Comparing clinical outcomes of diabetic patients in NZ and the UK

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ABSTRACT

This study compares and contrasts two similar models of diabetes care from opposite sides of the world, assessing their efficacy in using evidence-based guidelines to achieve desirable diabetic outcomes in their practice populations.

The two practices are located in Sheffield, England and Masterton, New Zealand. Both have similar sized diabetic registers of around 250 patients, and have implemented new structured diabetes management programmes over the last four years.

Methods

Diabetes care is regularly benchmarked through the measurement of three intermediate indicators: HbA1C, blood pressure and cholesterol levels. These three indicators are compared between two practices. The IT tool CDEvolution was configured to facilitate data acquisition and analysis in NZ comparable to that provided by EMIS in the UK. The previous 15 month period was compared. Data was analysed at a single point in time using the relevant computer system. Laboratory results are comparable with both practices using HbA1C values that are DCCT aligned. Statistical analysis was performed using the Student's *t* test.

Results

Both practices have 4–5% prevalence for diabetes mellitus. However, ethnic differences and deprivation affected more of the New Zealand patients. The QOF blood pressure audit standard of 145/85 was achieved in over 80% of the diabetic patients in both countries. More UK patients were treated to the standards recommended for cholesterol of 5.0 mmol/l or less and blood glucose control represented by an HbA1c of 7.4 or less.

The Masterton practice results are comparable with those published for England based on national QOF data to 2006.[1] Further analysis of the NZ patients allowed a comparison of care standards between Maori and Pakeha patients. No significant difference in outcome measures was identified for each of the audit standards.

Conclusions

Despite funding and programme differences, application of evidence-based guidelines in a systematic way to achieve defined clinical outcomes has produced comparable results in practices in both countries. In the Masterton practice this has also eliminated disparities between Maori and Pakeha diabetic patients with respect to the intermediate indicators of HbA1C, blood pressure and cholesterol.

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Introducing the practices

The Doctors Masterton is a 4.5 FTE doctor practice servicing 6200 enrolled and funded patients in the rural town of Masterton, 90 minutes northeast of the capital city, Wellington. The Diabetic Register comprises 257 patients with 65% of this cohort on the Care Plus Programme.[2] The Doctors Masterton was an early adopter of the Care Plus programme and has been enrolling diabetic patients into it since July 2004. This programme consists of subsidised quarterly review and monitoring of clinical indicators coupled with the application of evidenced-based guidelines and innovative IT tools.[3] It has also provided additional nurse support to the diabetic patients with the greatest health needs.

The Old School Medical Centre Sheffield is a 3.0 FTE practice servicing 4750 patients in suburban Sheffield. The diabetic register comprises 234 patients managed under the NHS Quality and Outcomes Framework. The Old School Medical Centre created diabetic registers and offered structured diabetic care in advance of the introduction of the new GMS Contract in April 2003. As part of this change, diabetic care became part of the Quality and Outcomes Framework payment by results system. The practice achieved 100% of the specified targets from the inception of the new process and also following the amendments of 2005. Clinical intervention is supported by the Population Manager software programme of Egton Medical Information Systems Ltd (EMIS).

Background

There is a worldwide epidemic of type 2 diabetes.[4] The adverse effects on the quality of life of individual patients collectively results in a progressive increase in the national socioeconomic burden. Efforts to reduce diabetic complications will have an impact on both the lives of these patients and this expenditure.

New Zealand and the United Kingdom have developed different models for the management of Long Term Conditions. These models are the Continuum of Well Being and Disease[5] in NZ and the NHS and Social Care Model[6] in the UK.

In New Zealand, the application of this model has included the introduction of population-based funding, supplemented by the Care Plus programme, which aims to provide additional financial support to patients with long-term conditions and increased health care needs. In the UK, the NHS Plan has been implemented through the National Service Frameworks (NSFs) and more recently the Quality and Outcomes Framework (QOF).

Integrated care programmes seem to have positive effects on the quality of care provided in chronic disease management programmes,[7,8] although different definitions have been used for patient management.[9] Several of these approaches are used to provide effective care for diabetic patients.[10,11,12,13]

In both countries the chronic disease management models use a structured and systematic approach and have similar aims.[14] These include early detection, control of the disease process to reduce complications, and clinical interventions based on current evidence that the patient's quality or duration of life is improved.[15] Other similarities are that clinical information systems support decision making and data collection and also the premise that through attention to process, intermediate indicators will be improved.

The intermediate indicators generally adopted may be summarised by the American Diabetic Society acronym 'ABC'; HbA1c, blood pressure and cholesterol respectively.[16] Recent evidence supports the use of these benchmarks on the basis that improvements in each are expected to improve outcomes in the diabetic population.

There is, as yet, no direct evidence for the effectiveness of disease management programmes. This may be due to poor control of risk factors and under treatment.[17,18]

The UK system differs from NZ because it relies on defined targets for these indicators linked to resource allocation. As a result, funding for diabetic care differs between NZ and the UK. In the UK, patients have free comprehensive care including unlimited primary care consultations and no prescription charges. Remuneration to primary care organisations is partially determined by the outcomes achieved within the QOF Framework as a form of 'payment by results'.

In NZ, the Care Plus programme provides a package of care that includes four subsidised clinical practitioner visits per year. Those not included in the Care Plus programme are liable to a standard nurse or doctor consultation fee. In addition, all diabetic patients are eligible for a free annual diabetic review under the Ministry of Health's *'Get Checked'* initiative. Medication costs for essential diabetic drugs are subsidised in NZ, but the patient still pays a $3.00 prescription charge for most items. There is no consistent application of the Care Plus Programme across New Zealand, though the Masterton practice was an early adopter of the Care Plus programme and approximately two-thirds of the patients were enrolled between 2004 and 2007.

In both practices, each patient is offered a structured review and educational support for self-management. These interventions have been shown to improve outcomes,[19,20] reducing long-term complications, particularly the cardiovascular risk associated with smoking, hypertension and hyperlipidaemia.[21] Both practices provided this as a minimum requirement with annual multi-factorial screening coordinated through specialist practice nurses and extra consultations as required. Clinical, as well as specific retinopathy, podiatry, dietary and pharmacotherapy assessments are an essential part of this process.

Decision support systems have been shown to improve intervention levels in primary care of diabetic patients.[22] Recent developments in desktop technology have included

daily audit and real-time consultation prompts for the primary care team. Computerised registers, data recording and recall systems have greatly improved the organisation of structured care. In addition, data analysis has enabled evidence-based guidelines to be developed for interventions in diabetic care, which also provides decision support to the clinician. The guidelines followed by both practices for the management of diabetic patients were similar.

Historically, hyperglycaemia has been a primary target for intervention, with the associated features of obesity, hypertension, dyslipidaemia and hypercoagulability receiving less attention. Recent evidence has altered this approach.[23] The recognition that cardiovascular disease is the leading cause of morbidity and mortality in diabetes has redirected the emphasis towards intervention against cardiovascular risk factors.[24] Based on recent estimates, diabetic dyslipidaemia and hypertension may affect over 70% of patients.[25,26]

In the UK Prospective Diabetes Study,[27] tight blood pressure control significantly reduced all diabetes related end-points, including stroke and death as well as a composite of microvascular outcomes.[28] Cardiovascular risk is further reduced in type 2 diabetes by the simple intervention of HMG CoA reductase inhibitor (statin) prescribing.[29] By contrast, efforts to lower blood glucose are more complex and less rewarding.

Despite these reservations, maintaining satisfactory blood glucose levels in type 1 and 2 diabetic patients has been shown to reduce microvascular complications[30,31] though the use of intensive therapy to lower HbA1c levels appears to reduce cardiovascular complications only in type 1 diabetic patients.[32] Surprisingly, when preventing diabetes related endpoints and death, the relative benefit from tight blood pressure control is greater than that derived from tight blood glucose control.[33,34]

In managing both blood pressure and blood sugars, both countries use similar generic medications. There are minor differences in the agents used, as indicated in Table 1. In practice, many clinicians adopt a policy of prescribing by class effect based on patient tolerance. There is some evidence for this approach with regard to the common classes of medication used in diabetes including: angiotensin converting enzyme inhibitors, calcium antagonists and statins.[35]

The IT tool, CDEvolution, was configured to facilitate data acquisition and analysis in NZ comparable to that provided by EMIS in the UK. The previous 15 months period was compared. Data were analysed at a single point in time using the relevant computer system. Additional comparisons were made using the CDEvolution data to evaluate the introduction of Care Plus and compare access to process and intermediate outcomes by ethnic group.

Table 1

Pharmaceutical	Masterton Practice	Sheffield Practice
Angiotensin converting enzyme inhibitor	Enalapril, Quinapril, Cilazapril	Ramipril, Enalapril, Lisinopril, Perindopril
Calcium antagonist	Felodipine,amlodipine, nifedipine	Amlodipine, felodipine
Thiazide diuretic	Bendrofluazide	Bendroflumethiazide
Beta-blocker	Metoprolol	Atenolol
Alpha-blocker	Doxazosin	Doxazosin
Statin	Simvastatin 20mg, atorvastatin	Simvastatin 40mg, atorvastatin
Biguanide	Metformin	Metformin
Sulphonylurea	Gliclazide	Gliclazide
Anti-platelet	Aspirin 100mg	Aspirin 75mg

Results

Both practices have 4–5% prevalence for diabetes mellitus. However, ethnic differences and deprivation affected more of the New Zealand patients. The absolute numbers on the patient registers were comparable and rates of compliance with regard to annual review attendance were approaching 100% for the preceding 15 months. These reviews were the main source for data entered into the respective IT systems.

The QOF blood pressure audit standard of 145/85 was achieved in over 80% of the diabetic patients in both countries. However, more UK patients were treated to the standards recommended for cholesterol of 5.0 mmol/l or less and blood glucose control represented by an HbA1c of 7.4 or less.

The Masterton practice results are comparable with those published for England based on national QOF data to 2006.[36]

There was no difference in the microalbuminuria screening rates or the number treated according to guidance.

More detailed analysis of the NZ patients allowed a comparison of care standards between Maori and Pakeha (European descent) patients. No significant difference in outcome measures was identified for each of the audit standards. The average age of diabetic Maori was almost six years younger than for the Pakeha population and the average BMI index was 5.5kg/m^2 greater in the Maori.

DM and number refer to the specific indicator in the Quality and Outcomes Framework versions 2003 and 2005.

The total population contains a small number of patients from the Indian Subcontinent, South East Asia and the Pacific Islands.

Discussion

Different models of care in different countries are capable of providing diabetic care to high standards, as evidenced by the achievement of performance targets in excess of the UK National audit standards for primary care. The higher Quality and Outcomes targets were exceeded by both the Masterton and Sheffield practices for the indicators for systolic blood pressure, cholesterol, glycaemic control and microalbuminuria and proteinuria testing and treatment.

The English experience suggests a progressive national improvement in these indicators between 2004/5 and 2005/6. Direct measurement, feedback and reporting through clinical and decision support programmes, despite different practice computer systems, contributes to this process. The overall outcome is more positive than that suggested by recent authors.37 The results for the Sheffield practice suggest that the proportion treated to target is potentially much higher than the 20-40% shortfall suggested as a whole.

The work of The Doctors Masterton demonstrates that adopting a systematic approach to diabetic care in the New Zealand health care system provides similar process and intermediate care outcomes to those in England three years after the introduction of the QOF component of the nGMS Contract. Careful application of the Care Plus model provided comparable results across the Maori and Pakeha groups irrespective of deprivation. The approach adopted in Masterton involved an adaptation of this programme based on the NHS model and using the available Care

Table 2. Prevalence of Diabetic Patients by Practice

Prevalence of Diabetic Patients by Practice	
Masterton	4.1%
Sheffield	4.9%

Table 3

		Masterton %	Sheffield %	England 2006 QOF %	QOF target %
DM1	Register of patients with diabetes mellitus	257	234		
DM	Percentage of patients with diabetes as current smoker	17	8		
DM5	Percentage with a record of HbA1c in previous 15 months	99	100	97	90
DM6	Percentage in whom last HbA1c 7.4 or less in previous 15 months	59	81	62	50
DM7	Percentage in whom last HbA1c 10 or less in previous 15 months	90	100		85
DM11	Percentage with a record of blood pressure in previous 15 months	100	100	98	90
DM12	Percentage in whom last blood pressure 145/85 or less	80	86	75	55
DM13	Percentage with a record of microalbuminuria testing in previous 15 months	99	95	83	90
DM15	Percentage of patients with proteinuria or microalbuminuria treated with ACE inhibitors or A2 antagonists	94	94	86	70
DM16	Percentage with a record of total cholesterol in previous 15 months	98	100	90	90
DM17	Percentage with last total cholesterol 5mmol/l or less	62	90	60	60

Plus funding. In NZ, this subsidised model of care does not have universal application and therefore national data for NZ is not available.

Therapeutic intervention guidelines were similar and the agents used in both countries were from similar therapeutic groups. Use of a higher statin dose in the UK may account for the higher percentage treated to a cholesterol level of 5 mmol/l or less.

The results indicate that multi-factorial intervention is achievable and that potentially over 80% of patients may reach individual targets. Payment for the results of systematic and structured inventions is effective in achieving intermediate indicators at levels in excess of those generally expected on the basis of routine care.

National strategies to fund diabetic care represent one of the most significant differences between NZ and the UK. In the UK there is no direct cost to the patient. The primary care organization is funded both by capitation and through the achievement of clinical target indicators through the Quality and Outcomes Framework. In NZ, funding is variable with some primary care organization and some patient funded components. Despite subsidised prescription costs for approved medications, a basic prescription charge remains for each item and many patients with diabetes require poly-pharmacy if the evidence-based targets that reduce microvascular and macrovascular risk are to be achieved.

Table 4. Deprivation of Diabetic Patients by Practice

Deprivation of Diabetic Patients by Practice	
Masterton Total Population (deprivation quintile 5)	18.4%
Sheffield Total Population	<5.0%
Masterton Diabetic Population	28.2%

Table 5. Ethnicity of Masterton Diabetic Patients

	Maori	Pakeha	Other
Masterton Total Population	19.4%	69.6%	11.0%
Masterton Diabetic Population	23.9%	62.7%	13.4%

The results indicate that multi-factorial intervention is achievable and that potentially over 80% of patients may reach individual targets

The costs of both systems of care seem comparable assuming that all QOF targets are exceeded as they are in these practices. The QOF achievement would have realized NZ$35,000 at current exchange rates and the 'Care Plus' and annual 'Get Checked' remuneration is estimated to be similar. As the funding is comparable, it is possible that the structure of this funding requiring 'payment by results' is assisting the UK patients to achieve outcomes of care that are closer to the optimal standard.

Aside from the effect of the UK target-driven approach, other obstacles seem to be affecting the outcomes of care for these high risk patients. There are limits placed on the numbers enrolled in the Care Plus programme, and an inflexible approach to the use of these funds. Another factor may be the modest prescription charge, which may discourage the most deprived from compliance with risk reduction treatments.

Conclusions and Implications

Different models have been adopted in different countries with respect to diabetic care. New Zealand and the UK adopt similar care standards, guidelines, multi-disciplinary care processes, patient education programmes and use a similar range of generic medication.

The adoption of different models of multi-factorial and systematic intervention based on the achievement of the ABC intermediate performance indicators is capable of improving process measures and clinical targets.

The evidence base for these targets and the interventions required to achieve them suggests an improvement in individual patient outcomes applied to whole populations is to be expected. This should provide the individual with the best prospect of avoiding the complications of the disease.

Despite the different approaches to funding with partially subsidized care in NZ and fully funded care in the UK, similar results for the intermediate indicators using the ABC system are achievable.

Table 6. Masterton Ethnicity data

Results	Age	Systolic BP	Cholesterol	HbA1c	Smoker	BMI	Care +
	Yrs	mmHg	mmol/l	%	Current	Wt/ht2	%
Total	61.6	132	4.96	7.51	17.5	31.9	
Maori	57.0	128	4.85	7.56	34.9	36.2	62.5
Pakeha	62.9	132	4.94	7.41	13.0	30.7	66.2

A payment by results model has the potential to increase the values for these performance indicators.

Minor adjustments to the structure of funding without a need for significant additional funding would permit a programme of comprehensive diabetic care to be implemented in NZ.

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Competing interests

Kevin Preston and David Nixon are Directors of Primary Care IT Solutions Ltd that owns CD Evolution CVD risk assessment tool and Chronic Disease Management System. Andrew Brown has no competing interests to declare.

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