurs less frequently, interventions such as photocoagulation and detection of diagnoses such as the presence of cataracts are also less likely. If those who are blind or have greater morbidity are more likely to be under specialist care, then this could also contribute to the clinical pattern found here. Differential mortality could also explain some of the findings here.

Interpretation of these data requires even further caution. Data on the proportions attending the hospital or other clinics from the catchment areas were not available and hence the data are unlikely to be truly population-based. After all, this is a comparison of one GP who was keen to overcome the distance and international barriers to participate in the audit with a large number of general GPs. The systems under which care was delivered are also very different. Those that attended the Tongan Practice were those able to afford to visit, while those in New Zealand had visits subsidised to a greater or lesser extent. It is plausible that these different methods of billing generated different

patient–doctor relationships and expectations, for example, we could not include an audit of average time for consultation in the audit. Patients in South Auckland had a greater choice of provider of care and this could also have impacted on patient expectations and desire for more time-consuming assessments.

Differences in patient expectations, ability to pay and behaviour are also likely to be impacting on the acceptability of insulin therapy (or those receiving insulin therapy may have transferred to the diabetes clinic). The excess morbidity from foot lesions needs greater investigation. Indeed, patients with established or severe or recurrent foot sepsis are more likely to be under the hospital clinic as once admitted, they frequently stay with the hospital clinic. So these figures probably under represent the incidence of the problem. Whether the greater risk of foot lesions in Tonga is a result of differences in footwear and/or access to timely intervention is again unknown. In general, numbers for most other complications were too small to compare.

It is clear that the Tongans in general practice in Tonga reviewed here need greater access to microalbumin, lipid and HbA1c screening if earlier intervention is to be achieved, hospitalization is to be avoided and international standards for care are to be achieved.[10] However, in both locations, a total population approach is likely to be needed to identify the real dynamics of diabetes care within the community. In both areas, hyperglycaemia was very common and systems[6] and personal barriers[7] need to be urgently addressed. Development of systems which merge general practice and diabetes clinic databases could be used to enhance population-based outcomes.[11] Care for Tongan patients is yet further fragmented as a result of travel between Tonga and New Zealand, supporting the case for a personal record of diabetes care events and results. With access to integrated data, the kind of benchmarking applied here could then be used to identify and quantify local priorities for diabetes care. In this group of patients, greater input into the blood pressure and foot outcomes is clearly needed.

In conclusion, this international comparison shows that Tongans in both Tonga and New Zealand remain at high-risk of complications independent of the health system under which care is being delivered. More intensive treatment of type II diabetes such as diabetes education, insulin therapy, lipid lowering agents and antihypertensives is likely to be of benefit, but may not be readily available in Tonga. Although such interventions are available in South Auckland, barriers to their implementation including systems, service, cultural and cost barriers will need to be overcome.

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