

Reducing length of stay and improving quality of care for inpatients with diabetesPrincipal investigator: **Dr Paul Drury**Host: **Auckland District Health Board Charitable Trust****Investigators:**

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Background as submitted (*references are those in original submission*)

Diabetes, largely type 2, is present in approximately 10 to 15% of patients admitted to hospital in New Zealand (NZ) ascertained using coding data - with similar findings in several DHBs (1-3). Around 15-20% of people with diabetes (PWD) are admitted to hospital each year with Maori and Pacific people being over-represented by 20-50% (1,3). Many of these patients are elderly, have multiple co-morbidities and are on many drugs. Much international data from the US, Europe and UK indicates a prolonged LoS in PWD by up to 60%, and thus a marked increase in cost per admission compared with non-diabetic patients (4-10) - the cost for Counties Manukau DHB alone was estimated at an additional \$66 million for 2007 (1). Recent NZ data shown below indicates a doubled length of stay (approximately +100%) throughout the country. Part, but far from all of this, relates to age and case complexity (4,8)

Length of stay (days) ADHB Funding & Planning	Diabetes coded			No diabetes coded		
	Mean	Median	Mode	Mean	Median	Mode
All NZ	6	3	0	3	1	0
Auckland DHB	6	3	0	3	1	0
Lakes	5	3	0	3	1	0
Mid Central	7	4	0	3	1	0

Rates of admission has been rising over the past 10 years, also for diabetic ketoacidosis in type 1 diabetes in NZ and are likely to continue to do so (1,9,10), though recent changes in Australasian coding methodology may obscure this. While American models of care have concentrated on improved glycaemic control as a clinical intervention (11-13), British studies have examined models of care, often demonstrating an apparent reduction in LoS when dedicated inpatient nurses are employed (14-17). There are widespread reports of poor satisfaction from patient lay organisations (18,19) so that inpatient care is now the focus of a major UK initiative in diabetes ('Think Glucose').

Comment

More recent data has confirmed these trends, and we now have national data which will allow in-depth analysis of these trends over time and in all DHBs – we are grateful to the Ministry for their help in data access. While concentrating on the individual centre data we have not yet analysed the national data in detail.

Project as performed

Three parallel prospective controlled studies examined three different process models of delivering inpatient care in Auckland, Lakes and Mid Central Health. Each ran over three consecutive periods:

- A baseline run-in phase (2 months)
- The intervention period (4 months)
- A return to baseline run-out phase (2 months)

Actual dates were as follows:

Control start	Tuesday 30 March	end Monday 31 May	2 months/9 weeks
Intervention start	Tuesday 1 June	end Monday 4 October	4 months/18 weeks
Control run-out start	Tuesday 5 October	end Monday 6 December	2 months/9 weeks

Data has also been collected from two additional non-intervention sites (Waikato & Wellington) to control for external/seasonal factors.

The **REACTIVE** model (Lakes) followed the current usual pattern of ward-initiated referrals with subsequent intervention as above but, for the intervention period, prioritised this activity above other routine tasks with little change in overall inpatient staffing.

The **PROACTIVE** intervention (Mid Central) employed daily (weekday) ward visits/phone calls and electronic notification seeking to identify PWD early during an admission. Nursing intervention was then promptly arranged to optimise care and minimise length of stay. This method used increased dedicated nurse inpatient staffing for the period of the study.

In the **ELECTRONIC** group (Auckland) all admissions of people with known diabetes from previous admission ICD-10 coding were notified by e-mail to the diabetes inpatient team. Central triaging then prioritised patients to arrange intervention as above where needed, but with no change in inpatient staffing.

Standardised data collection documentation and prioritisation scales were used at all sites, and regular team meetings held as proposed in the original submission.

Main Outcome Measures submitted

1. Time (in hours) from admission to diabetes input and diabetes input to discharge.
2. Changes in duration of total admission between intervention and run in/out periods
3. Nursing resource use measured per patients seen and per total bed numbers/diabetic bed numbers. Also for subsequent outpatient visits.
4. Readmission rates and achievement of intermediate outcomes (e.g. HbA1c, retinal screening, CV risk intervention) on follow-up up to 3 months.
5. Patient and staff satisfaction and care surveys performed during each of three periods

Additionally in collaboration with the Ministry of Health (MoH), we are determining admission rates for coded diabetes for all 20 DHBs from the National Minimum Data Set, and match these with those people identified by existing MoH algorithms as having diabetes. Given the reasonably accurate estimates now available of PWD in New Zealand, this will give an indication of both the inpatient referral rates, accuracy of coding and/or rate of new diabetes diagnoses. It will also demonstrate any discrepancies between DHBs for both these variables and LoS for different ages, ethnicities and groups of primary diagnoses, and potentially allow derivation of a profile of patients at high risk of admission/readmission.

The study is deliberately not about simply adding staff resources, though its results and national trends might well require that. It is about 'working smarter', not just working harder.

Maori patients are over-represented among PWD and those admitted to hospital. While the intervention is system-wide rather than individual we are consulting with Maori advisors in each DHB to ensure the satisfaction and care survey is sensitive to Maori healthcare beliefs and can identify barriers to optimal care. We are also analysing the data by ethnicity and deprivation.

Analysis

The data collection at patient level was completed on 6 December and all data was with the statistician by Christmas. Data cleaning was completed in January, but we were unable to access the 3 DHBs discharge data until March as not all patients had been discharged and coding was not complete. We have also taken some time to perfect the data query required, which was not identical due to the different DHB IT systems used (Our thanks to Steffi Richter of ADHB in particular).

We now have the data from Waikato and Wellington, and have recently run the DHB admitted patients against the MoH 'Virtual Diabetes Register' to allow comparison of diagnosed vs coded diabetes. Analysis of readmission rates obviously cannot take place for some time to come.

Headline results are:

The **REACTIVE** intervention produced no significant change in time to ward visit or length of stay.

The **PROACTIVE** method led to an approximate doubling in the number of patients seen but no significant changes in time to ward visit or length of stay.

The **ELECTRONIC** method led to a 35% increase in patients seen, a >50% reduction in time to ward visit (3.9 to 1.8 days; $p < 0.001$) and an apparent 30% reduction in length of stay (8.6 to 5.9 days; $p < 0.005$). Part of the LoS change could potentially be an artefact caused by earlier visits and we are performing further analyses to address this.

We can already conclude from overall data and analyses undertaken so far:

- Diabetes in patients admitted to hospital is even more common than recognised previously
- The 'virtual diabetes register' is far more complete, sensitive and accurate than previous admission coding for diabetes
- There is a major unmet need for inpatient advice, at least in Mid-Central and Auckland. The interventions were perceived as excellent but unsustainable by the nursing teams.
- Diabetes is associated (but not necessarily causative) with increased length of stay
- Delay in initial referral to diabetes teams is potentially a major cause of delay in discharge
- Simple prioritisation of inpatient work is ineffective
- Automated referral methods, without waiting for manual referrals, are effective in reducing delays in seeing patients and may prove effective in reducing length of stay.

The questionnaires were not generally successful; patients were generally too unwell to complete them and, especially in Auckland, many did not have adequate English language skills.

Three abstracts have thus far been submitted - two accepted for presentation at NZSSD in early May and one awaiting a decision for EASD. These are attached. Once further analysis is completed we will be presenting the work to our DHBs and to the MoH. A full paper is in the course of preparation

We have considerably underestimated the time required for analysis, which will continue for many months to come, and we anticipate having significant further findings.