



Susan Harch  
David Reeve  
Carole Reeve

# Management of type 2 diabetes

## A community partnership approach

### Background

The impact of type 2 diabetes is severe in Aboriginal and Torres Strait Islander people. The Fitzroy Valley, a remote region of the Kimberley in Western Australia, has a high population of Indigenous Australians. An effective community partnership has been formed between the local hospital, the population health service and local health services.

### Objective

This article describes the evaluation of a new model of partnership care using an audit cycle.

### Results

Statistically significant improvements in foot examination, body mass index, urine albumin creatinine ratio, total cholesterol, triglycerides and visual acuity measurements were observed. Significant increases in the proportion of patients achieving cholesterol and triglycerides therapeutic targets occurred. Most other outcome indicators demonstrated a nonsignificant improvement, which may be due to the short time interval in the audit for potential change.

### Conclusion

A dedicated chronic disease team and a clinical information system to coordinate culturally appropriate, multidisciplinary chronic disease care enables effective management of chronic diseases such as type 2 diabetes.

### Keywords

diabetes mellitus/type 2; indigenous health service; quality improvement

hospital (Fitzroy Valley Health Service or FVHS) and the Kimberley Population Health Unit (KPHU) are both funded by the State Health Service and provide services in Fitzroy Crossing and outreach clinics in the larger surrounding communities. 'Healthy for Life' is a Commonwealth program aimed at improving the health of Aboriginal and Torres Strait Islander people. It funds dedicated positions in Fitzroy Crossing through KPHU. Nindilingarri Cultural Health Services (NCHS) is a Commonwealth funded Aboriginal medical service; it provides nonclinical health services for the Fitzroy Valley.

### The model

Over the past 4 years – as part of a formal partnership agreement – FVHS, KPHU and NCHS have moved toward an integrated primary healthcare model.<sup>6</sup>

This new model of care is based on Wagner's chronic disease care model.<sup>7</sup> The fundamental environmental enabler has been the community components of policy change and availability of dedicated resources. The Healthy for Life program created employment for a coordinator, a diabetes educator and Aboriginal project officers.

The partnership enabled the re-organisation of healthcare delivery using the clinical information system Communicare (Communicare Systems Pty Ltd 1998–2010), which facilitated proactive screening, recall for follow up, decision support and self management.

This holistic approach is fundamental for successful prevention and management of chronic diseases.<sup>8–9</sup>

### The intervention

Between March and September 2010, the KPHU resident medical officer (RMO) spent 3 days a week in the Fitzroy Valley working with the hospital, the NCHS health promotion team, KPHU community health and the Healthy for Life staff.

The impact of type 2 diabetes is severe in Aboriginal and Torres Strait Islander people. Compared with non-Indigenous Australians, type 2 diabetes in Indigenous Australians is four times more prevalent, associated with an earlier age of onset and 12–17 times more deaths.<sup>1–4</sup> The Department of Health and Ageing estimate 80% of the total burden of disease in Australia is due to chronic diseases when measured in disability adjusted life years.<sup>1</sup>

The Fitzroy Valley is a remote region of the Kimberley in Western Australia. More than 80% of the population are Indigenous Australian with 86% aged less than 50 years.<sup>5</sup> The Fitzroy Crossing

Redesign of the health delivery system included:

- development of multidisciplinary care teams
- population management – protocol based management, self management support and intensive follow up.<sup>1,8</sup>

The intervention resulted in regular community health promotion days for screening and education, and team outreach clinics for the development of self management care plans with patients.

The Communicare software, which previously was utilised predominantly as an acute care medical record, was used to provide a population approach by:

- identifying the population at risk through proactive systematic screening (health checks)
- developing disease registers
- providing intensive follow up (recalls)
- best practice care (Chronic Disease Care Plans and Diabetes Annual Cycle of Care templates)
- using this electronic information in an audit cycle as continuous quality improvement.

Inclusion criteria of patients for the audit were:

- a confirmed diagnosis of type 2 diabetes
- patient nomination of Fitzroy Valley as their current residence
- one or more attendances at FVHS within the previous 24 months (1 March 2008 to 1 March 2010).

Patients were excluded if they had type 1 diabetes, gestational diabetes or if they stated they did not reside in the Fitzroy Valley. No limits were placed on age or Aboriginality.

## Measurement and data collection

Process indicators (health checks, care plans and Diabetes Annual Cycle of Care completion) and intermediate outcome indicators (achieving therapeutic targets) were measured at the commencement and end of the RMO placement (1 March and 1 September 2010) to review the impact of the change management process.

Data was extracted via the report function of the electronic medical record system, Communicare.

Process of care indicators and intermediate therapeutic outcomes were compared before and after the implementation of an enhanced chronic disease program and benchmarked against the

current regional guideline, *The Kimberley Chronic Disease Therapeutic Protocols: Diabetes II*<sup>0</sup> in a similar manner to other chronic disease audits.<sup>11</sup>

The protocol is based on The Royal Australian College of General Practitioners (RACGP) and Diabetes Australia guidelines for processes of care and therapeutic targets.<sup>12</sup>

Diabetes prevalence was calculated using number of people screened as the denominator.

Statistical analyses were performed using the software program SPSS (Version 13, Chicago, Illinois). Means and proportions were used to describe continuous and binomial data. Differences in process and intermediate outcomes between the two time-points were analysed with paired sample t-tests. Tests were two-tailed, with statistical significance at  $p < 0.05$ .

Ethics approval was granted by the Western Australia Country Health Service Research Ethics Committee and Western Australian Aboriginal Health Information and Ethics Committee.

## Results

Characteristics of the study population are described in *Table 1*. The estimated prevalence of known diabetes in the Fitzroy Valley was 10.3%.

The number of patients with a current health check or Diabetes Annual Cycle of Care increased by 242 and 28 respectively. The completion of recommended examinations or investigations during the recommended timeframe at the first time-point (baseline) varied between care types (*Table 3*).

Adherence to the protocol improved across all care items at the second time-point, 1 September 2010 (*Table 3*). The exception was glycosylated haemoglobin (HbA1c) testing. As the recommended timeframe for some of the indicators are 1 year and 2 years respectively, the data will be recollected at those points as part of

continuous quality improvement.

At baseline, the number of patients achieving the recommended therapeutic targets ranged between 19.7% and 59.1% (*Table 4*). A statistically significant improvement in the proportion of patients achieving the therapeutic target for total cholesterol and triglycerides was observed at the completion of the 6 month interval. With the exception of diastolic blood pressure (BP), all other parameters showed some improvement in the number of patients reaching targets, although it was not statistically significant.

## Discussion

This study provides quantitative evidence of improvement in process and intermediate outcome indicators following the implementation of multidisciplinary, culturally appropriate, coordinated care in the Fitzroy Valley.

The population prevalence of known diabetes in the Fitzroy Valley was calculated to be approximately 10.3%, this is consistent with other remote indigenous communities reported in the literature.<sup>13–14</sup> These high rates of type 2 diabetes demonstrate the need for proactive screening for chronic disease and best practice chronic disease management.

The improvement in the number of health checks at FVHS will facilitate earlier diagnoses of chronic disease. This has been previously observed in the literature by an urban indigenous health service.<sup>15</sup>

The statistically significant improvement in process indicators also demonstrates the effectiveness of a systematic proactive approach to chronic disease care. There is a suggestion that the improvement in chronic disease process and intermediate outcome indicators, as seen in this audit, will over time result in improved health outcomes.<sup>9</sup>

The implementation of the new model of

**Table 1. Profile of type 2 diabetes in the Fitzroy Valley at 1 March 2010**

Population of the Fitzroy Valley, census 2006, accounting for undercounting of Indigenous Australians <sup>5</sup>	3311
Regular patients of FVHS with diabetes at 1 March 2010	341
Median age (first to third quartiles)	49 (41–58) years
Males (%)	133 (39.0%)
Aboriginal (%)	329 (96.5%)
Type 2 diabetes prevalence	10.3%

**Table 2. Performance of relevant Medicare Chronic Disease Care initiatives at Fitzroy Valley Health Service**

	At 1 March 2010		At 1 September 2010	
	Eligible clients	Completed check n (%)	Eligible clients	Completed check n (%)
<b>Adult indigenous health checks</b>				
Males with current MBS Item 710 claimed	982	38 (3.9)	1049	126 (12.0)
Females with current MBS Item 710 claimed	1119	4 (0.4)	1153	84 (7.3)
Males with current MBS Item 704 or 706 claimed	120	3 (2.5)	128	30 (23.4)
Females with current MBS Item 704 claimed	130	1 (0.8)	141	18 (12.8)
Total	2351	46 (2.0)	2471	258 (10.4)
<b>Diabetes annual cycle of care</b>				
Cycle of care claimed within 12 months	341	3 (0.9)	352	31 (8.8)

Note: In 2010 MBS Item numbers 704–710 were for Aboriginal and Torres Strait Islander Health Checks (item 710 for people aged 15–54 years; items 704 or 706 for those aged 55 years or more)

**Table 3. Process indicators completed during the scheduled interval according to the type 2 diabetes protocol at Fitzroy Valley Health Service**

	Scheduled interval (months)	Population receiving service (%) during the preceding scheduled interval		Difference in proportion receiving service	Significance (two-tailed)
		1 March 2010	1 September 2010		
Systolic BP	6	75.7%	77.1%	1.5	0.588
Diastolic BP	6	75.7%	77.1%	1.6	0.588
HbA1c	6	68.0%	62.8%	– 5.2	0.139
BMI	6	42.2%	51.3%	9.1	0.008
Foot examination	6	6.2%	17.6%	11.4	0.000
Urine albumin:creatinine ratio (ACR)	12	67.7%	74.5%	6.8	0.008
Creatinine	12	76.0%	76.5%	0.5	0.76
Total cholesterol	12	77.1%	81.2%	4.1	0.035
Triglycerides	12	75.7%	79.8%	4.1	0.035
Visual acuity	12	9.7%	18.5%	8.8	0.000
Retinal screening	24	27.0%	26.1%	– 0.9	0.59

care saw improvement across most outcome indicators, most notably in cholesterol and triglyceride levels. It is challenging to compare the number of patients achieving therapeutic targets at FVHS to that of other health services published in the literature due to the use of varied 'target outcomes'.<sup>16–18</sup> However, the proportion of patients at FVHS achieving targets, such as HbA1c, was generally similar to that of a major metropolitan Sydney teaching hospital<sup>19</sup> and community health centres in the Northern Territory.<sup>16</sup>

As described by Wagner<sup>9</sup> we found the key

elements of a successful chronic disease program to be:

- community policy and resources to enable redesign of healthcare
- redesign of healthcare – multidisciplinary care teams and clinical information systems, which enable population management
- delivery system design, decision support and self management.

Although the partnership and clinical information system had been in place for several years, this project provided a catalyst for a coordinated team approach, which was the key to bringing all the

elements together in a new model of care.

## Conclusion

Organisational changes, which incorporate clinical information systems and community partnerships, are particularly valuable given the highly mobile nature of both patients and healthcare providers in remote settings such as the Fitzroy Valley. This audit is an initial step in the chronic disease quality improvement cycle. Our findings demonstrate an effective chronic disease model for rural and remote Aboriginal communities. It is hoped that future quality improvement audits will

**Table 4. Outcome indicators – proportion of patients with type 2 diabetes achieving therapeutic targets at Fitzroy Valley Health Service**

Therapeutic target	Proportion achieving target (%) (n=341)		Difference in proportion achieving target	Significance (two-tailed)
	1 March 2010	1 September 2010		
HbA1c <7%	28.4%	28.7%	0.3	0.86
Total cholesterol <4 mmol/L	24.1%	28.1%	4.0	0.028
Triglycerides <2 mmol/L	39.4%	44.7%	5.3	0.029
ACR <3.5 mg/mmol creatinine	28.3%	29.6%	1.3	0.40
Systolic BP <125 mmHg	40.6%	42.8%	2.2	0.45
Diastolic BP <80 mmHg	59.1%	57.2%	- 1.9	0.54
BMI <25 kg/m <sup>2</sup>	19.7%	20.1%	0.4	0.76

demonstrate further improvements in both care processes and outcomes.

### Authors

Susan Harch MBBS(Hons), BMedSc(Hons), is Population Health Resident Medical Officer, Kimberley Population Health Unit, Broome, Western Australia. [susanharch@gmail.com](mailto:susanharch@gmail.com)

David Reeve BSc(Hons), DrPH, is Acting Primary Health Manager, Kimberley Population Health Unit, Broome, Western Australia

Carole Reeve MBChB, MPH, is Public Health Medical Officer, Kimberley Population Health Unit, Broome, Western Australia.

Conflict of interest: none declared.

### References

- National Health Priority Action Council. National Chronic Disease Strategy. Department of Health and Ageing, 2006.
- National Aboriginal Community Controlled Health Organisation and The Royal Australian College of General Practitioners 2005. Evidence base to a preventive health assessment in Aboriginal and Torres Strait Islander peoples. Available at [www.racgp.org.au/Content/NavigationMenu/ClinicalResources/RACGPGuidelines/NationalguidetoapreventiveassessmentinAboriginalandTorresStraitIslanderpeoples/200509evidence\\_base.pdf](http://www.racgp.org.au/Content/NavigationMenu/ClinicalResources/RACGPGuidelines/NationalguidetoapreventiveassessmentinAboriginalandTorresStraitIslanderpeoples/200509evidence_base.pdf).
- Australian Bureau of Statistics. 4715.0 – National Aboriginal and Torres Strait Islander Health Survey, 2004–2005. Commonwealth of Australia: Canberra, 2006.
- Wang Z, Hoy W. Association between diabetes and coronary heart disease in Aboriginal people: are women disadvantaged? *Med J Aust* 2004;180:508–11.
- 2006 Census of Population and Housing, Postal Area 6765. Canberra: Australian Bureau of Statistics 2006. Available at [www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/B1BCF4E6DD320A0BCA25714C001822BC/\\$File/47150\\_2004-05.pdf](http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/B1BCF4E6DD320A0BCA25714C001822BC/$File/47150_2004-05.pdf).
- World Health Organization. Health Care: Report of the International Conference on Primary Health Care; Alma-Ata, Union of Soviet Socialist Republics 6–12 September 1978. Geneva, 1978.
- Wagner EH. Chronic disease management: What will it take to improve care for chronic illness? *Eff Clin Pract* 1998;1:2–4.
- World Health Organization. Preparing a health care workforce for the 21st century. The challenge of chronic conditions. Geneva, 2005.
- Wagner EH. The role of patient care teams in chronic disease management. *BMJ* 2000;320:569–72.
- Kimberley Aboriginal Medical Services Council. Kimberley Chronic Disease Therapeutic Protocols: Diabetes Type II [updated 15th July 2009]. Available at [www.kamsc.org.au/resources/resourceguidelines.html](http://www.kamsc.org.au/resources/resourceguidelines.html) [Accessed 27 April 2010].
- Menzies School of Health Research. The Menzies Institute Audit and Best Practice for Chronic Disease tools (ABCD). Available at <http://menzies.edu.au/research/services-systems-and-society/abcd-national-research-partnership-project/benefits-health-serv> [Accessed 20 September 2011].
- The Royal Australian College of General Practitioners and Diabetes Australia. Diabetes Management in General Practice, 17th edn, 2001/12. Available at [www.racgp.org.au/Content/NavigationMenu/ClinicalResources/RACGPGuidelines/Diabetesmanagement/201107diabetesmanagementingeneralpractice.pdf](http://www.racgp.org.au/Content/NavigationMenu/ClinicalResources/RACGPGuidelines/Diabetesmanagement/201107diabetesmanagementingeneralpractice.pdf) [Accessed 16 September 2011].
- Maple-Brown LJ, Brimblecombe J, Chisholm DJ, et al. Diabetes care and complications in a remote primary health care setting. *Diabetes Res Clin Pract* 2004; 64:77–83.
- Couzos S, Melanie T, Colagiuri S, Colagiuri R. Adult Health, Diabetes Prevention and Early Detection. In: National Aboriginal Community Controlled Health Organisation, editor. Evidence base to a preventive health assessment in Aboriginal and Torres Strait Islander peoples. Melbourne: The Royal Australian College of General Practitioners; 2005, p. 51–65.
- Spurling G, Hayman N, Cooney A. Adult health checks for Indigenous Australians: the first year's experience from Inala Indigenous Health Service. *Med J Aust* 2009;190:562–4.
- Si D, Bailie R, Connors C, et al. Assessing health centre systems for guiding improvement in diabetes care. *BMC Health Serv Res* 2005;5:56.
- Simmons D, Bourke L, Yau E, Hoodless M. Diabetes risk factors, diabetes and diabetes care in a rural Australian community. *Aust J Rural Health* 2007;15:296–303.
- Tapp RJ. Diabetes care in an Australian population: frequency of screening examinations for eye and foot complications of diabetes. *Diabetes Care* 2004;27:688.
- Bryant W, Greenfield JR, Chisholm DJ, Campbell LV. Diabetes guidelines: easier to preach than to practise? *Med J Aust* 2006;185:305–9.

correspondence [afp@racgp.org.au](mailto:afp@racgp.org.au)