PREVENTING AND MANAGING CHRONIC KIDNEY DISEASE

A REVIEW OF BEST PRACTICE

Evidence Review for MidCentral District Health Board

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1. ACKNOWLEDGMENTS

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2. BACKGROUND

2.1 INTRODUCTION

MidCentral District Health Board has engaged Synergia Ltd to develop a model of renal service demand, to plan services across the spectrum of primary and secondary care. This review of international thinking in best practice for renal services provides a platform for developing scenarios for future renal services.

The evidence from the international literature supports a system-wide approach that integrates renal services with other services across the spectrum of prevention, management, treatment and palliative care. Such an approach places CKD within a continuum of care that tackles its causes, better manages prevalence, and in the long term reduces incidence.

Consistent with this approach, Levin (2006) suggests a definition for optimal care of CKD and its complications and co-morbidities, which provides a useful starting point for framing best practice thinking:

> Optimal care is care that leads to desired outcomes. Optimal care of kidney disease patients is therefore care which, when implemented reliably, is associated with delay of progression of CKD; delay of time to dialysis/transplantation; evidence of pre-emptive transplantation in eligible individuals; delay of progression of CVD; and reduction in mortality, irrespective of renal replacement therapy (1).

Chen et al (2006) identify 4 key strands of activity for optimising disease management for patients with CKD:

- slowing the progression of CKD,
- identifying and managing the complications of CKD,
- identifying and managing associated comorbid conditions, and
- smoothing the transition to renal replacement therapy (RRT) (2).

The report opens with a description of the provision of renal services in New Zealand, followed by an exploration of trends and projections in demand, which will be tested and developed further within the modelling effort and their potential costs. The review then explores recommended best practice in the four areas listed above. The report then turns to examine multidisciplinary collaboration as an enabler for improved renal service delivery, and concludes with a brief discussion of opportunities for CKD prevention, looking beyond the health services sector and linking with health promotion strategies.

2.2 METHODOLOGY

Sources for this review were identified using Medline searches with keywords such as kidney disease, screening, primary care, and disease management. Because of the time limitations in preparing this review, the focus was generally restricted to evidence-based reviews rather than an exhaustive trawl of individual studies. From these identified sources, further published articles were followed up. Also included in the review were internationally sourced guidelines, such as K/DOQI in the United States, and CARI in Australasia, as well as service frameworks and planning documents such as those emerging from the NHS in Britain and regionally in New Zealand. This work also draws on work undertaken by the author for the National Renal Advisory Board in developing a scoping paper on strategic issues facing the renal sector in New Zealand.

Interviews with two senior staff at the MidCentral renal unit provided a local context to assess the degree to which international best practice is being implemented and the constraints on achieving this.

Renal data for New Zealand and the MidCentral district were obtained from ANZDATA and regional dialysis projections undertaken by Paul Greatorex at Midcentral DHB.

3. RENAL SERVICES IN NEW ZEALAND

3.1 GROWTH IN RENAL SERVICE PROVISION

Renal services comprise a relatively small but steadily growing and expensive area of the health sector. Over the decade from 1995 to 2004, the number of renal dialysis patients (per million population) in New Zealand grew by 7.2 percent per annum on average, while the number of people with functioning transplants grew by only 3.9 percent. The number of transplants performed in New Zealand remained constant at approximately 28 per million per year from 1998 to 2003, declining to 26 in 2004 (3, 4).

The key drivers of the growth in dialysis patient numbers are an increasing incidence of CKD either presenting or being referred for dialysis, as a result of:

- Improved survival (especially cardiovascular) of the general population
- Type II diabetes epidemic
- Greater acceptance of and demand for dialysis services from Maori and Pacific Island peoples
- Greater acceptance of and demand for dialysis services from elderly patients
- Greater expectation for dialysis services from the medically frail, who previously would either not have been offered, or would not have taken up an offer of dialysis.

CKD is divided into five stages, which are defined by the level of kidney function or glomerular filtration rate (GFR) (5, 6). These are

- Stage 1: Kidney damage (pathological abnormalities or markers of damage including abnormalities in blood or urine tests or in imaging studies) with normal or raised glomerular filtration rate (≥90 mL per min per 1·73 m^2)
- Stage 2: Glomerular filtration rate 60–89 mL per min per 1·73 m^2 with evidence of kidney damage
- Stage 3: Glomerular filtration rate 30–59 mL per min per 1·73 m^2
- Stage 4: Glomerular filtration rate 15–29 mL per min per 1·73 m^2
- Stage 5: End-stage renal failure; glomerular filtration rate <15 mL per min per 1·73 m^2

The GFR scale represents steadily decreasing levels of kidney function. Chronic kidney disease is defined as either kidney damage for three or more months or GFR<60mls/min/1.73m^2 (for the latter, CKD 3 and above) (5). CKD 4 represents advanced kidney disease not requiring dialysis, and CKD 5 represents ESKD, most of whom require dialysis or transplantation.

At present, there are no reliable prevalence estimates of the number of people in New Zealand with chronic kidney disease. US data from K/DOQI indicates CKD affects 11 percent of the national population. Applying these data to the New Zealand population (recognising the problems with such an extrapolation, given their different population profiles) would suggest the following levels of CKD prevalence at stages 3 to 5:

- CKD 3 with GFR 30-59mls/min - 178,000
- CKD 4 with GFR 15-29mls/min - 8300
- CKD5 with <15 mls/min or RRT – 4200 (Collins J, pers comm)

In New Zealand, there were 3,093 (755 per million) receiving renal replacement therapy (RRT) as at 31 December 2005.[*] Of these, 1,239 (302 per million) had a functioning kidney transplant[†], and 1,770 (452 per million) received dialysis treatment. Within New Zealand, 436 patients (106 per million) commenced RRT in 2005. Among those receiving dialysis treatments in 2005, 34 percent were Maori and 19 percent were Pacific peoples (7).

In Palmerston North, there has been a strong growth in demand for incentre haemodialysis services in recent years, rising from 35 patients in 2004 to 55 in 2006. This compares to growth in home haemodialysis and peritoneal dialysis of only 4 patients each over the same period (Paul Greatorex, personal communication).

4. SLOWING PROGRESSION OF CHRONIC KIDNEY DISEASE

The international literature points to three key strategies for slowing CKD progression in its early stages:

- Early detection
- Screening of high-risk populations
- Management by primary care in earlier stages

These are discussed in turn. This section also briefly discusses conservative management of CKD, often referred to as palliative care, which has relevance to this area of activity.

4.1 EARLY DETECTION

A key barrier to managing CKD is identifying patients with CKD. CKD has been described as an 'insidious' condition, with the majority of patients relatively asymptomatic in the early stages of the disease (2). Chronic kidney disease is also often accompanied by co-morbidities such as diabetes and hypertension, which are themselves risk factors for CKD. Despite these easily identified risk groups for CKD, screening is not routinely carried out. This frequently has the consequence of late detection of CKD and late referral to nephrology services (1).

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[*] RRT includes haemodialysis, peritoneal dialysis and transplantation.

[†] Note that those with functioning transplants move from CKD 5 category to CKD 2 or 3, as a direct result of their improved kidney function.

Levin (2000) describes early identification of CKD as the 'cornerstone' of optimal care. The key means to achieve this is through reporting of GFR to physicians. Measuring GFR was until recently an intensive process, but the eGFR test provides an estimate of GFR, using a combination of simple serum biochemistry results and demographic factors. GFR testing enables informed doctors in primary and secondary care to determine what treatments are required to delay progression of renal disease and when referral to a renal unit is required. The eGFR has been proven to be a more accurate measure of kidney function than the standard serum creatinine and can be used to both diagnose and stage the severity of CKD (8). It is noted however that eGFR is only an estimate of GFR, and has limitations. It has alerted doctors to the presence of kidney disease and its severity, and in that sense is an important step forward. Its precision however is only average and some people who have no active kidney disease can be classified inappropriately as having moderate CKD, while others have eGFR calculated where it should not have occurred (Collins, pers comm.).

4.2 SCREENING OF HIGH RISK POPULATIONS

Screening in primary care can be an effective means of identifying the presence of disease in an individual. There is currently no systematic screening of the New Zealand population for kidney disease.

The cost-effectiveness of population vs targeted screening for CKD is a matter of some debate. In cardiovascular disease, population screening is likely to be more effective than targeted approaches because most cases are not derived from the high-risk 'tail'. However, for chronic kidney disease, the Kidney Disease Outcome Quality Initiative (K/DOQI) favours a approach based on targeted screening of at-risk individuals (9).

Within Levin's framework of optimal care, screening of high risk populations is an important strand of activity, targeting to persons with diabetes, CVD, those with a family history of kidney disease, and those from specific ethnic groups (1). More systematic targeted screening of high-risk patients through primary care has the potential to identify a greater number of patients with kidney disease, and to treat these people at an earlier stage, preventing or delaying the need for intensive treatments.

4.3 MANAGEMENT BY PRIMARY CARE IN EARLIER STAGES

Critical to delaying progression from early stages of CKD to dialysis is management in the earlier phases by primary care, with the support of guidelines and involvement of secondary care physicians where appropriate. Chen et al suggest that it may only be feasible for patients with more advanced CKD (stages 3 and higher) to be seen by a

nephrologist. It is important therefore for primary care teams to take more responsibility than has been achieved to date for managing patients in the early stages of CKD (2).

An appropriately enabled and multidisciplinary primary care workforce should be able to deal with CKD in its earlier stages, supported by detailed guidance from secondary care or readily available information tools to support primary care management.

In taking this approach forward, Frankel et al (2005) argue that

> The challenge is for primary and secondary care to set up together the necessary systems to implement such a model. These systems may require novel approaches to commissioning and clarity with regard to clinical responsibility for the patients. As the patients move through this pathway, they will need to be managed according to guidelines, with targets for the control of blood pressure, diabetes, lipids, and smoking. This will have to be provided in a patient centred environment, which gives the patient a role and an incentive for achieving these goals. With optimum treatment cardiovascular complications can be reduced and patients can have the progression to end stage renal disease delayed by many years (10).

As indicated above, this would be assisted by more innovative approaches to primary/secondary consultation. Possible options in this area include:

- improved primary care education;
- greater ability of GPs to discuss issues with consultants, such as dedicated mobile phone for GP consultation held by nephrologist, and funded written or phone response by nephrologist to new referrals rather than the patient waiting on an FSA list (Collins, pers comm.)
- enhanced capacity of nurse specialists and general practitioners working across the interface with secondary care;
- guidelines for managing people in this pre-RRT stage through primary care; and
- enhanced support services.

Frankel et al's observation above also highlights the need for systems that link information in primary and secondary care. Typically, renal information in New Zealand is disparate and is not integrated into a single information system. Without an information infrastructure, it is impossible to track the progress of patients along the primary and secondary care pathways, and to ensure that they are receiving appropriate treatments. There is currently considerable variability in the quality of information systems to support this level of integrated care.

There are a range of strategies for managing CKD in primary care that the international evidence indicates is effective. Key strategies include aggressive management of blood pressure, use of ACE inhibitors, angiotensin receptor blockers,

and for diabetic patients, tight glucose control. The role of primary care in supporting preventive activities, including smoking cessation, improved nutrition weight reduction and physical activity are also important (8, 9, 11-14). Studies indicate that use of multiple interventions which slow the annual decline of GFR from 5.0 mL/min/1.73m^2 to 2.0 mL/min/1.73m^2 can theoretically add nearly 30 years of life off dialysis to a 25-year old patient with CKD (13).

The strongest evidence appears to centre around hypertension control, and use of angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARB). Evidence from trials using ACE inhibitors and ARBs show that it is possible to modify the outcome of patients with early kidney disease and slow the progression of CKD by a third to a half. It has also been shown that controlling blood pressure using ACE inhibitors in type 1 diabetics and non-diabetics, and ARB in type 2 diabetics can slow or regress the progression of microalbuminuria and/or proteinuria in these patients in addition to slowing down the rate of reduction of GFR (9, 12). More reliable use of simple and effective interventions such as these clearly have considerable potential to delay CKD progression.

Despite the evidence, it appears that ACE inhibitors are not prescribed to large numbers of patients who clearly would benefit from them (15). Blood pressure control in CKD is generally difficult to achieve in standard community care, with only an estimated 30% on average reaching guideline goals. There is excellent evidence that optimal blood pressure control has the greatest impact on delaying progression. Many patients, particularly people with diabetes require more than three anti-hypertensive meds in addition to salt restriction. The latter is generally poorly managed. All of this points to the need for more intensive and effective ways being needed to control blood pressure (Collins, pers comm.).

A US-based study found a relatively low awareness and update of guidelines for CKD management in primary care (8). The study also identified an educational need to present the key elements of these guidelines into a format to allow primary care teams to incorporate them into their daily practice. These findings also have applicability to the New Zealand situation. In discussions with senior staff in the renal unit at MidCentral DHB, it is apparent that the local primary care workforce was not properly enabled and was unsure how to manage people in early stages of CKD. Although GPs are now routinely receiving the eGFR test results, they are not equipped to deal with the information appropriately. The result is a tendency to refer to the renal unit at early stages, yet the renal unit is already over-stretched and currently only able to deal with people in CKD 5. The pending appointment of an anaemia coordinating nurse, to identify anaemic patients and liaise with primary care, was seen as an important step to improve knowledge and practice within primary care. Comments from peer review of this report indicate that while laudable, the appointment of an anaemia nurse should not detract from the importance of controlling blood pressure which is the only intervention consistently shown to reduce

cardiovascular events, reduce progression to dialysis and improve survival (Collins, pers comm.).

Table 1 below lists a range of interventions to slow CKD progression, drawn from a review undertaken by Nahas and Bello (2005) (9).

Table 1: Interventions and objectives to slow the progression of CKD

Blood-pressure control For blood pressure <130–135/80–85 mm Hg (mean arterial pressure 92 mm Hg), if proteinuria <1 g in 24 h For blood pressure <125/75 mm Hg (mean arterial pressure 90 mm Hg), if proteinuria >1 g in 24 h Initially with an ACE inhibitor • Add salt restriction/diuretic to maximise the effect of the ACE inhibitor • Add: angiotensin-2-receptor blocker; or non-dihydropyridine calcium-channel blocker, because they are more effective in reducing proteinuria than dihydropyridine calcium-channel blockers; or ß or α blocker **Proteinuria** <1 g in 24 h — use an ACE inhibitor or angiotensin-2-receptor blocker alone or in combination; titrate to control proteinuria even if blood-pressure target is achieved **Blood-glucose control in diabetes mellitus** Haemoglobin A1c 7–8% **Dyslipidaemia** Total cholesterol <5·17 mmol/L, LDL cholesterol <3·10 mmol/L: use a statin **Smoking** No cigarette smoking

5. IDENTIFYING AND MANAGING THE COMPLICATIONS OF CKD AND ASSOCIATED CO-MORBIDITIES

The significance of CKD is not only the impact in and of itself, but also its co-location with other diseases. Where CKD is present alongside other diseases, such as cardiovascular disease, there is a multiplier (rather than additive) effect of premature mortality. Patients with CKD often have many co-morbidities and their care can require intermittent expert input and careful co-ordination

Once patients have reached stage 3 CKD, coordinating the management of complications of CKD (such as anaemia and bone disease) and comorbid conditions (such as diabetes, cardiovascular disease) becomes increasingly important on top of strategies to slow its progression (2). Proactive management of hypertension among people at this stage of CKD is critical, which can improve and even regress left ventricular hypertrophy, improve congestive heart failure and decrease

hospitalization rates (2). It should be noted that most patients with CKD 3 will not live to need dialysis. Reduced GFR and albuminuria are two of the most potent cardiovascular risk factors (in some studies predicting a higher cardiovascular event rate than known coronary heart disease); the emphasis on managing these patients is rightly focused on managing all cardiovascular risk factors as well as delaying progression (Collins, pers comm.).

This stage of CKD does not necessarily mean that the patient needs to transfer entirely from primary care to secondary care. Thorp et al (2006) propose that CKD-specific complications tend to occur later in the course of disease and may be best treated by a nephrologist, while CKD-related complications may be most easily treated by primary care physicians. Critical however to dealing with both however is the need to coordinate patient care across the various disciplines (15).

Management of hypertension, diabetes, lipids, and obesity may best be managed in primary care following guidelines or information tools, and with support from secondary care teams. Anaemia, bone disease, and dialysis access management could best be overseen by nephrologists, also with appropriate support and assistance. Secondary care can then focus on CKD-related issues such as anaemia, bone disease, and preparation for renal replacement therapy. Thorp et al argue that by focusing on early intervention and collaboration between primary care and nephrologists, a decrease in the incidence of ESRD may prove possible (15).

Drawing on the work by Thorp et al, Table 2 below indicates how the different elements of treatment of CKD co-morbidities and complications can be managed by primary care and nephrology respectively.

The international literature indicates that providing appropriate treatment to people with CKD at stages 3 and 4 can slow the progression of disease. Models that factor slowing progression show considerable potential savings to the healthcare system (2)[‡].

[‡] Using US data, such scenarios among patients with CKD 3 signalled potential savings to the US health care system of up to $US 60 billion, if progression is slowed by 30% (2).

Table 2: Chronic Kidney Disease 'Division of Labour' [needs SI values]

Primary care	Nephrology
Hypertension • BP < 130/80 • ACEI/ARB as first line therapy Hyperlipidemia • Total cholesterol < 5.2 mmol/L • LDL cholesterol < 2.6 mmol/L Diabetes • HbA1C < 7.0% Obesity management • BMI < 35 Smoking cessation	Medication oversight • Renal dosing of medications • ACEI/ARB for all CKD patients Anaemia • Workup of anaemia • Erythropoietin management to keep Hct at 32–36 Bone disease • Replete 25 OH vitamin D • Monitor PTH, phosphorous, calcium, vitamin D • Manage phosphate binders Ca x Phos < 4.0 Treat sHPT PTH < 20 pmol/L Early dialysis education Dialysis access > 50% fistula placement as initial access
BP, blood pressure; ACEI/ARB, angiotensin converting enzyme inhibitor/angiotension receptor blocker; CKD, chronic kidney disease; LDL, low-density lipoprotein; Hct, hematocrit; PTH, parathyroid hormone; sHPT, secondary hyperparathyroidism; BMI, Body Mass Index.	

Source: Thorp et al (2006)

Discussions with the Steering Group overseeing this initiative at MidCentral DHB indicate that there are challenges to making a shift towards greater involvement of primary care, such as difficulties with the use of ACE inhibitors and angiotensin receptor blockers in treating kidney failure, and avoidance of potential nephrotoxins. For such a transition to primary care to be successful, GPs require electronic information tools and/or guidelines for primary care management of CKD (consistent with, and building on, existing guidelines for type II diabetes and cardiovascular disease).

At the time of writing, a key barrier identified by staff at MidCentral DHB was the shortage of nephrologists to enable such cross-disciplinary activity. With only one nephrologist in place, the renal unit is unable to perform first specialist assessments (FSA) for anyone except more urgent cases of people with GFR of 15 (for people with diabetes), or GFR of 10 (people without diabetes). It was recognised this was well short of the ideal scenario of people receiving FSA when they have a GFR of 30, which would enable a two-year education and planning horizon for dialysis treatment. The forthcoming appointment of a second nephrologist in March would ease this pressure, but a third nephrologist was also seen as necessary. Although it was recognised that many patients could be managed by a pre-dialysis nurse providing dialysis education and patient monitoring, the existing nurse in place was already over-burdened with a large patient workload. The extent to which other options for

use of nurses within the renal team were under consideration was not discussed at these initial interviews.

6. SMOOTHING THE TRANSITION TO RENAL REPLACEMENT THERAPY

6.1 TIMELY SPECIALIST REFERRAL

The international evidence indicates that early and regular nephrology specialist care in the predialytic phase of CKD is associated with decreased morbidity, decreased short-term mortality, improved long-term survival on dialysis, and decreased costs. Despite this evidence, the epidemiological data from many countries indicates that late referral has not decreased in recent years. There is no barrier to referral to nephrology specialist care in most countries, suggesting that the problem signals a widespread lack of awareness of the potential benefits of early and regular management of CKD (14).

The New Zealand experience appears to mirror the international situation. Secondary services are frequently stretched to absorb a substantial number of people who are referred with advanced kidney disease. In 2004, 22 percent of New Zealand patients starting dialysis were first referred to a renal service within 3 months of the start of dialysis, many more within a year of commencing dialysis (4). This is too late for implementing strategies to delay commencement of dialysis, and to appropriately assess and prepare the patient and their families for therapy. Late referrals are strongly associated with greater co-morbidity, longer initial hospitalisation and higher mortality, as well as higher costs to the health system. Late referral also limits treatment options, which in turn can have consequences for long-term outcomes once patients are on dialysis. (16).

The situation in MidCentral appears similarly problematic. A key problem raised by staff at the renal unit was the frequent late referral of patients with ESRF, particularly from the Wanganui district. This could also reflect the current constraints at MidCentral where people are generally unable to be accepted until they are approaching this acute phase.

The NHS service framework for renal services recommends

- Referral to a multi-skilled renal team, where possible at least one year before the anticipated start of dialysis treatment, for appropriate clinical and psychological preparation. This principle should also be followed for people with a failing transplant.

- Accelerated process with intensive input from the renal team for those who present late to renal units or as acute uraemic emergencies.
- People with ERF given information about all forms of treatment so that an informed choice can be made.
- Patients put on the national transplant list within six months of their anticipated dialysis start date if clinically appropriate.
- Anaemia treated to maintain an adequate haemoglobin level (17).

The Australasian CARI guidelines recommend that patients and their families or carers should receive sufficient information and education regarding the nature of ESRF, and the options for the treatment to allow them to make an informed decision about the management of their ESRF. Available information indicates that these clinics and education programmes can assist with the improved medical care of patients (for example, better control of anaemia and hypertension), greater patient involvement in the selection of the mode of dialysis, a reduction in the need for 'urgent start' dialysis, and improved short-term survival and quality of life after the initiation of dialysis (18).

6.2 TIMELY SURGICAL PLACEMENT

As indicated above, sufficient time is needed to allow for vascular surgery. As a marker of best practice, the NHS Service Framework for renal services identifies early referral for assessment and investigation for the best means of access to dialysis, to allow vascular surgery at least six months prior to haemodialysis and four weeks prior to peritoneal dialysis to enable patients to begin dialysis with their vascular or peritoneal dialysis access established and functioning (17). The Canadian Society of Nephrology guidelines recommend that at least 12 months are needed before initiation of dialysis for adequate preparation for RRT (16).

To support surgical placement, the NHS service framework further advises:

- Monitoring and early intervention to minimise complications of the access.
- Recording and regular auditing of the type of access in use at the start of dialysis, time from referral to surgery, and complication rates for each procedure. Temporary access replaced by permanent access as early as possible.
- Proper training for patients, carers and members of the renal team in the care of the access.

At MidCentral, two key blockages to timely vascular surgery are surgeons giving sufficient priority to such surgery, and delays in processing referrals for ultrasound prior to surgery. As a consequence, surgery times fall far short of ideal.

6.3 APPROPRIATE CHOICE OF MODALITIES

Whilst offering the full range of treatment modalities, New Zealand has among the highest proportions of ESRF patients treated with home dialysis (both PD and HD) in the world (19). This has emerged (or, in the New Zealand context, re-emerged in recent years) from a mixture of philosophical position favouring this form of treatment, evidence of better patient outcomes and quality of life, lower costs and greater cost-effectiveness of such treatments[§], particularly home haemodialysis (20-22). There is significant variation across New Zealand DHBs in the mix of dialysis modalities that are offered. These include application of home therapies and approaches to satellite care, reflecting different population needs and differences in how services have developed.

The National Renal Advisory Board advises that where dialysis is indicated, a continued focus on home/community or self care dialysis treatment is favoured, where patients have sufficient independence and where such services are available (23). Kidney transplantation is also a favoured treatment option, as it is clearly a cost-effective intervention delivering improved quality of life and life expectancy (22). However, the National Renal Advisory Board advises that not all patients can have a kidney transplant and not all dialysis patients can be treated in the community. Unfavourable community circumstances, lack of family support, other medical problems and complications of treatment, require that full care dependent haemodialysis facilities are available (23).

The CARI guidelines do not specifically recommend which dialysis modality should be used. They suggest however that the primary determinants of mode of initial dialysis include the preference of a fully-informed patient, absence of medical and surgical contraindications, and resource availability. When dialysis modality is not determined by preference of a fully-informed patient, absence of medical and surgical contraindications and resource availability, CARI suggest considering continuous ambulatory peritoneal dialysis (CAPD) in preference to haemodialysis to better preserve residual renal function and allow graded introduction of dialysis (18).

Lynn and Buttimore (2005), in reflecting on the New Zealand experiences of home haemodialysis, offer the following suggestions to underpin ongoing use of this form of treatment:

- Multidisciplinary teams comprising nephrologists, nurses and clinical technicians who are skilled in training patients for home dialysis and are certain of their roles;
- An approach based on patient autonomy and responsibility, and allowing flexible solutions for individual patients;

[§] For example, Cass et al's modelling of increasing home HD and PD would produce net savings in Australia of A$88.2 million for HD and A$135.4 million for PD (23).

- A dedicated surgeon for the provision of durable, patient-friendly vascular access;
- Training undertaken in an environment more like the home than in a hospital and geographically separate from hospital and in-centre dialysis units (21).

Directions established by the MidCentral renal unit, including multidisciplinary teams and establishing a self-care unit away from the main hospital building and dialysis unit, are consistent with the approach presented above.

Not all patients are clinically suitable for transplantation or dialysis treatment, or they may choose to live with their progressive disease, managing their kidney failure with the support of their family, GP and other health professionals. This conservative approach recognises that many of these patients will die of other co-morbid conditions before requiring RRT. Likewise a patient undergoing RRT has the option of withdrawing from continued dialysis treatments and it is important that the patient and their family is linked into the appropriate palliative care networks and support at this time. End of life planning is an important component of the renal care continuum and health professionals should ensure that there are regular opportunities provided for patient review and discussion of management plans. Discussions with senior renal unit staff at MidCentral indicated strong links are already in place with the palliative care team at the DHB.

6.4 PRIORITISING TRANSPLANTS

Transplantation is the treatment of choice for all medically suitable kidney failure patients, and offers significantly improved quality of life and long-term survival. For health planners and policy-makers, kidney transplantation offers a rare combination of markedly improved health outcomes and relatively lower long-term costs. However, compared to renal dialysis, transplantation numbers are quite low, primarily due to a low donation rate.

Improving the rate of live donation will require increased public awareness of how to donate a kidney, what living with one kidney means, what is involved in donation and transplantation, and the benefits of donating a kidney (24). Continued use of deceased donors is also supported, and Organ Donation New Zealand has initiated a multi-faceted programme to ensure that every opportunity for organ donation is recognised and the opportunity to donate is offered to all families of suitable potential donors. This will be achieved through developing 'link teams' in intensive care units across New Zealand to coordinate organ and tissue donation and retrieval from brain-dead patients; provision of liaison, support and advice to link teams; and training programmes for intensive care doctors and nurses in organ and tissue donation.

A key limiting factor locally is the resource constraints on live-donor transplants. Capital Coast DHB (CCDHB) are currently allocated only one space per month and

wish to increase this to two but are finding it difficult to obtain theatre time. This will influence CCDHB's capacity to increase live donor ops for MidCentral.

6.5 COMPREHENSIVE PATIENT-CENTRED PLANNING

A key strand in managing ESRF is ensuring that care for each patient is centred on the patient's needs. The NHS service framework for CKD identifies markers of good practice as:

- Provision of high quality, culturally appropriate and comprehensive information and education programmes.
- Education programmes tailored to the needs of the individual.
- Individual care plans, regularly audited, evaluated and reviewed.
- Access to a multi-skilled renal team whose members have the appropriate training, experience and skills.

These markers support a standard aimed at ensuring "all children, young people and adults with chronic kidney disease are to have access to information that enables them with their carers to make informed decisions and encourages partnership in decision-making, with an agreed care plan that supports them in managing their condition to achieve the best possible quality of life." (17)

Behind this approach is recognition that patients often understand their conditions as well as the professionals. Those who manage their own dialysis independently develop a significant set of knowledge of their self care. This form of learning underpins 'expert patient' models of self care developed in the UK. The approach helps people to learn more about their own illness, and how to manage it effectively without always depending on professionals for support (25). Staff at MidCentral DHB thought that these expert patient models had applicability in New Zealand.

Patient-centred planning therefore seeks not only to ensure that the needs of the patient are met, but that the patients themselves have access to information, advice, education and support so that they can become partners in care and to varying degrees manage their own conditions. There is evidence that patients with chronic kidney disease who choose to receive education on their conditions have improved psychological and social outcomes. Information and support can enable patients to maintain employment and to ward off the depressive symptoms that can sometimes arise when people are undergoing long-term dialysis (17).

Levin (2006) observes that it is important that both patients and health care providers understand care goals and are able to measure individual and patient outcomes reliably. This can be supported by use of guidelines, tools, and incentives for both patients and practitioners. Given the multiplicity of conditions that may lead to CKD, both general practitioner and specialist education is required, working within a multidisciplinary model (1).

7. MULTIDISCIPLINARY COLLABORATION

Levin (2006) argues that the complexity of managing people with CKD and ESRF requires a care model which deals with that complexity, for which the individual practitioner office paradigm is unlikely to be effective (1). Underpinning the design of renal services therefore needs to be an approach that draws on the collective efforts of professionals across the health sector, including primary care, secondary care, pharmacists, nurses, dieticians, social workers and occupational therapists.

Frankel et al (2005) observed that:

> The use of calculated glomerular filtration rate is likely to identify patients with less severe degrees of chronic kidney disease, who may be missed if serum creatinine is used to assess kidney function. We do not have enough nephrologists or nephrology outpatient clinics to manage the workload that this would generate, and evidence shows that using nephrology outpatient clinics is not the most effective means of managing chronic diseases. Such patients would be best managed in a partnership arrangement between primary and secondary care. In this model, many professional groups including general practitioners with a specialist interest, specialist nurses, pharmacists, and dieticians all have a role in the management of the chronic condition (10).

Building on these observations, renal providers need to think creatively about the skills their workers will need in the future, and create roles and training to reflect those needs. Trends in similar services in NZ (such as diabetes), and renal services internationally, indicate that an effective way to respond to the growing demand for renal services lies in the development of new roles within the renal workforce, such as nurse practitioner. There may also be benefits in developing links to these new roles within the primary health sector, dealing with the early stages of CKD as part of a comprehensive package addressing chronic disease in general (incorporating cardiac and diabetes in particular). This could be an attractive field of work for renal nurse specialists, offering flexibility and a community base. Such working conditions are likely to promote workforce retention.

These themes are also echoed by a renal workforce plan developed by the British Renal Society, which states:

> 'A patient's 'journey' with renal disease can span many decades. High quality care and efficient use of resources throughout this journey require a seamless service. Patients require access to and support from the whole range of renal healthcare professionals and primary care practitioners to differing degrees at differing times and stages of evolution of their renal disease…

> Coordinated service delivery requires an integrated multiprofessional team with the range of skills, competencies and responsibilities to manage patients throughout their journey of care and to minimise the institutional, professional and geographical barriers to the timely provision of appropriate care.' (26)

Initiatives at MidCentral demonstrate support for a multi-disciplinary model, evidenced by the pending appointment of an anaemia coordinating nurse, and the use of a pre-dialysis nurse educator. However, noted shortages in the team, including nephrologists and clinical psychologist, undermine the ability to craft a multi-disciplinary group, and to move beyond responding to acute demand. It was also felt that funding would be needed to ensure renal patients from the Whanganui district would have transport access to dialysis services; and ideally, that dialysis units would be located where people can most comfortably access treatment.

The potential of service re-design around a multi-disciplinary team is highlighted by a study of a pre-dialysis service in Melbourne (27). A review of the service identified three critical points where blocks, waste, or risk occurred: notification of patients to service, predialysis education, and vascular access. The specific objectives of this pathway redesign were to:

- encourage earlier notification of each patient to the NWDS so that better planning for that patient could occur;
- facilitate earlier establishment of vascular access;
- increase the proportion of patients commencing haemodialysis with a permanent access.

In association with process redesign, the proportion of patients registered 'late' decreased from 29% in July– September 2000 (pre-implementation) to 6% in January–March 2004 with the corresponding median time from registration to commencement of dialysis increasing from <1 month to 14 months. Patients not registered with the service decreased from 57 to 0%. Eighty-three per cent of patients commenced dialysis with a permanent vascular access in January–March 2004, compared with 24% in July–September 2000 (27).

8. OPPORTUNITIES FOR CKD PREVENTION

Although this work programme is focused on the continuum of CKD management and treatment from primary through to secondary and palliative care, some consideration should be given to the potential for population health strategies to impact on CKD and ESRF incidence into the future. One review suggests that prevention of CKD by the eradication of type 2 diabetes and obesity (through improvement of lifestyle

factors), and adequate treatment of hypertension, has the potential to eliminate at least a third of the common causes of ESRF in developed countries (11).

This is particularly pertinent in the New Zealand context. In 2004, type II diabetes was the primary renal disease of 36 percent of New Zealand dialysis patients, compared to 21 percent in Australia (4). Given this, there are potentially significant gains to be made from population-level improvements in nutrition and physical activity, and reductions in obesity. Lifestyle modifications, such as weight reduction, physical activity, and dietary changes can be effective, as shown in clinical trials in which the incidence of type II diabetes in overweight individuals with impaired glucose tolerance was substantially lowered by these means (9).

In the long-term, reducing the burden of CKD and ESRF requires attention to preventing its causes alongside managing its prevalence, linking with population health strategies such as *Healthy Eating, Healthy Action* (28). Achieving these changes in population health requires action on a broad range of fronts, including public awareness of and motivation for adopting healthy lifestyles, changes to the environments that influence nutrition and physical activity, and improvements in health service responsiveness to at-risk populations. Gains can also be made through heightened public motivation to find out about CKD or to identify at an early stage if they have the disease.

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