Review of Nationally Funded Centres
Pancreas Transplant Program

NSW Health on behalf of the Nationally Funded Centres
Reference Group
# Table of contents

**Executive Summary** .................................................................................................................. 1  
**Recommendations** ................................................................................................................... 3  
  Key recommendation .................................................................................................................. 3  
  Supplementary recommendations ............................................................................................... 3  
**Glossary** ........................................................................................................................................ 5  
**Reviews of the Nationally Funded Centres Programs** ................................................................. 6  
  Background ................................................................................................................................. 6  
  This review .................................................................................................................................. 8  
**The Nationally Funded Centres Pancreas Transplant Program** ................................................. 10  
**Solid organ pancreas transplantation procedures** ..................................................................... 12  
  The development and evolution of pancreas transplantation procedures ................................. 12  
  Simultaneous transplantation of kidney and pancreas ................................................................ 13  
  Pancreas-after-kidney transplantation ....................................................................................... 15  
  Pancreas transplant alone ........................................................................................................... 15  
**Technical options in pancreas transplantation** ......................................................................... 16  
  Pancreatic duct drainage ............................................................................................................ 16  
  Venous drainage ......................................................................................................................... 17  
  Immunosuppression .................................................................................................................... 17  
**Patient and graft survival** ........................................................................................................... 18  
**Islet cell transplantation** ........................................................................................................... 18  
**Access to the NFC pancreas transplant program** ...................................................................... 20  
  Introduction .................................................................................................................................. 20  
  Donor and recipient characteristics ......................................................................................... 20  
  The availability of donor organs ............................................................................................... 20  
  The allocation of transplantable organs ..................................................................................... 21  
  Kidney-alone transplant waiting list ......................................................................................... 23  
  Pancreas transplant waiting times .......................................................................................... 24  
  Geographic access for pancreas transplants ............................................................................ 24  
  International acceptance criteria ............................................................................................... 26  
  Current Australian acceptance criteria ...................................................................................... 28  
  Waiting list numbers and waiting times .................................................................................. 29  
  Rural patient access ................................................................................................................... 30  
  Summary of access issues and their resolution ........................................................................... 30  
**Health outcomes** ....................................................................................................................... 33  
  Introduction .................................................................................................................................. 33  
  International experience ........................................................................................................... 33  
  Patient age .................................................................................................................................... 33  
  Diabetes ...................................................................................................................................... 33  
  NFC results - mortality ............................................................................................................... 36  
  NFC results - morbidity .............................................................................................................. 39  
  NFC results - graft failure .......................................................................................................... 39  
  Quality of life ............................................................................................................................... 40
Stakeholder perspectives on the Nationally Funded Centres .................................................. 42
Introduction ............................................................................................................................ 42
Referring clinician satisfaction with the NFC pancreas transplant program ....................... 43
Patient satisfaction with the NFC pancreas transplant program ........................................... 44
NFC models of care and service delivery .............................................................................. 49
Introduction ............................................................................................................................ 49
Leadership and staff .............................................................................................................. 49
Service scope ......................................................................................................................... 49
Continuum of care .................................................................................................................. 50
Clinical infrastructure, equipment and facilities .................................................................. 51
Relationship with referring units ........................................................................................... 51
Current and future services gaps and constraints .................................................................. 51
Quality and Safety ................................................................................................................. 52
Adherence to treatment protocols and pathways .................................................................... 52
Adherence to agreed evaluation and reporting ..................................................................... 52
Inpatient complications, infections, unexpected admissions to ICU, adverse events ............ 52
Patient and carer satisfaction .................................................................................................. 52
Teaching, Training and Research ......................................................................................... 53
Westmead National Pancreas Transplant Unit .................................................................... 53
Monash Medical Centre ......................................................................................................... 54
Clinical Practice .................................................................................................................... 55
Recent or foreseeable changes in clinical practice ................................................................. 55
Development of comparative treatments ............................................................................. 55
Service demand ...................................................................................................................... 56
Introduction ............................................................................................................................ 56
Criteria for solid organ pancreas transplantation in Australia .............................................. 56
Demand projections .............................................................................................................. 56
National collaboration ........................................................................................................... 60
Cost analysis ........................................................................................................................... 61
Risk Management .................................................................................................................. 67
Potential risks to the viability and operation of the service .................................................... 67
Quality risks ............................................................................................................................ 67
Risks relating to the enhancement of Monash Medical Centre's national service ................. 68
References ............................................................................................................................. 69
Attachment A .......................................................................................................................... 75
Transplantation Society of Australia and New Zealand national pancreas allocation (November 2007) .......................................................... 75
Attachment B .......................................................................................................................... 78
Referring Unit Stakeholder Survey ....................................................................................... 78
Attachment C .......................................................................................................................... 87
Report from Westmead National Pancreas Transplant Unit .................................................. 87
Attachment D ................................................................................................................................. 100
   Report from the Monash Medical Centre Pancreas Transplant Unit ............................... 100

Attachment E ............................................................................................................................. 116
   Journal articles and Unit papers, WNPTU and Centre for Transplant and
   Renal Research ..................................................................................................................... 116

Attachment F ............................................................................................................................. 127
   Peer reviewed publications, Monash Medical Centre ....................................................... 127
Executive Summary

Pancreas transplantation is a highly specialised procedure that is undertaken in Australia at the Westmead National Pancreas Transplant Unit (WNPTU) in New South Wales and the Monash Medical Centre (MMC) in Victoria (the Units). The Units are funded through the Nationally Funded Centres (NFC) Program to provide equitable, high quality services to people from all Australian jurisdictions.

In Australia pancreas transplantation almost always is undertaken in association with kidney transplantation in patients with type 1 diabetes mellitus which has caused End Stage Renal Disease (ESRD). It has become a highly effective procedure which usually is reserved for younger patients because there is a clear association between age and outcome. In the United States of America (USA) the procedure is offered to some older patients and patients with type 2 diabetes mellitus. Clinicians generally support the existing patient selection policy that applies in Australia.

This report presents the findings of a periodic review of the WNPTU and the MMC Unit, conducted in accordance with criteria established by the NFC Program.

The reviewers have concluded that both of the Units are providing high quality services which meet international outcome standards and attract extremely high levels of consumer satisfaction. Staff of both of the Units should be congratulated on their achievements.

The WNPTU is providing approximately 25 procedures annually to patients from all States and Territories except Victoria. The MMC Unit is providing approximately 10 procedures annually to Victorian patients only. Despite this variation in the Units’ geographic bases, there has been reasonable equity of access nationally and in particular there is no evidence that patients from either Victoria or New South Wales are receiving preferential access compared with patients from other jurisdictions. There is, however, a higher number of Victorian patients on the MMC waiting list than would be expected compared with the numbers of patients from other jurisdictions on the WNPTU waiting list. Monitoring to ensure ongoing equity of access for patients from all jurisdictions will be necessary.

While islet cell transplantation is developing as a technology, a number of problems need to be addressed before it could be contemplated as a replacement technology for pancreas transplantation.

Waiting list numbers and waiting times are increasing slowly in both Units. ESRD is a complication of type 1 diabetes that usually takes more than two decades to develop. Although there has been a recent increase in the number of young people diagnosed with type 1 diabetes, treatments and technologies have improved and it is hoped that the incidence of ESRD will decrease in this group of patients, or its onset will be delayed. It is unlikely that the size of the patient cohort that meets the criteria for pancreas transplantation will increase significantly in the next decade.
Consumers believe, however, that some referring clinicians and potential patients are unaware of the availability of the procedure and its excellent outcomes, possibly indicating an existing level of unmet demand.

We recommend that the WNPTU and the MMC Unit increase their communication efforts with referring clinicians in relation to the status and progress of individual patients and to the technology generally. Additional funding will be required to enable communication to be improved.

Waiting times are around 2 years from the date of referral in both Units and are considerably shorter on average than waiting times for patients awaiting kidney-alone transplantation with a deceased donor organ. Combined pancreas/kidney donors are required to be younger and have a better prior health status than donors of kidneys alone, resulting in pancreas transplant recipients accessing deceased donor kidneys which generally are of higher quality than those offered to people waiting for kidney-alone transplantation. Some renal physicians and transplant surgeons consider that this situation is inequitable. Others are concerned that organs that could be available for pancreas transplantation sometimes are not accepted because there is an effective ‘cap’ on activity by the Units or because logistic issues in the Units preclude acceptance of the organ. If these organs were accepted for transplant, however, there would be a further reduction in the availability of kidneys for kidney-alone transplantation.

Clinicians in other renal transplant units also raised the issues of the criteria for and timing of acceptance onto the waiting list for pancreas transplantation. There are complex clinical and ethical issues that are relevant to this debate. Responding to these concerns, a recommendation is made that the Transplantation Society of Australia and New Zealand and the newly established Cognate Committee on Organ and Tissue Donation and Transplantation are asked to lead a consultation with clinicians nationally to clarify the criteria which govern the allocation of kidneys for Simultaneous Pancreas Kidney transplantation and acceptance onto the waiting list for the procedure, taking into account competing demands for scarce donor organs.

Service sustainability and effective risk management depend on developing a critical mass of clinicians and patients who can participate in demanding emergency rosters as well as contribute to teaching, training and research. Any increase in the number of units performing the procedure would diminish capacity to achieve an appropriate critical mass in each participating unit. Both of the Units are achieving good outcomes and the clinicians who were consulted during this review did not support any increase in the number of units offering pancreas transplantation. We consider that continuation of the current two unit configuration is appropriate.

The MMC Unit would benefit from an increase in throughput in order to improve its sustainability and meet demand, but care will need to be taken to not diminish throughput at the WNPTU as a consequence. Both the WNPTU and MMC Unit should maintain their active research and teaching programs.
We also recommend that the framework for reporting to the NFC Reference Group is refined to enable close monitoring of access and sustainability as the changes recommended in this report are implemented.

Recommendations

Key recommendation

**Recommendation 1**

That NFC Program funding for the pancreas transplantation units at Westmead and MMC is continued for another three years, followed by review. Demand projections indicate an annual national caseload of approximately 40 pancreas transplants per year, consequently the WNPTU should continue to provide approximately 25 procedures per year to a national patient base and the MMC Unit should increase its activity to approximately 15 procedures per year, offer its services to patients who reside outside Victoria (particularly in South Australia and Tasmania) and develop its support services to a level equivalent to those provided by the WNPTU to interstate patients.

Supplementary recommendations

**Recommendation 2**

That the NFC Reference Group asks the Transplantation Society of Australia and New Zealand and the recently established Cognate Committee on Organ and Tissue Donation and Transplantation to consult with the NFC Units and other relevant stakeholders (including referring renal physicians and jurisdictional transplantation committees) and:

- confirm or re-define the criteria which govern the allocation of organs for SPK transplantation; and
- clarify national criteria for admission into the pancreas transplant program including agreed criteria for the date of acceptance onto the waiting list and whether patients should be permitted to be on both the SPK waiting list and the kidney-alone waiting list.

**Recommendation 3**

That the NFC Reference Group incorporates key indicators of waiting lists, waiting times and utilisation of medically-suitable organs into the framework for reporting by the NFC Units, enabling the NFC Reference Group to monitor equity of and trends in access to pancreas transplantation and report this information regularly to jurisdictions.
Recommendation 4

That the WNPTU and the MMC Unit, in consultation with the Transplantation Society of Australia and New Zealand (TSANZ) develop a common set of key clinical performance indicators specific to pancreas transplantation and that the NFC Secretariat adopts those performance indicators as the basis for reporting by the Units on their clinical performance.

Recommendation 5

That the NFC Units, supported by each jurisdiction, enhance their communications with local renal units to ensure high levels of awareness about indications for and outcomes of pancreas transplantation generally and also to ensure effective communication about individual patients.

Recommendation 6

That the NFC Units work with groups that have contact with consumers (e.g. Diabetes Australia) to enhance consumer awareness and choice in relation to pancreas transplantation.

Recommendation 7

That consistent with the NFC status of the service and with a proposed expanded national role for the MMC Unit the allocation of donor organs from Queensland, South Australia, Western Australia and the Northern Territory is monitored and adjusted if necessary to ensure equity in accordance with the relative demand managed by each Unit.

Recommendation 8

That building on their current co-operative activity, the Units identify further opportunities to enhance national collaboration.

Recommendation 9

That the rate of reimbursement for each pancreas transplant is set at $122,351.
Glossary

AHMAC  Australian Health Ministers’ Advisory Council
AHMC  Australian Health Ministers’ Conference
ANZDATA  Australian & New Zealand Dialysis & Transplant Registry
ANZPTR  Australian and New Zealand Pancreas Transplant Registry
BD  Bladder Drainage
CMV  Cytomegalovirus
C-peptide  Connecting peptide (used to measure pancreatic insulin production)
DD  Deceased Donor
ED  Enteric Drainage
ESRD  End Stage Renal Disease
GFR  Glomerular Filtration Rate
GSR  Graft Survival Rate
HbA1c  Haemoglobin A1c (used to test average blood glucose over recent months)
Hep BsAg  Hepatitis B Surface Antigen
Hep C  Hepatitis C
HIV  Human Immunodeficiency Virus
HLA  Human Leukocyte Antigen
IPTR  International Pancreas Transplant Registry
KDOQI  National Kidney Foundation Kidney Disease Outcomes Quality Initiative
MMC  Monash Medical Centre
MMF  Mycophenolate Mofetil
NFC  Nationally Funded Centre
OPTN  Organ Procurement & Transplant Network
PAK  Pancreas After Kidney (transplant)
PTA  Pancreas Transplant Alone
PVD  Portal Venous Drainage
QOL  Quality of Life
SD  Standard Deviation
SPK  Simultaneous Pancreas Kidney (transplant)
SVD  Systemic Venous Drainage
TAC  Tacrolimus
TF  Technical Failure
UNOS  United Network for Organ Sharing
WNPTU  Westmead National Pancreas Transplant Unit
Reviews of the Nationally Funded Centres Programs

Background

At the June 1990 Australian Health Ministers' Conference (AHMC), Ministers endorsed a national policy for public sector provision of high cost, highly specialised clinical practices and technologies with limited demand - the NFC Program.

NFCs are established to provide Australians with equitable access to certain high cost, low demand, new and emerging technologies. They are approved by the Australian Health Ministers' Advisory Council (AHMAC) and funded by the jurisdictions. The NFC Reference Group, which has representatives from the Australian Government and each State and Territory, is responsible for planning and managing the NFC Program, the assessment of new submissions and the commissioning of reviews of existing programs. A number of the jurisdictional representatives have clinical experience in medicine or nursing. The NFC Reference Group reports to AHMAC through the Health Policy Priorities Principal Committee.

The objectives of the NFC Program are to ensure that:

- there is maximal access to certain high cost, low demand, new and emerging technologies regardless of geographic location, in the context of workforce and resource availability;
- these technologies are provided efficiently and effectively;
- requirements for high quality and safe introduction and ongoing provision of these technologies have been defined and implemented; and
- health and cost outcomes of these technologies are monitored and evaluated.

For a technology to be considered for provision through an NFC, it must be an established clinical practice requiring a national population base for efficient and effective service provision. Technologies eligible for consideration for provision through an NFC include devices, prostheses, techniques, skills or expertise (or personnel with skills or expertise) and/or procedures, or combinations of these.

NFCs for a particular technology may be established in one or more sites and service delivery is intended to be restricted to those sites.

Funding for NFCs is provided by the jurisdictions according to a weighted population-based formula. There is an agreed price for each procedure.
Reviews of NFCs are commissioned on a regular basis. The basis of each review is set out in *Nationally Funded Centres Guidance for Governance, Management, Funding, Establishment, Review* (the Guidance Document), the latest version of which was endorsed by AHMAC in May 2007. Appendix 9 of the Guidance Document sets out the criteria by which NFC Programs are to be reviewed, which include:

- access to the NFC;
- health outcomes;
- model of care and service delivery;
- quality and safety;
- teaching, training and research;
- changes to clinical practice;
- service demand;
- cost; and
- risk management.

Each review results in a report to the NFC Reference Group which in turn provides a report to AHMAC. The possible recommendations from a review include to:

- continue the activities of the NFC at a reduced, equal or increased level for a further defined period with a further review to be conducted at the end of that period; or
- decrease the number of NFCs providing the service; or
- increase the number of NFCs providing the service; or
- cease NFC status effectively by 30 June in the next calendar year from the date of the decision.

As part of the continuation of the activities of the NFC the following recommendations also may be made:

- address and rectify issues identified by the review team; and/or
- modify the scope of the services and care provided by the NFC to meet current clinical and service requirements.
A recommendation may be made to AHMAC to increase the number of NFC providers if it is shown that:

- satisfactory health and cost-effectiveness outcomes have been achieved;
- existing centre(s) does not have the capacity to meet the needs of the Australian population for the foreseeable future;
- the combined national and international demand justify expansion;
- the cost effectiveness of an additional centre or centres is similar to that of the first centre;
- establishment of an additional centre or centres will not adversely affect the health outcomes; and
- establishment of an additional centre or centres will not adversely affect equity of access.

At some point in the provision of a specific NFC program, agreement may be reached by AHMAC that NFC status is no longer appropriate. This point may be reached when:

- there is no longer any need for an NFC as technology or services are provided in the majority of jurisdictions; or
- the technology has been superseded by another practice.

This review

This report is the outcome of a comprehensive review of the NFC Pancreas Transplant Program which is provided by the MMC in Victoria and Westmead Hospital in New South Wales.

The review was undertaken by DLA Phillips Fox (Dr Heather Wellington and Dr Paul Woodhouse), who were appointed following a competitive tender process. Clinical advice was provided by Professor Napier Thomson (Director of Renal Services, The Alfred Hospital) and Professor Peter Colman (Departmental Head, Diabetes and Endocrinology, Royal Melbourne Hospital) and financial advice was provided by Mr Peter Doughty (Strategic Assurance Services).

The review was conducted in accordance with the criteria set out in the Guidance Document, with particular reference to Appendix 9. A Project Management Group was established by the NFC Reference Group to oversee and guide the review.

The scope of the review did not include an assessment of the Islet Cell Transplant Service which also operates from Westmead Hospital.
The focus of the review was on operations and activity in the Units since the most recent review in 2001.

The process for the review incorporated:

- a literature review;
- site visits to the MMC Unit (14 February 2008) and the WNPTU (3 March 2008), accompanied by jurisdictional representatives at both sites and a representative of the Project Management Group at the WNPTU;
- consumer focus groups conducted at both sites;
- a survey of referring units in all jurisdictions;
- interviews with referring clinicians from South Australia and Western Australia;
- review of information provided by the Units including:
  - a response to the Guidance Document Appendix 9 review criteria;
  - Guidance Document Appendix 2 and 3 reports;
  - abstracts written by MMC Unit staff;
  - the Australia & New Zealand Pancreas Transplant Registry Report 1984-2006 (provided by the WNPTU); and
  - key peer reviewed papers written by Unit staff.

The staff of the Units were very generous with their time and provided comprehensive presentations to the consultants, jurisdictional representatives and members of the Project Management Group. The Units also responded to information requests promptly and facilitated the consultants’ access to consumers.

A comprehensive report on the visits and the information provided by each Unit is presented in Attachments C and D.
The Nationally Funded Centres Pancreas Transplant Program

In Australia and New Zealand, 360 solid organ pancreas transplants were performed in the period 1984-2006. 96% of these were Simultaneous Pancreas Kidney (SPK) transplants, 8 were Pancreas after Kidney (PAK) transplants, 6 were Pancreas Transplant Alone (PTA) and there was 1 pancreas/liver and kidney transplant.

The pancreas transplantation unit at Westmead Hospital, Sydney - the WNPTU - was established as an NFC in 1992 following reviews by the [then] Health Care Committee and the Australian Health Technology Advisory Committee (AHTAC) of the National Health and Medical Research Council. Funding for the centre was provided for an initial period of 3 years.

In the 1992-93 financial year, 9 procedures were performed. Over the next 2 years, a further 20 procedures were performed.

A review of the program in 1996 resulted in a recommendation for the WNPTU to continue under NFC status. It also identified that at the time of the review no patients from Western Australia had yet been transplanted. The review also recommended that an assessment of quality of life indicators should be undertaken and the pancreas transplant effect on secondary complications of diabetes should be investigated. Since then WNPTU has transplanted patients from Western Australia and undertaken the recommended research.

A further review of the program by the Medical Services Advisory Committee (MSAC) which was undertaken in 2001 found that:

- pancreas transplantation procedures are still highly specialised;
- the SPK procedure has a relatively high risk of technical failure and rejection, thus requiring both specific surgical skills and more immunosuppression than kidney transplants alone;
- in terms of outcome and risk these procedures should not be considered part of established medical practice; and
- as the technology continues to evolve it should not be considered routine medical practice.

On the basis of these findings the review recommended that pancreas transplantation should remain in the NFC Program.
The review further found that there had been a marked increase in the demand for the service nationally. The review consequently recommended:

- as pancreas transplantation meets the criteria for NFC technology, the procedure should remain in the NFC Program;
- the WNPTU should continue to operate under the NFC Program and should be funded for a further three years;
- the WNPTU should continue to provide a national pancreas transplant service for the next three years at the rate of at least 20 procedures per year;
- a second national pancreas transplant unit be established under the NFC Program and be funded for an initial period of three years to provide a minimum of 15 transplant procedures per year; and
- AHMAC consider the submission from the Victorian Department of Human Services for Monash Medical Centre to be approved as a second NFC for pancreas transplantation.

The MMC Unit's interest in treating diabetic patients with renal failure arose during the 1970s from observation of the relatively poor long-term prognosis for this group of patients. In 1984, subsequent to visits by senior staff to pancreas transplantation centres in Europe and the USA, a program of both kidney and pancreas transplantation for patients with type 1 diabetes was commenced at Prince Henry's Hospital. The program was established following laboratory experience with dog pancreas transplants and studies of rat pancreas preservation which demonstrated excellent endocrine function after 24 hours of cold storage in a preservation solution and re-transplantation results similar to kidney preservation.

During the 1980s, 7 SPK transplants were performed using an evolving series of surgical techniques. Four of the transplanted patients had satisfactory function for months or years. In 1991 the Unit moved to the MMC.

Over this period, a team of physicians and transplant surgeons skilled in all aspects of the procedure including the screening and selection of patients with type 1 diabetes, surgical management, post-operative immunosuppression and long-term monitoring and management had developed.

Prior to recognition as an NFC, the MMC Unit performed 4-6 transplants annually. Under the NFC Program it has been performing 9-10 transplants each year and completed its 100th transplant in December 2007.

The WNPTU performs about 25 transplants each year and up until February 2008 had performed a total of 237 pancreas transplants.
Solid organ pancreas transplantation procedures

The development and evolution of pancreas transplantation procedures

Pancreas transplantation was first performed in the USA in 1966 with the objective of replacing the need for insulin and diet therapy in people with type 1 diabetes. Since the technique was first developed a variety of factors including advances in surgical techniques, immunosuppression therapy (both induction and maintenance), graft preservation techniques, methods of diagnosis and treatment of rejection and management of common post-transplant complications have led to significant improvements in graft and patient survival (Larsen 2004).

The principal target group for solid organ pancreas transplantation is patients with type 1 diabetes and ESRD. Treatment option for these patients are dialysis or, if judged eligible, one of three transplant procedures - kidney-alone transplantation, SPK transplantation or PAK transplantation, where the kidney graft is obtained from either a living or deceased donor. PTA is an additional pancreas transplantation option for people with diabetes who experience frequent, acute and severe metabolic complications which insulin-based management has failed to control.

At 31 December 2004, 23,043 pancreas transplants had been reported to the International Pancreas Transplant Registry, of which 17,127 had been performed in the USA and 5,916 elsewhere in the world.

Table 1 summarises the proportion of pancreas transplants of each type that have been performed since 1987. In the USA, distinct from elsewhere, the relative proportion of PAK is higher and has increased further in recent years.

<table>
<thead>
<tr>
<th>Location</th>
<th>SPK</th>
<th>PAK</th>
<th>PTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA 1987-2004</td>
<td>78%</td>
<td>16%</td>
<td>7%</td>
</tr>
<tr>
<td>World ex USA 1987-2004</td>
<td>91%</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>USA 2003 only</td>
<td>67%</td>
<td>25%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Source: IPTR 2004

In the three years to 2007, 65% of USA pancreas transplants were SPK transplants (Organ Procurement & Transplant Network 2007).
Table 2 summarises USA patient characteristics reported to the United Network of Organ Sharing (UNOS) for the period 1996-2002.

**Table 2: Characteristics of USA transplant patients reported to United Network of Organ Sharing (UNOS) at October 2002 for 1996-2002**

<table>
<thead>
<tr>
<th></th>
<th>SPK</th>
<th>PAK</th>
<th>PTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (%)</td>
<td>6032 (78%)</td>
<td>1081 (14%)</td>
<td>471 (6%)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>39.3 +/- 7.9</td>
<td>41.1 +/- 7.5</td>
<td>38.8 +/- 9.0</td>
</tr>
<tr>
<td>Duration of diabetes (years)</td>
<td>26 +/- 8</td>
<td>28 +/- 7</td>
<td>24 +/- 10</td>
</tr>
</tbody>
</table>

(Larsen 2004 adapted from Gruessner & Sutherland 2001)

**Simultaneous transplantation of kidney and pancreas**

Although there is no consensus statement specifying all indications, the usual indication for SPK transplantation in the USA is a type 1 diabetic patient with:

- ESRD;
- adequate cardiac reserve; and
- either no option for a living kidney donor, or a desire to receive both organs simultaneously rather than waiting for a pancreas after the kidney transplant is completed (Larsen 2004).

In the USA, the annual number of SPK transplants varies quite considerably from year to year, with 796 performed in 2007 and 924 performed in 2006. The highest annual number of procedures was 972 in 1998.

Table 3 describes some characteristics of the SPK waiting list in the USA. In 2004 there were 1735 new registrations.

**Table 3: Characteristics of USA waiting list for SPK transplants**

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiting list</td>
<td>2062</td>
<td>1720</td>
</tr>
<tr>
<td>Annual death rate for patients waiting</td>
<td>88/1000 patient years at risk [2003]</td>
<td>95/1000 patient years at risk [2004]</td>
</tr>
<tr>
<td>Median time to transplant</td>
<td>542 days [2000]</td>
<td>457 days [2003]</td>
</tr>
</tbody>
</table>

Cohen et al 2006
The age breakdown of patients waiting in the USA is:

- 18-34 years: 20%;
- 35-49 years: 61%;
- 50-64 years: 18%;
- >65 years: 0.5%.

In recent years the rate of patient death whilst on the waiting list has increased but the death rate post-transplantation has reduced. In the year after transplantation the annual death rate in 2001 was 60/1000 patient years at risk.

Patient survival generally is high after all pancreas transplantation procedures, including SPK, and is comparable to survival after kidney transplantation alone, but SPK transplantation results have the best 1-yr and long-term pancreas graft survival rate of any pancreas transplantation procedure (Table 4).

**Table 4: Unadjusted graft and patient survival for USA pancreas transplant patients (Organ Procurement and Transplantation Network/Scientific Registry of Transplant Recipient Patients)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SPK Kidney</td>
<td>92%</td>
<td>85%</td>
<td>77%</td>
</tr>
<tr>
<td>SPK Pancreas</td>
<td>86%</td>
<td>79%</td>
<td>71%</td>
</tr>
<tr>
<td>SPK Patient</td>
<td>95%</td>
<td>91%</td>
<td>86%</td>
</tr>
<tr>
<td>PAK Pancreas</td>
<td>78%</td>
<td>66%</td>
<td>57%</td>
</tr>
<tr>
<td>PAK Patient</td>
<td>96%</td>
<td>90%</td>
<td>84%</td>
</tr>
<tr>
<td>PTA Pancreas</td>
<td>77%</td>
<td>62%</td>
<td>56%</td>
</tr>
<tr>
<td>PTA Patient</td>
<td>96%</td>
<td>94%</td>
<td>91%</td>
</tr>
</tbody>
</table>

Source: Cohen et al 2006

By way of comparison, USA patients with diabetes who were transplanted with non-expanded criteria donor kidneys had 1-year, 3-year and 5-year graft survivals of 89%, 77% and 65% respectively (Cohen et al 2006).
Pancreas-after-kidney transplantation

PAK transplantation is indicated for patients with type 1 diabetes who have identified a living donor for kidney transplant and want to plan a later PAK transplant; or in some patients with type 1 diabetes who already have received a kidney transplant and have stable graft function and the cardiac reserve to undergo the procedure.

A living donor kidney offers the best short- and long-term patient and graft survival outcomes for diabetic recipients (Gaston et al 2003). In the USA outstanding patient and kidney graft survival outcomes after living-donor kidney transplantation, along with increasing waiting list times for deceased donor kidneys, have encouraged transplant units to perform living-donor kidney transplants with or without a later pancreas transplant.

Pancreas graft survival with PAK transplantation also has improved. Internationally, the proportion of PAK transplants has increased from 11% of all pancreas transplants in 1998 to 18% in 2000. During the same period the number of SPK transplants performed has stayed the same, limited by the number of available deceased kidney donors (Gruessner & Sutherland 2000).

Similar analyses (Venstrom et al 2003; Gruessner, Sutherland, Gruessner 2005) drew different conclusions about the survival benefit of solitary pancreas transplantation either as a PAK transplant or PTA. As subtle differences in methodology led to different outcomes, any adverse or beneficial effects of these forms of pancreas transplantation are likely to be small (Cohen et al 2006).

Pancreas transplant alone

Internationally, PTA is the least common pancreas transplantation procedure performed, at about 5% of total pancreas transplants (Gruessner & Sutherland 2002). The American Diabetes Association position statement suggests that indications for a pancreas transplant in the absence of kidney failure are ‘frequent, acute and severe metabolic complications (hypoglycemia, hyperglycemia, and ketoacidosis) requiring medical attention’ as well as ‘clinical and emotional problems with exogenous insulin therapy that are so severe as to be incapacitating; and consistent failure of insulin-based management to prevent acute complications’ (American Diabetes Association 2000).
Technical options in pancreas transplantation

Pancreatic duct drainage

The graft’s exocrine duct can be drained either into the bladder (Bladder Drainage, or BD) or into the small bowel (Enteric Drainage, or ED).

In early pancreas transplants when rejection rates were higher, frequent monitoring of pancreas graft rejection following BD procedures was possible through monitoring of urine amylase or biopsies of the pancreas graft through a cystoscope across the bladder wall. Bladder drainage has the potential to cause problems, however, with urological complications occurring in 50–77% of cases, although graft loss as a result is uncommon (Orsenigo et al 2002). As sodium bicarbonate-rich pancreatic secretions pass into the urine metabolic acidosis occurs in most patients, with extracellular volume depletion occurring commonly, which occasionally is severe enough to require hospitalisation (Schang et al 1991). Oral sodium bicarbonate therapy is required in almost all recipients to manage these complications. Additional problems that can complicate BD include bladder leak, reflux pancreatitis, chemical cystitis, chemical urethritis, frequent bladder infections, duodenitis in the connecting segment, bladder tumours, bladder calculi, urethral stricture, urethral erosion, epididymitis, prostatitis, and prostatic abscess (Hickey et al 1997; Del Pizzo et al 1998).

It is feasible to convert BD transplants to ED transplants, the indications for conversion being frequent episodes of severe extracellular volume depletion, severe metabolic acidosis, urological complications or problems with the duodenal segment, with 9% converted by 1 year and 15% by 3 years for transplants performed in the USA in the period 1996–2000 (Gruessner & Sutherland 2002). The results of conversion surgery are good with 100% patient survival and 96% pancreas graft survival in one series, with resolution of nearly all the indications for surgery by 22 months (Sindhi et al 1997). Three-year follow-up after conversion in 51 patients in the Netherlands found patient, kidney and pancreas graft survival rates of 93%, 97% and 93% respectively (van de Linde et al 2006).

In ED procedures the pancreatic duct is inserted into the small bowel. There has been a trend to using ED procedures because better immunosuppression therapy has reduced the risks of anastomosis break down and also has reduced the need for monitoring the pancreas graft. According to UNOS data, in 2002/03 ED was used in 82% of SPK transplants, 72% of PAK transplants and 57% of pancreas transplants alone in procedures performed in the USA (Gruessner & Sutherland 2005).

Patient survival rates were slightly better in SPK transplantation procedures in which ED was used compared with procedures in which BD was used. Pancreas graft survival was slightly better in all three transplant categories with BD compared with ED, although the difference was not significant. SPK kidney graft survival rates were slightly higher with ED, although again the difference was not significant (Gruessner & Sutherland 2005).
Venous drainage

Two alternatives also exist for the venous drainage of the pancreas graft - Systemic Venous Drainage (SVD) via the iliac vessels or Portal Venous Drainage (PVD) via the portal venous circulation.

When SVD is used insulin that is secreted into the pancreatic venous effluent is not subject to a first pass effect by the liver, resulting in elevated systemic concentrations of insulin (hyperinsulinaemia), both fasting and postprandial (Larsen 2004). PVD, in which the pancreatic venous effluent is drained into the portal venous circulation, was developed as an alternate procedure. The combined PVD with ED procedure resulted in much lower peripheral insulin concentrations than occurred when SVD was used (Gaber et al 1995).

Because PVD recreates more normal physiology than SVD it was thought it would be beneficial to lipid metabolism and insulin actions, but in all transplants reported to UNOS outcomes after PVD and SVD were similar (Gruessner & Sutherland 2000; Stratta et al 2000). More recent UNOS data indicates that 1-yr pancreas graft survival was no different between PVD and SVD for any type of pancreas transplant (Gruessner & Sutherland 2005). Without established significant advantages of PVD over SVD, most pancreas transplant recipients still receive SVD because there is greater surgical experience with it over PVD and it allows greater flexibility to perform either ED or BD (Larsen 2004).

Immunosuppression

The most common regimen for maintenance immunosuppression is a combination of tacrolimus (TAC) and mycophenolate mofetil (MMF), which from 2000 to 2004 was used in more than 65% of all USA transplants in all three categories of pancreas transplantation (Gruessner & Sutherland 2005). The second most common regime was a maintenance protocol based on sirolimus (16%), most frequently used in combination with TAC or TAC/MMF. The combination of TAC/MMF has largely replaced cyclosporine/MMF because of evidence of lower rejection rates, better blood pressure control and better blood lipids (Kaufmann et al 1999).

Because immunosuppressive drugs have a number of potentially severe adverse effects, efforts are made to reduce doses to the minimum effective amount. Corticosteroids are used to reduce the dose of calcineurin inhibitors (cyclosporine and tacrolimus), but corticosteroids can cause weight gain, glucose intolerance, dyslipidaemia, and bone loss. Calcineurin inhibitors also can cause dyslipidaemia, bone loss, and glucose intolerance, so the benefits of a corticosteroid-free protocol are reduced (Larsen 2004).

With respect to induction immunosuppression for SPK patients in the period 2000-2004, the use of non-depleting antibodies either alone or in combination with depleting antibodies seems to be superior compared with the use of depleting antibodies alone or no induction therapy at all (Gruessner & Sutherland 2005).
Patient and graft survival

The outcomes of pancreatic transplantation have been described as "truly excellent" (Gruessner & Sutherland 2005). Patient survival rates 1 year post-pancreas transplantation equal or exceed 95% in all recipient categories and have improved significantly since the technique was first introduced. Pancreas Graft Survival Rates (GSRs) also have improved dramatically over time (Table 5).

Table 5: Average USA 1-year pancreas graft survival rate 1999-2001 and 2000-04 for each pancreas transplant type

<table>
<thead>
<tr>
<th>Type</th>
<th>1999-2001</th>
<th>2000-04</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPK transplant</td>
<td>83%</td>
<td>95%</td>
</tr>
<tr>
<td>PAK transplant</td>
<td>82%</td>
<td>95%</td>
</tr>
<tr>
<td>PTA</td>
<td>80%</td>
<td>98%</td>
</tr>
</tbody>
</table>

Source: Gruessner & Sutherland 2001; IPTR 2004

One-year kidney graft survival is higher in PAK transplants compared with SPK transplant, possibly because of greater use of living-donor kidney grafts, but also the pancreas transplant procedure itself selects for recipients whose kidney function is stable and adequate after kidney transplant (Gruessner & Sutherland 2001; Humar et al 2001).

Islet cell transplantation

The idea of transplanting islets of Langerhans was first proposed in 1966. This procedure offers the potential to improve glycaemic control in some patients with type 1 diabetes who are disabled by refractory hypoglycaemic unawareness. Although it has been difficult to achieve reliable, long-term diabetes control with transplanted cells, a significant improvement in the success rate has been achieved with better patient selection, use of non-toxic immunosuppression and isolation and transplantation of a viable number of islets to control blood glucose (O’Connell et al 2006).

In Edmonton 65 islet transplants were performed up until 1 November 2004, the main indication being severe hypoglycaemic unawareness. In the completed patients, 5-year follow up showed about 80% had C-peptide present post-transplant, with about 10% maintaining insulin independence. The mean duration of insulin independence was 15 months (interquartile range 6.2-25.5 months). The HbA1c level was well controlled in those not requiring insulin and those requiring insulin but who were C-peptide positive, and higher in those who lost graft function (Ryan et al 2005).

In a further study of 36 patients using a standardised treatment regimen, the Edmonton Protocol, 44% of patients had insulin independence with adequate glycaemic control one
year after final transplantation, 28% had partial function and 28% had complete graft loss. 58% of patients attained insulin independence at any point during the trial. 14% of patients remained insulin independent after 2 years (Shapiro et al 2006).

A recent study has identified that two drugs used in the Edmonton Protocol, tacrolimus and sirolimus, can inhibit B-cell proliferation. It is postulated that this may have contributed to the relatively poor outcomes in the human islet-transplant series so far reported (Ruggenenti, Remuzzi & Remuzzi 2008).

In Australia, in a study in which 5 patients received two islet cell infusions, 3 became insulin independent with excellent glycaemic control, although one patient withdrew after 7.5 months because of side effects of immunosuppression. Two others had islet function with circulating C-peptide, improved glycaemic control, reduced insulin requirements and the abolition of severe hypoglycaemic episodes. Over two years, however, graft function deteriorated, although recipients who initially were insulin independent remained C-peptide positive but required supplementary insulin. Three of four patients who were not working before transplantation were able to return to work (O'Connell et al 2006). The Australian researchers concluded that "islet transplantation is effective at improving glycaemic control and hypoglycaemic unawareness in the short to medium term. However, problems with long term safety of immunosuppression, islet-induced thrombosis and early detection of loss of islet function remain to be addressed" (O'Connell et al 2006).

In the period 2002-2006 there were 18 islet transplants in Australia in 9 patients, with a 100% patient survival (ANZPTR 2007).
Access to the NFC pancreas transplant program

Introduction
The following factors influence access to pancreatic transplantation in Australia:

- the availability of donor organs;
- the number of eligible patients; and
- physical barriers such as geography.

In the following section each of these elements of access is discussed.

Donor and recipient characteristics
In Australia and New Zealand in the period 1984 until 2006, 52% of recipients and 61% of donors were male. The median age of donors was 23 (SD 10.5) years, with a range of 6 to 61 years. About 30% of donors were aged 11-20 years, a similar number were aged 21-30 years and a further 20% were aged 31-40 years. The median age of recipients was 37 (SD 7.17) years, with a range of 20 to 60 years. Almost half of recipients were aged 31-40 years, a third of recipients were aged 41-50 years and 15% aged 21-30 years (ANZPTR 2007).

The availability of donor organs
The Transplantation Society of Australia and New Zealand (TSANZ) establish donor suitability criteria for pancreas transplants. WNPTU uses the following standard criteria:

- general organ donor criteria;
- no known diabetes mellitus or insulin dependence;
- no known pancreatic trauma - may be considered for separated islets; and
- no history of alcoholism or chronic pancreatitis.

Other information which is required for allocation includes:

- blood group;
- body weight;
- approximate height;
- laboratory tests: general organ donor criteria for viral studies:
  - HIV, Hep BsAg, Hep C, CMV;
electrolytes, glucose, amylase and or lipase;

- current use of insulin, dextrose and steroids.

Based on the TSANZ donor criteria MMC establishes two classes of donors. Class A donors are required to have no donor history of diabetes or pancreas pathology (haemochromatosis, chronic pancreatitis, cystic fibrosis etc) as well as the following characteristics:

- donor age less than 45 years;
- donor weight <90 kg (male) and < 80kg (female), with a preferred donor BMI of <30kg/m^2;
- normal lipase +/- amylase;
- normal serum creatinine and passing adequate urine; and
- ICU admission – no history of abdominal trauma and no prolonged hypotension.

In addition, donors requiring insulin infusions (Class B) may be accepted if they are:

- aged <30 years;
- on corticosteroids or vasopressors for haemodynamic stability; and
- shown to have a macroscopically suitable pancreas as assessed by the harvesting transplant surgeon.

Since 2003 the USA Organ Procurement Transplantation Network (OPTN) has set an upper donor age limit of 50 years in the USA. In 2005 it further decided that donors aged more than 50 years and/or with a BMI of more than 30 could be allocated for pancreas islet transplant (Cohen et al 2006).

The allocation of transplantable organs

TSANZ has established protocols for the allocation of transplantable organs in Australia. An abridged version of the current pancreas protocol is provided in Attachment A. TSANZ released updated protocols for kidney-alone transplants recently, which use detailed national and state algorithms to determine allocation.

When consent is obtained to retrieve organs for transplantation from a suitable deceased donor, two kidneys and one pancreas generally become available for allocation. If the donor meets pancreas donation criteria, the pancreas and one kidney are offered first to either the WNPTU or MMC Unit, unless there is no or only one Human Leukocyte Antigen (HLA) mismatch with a person on the kidney-alone transplant waiting list, in which case the donor kidney is allocated to that person.
The absence of an HLA-matching requirement for kidney/pancreas transplantation means that when a pancreas and kidney are offered to a patient awaiting SPK, they are allocated to the next person on the waiting list who has the appropriate blood group. If the donor resides in Victoria or Tasmania, the MMC Unit is offered the organs first. Organs from potential donors from all other jurisdictions are offered preferentially to the WNPTU. The second kidney then is allocated to the larger pool of patients awaiting kidney transplantation, in accordance with national protocols.

The current pattern of allocation of pancreas/kidney donor organs, with the exception of the allocation of Tasmanian organs, reflects patient referral patterns to the WNPTU (which receives patients from all jurisdictions except Victoria) and the MMC (which to date has received patients only from Victoria). The allocation of donor organs is equitable, therefore, with respect to jurisdictional referral patterns.

Clinical criteria for accepting a pancreas for transplantation are more restrictive than criteria for accepting a kidney for transplantation and in many cases a deceased donor’s kidneys are suitable for transplantation but the pancreas is not, so both kidneys are allocated to patients awaiting kidney-alone transplantation.

Some (but certainly not all) patients awaiting kidney-alone transplantation also have the option of a living donor kidney transplant.

The strict acceptance criteria for a donor pancreas which result in allocation of the highest quality organs to patients awaiting SPK are perceived by some referring renal physicians and transplant surgeons to be inequitable with respect to patients awaiting kidney-alone transplantation. This is an issue of significant concern for some of these clinicians.

At present, each of the Units rejects some donor organs for non-medical reasons. A study in Victoria (yet to be published, but provided by MMC) indicated that 73% of donor organs which were offered to MMC were declined. This figure is consistent with international benchmarks. Of those organs declined in Victoria, 73% were declined for medical reasons and 27% were declined for non-medical reasons including surgeon unavailability (46%) and recipient unsuitability due to lack of AB blood group recipients (46%). Declined organs are offered routinely to the other NFC Unit. Some medically-suitable organs which are unable to be used by either Unit for solid organ transplant are allocated to the Islet Cell Transplantation Program or used for research.

It should be noted that while there is no limit to the number of transplants for which each NFC can receive funding, the WNPTU appears to have set itself an informal target of 25 transplants per annum based on its view of demand, its capacity to undertake transplants and relative waiting times for kidney-alone transplants. WNPTU staff advised that if it appears that this number of procedures will be exceeded in a year, they are more selective about accepting donor organs, thereby reducing the frequency of transplants and maintaining overall activity close to 25 procedures. Whilst some referring clinicians believe that patients on the SPK list receive unfair priority of organ allocation, a situation which would be worsened if the NFCs undertook more transplants, other clinicians expressed a strong
view that it is unacceptable for national centres to cap their activity. If a higher proportion of medically-suitable organs was accepted for SPK transplantation, however, the perceived inequity in waiting times between patients awaiting SPK transplants and patients awaiting kidney-alone transplants would increase.

**Kidney-alone transplant waiting list**

The number of patients with both non-diabetic and diabetic ESRD awaiting a kidney-alone transplant has declined steadily from 1710 at 31 March 2003 to 1344 at 31 December 2006. Of those waiting, about 35% were aged 44 years or younger. The two largest ten-year age cohorts were 45-54 years (30% of the total list) and 55-64 years (27% of the total list).

In 2006 there were 202 deceased donors and 738 kidney transplants, including transplants from living donors. In the previous five years the number of transplants was in the range of 614 to 789.

The average waiting time (time from first treatment for ESRD until transplantation) for kidney-alone transplantation is increasing. In 2006 it was 3.79 years for deceased donor organs and 1.38 years for living organ donors. The average waiting time for the five previous years for deceased donor transplantation was 3.55 years (range: 3.04-4.08 years) and 1.33 years for living donor transplantation (range: 1.16-1.53 years).

Australian and New Zealand Dialysis And Transplant Registry (ANZDATA) data for the five years to 31 December 2006 (Table 6) demonstrates a fairly consistent downward trend in the number of younger people waiting for kidney transplantation. When considering equity of access, this is the group of patients which should be compared with those awaiting SPK. In 2003 about half of all patients being dialysed were on transplantation waiting lists but by 2006 this had fallen to about one third. The number aged less than 44 years in 2006 on the transplantation waiting list was about 30% less than in 2003 and the number aged less than 35 years in 2006 on the transplantation waiting list was about 40% less than in 2003. This decline in the number of younger patients on the waiting list probably reflects the greater use of living donation given the ever increasing waiting time for kidneys donated by deceased donors.

**Table 6: Kidney transplant waiting list and dialysis trends for younger patients**

<table>
<thead>
<tr>
<th>Survey date</th>
<th>Patients aged &lt;35 years: waiting list (total number dialysing)</th>
<th>Patients aged 35-44 years: waiting list (total number dialysing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>31 March 2003</td>
<td>312 (613)</td>
<td>357 (754)</td>
</tr>
<tr>
<td>31 March 2004</td>
<td>279 (584)</td>
<td>313 (787)</td>
</tr>
<tr>
<td>31 December 2004</td>
<td>262 (580)</td>
<td>318 (805)</td>
</tr>
<tr>
<td>31 December 2005</td>
<td>217 (461)</td>
<td>274 (838)</td>
</tr>
<tr>
<td>31 December 2006</td>
<td>190 (531)</td>
<td>286 (871)</td>
</tr>
</tbody>
</table>

Source: ANZDATA 2003-2007 (table 7.2)
Pancreas transplant waiting times

Waiting time for pancreas transplantation starts when the transplant unit receives the referral. Median waiting times for patients currently on the waiting list and median waiting times for transplanted patients in recent years are reported in Table 7.

Table 7: Waiting times for pancreas transplantation (time in months)

<table>
<thead>
<tr>
<th></th>
<th>Current median wait (range) for waiting list patients</th>
<th>2007 median wait (range) for transplanted patients</th>
<th>2006 median wait (range) for transplanted patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>WNPTU</td>
<td>23 (9-80)</td>
<td>38 (17-51)</td>
<td>24 (8-93)</td>
</tr>
<tr>
<td>MMC</td>
<td>23 (6-32)</td>
<td>12.5% pre-emptive</td>
<td>12% pre-emptive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>28 (17-51)</td>
<td>21 (6-47)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0% pre-emptive</td>
<td>25% pre-emptive</td>
</tr>
</tbody>
</table>

Concerns about relative inequities between the kidney-only and kidney-pancreas waiting lists were expressed by many survey respondents. One referring clinician made the following comment:

"There should be equity of access for kidney only prospective recipients (KR) and kidney pancreas prospective recipients (KPR) to the pool of deceased donors. There needs to be a mechanism in place to ensure that this principle of allocation is achieved. The current mechanism may not achieve this because kidney/pancreas are allocated without an HLA matching whereas kidney only is allocated with HLA matching. This means that there is a degree of freedom enacted for KPR that is not enacted for KR."

At the conclusion of this chapter on access, we make some recommendations about how this contentious issue may be resolved.

Geographic access for pancreas transplants

The NFC program is supported by pro-rated contributions from all the States and Territories. Consequently, an objective of the program is to ensure that there is "optimal access to certain high cost, low demand, new and emerging technologies regardless of geographical location...".

It is possible to establish a number of comparative measures to determine whether the patients of each jurisdiction are being treated equitably and whether each jurisdiction is indeed receiving beneficial access for the funds it contributes. Each measure will have limitations, however, as it will be confounded by small case numbers, especially in the less populous States and Territories. In addition, fixing an appropriate denominator at a point in time may raise some questions about validity. The measures described below provide an indicative picture of access for residents on a State and Territory basis.
Based on the annual statistical returns made by each of the NFC Units, it is possible to calculate the number of solid organ pancreas transplantations per head of population (Table 8). From 1 July 2005 to 31 December 2007 there were 84 transplants. Given fairly stable relative populations, resident population at 30 June 2006 has been used as the denominator.

Table 8: Solid organ pancreas transplants per million population July 2005 to December 2007 (MMC); July 2005 to February 2008 (WNPTU)

<table>
<thead>
<tr>
<th></th>
<th>NSW</th>
<th>Vic</th>
<th>QLD</th>
<th>WA</th>
<th>SA</th>
<th>Tas</th>
<th>ACT</th>
<th>NT</th>
<th>Aust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resident population 2006 (millions)</td>
<td>6.62</td>
<td>5.09</td>
<td>4.05</td>
<td>2.05</td>
<td>1.55</td>
<td>0.49</td>
<td>0.53</td>
<td>0.21</td>
<td>20.6</td>
</tr>
<tr>
<td>Number solid organ pancreas transplants</td>
<td>23</td>
<td>23</td>
<td>18</td>
<td>9</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>84</td>
</tr>
<tr>
<td>Transplants per million population</td>
<td>3.47</td>
<td>4.52</td>
<td>4.44</td>
<td>4.39</td>
<td>3.22</td>
<td>6.14</td>
<td>5.63</td>
<td>0.00</td>
<td>4.08</td>
</tr>
</tbody>
</table>

Source: NFC Appendix 3 reports; ANZDATA Registry Reports

An alternative analysis is the number of transplants per target population, using as the denominator the number of new cases of ESRD in patients with type 1 diabetes who are aged either less than 44 or 54 years. In this measure the denominator selected is the number of new cases recorded in the ANZDATA reports for the three years 2004-2006. Given an average waiting time of about two years, this population corresponds with the patients transplanted since July 2005 (Table 9).


<table>
<thead>
<tr>
<th></th>
<th>NSW</th>
<th>Vic</th>
<th>QLD</th>
<th>WA</th>
<th>SA</th>
<th>Tas</th>
<th>ACT</th>
<th>NT</th>
<th>Aust</th>
</tr>
</thead>
<tbody>
<tr>
<td>New cases of type 1 diabetes; ESRD; age&lt;44; 2004-06</td>
<td>44</td>
<td>37</td>
<td>29</td>
<td>10</td>
<td>13</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>145</td>
</tr>
<tr>
<td>New cases of type 1 diabetes; ESRD; age&lt;54; 2004-06</td>
<td>64</td>
<td>58</td>
<td>33</td>
<td>14</td>
<td>18</td>
<td>7</td>
<td>4</td>
<td>5</td>
<td>203</td>
</tr>
<tr>
<td>Solid organ pancreas transplants 7/2005-12/2007</td>
<td>23</td>
<td>23</td>
<td>18</td>
<td>9</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>84</td>
</tr>
<tr>
<td>Transplants per 1000 new cases of type 1 diabetes; ESRD; age&lt;44; 2004-06</td>
<td>523</td>
<td>622</td>
<td>621</td>
<td>900</td>
<td>385</td>
<td>600</td>
<td>1500</td>
<td>0</td>
<td>579</td>
</tr>
<tr>
<td>Transplants per 1000 new cases of type 1 diabetes; ESRD; age&lt;54; 2004-06</td>
<td>359</td>
<td>397</td>
<td>545</td>
<td>643</td>
<td>278</td>
<td>429</td>
<td>750</td>
<td>0</td>
<td>414</td>
</tr>
</tbody>
</table>

Source: NFC Appendix 3 reports; ANZDATA Registry Reports
It should be noted that in the context of a highly specialised, small volume procedure there is
the potential for large variations in access rates as a consequence of small periodic
variations in the number of patients from each jurisdiction who are referred and/or treated.
Nevertheless, it appears that geographic access to the NFC pancreas transplant program
has been relatively equitable. Although South Australia (SA) appears to have a relatively low
rate of access, the prevalence of renal transplant patients in that state in 2006 was 478 per
million which was a third higher than any other State or Territory (ANZDATA 2007). It is
possible that potential SPK transplant patients are benefiting from high organ donor rates in
SA and receiving a kidney-alone transplant instead of waiting for a SPK transplant.

Although the MMC Unit has treated only Victorian patients, there is no evidence that either
NSW or Victorian patients are receiving preferential access because of the location of the
Units in their states.

During this review it became apparent that some referring units/clinicians were unaware of
the national nature of the program and in particular that the MMC Unit is funded as an NFC
and, therefore, is accessible by patients from outside Victoria. The MMC Unit also requested
guidance about program expectations regarding the number of procedures to be performed
and the expected geographic scope of its service.

A number of issues need to be considered in this context. The WNPTU has achieved a
critical mass, supporting a sustainable service which is engaged actively in research,
education and training and has demonstrated significant national and international
leadership. Its research output, in particular, is impressive. Whilst working collaboratively
with the MMC Unit, it is concerned that any redirection of existing referral streams to the
MMC Unit would diminish its critical mass and damage its prospects for successful
development. The MMC Unit is keen to expand its patient numbers, but not at the expense
of the WNPTU. In addition, the cost of two Units each providing interstate outreach services
in the same jurisdictions needs to be factored in to any decision about extending the MMC
Unit’s national role.

Ensuring that further development of the MMC Unit occurs without detriment to the well-
performing WNPTU is a key issue for the future development of this NFC program. The
issue is considered later in this report (see discussion commencing on page 56) and an
expansion in total procedural numbers which will enable the MMC Unit to expand its
procedural numbers and geographic scope without detriment to the sustainability of the
WNPTU is recommended.

**International acceptance criteria**

As noted above, the principal target group for solid organ pancreas transplantation is
patients with type 1 diabetes and ESRD. The overall mean age of patients receiving
pancreas transplants is increasing (Gruessner & Sutherland 2005) and in some centres in
the USA patients with type 2 diabetes are admitted to the program.
In the USA, the average age of pancreas transplant recipients has increased gradually at all centres for all transplant types (Table 10).

Table 10: Proportion of pancreas transplant recipients aged over 45

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SPK</td>
<td>9%</td>
<td>24%</td>
<td>32%</td>
</tr>
<tr>
<td>PAK</td>
<td>9%</td>
<td>29%</td>
<td>36%</td>
</tr>
<tr>
<td>PTA</td>
<td>11%</td>
<td>25%</td>
<td>34%</td>
</tr>
</tbody>
</table>

Source: (Gruessner & Sutherland 2002, 2005)

It has also been reported that the proportion of SPK transplanted patients aged over 50 years was 15% in 2003 and 19% in 2004 (Cohen et al 2006).

Pancreas transplantation is not used commonly for type 2 diabetic patients, who are more likely to be older and obese and predominantly have insulin resistance rather than insulin deficiency. A survey of USA transplant programs confirmed that older age and/or obesity are viewed as an absolute contraindication to pancreas transplantation in a significant proportion of centres (Friedman & Friedman 2002).

It has been reported that 7.7% of USA SPK recipients in the period 2002-03 had type 2 diabetes (Gruessner & Sutherland 2005). In the 2004 IPTR Annual Report it was further noted that more pancreas transplant patients had type 2 diabetes than in previous years. At that stage outcomes were similar for type 1 and type 2 patients, although it was suggested that further analysis was needed to determine if the two groups did indeed differ epidemiologically (IPTR 2004).

In the period 2000-2004 for SPK recipients with type 1 or type 2 diabetes there was no difference in patient or pancreas graft survival (Gruessner & Sutherland 2005). Recipients with type 1 and type 2 diabetes are reported to have the same HbA1c and frequency of requiring insulin or oral hypoglycemic agents after SPK transplantation (Light et al 2001). The encouraging results reported for pancreas transplantation in recipients with type 2 diabetes are likely, however, to be accounted for by conservative selection policies (Friedman & Friedman 2002).
Current Australian acceptance criteria

TSANZ establish general recipient suitability criteria for pancreas transplants. The criteria were reviewed in November 2007 and require the patient to:

- have type 1 diabetes mellitus, with ESRD acceptable for kidney transplantation;
- be accepted onto the waiting list by a recognised SPK transplant unit; and
- have an absence of contra-indications including life threatening disease considered to preclude successful pancreas or kidney transplantation.

The Units then establish additional specific criteria, which are based upon their knowledge and experience of patient outcomes. Both of the Units have a maximum age requirement (50 years) with some flexibility in its application if a patient has a better functional status than his or her age would suggest. In addition, the WNPTU has an explicit requirement about body weight as a percentage of ideal body weight.

The MMC Unit advised that it accepts patients with a Glomerular Filtration Rate (GFR) <25 ml/min and the WNPTU advised that its admission criterion is a GFR of <15 ml/min, which is stage 5 in the National Kidney Foundation Kidney Disease Outcomes Quality Initiative (KDOQI) classification of chronic kidney disease (Chadban & Ierino 2003). There appears to be little difference in practice, however, about when patients are accepted as 'active' on the waiting lists of each of the Units. The general rule is that patients are placed on the waiting list from the date of referral which has the value that patients who have rapidly deteriorating stage 3 or stage 4 chronic kidney disease are referred early while those with slower and less devastating disease courses are referred later. This prioritisation system, which is simply determined by the decision to refer, removes the need for clinicians in the two NFC Units to make other subjective judgements about patient priority.

Patients who are referred early, before their renal failure has deteriorated sufficiently to warrant the risks of immunosuppression, are not listed as 'active' in either unit until their GFR is < 15 ml/min. The WNPTU advises that an increasing number of patients fall into this category.

Placing patients on the waiting list from the date of referral is perceived by some referring clinicians to be inequitable, however, because waiting time may commence before the patient has significant signs or symptoms of renal failure. A small number of SPK patients receive pre-emptive transplants, an option which is not available to kidney-alone deceased donor transplant recipients. A patient's outcome is likely to be better if they have not commenced dialysis or have experienced a reduced time on dialysis.

In contrast with units in the USA, the Units do not accept patients with type 2 diabetes or patients aged more than 50 years for treatment, with some flexibility applied in relation to the age limit. The age limit is applied because of generally worse outcomes for older transplant patients - see the discussion on factors known to affect health outcomes, commencing on
page 33 of this report. In addition, the additional life years available to young donor recipients from well functioning kidney and pancreas transplants will exceed those of older recipients.

These acceptance criteria have been queried by some referring clinicians. The active waiting lists for both Units are relatively short and at times a suitable donor organ cannot be accepted because there is no suitable patient. Many patients on the waiting list are not ready for transplant at any point in time. Each Unit requires at least 6 blood group O, 4 group A, 3 group B and 1 group AB patients on the list, so it may be difficult for a smaller Unit to maintain an effective list unless broader acceptance criteria are applied. Some physicians believe that there is the potential to expand the waiting list acceptance criteria to accommodate some selected older patients and/or selected patients with complicated type 2 diabetes.

If USA trends are replicated in Australia the demand by older patients for SPK transplants will have an impact on the length of the waiting list and waiting time. If more patients are transplanted there also will be cost implications.

### Waiting list numbers and waiting times

Consistent with overseas practice both Units maintain an active and a 'not ready for transplant' list. At the beginning of February 2008, the MMC Unit had an active waiting list of 17 patients (15 awaiting SPK and two awaiting PAK) and an inactive waiting list of 37 patients; and the WNPTU had an active list of 23 patients (all awaiting SPK) and an inactive waiting list of approximately 87 patients.

Maintaining patients fit for transplant is a resource-intensive process. Patients are inactive for a range of reasons, both clinical and social.

Seventeen (42.5%) of the forty patients on the active waiting lists were resident in Victoria, a proportion in excess of that which would be expected based on population (approximately 25%). If the availability of organs for transplantation remains stable, the larger waiting list is likely to result in longer waiting times for Victorian patients. If, however, an increased number of organs were available for transplant (either through increased donation rates or fewer rejections of suitable organs) the higher proportion of Victorian patients on the waiting list would result in preferential access by Victorians to the NFC program.

As noted earlier in this report, the MMC Unit advised that median waiting time for patients currently on the active waiting list is 23 months. The median waiting time for transplanted patients was 28 months in 2007 and 21 months in 2006. The median waiting time for patients currently on the WNPTU waiting list also is 23 months, whereas the median waiting time for transplanted patients was 38 months in 2007 and 24 months in 2006.

Since 2004, twenty-two patients referred to the MMC Unit have been removed from the waiting list, twelve because of medical unsuitability and ten because of death.
We believe that in a national program, national waiting times should be equitable. A national waiting list would be one mechanism to standardise waiting times. As noted above, however, current waiting times are fairly similar between the Units, so any change to the current arrangements would need to be justified. We address this issue below.

Rural patient access

Patients from rural and regional areas often are disadvantaged compared to patients from metropolitan areas with respect to access to primary, secondary and tertiary health care. NFC program funding offers the opportunity to overcome rural disadvantage with respect to pancreas transplant.

In the USA patients living in small towns and isolated rural areas had a lower rate of admission to solid organ waiting lists (8-15% less) and transplantation of solid organs (10-20% less) (Axelrod et al 2008).

In Canada renal transplantation rates varied from 27.4 (per million population) in Saskatchewan to 51.8 (per million population) in the Atlantic states (Knoll et al 2005).

Twenty percent of patients transplanted at the MMC Unit since 2004 lived outside the metropolitan area, which is less than the proportion of 25% of Victorians who live outside Melbourne. Over a similar period 30% of patients transplanted at the WNPTU lived outside capital cities. Overall for both Units the figure was 27% whereas 36% of Australia’s population lives outside capital cities. It is possible, however, that people with serious chronic illnesses including type 1 diabetes and ESRD may reside preferentially in metropolitan areas to facilitate their access to essential health services. It is not clear, therefore, if there is inequitable access to the program based on place of residence. Further analysis of the places of residence of patients who may be eligible for a pancreas transplant would be worthwhile.

Summary of access issues and their resolution

The following access issues were raised by stakeholders during this review:

- waiting list management criteria are not always transparent to referring clinicians;
- each Unit currently maintains separate waiting lists, with the potential for differential waiting times between the Units;
- patients awaiting SPK transplantation receive priority access to the highest quality kidneys in a shorter time frame than patients awaiting kidney-alone transplantation;
- patients waiting for, and who have had, an SPK transplant are on average younger than patients awaiting a kidney-alone transplant;
- clinical criteria for admission to the waiting list are more restrictive than those adopted by some USA units, which are achieving good results in selected patients;
a patient who is eligible for an SPK transplant can be admitted to the waiting list earlier than a patient who requires a deceased donor kidney-alone transplant;

- a patient may receive a deceased donor SPK transplant pre-emptively, an option which is not available to patients awaiting deceased donor organs for kidney-alone transplants;

- some patients awaiting a pancreas transplant also are on the kidney-alone waiting list, which some referring clinicians believe gives an unfair ‘double chance’;

- proportions of PAK transplants and PTA are lower in Australia than in comparable international centres; and

- some medically-suitable organs are not able to be utilised for pancreas transplant, usually because of lack of availability of staff or because of insufficient waiting list numbers to take up organs of all blood group types.

In addition, later in this report we note consumer views that it is likely that some eligible patients are unaware of the availability of this procedure.

We make the following comments and recommendations:

- clinicians who work within the NFC Units and others who refer to those Units clearly share an objective of ensuring that organ allocation rules are equitable between groups of patients with different conditions and needs and that the benefits from organ transplantation to the individual and community are maximised. There are challenging clinical and ethical issues that need to be considered and there is no ‘right’ answer but it is important that allocation criteria are reviewed periodically and outcomes monitored to ensure reasonable equity between the two NFC Units and between the NFC program and the kidney-alone transplantation program;

- there should be nationally-accepted criteria for admission to the NFC pancreas transplant program which are transparent to referring clinicians and which are designed to achieve national equity of access;

- criteria for admission to the NFC program should be reviewed formally by the NFC Units in conjunction with referring clinicians, taking into account international experience. In particular, the flexibility of the 50 year age cap depending on the patient’s health status, the eligibility of type 2 diabetic patients and the relatively low numbers of PAK transplants in Australia should be reviewed; and

- a date of admission to the waiting list that commences from the date of the referral letter may not be clinically relevant; may be open to ‘gaming’; and would benefit from review.
Recommendation 2

That the NFC Reference Group asks the Transplantation Society of Australia and New Zealand and the recently established Cognate Committee on Organ and Tissue Donation and Transplantation to consult with the NFC Units and other relevant stakeholders (including referring renal physicians and jurisdictional transplantation committees) and:

- confirm or re-define the criteria which govern the allocation of organs for SPK transplantation; and
- clarify national criteria for admission into the pancreas transplant program including agreed criteria for the date of acceptance onto the waiting list and whether patients should be permitted to be on both the SPK waiting list and the kidney-alone waiting list.

Recommendation 3

That the NFC Reference Group incorporates key indicators of waiting lists, waiting times and utilisation of medically-suitable organs into the framework for reporting by the NFC Units, enabling the NFC Reference Group to monitor equity of and trends in access to pancreas transplantation and report this information regularly to jurisdictions.
Health outcomes

Introduction

The provision of effective health services is a key objective for NFCs.

Internationally, advances in surgical techniques, immunosuppression therapy, graft preservation techniques, methods of diagnosis and treatment of rejection and management of common post-transplant complications have led to significant improvements in graft and patient survival (Larsen 2004).

This section describes outcomes achieved internationally and by the NFC Units.

International experience


Patient age

Recipients aged more than 40 have been shown to have lower patient survival after SPK or PAK transplant than those aged less than 40 (Venstrom et al 2003; Navarro et al 1996). There may be no benefit in patient survival in SPK over kidney transplant alone in patients aged over 50 (Ojo et al 2001).

UNOS data to December 2004 demonstrated that while SPK and PAK patients older than 44 years at the time of transplantation showed an increased mortality risk, their risk of immunological graft loss was significantly decreased. Multivariate analyses demonstrated a significantly higher hazard ratio for recipients older than 45 years compared with recipients aged 30-44 years. In the PTA category, there were no clear associations between recipient age and patient survival (Gruessner and Sutherland 2005).

Diabetes

The duration of diabetes increases the risk to the patient, with the presence of neuropathy and abnormal cardio-respiratory reflexes also predicting greater mortality in pancreas transplant recipients (Navarro et al 1996).

Microvascular complications of diabetes include retinopathy, neuropathy, nephropathy and peripheral microangiopathy which leads to skin ulceration.
A functioning pancreas graft can prevent the development of diabetic nephropathy and early pathological changes of diabetes in native kidneys can reverse after more than 5 years of normal pancreas function (Fioretti et al 1998).

Diabetic retinopathy may worsen initially after pancreas transplantation with sudden improvement in glucose concentration. After 3 or more years of pancreas graft function, less laser photocoagulation treatment is required after SPK transplantation compared with kidney-alone transplantation in patients who do not have end-stage eye disease already. It has been reported that 40 to 55% of patients who have had a pancreas transplant require cataract surgery within 5 years, although many cataracts began before transplant (Pai et al 2000). Patients on corticosteroids are at particular risk of developing cataracts.

In the United Kingdom, a review of seventeen SPK cases with a mean follow-up of 5.1 years found that of nine patients who had unstable diabetic retinopathy before transplantation, eight had stabilised after the transplant and only one needed photocoagulation. All eight cases which were stable before transplantation remained stable post-transplantation. Seven of seventeen (41%) patients required cataract surgery in the follow-up period (Pearce 2000).

Ongoing improvements in sensory and motor neuropathy occur up to ten years after SPK transplantation. Autonomic neuropathy parameters such as hypoglycaemic unawareness and autonomic response to hypoglycaemia have improved in some studies, though autonomic neuropathies, if they do improve, may take more than ten years and may only be partially reversible (Larsen 2004).

Immunosuppressive agents contribute to weight gain, dyslipidaemia, increased blood pressure, and insulin resistance after transplantation. Immunosuppression protocols, the procedure performed and genetic, ethnic, or behavioural variables may contribute to differences reported in cardiovascular risk factors and outcomes between populations and centres (Larsen 2004).

In people with type 1 diabetes with ESRD who had an SPK transplant, blood pressure and dyslipidaemia significantly improved compared to pre-transplant levels, whereas kidney transplant alone did not have these positive effects (Luan 2007).

The main cause of death for patients with diabetes and patients on dialysis is coronary artery disease. Pre-existing vascular disease and greater time of pre-transplant dialysis are also risk factors for macrovascular events such as peripheral vascular disease, cardiovascular disease and carotid artery disease (Woeste et al 2006). Individual vascular risk factors may vary according to a patient’s genetic risk, smoking status or weight gain, the immunosuppressive agents used, the procedure performed, and post-transplant graft function (Nankivell et al 2000). Withdrawal of corticosteroids and calcineurin inhibitors generally leads to improvements in blood pressure and lipid profiles, though acute rejection may occur, but overall graft loss and mortality rates are not affected (Marcen 2006). Hypertension management is important to prevent graft loss and cardiovascular events, though it is commonly aggravated after kidney transplant. Achieving a blood pressure target, therefore, is of great importance (Larsen 2004).
Pancreas transplantation neither worsened nor improved peripheral vascular disease events or progression (Knight et al 1998; Biesenbach et al 2000). Amputation can result not only from peripheral vascular disease but also from an injury or infection resulting from preexisting neuropathy or immunosuppression (Larsen 2004). In patients who have had pancreas transplants, foot infections are reported to be the second most common infection after cytomegalovirus (CMV) (Bruce et al 1996). The risk of amputation is greatest in those with longer duration of pre-transplant dialysis and history of amputation before transplant (Woeste et al 2003).

The results to date suggest that macrovascular disease improves in most patients after SPK transplantation, but inadequate data are available to comment on change in risk after pancreas transplantation alone or PAK transplantation (Larsen 2004).

SPK transplantation also improves pulmonary function in uraemic type 1 diabetic patients (Dieterle et al 2007).

Immunosuppression increases the risk for a number of different kinds of infection. Most, if not all, patients who have undergone pancreas or SPK transplantation will have some type of infective episode in the first year after transplantation (Fishman & Rubin 1998), with deaths from infection greater in recipients of SPK transplants than recipients of kidney-alone transplants (Manske, Wang & Thomas 1995). Viral infections are a particular concern in the first 6 months after transplantation. CMV infections can cause unexplained fever and may predispose to both acute and chronic rejection of the organ as well as other opportunistic infections and possibly vascular disease (Larsen 2004).

Cancer risk also increases with chronic immunosuppression. The two most common reported cancers are skin cancers and post-transplant lymphoproliferative disease (PTLD). Most known causes of death in 1996-2002 USA pancreas recipients were from cardio-cerebro-vascular accidents (1.3-2.6% incidence) or from infections (1.2-1.4% incidence), while death from malignancy or PTLD was reported in less than or equal to 0.6% of recipients (Gruessner & Sutherland 2002).

Immunosuppression agents and other factors in pancreas transplant patients impact upon bone turnover and bone mass, so patients are at risk of osteoporosis (Larsen 2004).
NFC results - mortality

Patient and graft survival rates in Australia are improving (Table 11) and compare favourably with international results (Table 12).

Table 11: One year SPK graft survival in Australia & New Zealand by decade

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney</td>
<td>83%</td>
<td>94%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>82%</td>
<td>87%</td>
</tr>
</tbody>
</table>

Source: ANZPTR 2007

Table 12: Three year graft and patient survival in Australia & New Zealand and the USA

<table>
<thead>
<tr>
<th></th>
<th>MMC current patient cohort</th>
<th>WNPTU</th>
<th>USA OPTN/SRTR 2000-2003 cohort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney</td>
<td>85.3%</td>
<td>94%</td>
<td>85%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>76.7%</td>
<td>85%</td>
<td>79%</td>
</tr>
<tr>
<td>Patient</td>
<td>96.9%</td>
<td>94%</td>
<td>91%</td>
</tr>
</tbody>
</table>

Source: Kave et al 2007; Chapman personal communication 2008; Cohen et al 2006

The following three figures compare patient and graft survival for patients treated at the MMC Unit and the WNPTU. In Figure 1 the number at risk means the number of patients alive and in that cohort. The total number of transplants performed by WNPTU is 246, with 102 at MMC. At five years post transplant, 142 WNPTU patients and 56 MMC patients remain alive.

Similarly, Figures 2 and 3 provide actual pancreas and kidney graft survival numbers for each 5 year cohort post transplant. These data are translated into a graphical representation in the respective figures.
Figure 1: Patient survival MMC Unit and WNPTU

![Graph showing patient survival]

Number at risk

<table>
<thead>
<tr>
<th></th>
<th>Follow-Up Time (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Westmead</td>
<td>246</td>
</tr>
<tr>
<td>Monash</td>
<td>102</td>
</tr>
</tbody>
</table>

Figure 2: Pancreas graft survival MMC Unit and WNPTU

![Graph showing pancreas survival]

Number at risk

<table>
<thead>
<tr>
<th></th>
<th>Follow-Up Time (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Westmead</td>
<td>245</td>
</tr>
<tr>
<td>Monash</td>
<td>101</td>
</tr>
</tbody>
</table>
The three year survival rates appear to demonstrate that the WNPTU is achieving somewhat better kidney and pancreas graft survival rates than the MMC Unit, whilst the MMC Unit appears to be achieving slightly better patient survival rates than the WNPTU, however the differences are not statistically significant. Overall, Australian outcomes are better than outcomes reported by USA centres.

The ten-year graft and patient survival for Australia and New Zealand SPK transplant patients compares favourably with other transplantation options (Table 13).

**Table 13: Graft and patient survival for kidney transplants in type 1 diabetics (Jan 1980-Dec 2004)**

<table>
<thead>
<tr>
<th>Donor &amp; Patient characteristics</th>
<th>Number</th>
<th>10 year patient survival</th>
<th>10 year kidney graft survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living donor; type 1 diabetes</td>
<td>83</td>
<td>65.6%</td>
<td>63.8%</td>
</tr>
<tr>
<td>Deceased donor; type 1 diabetes</td>
<td>159</td>
<td>32.2%</td>
<td>11.2%</td>
</tr>
<tr>
<td>Deceased donor; SPK</td>
<td>245</td>
<td>76.5%</td>
<td>66.1%</td>
</tr>
</tbody>
</table>

Source: Chapman et al 2006

We have concluded that both Units are achieving good results which are comparable to those achieved by international centres.
NFC results - morbidity

Each Unit is required to provide an annual report to the NFC Secretariat (based on the criteria set out in Appendix 3 of the Guidance Document) which includes information about patient outcomes including nosocomial infections, adverse events, unplanned admissions to ICU and unplanned readmissions after discharge.

The WNPTU advised in general terms that for the 2005-06 and 2006-07 financial years and for the seven months to February 2008, nosocomial infections, adverse clinical events and unplanned readmissions were within the expected range, without specifying exact numbers. In 2005-06 there was one ICU admission for a patient with a blocked IVC; in 2006-07 admissions were for bleeding, respiratory failure and pulmonary embolus; and to date in 2007-08 there have been two admissions related to respiratory problems.

The MMC Unit reported complications as detailed below (Table 14).

Table 14: MMC complications, July 2005-February 2008

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nosocomial infections</td>
<td>abdominal sepsis</td>
<td>CMV oesophagitis</td>
<td>enterococcal septicaemia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PUO</td>
<td></td>
</tr>
<tr>
<td>Adverse clinical events</td>
<td>severe rejection episode</td>
<td>2 pancreas graft thromboses</td>
<td>pancreas graft thrombosis pancreatitis</td>
</tr>
<tr>
<td>Unplanned admit to ICU</td>
<td>-</td>
<td>-</td>
<td>airway support</td>
</tr>
<tr>
<td>Unplanned readmit post discharge</td>
<td>abdominal sepsis</td>
<td>3 febrile illnesses</td>
<td>hypotension renal biopsy</td>
</tr>
<tr>
<td></td>
<td>2 CMV infection</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NFC results - graft failure

In Australia and New Zealand for the period 1984-2006 the most common cause of pancreas graft failure was thrombosis which occurred in about half of the failed transplants, with almost 20% of failures due to rejection. Kidney graft failure was caused by thrombosis in 41% of cases and rejection in 35% of cases (ANZPTR 2007). At the WNPTU graft thrombosis occurred in 9.3% of enteric drained grafts (4 cases) compared with 16.2% of bladder drained grafts (23 cases) (WNPTU 2008). The MMC Unit has pancreas graft thrombosis rates of 7.5%, with one year rejection-free survival rates of 67.2% in portal-enteric drainage transplants (Kave et al 2006)
Quality of life

The goal of organ transplantation is not only to ensure the survival of individuals but also to offer patients the health they enjoyed before the disease, achieving a good balance between the functional efficacy of the graft and the patient’s psychological and physical integrity. Quality of Life (QOL) is emerging as a new medical indicator in transplantation medicine (Burra et al 2007).

QOL improves after both SPK transplantation and kidney-alone transplantation when the recipient receives the procedure they were expecting. Individuals who received a combined pancreas-kidney transplant but experienced pancreas graft failure were far less positive about a change in QOL even if the kidney graft still functioned, because of the disparity from expectation (Milde, Hart, Zehr 1995). Studies have shown improvements in physical health in both SPK transplant and kidney-alone transplant recipients, but there are greater improvements in diabetes-related disease parameters after SPK transplantation (Gross et al 2000). Sustained improvement in diabetes-related QOL was better in patients following SPK transplantation compared with those who remained on the waiting list, although overall improvement in QOL was not found (Sureshkumar et al 2006).

Knoll & Nichol (2003) used a decision analytic Markov model on UNOS registry data; patient interviews; and the published literature to determine the life expectancy (LE) and quality of life following transplantation of Type 1 diabetic patients with ESRD (see Table 15). When living kidney transplantation is excluded from the analysis, SPK transplantation provides the greatest LE and quality-adjusted life expectancy benefit.

Table 15: LE and QOL for transplant patients with type 1 diabetes and ESRD

<table>
<thead>
<tr>
<th>Treatment modality</th>
<th>Life expectancy in life years</th>
<th>Quality-adjusted life years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living kidney transplant</td>
<td>18.30</td>
<td>10.29</td>
</tr>
<tr>
<td>PAK transplant</td>
<td>17.21</td>
<td>10.00</td>
</tr>
<tr>
<td>SPK transplant</td>
<td>15.74</td>
<td>9.09</td>
</tr>
<tr>
<td>Cadaveric kidney transplant</td>
<td>11.44</td>
<td>6.53</td>
</tr>
<tr>
<td>Dialysis</td>
<td>7.28</td>
<td>4.52</td>
</tr>
</tbody>
</table>

Source: Knoll & Nichol 2003

Staff of the WNPTU noted the difficulty of undertaking QOL assessments and problems of interpreting results for the small number of patients involved. The WNPTU uses a number of QOL measures including the Campbell Health Scale, the Nottingham Health Profile and the Diabetes Control & Complication Trial. Quality of life is assessed both before and after transplantation.

The Campbell Health Scale is a subjective measure of well-being with scores of less than three indicating very low well-being and patients with very high levels of well-being and no chronic health conditions scoring more than fourteen. Prior to transplantation WNPTU
patients had a mean score of 6.5 (+/- 1.6); after transplantation the mean score was 10.1 (+/- 1.8), which represented a mean score improvement of more than 50%.

The Nottingham Health Profile measures six factors. There was an improvement on mean scores for each measure after transplantation but especially for energy, social isolation and emotional reaction and less so for physical mobility, sleep and pain.

The WNPTU also has established a Cardiac Rehabilitation Program which for the first ten patients shows increased QOL, improved exercise tolerance and weight maintenance on before and after measures.

Notwithstanding the requirement that an assessment of QOL should be undertaken, MMC has advised in its Appendix 3 reports that this has not in fact occurred. As noted above WNPTU is concerned that small case numbers impact upon the validity of the findings, Consequently a collaborative approach between the Units may be required to overcome this problem.

The Annual Appendix 3 Report to the NFC secretariat is an important mechanism to ensure accountability for the expenditure of funds. As currently structured, however, it is uncertain whether it captures the most useful information. Without introducing unnecessary burdensome reporting requirements the Units should be consulted further about what information about morbidity and mortality can usefully be disclosed. In addition, mechanisms should be investigated to develop statistically valid measures of quality of life in the Australian context.

**Recommendation 4**

That the WNPTU and the MMC Unit, in consultation with the Transplantation Society of Australia and New Zealand (TSANZ), develop a common set of key clinical performance indicators specific to pancreas transplantation and that the NFC Secretariat adopts those performance indicators as the basis for reporting by the Units on their clinical performance.
Stakeholder perspectives on the Nationally Funded Centres

Introduction

Referrals to the WNPTU and the MMC Unit usually are made by specialist nephrologists, although some referrals are made by other clinicians. An important aspect of this review was seeking advice from referring units about their experiences in dealing with the Units, as well as their views on the service system configuration.

To obtain the views of referring clinicians, each jurisdiction was asked to distribute a survey to all parent hospitals and/or regional networks listed on the ANZDATA Registry. A copy of the survey is at Attachment B.

Fourteen responses were received from the following jurisdictions:

- ACT (1);
- NSW (5);
- Queensland (3);
- South Australia (1);
- Tasmania (1);
- Victoria (3);
- Western Australia (1).

Three responses were from units which refer to the MMC Unit and 11 responses were from units which refer to the WNPTU.

Interviews also were conducted with clinicians from Western Australia and South Australia.

In addition, focus groups were held with consumers from both the MMC Unit and the WNPTU. People on the waiting list, people who had undergone successful SPK and people who had undergone failed SPK were included in these focus groups.

Below, we detail referring clinicians’ perspectives as conveyed via the survey responses and interviews and patient perspectives as conveyed via the focus groups.
Referring clinician satisfaction with the NFC pancreas transplant program

Clinician satisfaction with the services provided by the NFC units generally is high but varies.

Referring clinician responses to the question "How would you rate the overall service provided by Westmead/MMC" where a response of 1 indicates "not at all satisfactory" and a response of 5 indicates "entirely satisfactory" are depicted in Figure 4. It should be noted that of the 11 respondents commenting primarily on the WNPTU, 9 scored their overall satisfaction at 3 or more out of 5; and each of the 3 respondents commenting primarily on the MMC unit scored their overall satisfaction at 4 or 5 out of 5.

Figure 4: Overall satisfaction with NFC pancreas transplant units

At a program level, there appears to be significant concern about preferential allocation of high quality donor kidneys to patients awaiting SPK which is seen by a significant number of clinicians as detrimental to patients awaiting kidney-alone transplantation. There also were a significant number of questions and comments about management of the waiting list including:

- the date on which the patient is entered onto the list (waiting time is credited from the date of the referral letter);
- the opportunity for SPK patients to receive pre-emptive transplantation, whereas deceased donor kidney-alone patients cannot;
- a perceived lack of transparency of management of the list; and
- the age-related criterion for acceptance into the program.

Concerns about the allocation of donor kidneys are summed up in the feedback from one respondent:

"The program needs to liaise better with other renal transplant services to synchronise or better align acceptance criteria and to specify proportions of donor kidneys to be allocated to kidney-pancreas vs. kidney transplants. The current situation where the
kidney-pancreas team automatically get first option on young donor kidneys is unjust and inequitable."

Other unit-specific issues raised by referring clinicians included:

**In relation to the MMC Unit:**

- in the majority of cases communication is generally rated as excellent, however one respondent advised that communication after transplantation was poor;

- updated written information would be of help (although there are very few patients this affects and most information is gathered by the patient from the MMC Unit);

- referring units have a very strong desire for patients to return to their care earlier. Patients should be vigorously encouraged by staff of the MMC Unit to return to their referring units. If patients elect to stay at the MMC Unit for their ongoing care, then continuing follow up information would be appreciated; and

- the approach is low in formality, outcomes are perceived to be excellent and there is less work for a good result.

**In relation to the WNPTU:**

- many referring clinicians described the service as a whole and the quality of care provided to patients on the waiting list and post-transplant as "excellent";

- many also indicated a desire for better communication including protocols for workup, a long term management plan for referred patients, feedback regarding patient progress, better information about the scheduling of interstate visits and information about pancreas survival rates; and

- two referring clinicians described significant patient distress about the circumstances in which they were told that they were not eligible for the WNPTU program.

Later in this report, we address the issues that were raised by these responses.

**Patient satisfaction with the NFC pancreas transplant program**

The focus groups with patients addressed the following issues:

- their knowledge of the procedure before their referral to the units;

- the adequacy of information provided to them at the time of referral and subsequently;

- their views on the way the waiting list is managed;
their experience of care whilst on the waiting list; during transplantation; and during the follow-up period;

• their views on the outcome of the procedure; and

• their views on the issue of the service system configuration.

Patients were extraordinarily positive about their experience. Whilst the procedure is complicated and demanding, the outcomes of a successful transplant are valued highly.

Program-related issues that were raised included:

• there is insufficient information available to people with type 1 diabetes with ESRD about the procedure and its potential benefits. Several patients from each Unit advised that they had raised the possibility of a SPK with their primary specialist, some of whom were sceptical about the procedure or did not know it was available. Patients believe that their referral was strongly influenced by their choice of specialist prior to referral, and that some specialists still see the procedure as “experimental” and will not refer. Patients saw this as raising significant inequities - in their view, a significant proportion of eligible patients may be unaware of the availability of the procedure;

• patients believe that the benefits of pancreas transplantation are so significant that it should be offered to people with type 1 diabetes even if they do not have renal failure. Several patients described the chronic debilitating effect of diabetes and their substantially enhanced sense of wellbeing post-transplant;

• there was discussion about the benefits of pre-emptive transplant, prior to commencing dialysis. Some patients strongly supported this, but an alternative view held by one consumer was that it may not be unreasonable for patients to experience dialysis before transplant, so that their “respect for the transplant” is enhanced;

• patients are aware that waiting times for SPK are shorter, on average, than waiting times for a deceased donor kidney transplant, but do not believe this is unfair;

• there is support for concentration of services to enhance expertise, but patients in NSW and Victoria recognise that they are very fortunate to have units in their home states:

  “It’s better to have fewer centres with more expertise.”

• in general, there was a view that access to the program should be based on an individual’s health status and the likelihood of success, rather than having a strict age criterion:

  “It needs to be about the individual - there should not be age-based rules.”
Unit-specific issues raised by patients included:

In relation to the WNPTU

The focus group at the WNPTU included four transplanted patients (three with carers) who had received their pancreas transplants between 7 weeks to more than 20 years previously. One patient resided interstate and she and her carer were visiting for routine follow up.

Patients who were cared for at the WNPTU were highly complimentary about the care they received.

There was strong endorsement of the level of information provided to them, at referral and throughout the episode of care:

"The information provided was exceptional".

The WNPTU provides significant support for patients and their carers when they visit the centre as well as in their home states. Patients were particularly appreciative of the coordination of the non-clinical aspects of their visits; the provision of accommodation; the availability of outreach services for interstate patients; and the support provided to carers:

"The support for partners is phenomenal."
"I had to stay near the hospital for 4 weeks … it was all organised."
"Everything is covered for the first 12 months. We only had to pay for meals and they were in the hospital cafeteria so they weren’t expensive."

There is a very high level of confidence in the skills and commitment of the health care professionals, both medical and nursing:

"The doctors provide their personal mobile numbers to us."
"We have great confidence in the nursing staff. It’s really important to have highly specialised staff."
"I felt I was in the best hands. How confidence-building is that?"
"The staff have been doing this for 20 years. The nurses know their stuff."
"The staff promote a very positive attitude."

All patients and carers expressed very high levels of satisfaction with the outcome of the transplant:

"The outcome is fantastic. The team is fantastic."
The MMC Unit

Participants in the MMC Unit focus group included two recently transplanted patients (one with a carer), a patient who had experienced both kidney and pancreas graft failure and was on dialysis and awaiting a second SPK, a patient who was living with a successful SPK and a patient on dialysis awaiting an SPK.

Patients also were complimentary about the quality of care they had received and, like the WNPTU patients, were extraordinarily positive about the impact of a successful transplant on their quality of life.

Some observed that there can be a loss of confidence following transfer from a 'home' renal unit which has provided good care, and it took time to build confidence in the MMC Unit, particularly when nurses were not well known to them and appeared very busy.

"You don't know the nursing staff and you are in a very fragile situation."

Relationships developed, however, particularly during the transplant episode.

There was an interesting discussion about the service system configuration. There was a view within the MMC Unit consumer group that the WNPTU program had more resources and that there may be benefit from attending a centre that is more experienced. All patients, however, were strongly supportive of the local unit:

"It would be very, very hard to go to Westmead. Family support is critical and you need to be local to get that."

Two patients were specifically aware, prior to transplant, that the WNPTU had more experience than the MMC Unit and one patient believed that that experience was likely to translate into better outcomes, particularly in the longer term, but neither patient elected to seek referral to the WNPTU. It was unclear whether this was because they did not believe the option was open to them or because they valued local access more highly. It was not considered appropriate to pursue this discussion further in the focus group setting.

Patients at the MMC Unit raised concerns about the expenses they were subject to, including car parking and costs of accommodation. While rural patients receive subsidies for such costs, patients felt that people living a significant distance from MMC in the metropolitan area also should receive such subsidies.

As with the WNPTU, patients were very confident in their ability to access advice or assistance when required:

"We can ring the ward anytime."

"The transplant nurse is a great source of advice."

While highly complimentary of the care they receive in relation to their transplant, MMC Unit patients raised the need for a 'whole of patient' care plan:
"Our diabetic complications continue - we need eye care and heart health care. We also need gynaecological checks and mammograms. We should have a 'whole of person' health plan."

MMC Unit patients make their own choices about whether they return to their referring renal unit or continue under the care of the MMC Unit. They see this as appropriate. They commented that communication with general practitioners could be improved, noting that few had any understanding of SPK or necessary follow-up care.

**Recommendation 5**

That the NFC Units, supported by each jurisdiction, enhance their communications with local renal units to ensure high levels of awareness about indications for and outcomes of pancreas transplantation generally and also to ensure effective communication about individual patients.

**Recommendation 6**

That the NFC Units work with groups that have contact with consumers (e.g. Diabetes Australia) to enhance consumer awareness and choice in relation to pancreas transplantation.
NFC models of care and service delivery

Introduction
This section describes the structure and models of care adopted by the WNPTU and the MMC Unit, with a focus on the criteria for review of NFC Programs listed in Appendix 9 of the Guidance Document (see page 6 of this report for the list of criteria against which NFCs are required to be reviewed).

Leadership and staff
The WNPTU is led by Professor Jeremy Chapman, who is Director of Renal Medicine, Westmead Hospital, Chair of the Australian Bone Marrow Donor Registry, President Elect of The International Transplantation Society, Immediate-Past President of the World Marrow Donor Association and past Chair of the Westmead Research Hub Executive and Scientific Advisory Committee.

WNPTU has five transplant surgeons, three transplant physicians, a transplant clinical fellow, a senior transplant coordinator, a transplant perfusionist and a transplant nurse practitioner.

The MMC Unit is led by Professor Peter Kerr, Professor/Director of Nephrology. His major research interest is in haemodialysis, including vascular access, nutrition, dialysers and vascular calcification. He served on ANZDATA for over 10 years and has been an Australian coordinator for the Dialysis Outcomes and Practice Patterns Study (DOPPS) for 6 years.

The MMC Unit has three transplant surgeons, two transplant physicians, a transplant nurse and a sessional transplant psychiatrist.

Service scope
Both Units provide clinical services for patients with type 1 diabetes seeking solid organ pancreas transplantation including: assessment; education; transplantation; early post-transplant care; long term post-transplant care and follow-up.

WNPTU surgeons work on a roster with Royal Prince Alfred Hospital to retrieve organs for transplant in NSW and in all other jurisdictions except Western Australia and Victoria. Interstate retrieval is necessary because of a reticence on the part of interstate transplant surgeons to retrieve organs relating to concerns about maintaining organ integrity - this mandates a larger retrieval workload for NSW surgeons and imposes an additional burden on the WNPTU's surgeons. MMC surgeons directly retrieve approximately 30% of the organs harvested in Victoria.

The WNPTU also provides pancreatic islet cell transplantation and undertakes research and education in relation to transplantation for type 1 diabetes, including islet cell transplantation. It leads an Australia-wide consortium which aims to develop pancreatic islet transplantation as a mainstream therapy for patients with difficult-to-control diabetes.
The MMC Unit has a very active basic research laboratory with interests in diabetic renal disease and pancreatic injury in diabetes as well as many other basic areas of research which have relevance to diabetic kidney disease (for example, general mechanisms of inflammation and renal injury and the role of several kinases, cytokines and macrophages).

**Surgical technique**

Consistent with international trends, both the MMC Unit and the WNPTU use Enteric Drainage of pancreatic duct exocrine secretions. At the WNPTU both graft and patient survival have improved since the change in the procedure from Bladder Drainage to Enteric Drainage (Table 16).

**Table 16: WNPTU one year graft and patient survival for bladder and enteric drainage**

<table>
<thead>
<tr>
<th></th>
<th>Bladder drainage (n=142)</th>
<th>Enteric drainage (n=43)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney</td>
<td>95%</td>
<td>100%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>78.8%</td>
<td>90.7%</td>
</tr>
<tr>
<td>Patient</td>
<td>92.2%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: WNPTU 2008

MMC surgeons use Portal Venous Drainage and WNPTU surgeons use Systemic Venous Drainage via the iliac vessels. As noted earlier in this report, when SVD is used, insulin that is secreted into the pancreatic venous effluent is not subject to first pass effect by the liver, so systemic concentrations of insulin (hyperinsulinaemia), both fasting and postprandial, are elevated as a result (Larsen 2004). Because PVD recreates more normal physiology than SVD it was thought it would be beneficial to lipid metabolism and insulin actions. In all transplants reported to USA transplant register, however, outcomes were similar after PVD and SVD (Gruessner & Sutherland 2000; Stratta et al 2000). Without established significant advantages of PVD over SVD, most pancreas transplant surgeons in the USA still use an SVD technique because there is greater surgical experience with it and it allows greater flexibility to perform either ED or BD (Larsen 2004).

**Continuum of care**

The model of care at both Units reflects a continuum from referral through transplantation and follow-up, so that the distinction between inpatient and non-inpatient care is an artificial one.

Patients at both Units benefit from standardised treatment and investigation protocols from the time of acceptance on to the waiting list, through transplantation to long term follow-up. Patients are case managed aggressively and they and their families receive intensive and on-going support. The Units aim to keep referring doctors and units informed of their patients' progress, although as noted earlier in this report the levels of communication achieved do not always satisfy referring doctors and in some cases have attracted sharp criticism.
Following an initial period of intensive non-inpatient monitoring, patients are reviewed routinely three and twelve months after transplant and then annually. MMC Unit patients also are reviewed six months after transplant.

It is expected that travel and accommodation expenses will be met by the Units during the treatment phase, however patients may need to access state based transport schemes for follow-up appointments.

The NFC secretariat has advised that routine follow-up care that is provided by the transplant Unit that could otherwise be provided by the original referring unit falls outside NFC funding guidelines and consequently should not be funded by the NFC Program.

**Clinical infrastructure, equipment and facilities**

The WNPTU has been relocated to newly refurbished facilities which will complete the investment required for the next ten years for the WNPTU and ancillary programs. The WNPTU research laboratory also has been refurbished.

The MMC Unit is located with the Department of Nephrology and Transplant Services at the MMC.

**Relationship with referring units**

The WNPTU holds new patient assessment and post-transplant review clinics in each state (except Victoria) as required by demand, but at least annually. Each clinic is held at a major referral centre. A physician, surgeon, the coordinator and senior nurse practitioner from the WNPTU attend. The WNPTU aims to provide referring clinicians with regular follow-up information about their patients from unit clinicians. Education sessions are held for patients. Resource material is provided to referring clinicians. Unit staff also deliver lectures to health care professionals.

The MMC Unit aims to maintain close communication with referring units, which takes the form of letters, emails and telephone conversations, although referring clinicians advised that follow-up communication has fallen short on occasions. Members of the team make themselves available at all times for discussion and in order to discuss or alter management plans. Talks also are given regularly to referring clinicians by the Unit’s transplant physicians.

**Current and future services gaps and constraints**

The WNPTU is planning to bring cardiac rehabilitation on-site with additional dietician support, which would be more convenient for patients and allow more intensive therapy.

The major constraint on all organ donation programs is the deceased organ donor supply. The Final Report to the Commonwealth of the National Clinical Taskforce on Organ and Tissue Donation, chaired by Professor Chapman (released February 2008) made 51 recommendations to address this problem.
Quality and Safety

Adherence to treatment protocols and pathways
The protocols used at both Units are similar and also reflect international practice. Close communication is maintained between the MMC Unit and WNPTU regarding protocols, acceptance criteria, changes in practice, complications and service provision. Annual meetings are held and both solid organ pancreas and islet pancreas transplant teams present and discuss their data and recent experiences (Pancreas Standing Committee of the Transplantation Society of Australia and New Zealand). Both Units provide data to the Australia & New Zealand Pancreas Transplant Registry and to ANZDATA on an annual basis.

Adherence to agreed evaluation and reporting
Both Units report annually to the NFC Secretariat in the form prescribed by the NFC in Appendix 3 of the Guidance Document.

Whilst the information requested in Appendix 3 is the same for all NFC programs, it does not necessarily reflect the most useful information that could be provided by pancreas transplant units. For instance the WNPTU advised with respect to questions about nosocomial infections, adverse clinical events and unplanned readmissions after discharge that rates were within expected limits. Clearly it is expected that with the intensity and complexity of the treatment that patients will suffer side effects - for example, the international literature indicates that most, if not all SPK patients will have some form of infective episode within the first year (Fishman & Rubin 1998). Consequently, it is recommended that specific clinical performance criteria for pancreas transplantation are developed (see Recommendation 4).

Inpatient complications, infections, unexpected admissions to ICU, adverse events
These issues have been discussed in the section on morbidity.

Patient and carer satisfaction
The WNPTU provides prospective patients with two volume information packages, which whilst comprehensive are easy to read and understand. The first volume covers the pre-operative period and the second provides information about the immediate post-operative stage, longer term issues and life at home. The MMC Unit also provides patients with a comprehensive information package.
Teaching, Training and Research

As NFCs, it is expected that both Units will contribute significantly to academic leadership and research, both locally and internationally, though there is little or no direct research collaboration.

Both Units have significant teaching, training and research programs.

Westmead National Pancreas Transplant Unit

The overarching aim of the WNPTU research program is to advance and develop new transplant therapies for patients with type 1 diabetes and identify the major clinical impediments to successful pancreas transplantation. These objectives are to be achieved by developing novel solutions through research and to translate into clinical practice novel research solutions developed in the laboratory.

Research activities include:

- clinical outcome studies: quality of life; and impact of SPK on secondary complications;
- evaluation of graft outcomes and graft histology: protocol biopsy study; ultrasound predictors of transplant glomerulopathy; genomics of chronic allograft nephropathy; and
- registry studies: survival data; cancer incidence.

Laboratory research activities include:

- developing pancreatic islet xenotransplantation through gene manipulation;
- novel approaches to overcoming the immediate blood inflammatory reaction and improving short term graft survival;
- understanding the role of macrophages in pancreatic islet graft rejection.

The following research milestones have been achieved:

- developed a new paradigm of the natural history of chronic allograft nephropathy;
- stratified the cancer risk for CKD/dialysis/transplant recipients compared to the general population;
- developed patient survival data in diabetic renal failure;
- completed Australia’s first successful trial of clinical islet transplantation;
Review of NFC pancreas transplant program

- identified a novel role for macrophages in islet xenograft rejection;
- identified immune regulators that inhibit the early destruction of islet xenografts after intra-portal transplantation; and
- developed a novel source of islets for islet xenotransplantation.

The WNPTU has been successful in securing $27.5 million in competitive research funding in the last five years. The Unit also has research collaborators in relation to competitive research funding at Mt Sinai Medical School (New York), Harvard Medical School (Boston), St Vincent’s Hospital (Melbourne), University of Adelaide, University of WA, Walter & Eliza Hall Institute of Medical Research (Melbourne) and Children’s Hospital Westmead.

Attachment E lists recent peer reviewed research for Journal articles and Unit papers from the WNPTU and Centre for Transplant and Renal Research. These relate to pancreas transplantation and transplantation in general.

**Monash Medical Centre**

Advanced trainees in nephrology as well as surgical trainees are involved actively in the process of assessing and treating patients and receive formal training in this specialised area. Other junior staff benefiting from the program include those studying Infectious Diseases, Metabolic Medicine, Cardiology and Endocrinology. A/Prof. John Kanellis and Dr. Bill Mulley have both given lectures on Pancreas Transplantation at Registrar Training Symposia and as part of course requirements in Nephrology and Transplant Training.

Comprehensive data collection for all patients under care is undertaken six-monthly, compiled and shared with the WNPTU Unit.

Trainee projects over the last 3 years have involved analyses related to this patient group. Benjamin Kave (B. Med. Sci. student) analysed the results of all patients undergoing the new surgical technique of Portal-Enteric anastomosis and compared this to Systemic-Bladder anastomosis as part of his thesis. His work was presented at both the TSANZ (Transplantation Society of Australia and New Zealand) and the IPITA (International Pancreas and Islet Transplant Association) meetings. Dr Parvinder Chaal (Nephrology Trainee) recently analysed the pancreas donor organ offers from within Victoria and examined the criteria determining acceptance or non-acceptance of those offers in collaboration with LifeGift Victoria (project for College of Physicians). Ongoing data is being collected regarding body composition studies (in collaboration with Prof. Boyd Strauss), nerve conduction and immunological parameters.

The MMC Renal Unit has a very active basic research laboratory. Areas currently being studied through PhD students, post doctoral students and senior researchers include Diabetic Renal Disease, Pancreas Injury in Diabetes as well as many other basic areas of research which have relevance to Diabetic Kidney Disease (for example, general mechanisms of inflammation and renal injury – role of several kinases, cytokines and macrophages).
Attachment F lists recent peer reviewed transplantation research published by the MMC Unit, however in the last four years there has been only one publication in the area of pancreas transplantation.

**Clinical Practice**

**Recent or foreseeable changes in clinical practice**

Increased access to transplantable organs may lead to more opportunities to increase the number of pancreas transplants, with a concomitant increase in total cost.

Insulin pumps have improved and new insulin therapies have become available in recent years. These may allow better control of diabetes thereby possibly decreasing complications and the need for transplantation in the future. The impact of these developments is yet to be seen. The referral numbers are fairly static or slowly increasing over the last few years.

There appears to be an increasing number of patients choosing live donation (kidney only) rather than waiting for the combined transplant procedure - this is mostly driven by a waiting period of 2-3 years which may result in an increased demand for PAK transplantation.

**Development of comparative treatments**

The Units do not foresee significant changes to clinical practice within three to five years. In particular, islet transplantation therapy will not become a replacement for whole organ transplantation until the problems of medium term islet graft failure are resolved.

The Westmead Centre for Transplant and Renal Research xenotransplantation program under Professor O'Connell has the long term goal of understanding the mechanisms of rejection of pancreatic islet xenografts and to developing novel strategies for suppressing immune responses.

It is likely that there will be a slow and cautious increase in PAK transplantation and PTA, but the Units believe that the results do not yet merit any substantially different approach. The WNPTU is at the forefront of developments of alternative therapy for this group of patients, therefore any advances in therapeutic options will be implemented rapidly into clinical practice with the continuation of the NFC program.
Service demand

Introduction

Assessment of the need for the continuation of pancreas transplantation as an NFC Program requires consideration of potential future demand and activity levels. These will be influenced by the criteria that are adopted for acceptance into the program, the availability of donor organs and the availability of resources to provide the service.

Both Units advised that the availability of donor organs and patient demand are relatively well-balanced, although there is some fluctuation in waiting times and overall they have increased. Limitations on throughput are attributed mainly to the limited availability of donor organs. There is some tension between the opportunity to increase the uptake of organs offered to the program and the concern by some renal physicians that SPK patients already receive priority access to deceased donor kidneys.

Below, we consider future activity projections assuming that donor organ availability and criteria for transplantation remain constant.

Criteria for solid organ pancreas transplantation in Australia

As noted earlier in this report, TSANZ sets down minimum criteria for recipient suitability for organ transplantation. With respect to solid organ SPK transplants the criteria are patients:

- with type 1 diabetes mellitus and ESRD acceptable for kidney transplantation;
- who are accepted onto the waiting list by a recognised SPK transplant unit; and
- who have an absence of contra-indications including life threatening disease considered to preclude successful pancreas or kidney transplantation.

The two NFC Units have established additional more specific criteria based on their own and international experience and outcomes. These criteria relate to age, the presence of cardiac disease and other risk factors, the degree of renal failure, the availability of patent vessels for vascular anastomoses and the ability of the patient to cope psychologically and socially.

Demand projections

In practical terms the primary caseload for acceptance on to the SPK transplantation waiting list is patients with type 1 diabetes and ESRD who are aged less than 50 years (although selected older patients who have better than expected functional status may be accepted). As the average time on the waiting list is about 2 years, but for individual patients may last 5 or 6 years, some patients will be older than 50 when a suitable organ becomes available for transplant.
The incidence of type 1 diabetes in Australia appears to be increasing, especially in those aged less than 14 years (Table 17).

Table 17: New cases of type 1 diabetes in Australia among those aged 0-39 at their first insulin use age-standardised rate per 100,000 population and (actual numbers)

<table>
<thead>
<tr>
<th>Age</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2004</th>
<th>2005</th>
<th>% change 2000-05</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-14</td>
<td>19.2 (760)</td>
<td>21.3 (849)</td>
<td>22.7 (906)</td>
<td>24.6 (982)</td>
<td>22.6 (901)</td>
<td>17.7%</td>
</tr>
<tr>
<td>15-39</td>
<td>10.8 (757)</td>
<td>10.9 (764)</td>
<td>11.9 (649)</td>
<td>12.3 (877)</td>
<td>10.9 (788)</td>
<td>0.9%</td>
</tr>
<tr>
<td>0-39</td>
<td>13.9 (1517)</td>
<td>14.7 (1613)</td>
<td>14.1 (1555)</td>
<td>16.8 (1859)</td>
<td>n/r (1689)</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Source: AIHW 2006a, 2006b, 2008

As the overall population aged 15-39 is larger than the younger age group combining the groups has an effect on the overall age standardised rate.

In the context of stable selection criteria and the typically long lead time for people with type 1 diabetes to develop ESRD (usually in the order of 25 years) demand for the procedure in the medium term is likely to be reasonably stable. The rate of new onset type I diabetes did not undergo a significant change 20 or more years ago. It also is anticipated the rate of new onset renal failure in this patient group might decrease with improved medical management through better control of hypertension and the use of ACE inhibitor drugs, although no definite trend has yet been observed. Data presented by WNPTU (Table 18) show a stabilisation in the number of type 1 diabetic patients diagnosed with ESRD who are accepted for dialysis. The number of type 1 diabetics who develop ESRD remaining fairly steady at 60-70 each year in the ten years to 2004 although in 2005 and 2006 there was a slight increase to 71 and 77 new cases respectively.

Table 18: Acceptance of diabetic patients for dialysis in Australia 1980-2004

<table>
<thead>
<tr>
<th>5 Year cohorts</th>
<th>Type 1 diabetes</th>
<th>Type 2 diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980-1984</td>
<td>142</td>
<td>70</td>
</tr>
<tr>
<td>1985-1989</td>
<td>221</td>
<td>170</td>
</tr>
<tr>
<td>1990-1994</td>
<td>300</td>
<td>529</td>
</tr>
<tr>
<td>1995-1999</td>
<td>359</td>
<td>1307</td>
</tr>
<tr>
<td>2000-2004</td>
<td>324</td>
<td>2146</td>
</tr>
</tbody>
</table>

Source: ANZDATA (presented by WNPTU 2008)
The most recently available data for a five year cohort (2002-2006), which overlaps the 2000-2004 data, shows a continuation of the long term trend (Table 19) although in 2005 and 2006 the number of new cases appeared to settle above 70 cases each year.

Table 19: Acceptance of diabetic patients for treatment by dialysis in Australia 2002-2006

<table>
<thead>
<tr>
<th>5 Year cohort</th>
<th>Type 1 diabetes</th>
<th>Type 2 diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002-2006</td>
<td>355</td>
<td>2688</td>
</tr>
</tbody>
</table>

Source: ANZDATA Annual Reports

The upward spiral of new type 2 diabetic patients starting dialysis continues unabated but these patients currently are not accepted for pancreas transplantation.

The WNPTU analysis also demonstrates that the number of diabetic patients aged less than 24 years with ESRD is falling consequent on better management of diabetes in the past ten years. The incidence between 25 and 55 years has plateaued in the past ten years, suggesting the demand for SPK transplants will remain static for the next ten years as younger type 1 diabetic patients start to see the longer term benefits of good glucose control.

A further analysis for the two most recent years of available data (Table 20) confirms that the number of patients aged less than 24 with type 1 diabetes commencing dialysis continues to fall whilst incidence in other transplantable age groups remains fairly stable.

Table 20: Age breakdown for new dialysis patients with type 1 diabetes 2005-2006

<table>
<thead>
<tr>
<th></th>
<th>&lt;24 years</th>
<th>25-34 years</th>
<th>35-44 years</th>
<th>45-54 years</th>
<th>Total &lt;54 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>2</td>
<td>22</td>
<td>29</td>
<td>20</td>
<td>71</td>
</tr>
<tr>
<td>2006</td>
<td>0</td>
<td>18</td>
<td>37</td>
<td>22</td>
<td>77</td>
</tr>
</tbody>
</table>

Source: Australian and New Zealand Dialysis And Transplant Registry Annual Reports

From 1 July 2005 until February 2008 there were 230 valid referrals to both centres of which 153 were accepted on to the transplant waiting list, an acceptance rate of 66.5%. Given the suitability criteria, it is likely that only a small proportion of referrals of patients aged over 45 would be accepted and it also is likely that a reasonable proportion of referrals of patients aged less than 45 would be rejected.

The WNPTU have concluded that given the current acceptance criteria there would be about 25-35 new patients accepted on to the waiting lists each year. The MMC Unit indicated that a maximum annual caseload for both units would be in the order of 35-40 cases and also that its activity has increased this year and it is anticipating completing 15 transplants for the year to 30 June 2008. This level of throughput was recommended in the 2001 NFC review.
Consistent with overseas experience there are likely to be more patients who may benefit from PAK transplantation although numbers in the foreseeable future are likely to remain low as a proportion of total pancreas transplants.

Another potential cause of an increase in demand may be the acceptance of some patients with type 2 diabetes (with very specific criteria) for SPK transplant. Small series reported recently in the USA show the success of SPK transplantation for some patients with type 2 diabetes. It is envisaged that this would be a very small group of patients (the current estimate is 1 patient in Australia every 1-2 years).

In the medium term, an increased annual national caseload of approximately 40 patients is predicted, based on:

- the very strong consumer views that a number of potentially eligible patients with type 1 diabetes and ESRD are not being referred to the NFC Units;
- the advice of the Units that some renal clinicians in Australia do not appear to refer their patients for consideration of transplantation; and
- the slow but steady increase in waiting times for pancreas transplantation.

Recommendation 1 of this report, which recommends a caseload of approximately 25 patients for the WNPTU and 15 patients for the MMC Unit, reflects the predicted national caseload of 40 patients. Improved communication by the NFC Units with referral units about the availability and outcomes of the service generally and the status of individual patients in particular will be necessary to support service expansion to this level. In addition, throughput will depend on the availability of sufficient donor organs, which will be influenced by the considerations of TSANZ as recommended in Recommendation 2. As noted earlier in this report, however, a proportion of suitable donor organs currently are not utilised, which may be sufficient to support the proposed modest expansion in activity.

If the MMC Unit expands its activity (to 15 of a total of 40 patients nationally - 37.5% of national activity) but continues to service only Victorian patients it is likely that significant inequities in access will develop between the States and Territories. To expand its activity equitably, the MMC Unit will need to attract referrals from other States, but this should not be at the expense of the WNPTU. It is likely that unmet demand and new demand exists which will enable the MMC Unit to achieve additional throughput without impacting negatively on the WNPTU, but throughput numbers at the WNPTU will need to be monitored to ensure that any expansion in MMC Unit numbers is not at the expense of critical mass at the WNPTU.

The MMC Unit will need to expand its capability to provide support services to interstate patients, who should receive equivalent clinical and non-clinical (including accommodation and psycho-social) support to that provided to interstate patients of the WNPTU.

Increasing the MMC Unit activity to 15 transplants per year will enable the appointment of a fellow which will contribute to the sustainability of the service.
An expansion of the MMC service outside Victoria also will necessitate a review of donor organ allocations to ensure they fairly reflect activity levels and are supportive of a national service. As previously noted donor organs from Victoria and Tasmania are offered first to MMC, with donor organs from the other States and Territories offered first to the WNPTU. If there is a shift in referrals (for example, with some South Australian patients referred to the MMC Unit) there will need to be a review of the allocation of donor organs from the states without pancreas transplant units. Monitoring waiting times (see recommendation 3) will provide guidance as to the equity of the allocation.

If it becomes apparent that waiting times are varying considerably between the Units consideration could be given to a shared national waiting list, which also would require a review of the allocation of donor organs. Under this proposal, patients would still be referred to either the WNPTU or the MMC Unit according to patient or referrer preference. If accepted the patient would be placed on the national waiting list in accordance with agreed protocols. Organs retrieved in NSW/ACT would be transplanted into the next suitable WNPTU patient on the list and organs retrieved in Victoria/Tasmania would be transplanted into the next suitable MMC Unit patient. If a donor organ became available in another state or territory it would be offered to the Unit with the next matched patient on the list. It would be the responsibility of the Unit which accepted an organ donation to organise its retrieval.

In addition it will be necessary to monitor the relative access of patients to SPK and kidney-alone transplantation to ensure that increased pancreas transplantation activity in Victoria does not unfairly reduce access for people awaiting kidney-alone transplantation.

**Recommendation 7**

That consistent with the NFC status of the service and with a proposed expanded national role for the MMC Unit the allocation of donor organs from Queensland, South Australia, Western Australia and the Northern Territory is monitored and adjusted if necessary to ensure equity in accordance with the relative demand managed by each Unit.

**National collaboration**

The Units collaborate well on a range of issues including clinical protocols, acceptance criteria, changes in practice and service provision generally. The small numbers of patients treated in each of the Units necessitates maintenance and development of that collaboration. A number of important areas of the national program would benefit from ongoing collaboration and cooperation including:

- training and succession planning of specialist clinicians;
- outcome evaluation including analysis of the QOL impacts of pancreas transplantation;
Review of NFC pancreas transplant program

- clinical and laboratory research programs; and
- program monitoring and development.

**Recommendation 8**

That building on their current co-operative activity, the Units identify further opportunities to enhance national collaboration.

**Cost analysis**

The current NFC allocation is $113,458 for each transplant.

Both Units provided a detailed breakdown of costs using the pro forma in Appendix 2 of the NFC guidelines. In addition the staff at the WNPTU also performed a further analysis using the costing process established in the original paper by the Centre for Health Economics Research Evaluation, *The Cost of Operating a National Renal/Pancreas Transplant Unit* (February 1993).

Clearly a considerable effort was made by the staff of both Units to collect costing data and to present it in an easily understandable fashion, notwithstanding the usual difficulties of extracting useful data from clinical costing systems.

Table 21 presents information provided by the Units and Table 22 presents an analysis of the primary data. In both cases the cost is for a single patient. Both of the Units calculated the overall costs of each aspect of the care path and averaged these costs against the number of annual transplants (25 at the WNPTU and 10 at the MMC Unit). In addition WNPTU identified costs in both simple completed cases and complex completed cases.

In Attachment C (page 97) the WNPTU provided a further analysis which is based on the relative proportions of four patient types (simple and complex, both completed and failed) so that a single average price per case is calculated.
Table 21 provides a summary of the costs of each of the major activities on the care path as provided by both Units.

**Table 21: Breakdown of costs for pancreas transplantation provided by the Units**

<table>
<thead>
<tr>
<th>Care pathway</th>
<th>WNPTU simple case</th>
<th>WNPTU complex case</th>
<th>MMC all cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of referral service</td>
<td>$156</td>
<td>$156</td>
<td>$420</td>
</tr>
<tr>
<td>Cost of pre-treatment work-up</td>
<td>$3,922</td>
<td>$3,922</td>
<td>$9,720</td>
</tr>
<tr>
<td>Cost of pre-transplant monitoring</td>
<td>$938</td>
<td>$938</td>
<td>$4,739</td>
</tr>
<tr>
<td>Cost of transplant and surgery</td>
<td>$17,748</td>
<td>$17,748</td>
<td>$18,226</td>
</tr>
<tr>
<td>Cost of HDU/ICU care</td>
<td>-</td>
<td>$9,000</td>
<td>$15,953</td>
</tr>
<tr>
<td>Cost of ward admission</td>
<td>$24,098</td>
<td>$45,165</td>
<td>$18,733</td>
</tr>
<tr>
<td>Cost of out patient care prior to discharge home</td>
<td>$23,819</td>
<td>$26,209</td>
<td>$8,215</td>
</tr>
<tr>
<td>Other direct costs</td>
<td>$7,604</td>
<td>$7,604</td>
<td>$2,700</td>
</tr>
<tr>
<td><strong>TOTAL DIRECT COSTS</strong></td>
<td><strong>$78,285</strong></td>
<td><strong>$110,742</strong></td>
<td><strong>$78,746</strong></td>
</tr>
<tr>
<td>Program management costs</td>
<td>$19,144</td>
<td>$19,144</td>
<td>$24,856</td>
</tr>
<tr>
<td>Administration and corporate costs</td>
<td>$3,300</td>
<td>$9,900</td>
<td>$15,749</td>
</tr>
<tr>
<td><strong>TOTAL INDIRECT COSTS</strong></td>
<td><strong>$22,444</strong></td>
<td><strong>$29,044</strong></td>
<td><strong>$40,605</strong></td>
</tr>
<tr>
<td><strong>TOTAL OPERATING COSTS</strong></td>
<td><strong>$100,728</strong></td>
<td><strong>$139,786</strong></td>
<td><strong>$119,351</strong></td>
</tr>
</tbody>
</table>

As noted above an additional analysis by the WNPTU based on the projected proportion of simple and complex failed and simple and complex completed cases calculated an average cost of $119,635 for all cases (see Attachment C on page 99).

In summary WNPTU provided two analyses, presented here in Table 21 and also in Attachment C. The above analysis provides for two of four patient care streams, where Attachment C provides an average over all four streams of care and therefore is more relevant in determining funding levels.

A line by line analysis of the cost data demonstrates quite different approaches to how treatment is provided, although the aggregate costs are very similar.

It also appears that the WNPTU may in fact have averaged the costs of referral and pre-treatment work-up over a greater number of patients than actually were transplanted, which would have increased these costs to $623 and $5,339 respectively for both WNPTU case types.

In addition it appears that the WNPTU estimated the costs of maintaining patients on the waiting list who eventually are transplanted, rather than the 100 or so who actually comprise the waiting list. The MMC Unit also reasonably identified that as the patient is usually on the waiting list for two years then two years of monitoring costs need to be included. Using the
MMC method would increase WNPTU pre-transplant monitoring cost from $938 to $7507. These figures are included in the updated Table 22.

It should be noted that each Unit follows strict protocols that detail the timing and extent of investigations and required treatments. These are consistent with international best practice. When the imaging and pathology costs are isolated, they are again quite similar with the cost of a simple WNPTU case being $16,778, the cost of a MMC Unit case being $16,165 and the cost of a complex WNPTU case being $26,323. Pharmaceutical costs are much higher at the MMC Unit, however, with each patient incurring almost $20,000 of costs, compared with just over $10,000 of costs for a complex WNPTU case. The costs of transplant and surgery are very similar between the Units, with both including costs of retrieval, noting that MMC costing was for the estimated proportion that it does indeed retrieve.

Another significant variation arises because of the way treatment is provided. No patients at the WNPTU are admitted routinely to an HDU or ICU, whereas MMC Unit patients typically have 4 days in these care settings. The overall cost of the ward stays were reasonable and comparable however, with staff wages being the key factor in overall costs.

Similarly the large difference in costs for out patient care reflects more intensive specialist medical, nursing and allied health oversight of the patients at the WNPTU.

Table 22: Breakdown of costs for pancreas transplantation after analysis

<table>
<thead>
<tr>
<th>Care pathway</th>
<th>WNPTU simple case</th>
<th>WNPTU complex case</th>
<th>MMC all cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of referral service</td>
<td>$623</td>
<td>$623</td>
<td>$420</td>
</tr>
<tr>
<td>Cost of pre-treatment work-up</td>
<td>$5,339</td>
<td>$5,339</td>
<td>$9,720</td>
</tr>
<tr>
<td>Cost of pre-transplant monitoring</td>
<td>$7,507</td>
<td>$7,507</td>
<td>$4,739</td>
</tr>
<tr>
<td>Cost of transplant and surgery</td>
<td>$17,748</td>
<td>$17,748</td>
<td>$18,226</td>
</tr>
<tr>
<td>Cost of HDU/ICU care</td>
<td>-</td>
<td>$9,000</td>
<td>$15,953</td>
</tr>
<tr>
<td>Cost of ward admission</td>
<td>$24,098</td>
<td>$45,166</td>
<td>$18,773</td>
</tr>
<tr>
<td>Cost of out patient care prior to discharge home</td>
<td>$23,819</td>
<td>$26,209</td>
<td>$8,215</td>
</tr>
<tr>
<td>Other direct costs</td>
<td>$7,604</td>
<td>$7,604</td>
<td>$2,700</td>
</tr>
<tr>
<td>TOTAL DIRECT COSTS</td>
<td>$86,738</td>
<td>$119,196</td>
<td>$78,746</td>
</tr>
<tr>
<td>Program management costs</td>
<td>$19,144</td>
<td>$19,144</td>
<td>$24,850</td>
</tr>
<tr>
<td>Administration and corporate costs</td>
<td>$3300</td>
<td>$9900</td>
<td>$15,749</td>
</tr>
<tr>
<td>TOTAL INDIRECT COSTS</td>
<td>$22,444</td>
<td>$29,044</td>
<td>$40,605</td>
</tr>
<tr>
<td>TOTAL OPERATING COSTS</td>
<td>$109,182</td>
<td>$148,240</td>
<td>$119,351</td>
</tr>
</tbody>
</table>

The total direct costs appear to reasonably reflect the expense of providing complex care to a small number of patients over a long period. The models of care are protocol driven and
are readily justified by the excellent patient outcomes. The difference in costs appears to be as a result of more intensive staffing arrangements at the WNPTU. Consequently, if the MMC Unit caseload increases it is expected additional staff will be required and other services may become viable so the average cost will not necessarily fall.

The higher program management costs at the MMC Unit largely reflect the lower caseload across which this cost can be allocated.

With respect to apportionment of administrative overhead, the MMC Unit used a flat 20% of program costs, whereas the WNPTU estimated the costs on the basis of number of bed days apportioned against all of Westmead administrative costs.

Both the ‘flat rate’ and ‘per bed day’ bases of allocation are acceptable methods often used to allocate costs that are not attributable directly to a clinical unit or activity.

The nature of these costs means that they are incurred for the benefit of a number of a health service's activities, and often for the health service as a whole. Examples include corporate management (governance and executives' time), human resources, finance, accounting and budgeting, information and communications services and some aspects of engineering and maintenance. It follows that allocation of these costs to particular clinical activities requires estimation and is somewhat arbitrary. The objective of this allocation process is to base the allocation on the most directly relevant ‘cost driver’, that is, the activity or aggregate which correlates most closely with the incidence of these costs. Some of the cost drivers (inputs) used in health care for this purpose include:

- direct labour staff hours related to total staff hours spent in the health service as a whole; or
- direct labour numbers (EFT) in the unit related to total staff numbers employed by the health service; or
- floor space occupied by the [transplant] unit related to the health service’s total floor area; or
- number of patients [transplanted] in the unit compared with the total number of acute care patients treated by the health service; or
- the ratio of overhead costs for the health service as a whole compared with its direct operating costs, giving rise to a flat percentage overhead cost ‘absorption’ rate (as used by MMC); or
- number of bed days delivered to transplant patients related to total bed days for all of the health services’ patients (as used by WNPTU)

As the number of bed days delivered relates more closely to transplant activity levels and, intuitively, the attribution of overhead costs, that method would be preferable in meeting the
above objective. On the other hand, there does not appear to be a universal connection between the ratio of overhead costs incurred and direct costs incurred in each department across a health service. Apart from that specific difficulty, comparison of overhead cost rates between health services is made more difficult by varying degrees of efficiency in management and administrative functions, as well as centralized services such as food and cleaning services, from one health service to another.

For these reasons, in practice, consistency of choice of the allocation method becomes a more important factor than precision of the basis used, where comparison of data between sites and/or services is the key purpose of the cost allocation.

On a more general note, if the flat rate method is preferred, data can be collected from other health services' annual reports to gain an understanding of the range in which the ratio of overhead costs to total operating costs falls. This may be a suitable way to set a uniform rate for application by both NFCs.

For instance, Sydney West Area Health Service’s (SWAHS) and Southern Health’s annual reports for 2005-06 and 2006-07 respectively can be used to compare the proportions of administrative, hotel and other equivalent full-time staff (‘EFT’) with direct care EFT numbers. This analysis shows that SWAHS’s indirect staff represented 38% of direct care staff numbers whereas Southern Health’s equivalent proportion was 33%. This [very approximate] ratio analysis suggests that indirect costs could be expected to lie between 30% and 50% of direct costs for the two NFCs, after allowing for a higher than average rate of operating and other costs for high technology equipment and support. Consequently, the difference between WNPTU’s indirect costs (overheads) at 26% of direct costs and MMC’s equivalent of 51% probably indicates a materially different measurement methodology.

There are therefore good reasons for the funding jurisdictions to provide guidance as to the preferred method of determining indirect costs by the Units.

If the higher costs outlined in Table 22 for two of the four WNPTU care streams are applied to the average cost of $119,635 all four care streams reported in Attachment C then the average cost would be in the range $126,813 to $130,402. Nonetheless it is noted that the NFC usually pays on the lower cost which on that basis would be the MMC cost of $119,351, which is marginally less than the average WNPTU of $119,635.

WNPTU has subsequently advised that to provide more timely reports to referring clinicians and also to raise local awareness, additional administrative support would be needed. On a whole time commitment of $75,000, this would translate to additional costs of $3000 per case.

In summary, the average cost of a pancreas transplantation exceeds the current rate of $113,458. In addition, an increased caseload at the MMC Unit offers the potential to improve the breadth and depth of services available for MMC Unit patients, so the average cost is unlikely to fall as the number of procedures increases. It is recommended that the rate per
case be increased to $122,351, which is based on the low cost of the MMC Unit per case plus an additional $3,000 for additional administrative support.

WNPTU also identified new equipment cost, which is based on the per annum replacement cycle at a pro rata use of 15%. Equipment to be replaced includes syringe pumps, infusion pumps, a cardiac monitor, ECG recorder and renal ultrasound with a total value of $158,000 and annual cost of $11,660.

MMC has identified an opportunity to enhance the NFC facility by enlarging the transplant office, after the relocation of another service. Alterations to a wall and doorway would cost about $15,000.

**Recommendation 9**

That the rate of reimbursement for each pancreas transplant is set at $122,351
Risk Management

Potential risks to the viability and operation of the service

The WNPTU highlighted a number of potential risks and identified mitigating factors. These are:

- key staff losses mitigated by training program diversification;
- new technology risk which is managed by the establishment and development of an internationally recognised research program;
- lack of donors which has been addressed by the National Clinical Taskforce on Organ & Tissue Donation in its February 2008 report; and
- maintenance of international standing, which is addressed by WNPTU staff providing international leadership.

The WNPTU has benefited from a comprehensive refurbishment of its facilities including the research laboratory. It continues to have the strong support of both NSW Health and the Area Health Service.

The MMC Unit identifies the development of core personnel and infrastructure as major issues. We concur that this is a significant risk and that, for sustainability purposes, it would be desirable for the MMC Unit to increase the number of procedures it is undertaking to enable the development of a more sustainable infrastructure including a critical mass of key professionals. The appointment of a full-time surgical fellow, which would be necessary to increase the number of transplants to at least 12-15 each year, will add to the sustainability of the MMC Unit. It will take 2-3 years to upgrade a surgical trainee post and advanced trainee or fellow position. Increased surgical support may be necessary with an increase in transplants performed, including increased retrieval activity.

Quality risks

Pancreas transplantation is a complex and technically-challenging procedure.

The WNPTU has achieved significant international standing as a clinical, research and teaching centre. The MMC Unit also provides a highly-regarded service. Outcomes are transparent and both the WNPTU and the MMC Unit are achieving results that are equivalent to those achieved internationally.

Quality risks are inherent in small volume, high complexity procedures, but are guarded against in this circumstance by:

- the restricted number of Australian centres undertaking this work;
targeted funding for the services; and
complete transparency of outcomes.

It should be noted that an analysis of pancreas transplant outcomes by centre size in the USA, which defined a large centre as having performed a total of 100 or more pancreas transplants during the period 2000-2004, showed:

- in univariate models, patient survival was slightly higher in larger centres after PAK and SPK transplantation ($p > 0.11$);
- there was no impact of centre size on patient survival in patients who had undergone PTA;
- multivariate models did not show any impact of centre size, neither for patient nor pancreas graft function rates; and
- pancreas GSRs for PTA were not significantly different between large and small centres (Gruessner & Sutherland 2005).

As noted earlier in this report, we consider that the framework for reporting to the National Reference Group could be refined so that it incorporates key performance indicators which more specifically assess the quality of care provided by the NFC Units (see Recommendation 4 on page 41).

**Risks relating to the enhancement of Monash Medical Centre’s national service**

The national approach to pancreas organ retrieval has been crafted over the past fifteen years through a combination of training, development of high quality relationships and trust. The system is responsive to geography, local availability of expertise, transport options and the time of the day or night. Relationships between referring and treating units require constant attention but are founded very strongly in the long term.

Expanding the scope of MMC’s services so that it becomes a genuinely national service will require care and planning to ensure that service quality is not diminished, communication pathways remain open and effective and the Units continue to collaborate constructively rather than compete. In particular, throughput of the WNPTU should not be allowed to diminish as a result of throughput at MMC increasing. It would be appropriate for the NFC Reference Group to maintain a close watch on the development of these services as this change progresses by:

- monitoring TSANZ’s progress in concluding the consultations recommended in Recommendation 2; and
- monitoring procedure numbers in both centres annually.
References


Australia and New Zealand Dialysis & Transplant Registry, *ANZDATA Registry Report 2007*; ed McDonald S, Chang S, Excell L. Adelaide, South Australia

Australia and New Zealand Dialysis & Transplant Registry, *ANZDATA Registry Reports 2006*; ed McDonald S, Chang S, Excell L. Adelaide, South Australia

Australia and New Zealand Dialysis & Transplant Registry, *ANZDATA Registry Reports 2004-05*; ed McDonald S, Excell L. Adelaide, South Australia

Australia and New Zealand Dialysis & Transplant Registry, *ANZDATA Registry Reports 2003*; ed McDonald S, Russ G. Adelaide, South Australia


Review of NFC pancreas transplant program


Chadban S, Ierino F 2005 Welcome to the era of CKD and the eGFR Medical Journal of Australia 183(30:117-118


Gruessner A, Sutherland D 2000 Pancreas transplant outcomes for United States (US) cases reported to the United Network for Organ Sharing (UNOS) and non-US cases reported to the International Pancreas Transplant Registry (IPTR) as of October 2000. Clin Transpl 45–72
Gruessner A, Sutherland D 2001 Analysis of United States (US) and Non-US Pancreas Transplants Reported to the United Network for Organ Sharing (UNOS) and the International Pancreas Transplant Registry (IPTR) as of October 2001. *Clin Transpl* 41–72

Gruessner A, Sutherland D 2002 Pancreas transplant outcomes for United States (US) and non-US cases as reported to the United Network for Organ Sharing (UNOS) and the International Pancreas Transplant Registry (IPTR) as of October 2002. *Clin Transpl* 41–77

Gruessner A, Sutherland D 2003 Pancreas transplant outcomes for United States (US) and non-US cases as reported to the United Network for Organ Sharing (UNOS) and the International Pancreas Transplant Registry (IPTR) as of May 2003. *Clin Transpl* 21-51

Gruessner A, Sutherland D 2005 Pancreas transplant outcomes for United States (US) and non-US cases as reported to the United Network for Organ Sharing (UNOS) and the International Pancreas Transplant Registry (IPTR) as of June 2004. *Clin Transpl* 19 (4) 433-455

Gruessner R, Sutherland D, Gruessner A 2005 Survival after pancreas transplantation (letter) *JAMA* 293: 675-676


National Clinical Taskforce on Organ and Tissue Donation 2008


Review of NFC pancreas transplant program


Westmead National Pancreas Transplant Unit 2008 Papers and presentations made to NFC pancreas transplant review consultants on 3 March 2008


Attachment A

Transplantation Society of Australia and New Zealand national pancreas allocation (November 2007)

The following is an abridged version of allocation policy, which does not include detailed references to Islet Cell Transplantation.

Pancreas organ donors’ suitability criteria

- General Organ Donor Criteria.
- No known diabetes mellitus or insulin dependence.
- No known pancreatic trauma - may be considered for separated islets.
- No history of alcoholism or chronic pancreatitis.

Required Information for allocation

- Blood group.
- Body weight.
- Approximate height.
- Laboratory tests: General Organ Donor Criteria for viral studies.
  - HIV, Hep BsAg, Hep C, CMV;
  - electrolytes, glucose, amylase and or lipase;
  - current use of Insulin, dextrose and steroids.

Organ retrieval mechanisms

The unit accepting the pancreas offer is responsible for:

- arranging the surgical procedure using a team of qualified surgeon(s) and associated staff;
- liaison with the relevant donor co-ordinator to achieve surgical starting times mutually acceptable to the donor hospital and all donor surgical teams involved;
- ensuring that the pancreas meets medical standards for organ donation and is delivered in a safe and appropriate manner to the recipient unit's hospital.
Review of NFC pancreas transplant program

Organ allocation and distribution

Whole pancreas/kidney or pancreas transplantation take precedence over separated islet transplantation. The Pancreas Transplant Unit in the State of the donor's hospital is offered the donation first (NSW/ACT-NSW, VIC/TAS – VIC). If the State unit does not want to accept the offer, it will be offered to the other Pancreas Transplant centre (NSW/ACT to VIC, or VIC/TAS to NSW) subject to state based kidney allocation rules for Pancreas/Kidney transplants.

Retrieval of the pancreas from states without a pancreas transplant program (SA, NT, QLD, WA,) should be offered to the NSW pancreas transplant program, since the patients from those states are on the NSW unit’s waiting list.

Following refusal for solid pancreas transplantation, the islet allocation protocol operates.

Recipient suitability criteria

There is no urgent case classification for pancreas transplants.

- Pancreas Kidney
  - Type 1 diabetes mellitus, with end-stage renal disease acceptable for kidney transplantation;
  - accepted onto the waiting list by a recognised SPK transplant unit;
  - absence of contra-indications including: life threatening disease considered to preclude successful pancreas or kidney transplantation.

- Pancreas
  - Type 1 diabetes mellitus, with or without end-stage renal disease;
  - accepted onto the waiting list by a recognised pancreas transplant unit;
  - absence of contra-indications including: life threatening disease considered to preclude successful pancreas transplantation.
Individual Patient allocation - Simultaneous Pancreas and Kidney

- ABO compatibility: absolute requirement;
- lymphocytotoxic crossmatch: peak and current serum negative test required;
- HLA matching: not required;
- size and weight compatibility: not generally a consideration except at extremes;
- waiting list: patients are transplanted in order of presentation for assessment within each blood group, within each transplanting unit.

The decision about each individual offer and waiting list management are the responsibility of each recognised pancreas transplant unit.

Note that acceptance for a simultaneous kidney/pancreas transplant usually overrides the renal allocation mechanism and is determined by the State.

Individual Patient allocation - Pancreas alone

- ABO compatibility: absolute requirement;
- lymphocytotoxic crossmatch: peak and current serum negative test required;
- HLA matching: not required;
- size and weight compatibility: not generally a consideration except at extremes;
- waiting list: Patients are transplanted in order of presentation to the national pancreas waiting list for within each blood group.

Final acceptance of each individual offer and waiting list management are the responsibility of each recognised pancreas transplant unit.
Attachment B

Referring Unit Stakeholder Survey

Background

DLA Phillips Fox health consulting team is reviewing the Nationally Funded Centre (NFC) pancreas transplant program (the Review).

This is a scheduled review which is being conducted in accordance with the NFC review guidelines.

The Review team, which consists of Dr Heather Wellington and Dr Paul Woodhouse, will be advised by a nephrologist, a diabetologist and a renal transplant surgeon.

An important requirement of the Review is to seek advice from referring units (actual or potential) about their experienced in dealing with the NFCs. To this end, we invite you to complete the following short survey and participate in further face-to-face or telephone consultation about a range of issues relevant to referring units.

We will contact you shortly to arrange details for further consultation.

If there is not a consensus view within your unit about the issues identified in the survey, please feel free to note in your response that there are varying views, and explain the range of views that are held.

Survey responses will be held in confidence - only aggregate results will be reported and comments will not be attributed to any individual or unit.

For more information, please contact Dr Heather Wellington (see contact details below, or mobile 0418577601).

Please return this survey by Friday 29 February 2008 to:

Dr Heather Wellington
DLA Phillips Fox Lawyers
heather.wellington@dlaphillipsfox.com
fax 03 9274 5111
Name of Unit:

Contact person:

Contact telephone number:

Email:

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>D/K</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the last three years have patients been referred from your unit to a pancreas transplant centre?

Were patients referred to Westmead?

Were patients referred to Monash Medical Centre?

Were there particular reasons why you referred patients to one centre rather than the other?

If you have not referred patients, why is that the case?

Does your Unit have a view about the appropriateness of prioritisation of kidney pancreas transplantation patients in relation to other patients with renal failure?
Does your Unit have a view of the appropriateness of prioritisation of kidney pancreas transplantation patients once those patients have been placed on the kidney pancreas transplantation waiting list?

In relation to the service at Westmead (please complete this section, even if you have not referred patients to Westmead):

Has the Westmead pancreas transplant centre provided your unit with information about their service?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>D/K</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Has this information been satisfactory?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>D/K</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please provide comments:

Has the Westmead pancreas transplant centre supplied your unit with information to distribute to prospective patients and carers?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>D/K</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Has this information been satisfactory?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>D/K</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please provide comments:
If you have referred patients to Westmead, on a scale of 1-5, where 1 is poor and 5 is excellent, how would you rate the following aspects of care?

If you have not referred patients to Westmead, please proceed to page 83.

<table>
<thead>
<tr>
<th>Aspect of Care</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>D/K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial referral</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment at transplant centre</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management of patient on waiting list</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short term follow-up arrangements after surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immunosuppression therapies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management of complications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall patient outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Are you satisfied with the model of care?

Are there gaps in the continuum of care?

Do you have any specific comments in relation to aspects of care at Westmead?

If you have referred patients to Westmead, on a scale of 1-5, where 1 is poor and 5 is excellent, how would you rate the following aspects of communication with your unit?

<table>
<thead>
<tr>
<th>Aspect of Communication</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>D/K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedback after initial assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provision of information to your unit whilst patient on waiting list</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provision of information to your unit after surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ongoing updates to your unit about patient progress</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Are you satisfied with the overall quality of communication with your unit?
Do you have any specific comments in relation to aspects of communication with your unit by Westmead?

If you have referred patients to Westmead on a scale of 1-5, where 1 is poor and 5 is excellent, how would you rate the following aspects of your unit’s relationship with the centre?

| Support for your clinicians in managing patients on the waiting list | 1 | 2 | 3 | 4 | 5 | D/K |
| Support for your clinicians in managing patients after transplantation |  |
| Update information about treatment options and protocols |  |

Do you have any specific comments in relation to aspects of your unit’s relationship with Westmead?

If you have referred patients to Westmead on a scale of 1-5, where 1 is not at all satisfactory and 5 is entirely satisfactory, how would you rate the overall service provided by Westmead?

| Rating of overall service provided by Westmead | 1 | 2 | 3 | 4 | 5 | D/K |
|  |

Do you have any other comments in relation to any aspect of Westmead’s service?
In relation to the service at Monash Medical Centre (please complete this section, even if you have not referred patients to Monash Medical Centre):

Has the Monash Medical Centre pancreas transplant centre provided your unit with information about their service?

Has this information been satisfactory?

Please provide comments:

Has the Monash Medical Centre pancreas transplant centre supplied your unit with information to distribute to prospective patients and carers?

Has this information been satisfactory?

Please provide comments:
If you have referred patients to **Monash Medical Centre**, on a scale of 1-5, where 1 is poor and 5 is excellent, how would you rate the following aspects of **care**?

If you have not referred patients to Monash Medical Centre, please go to the final section of the survey on page 86.

<table>
<thead>
<tr>
<th>Aspect</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>D/K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial referral</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment at transplant centre</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management of patient on waiting list</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short term follow-up arrangements after surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immunosuppression therapies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management of complications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall patient outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Are you satisfied with the model of care?  

Are there gaps in the continuum of care?  

Do you have any specific comments in relation to aspects of care at **Monash Medical Centre**?

If you have referred patients to **Monash Medical Centre**, on a scale of 1-5, where 1 is poor and 5 is excellent, how would you rate the following aspects of **communication with your unit**?

<table>
<thead>
<tr>
<th>Aspect</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>D/K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedback after initial assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provision of information to your unit whilst patient on waiting list</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provision of information to your unit after surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ongoing updates to your unit about patient progress</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Are you satisfied with the overall quality of communication with your unit?
Do you have any specific comments in relation to aspects of communication with your unit by Monash Medical Centre?

If you have referred patients to Monash Medical Centre, on a scale of 1-5, where 1 is poor and 5 is excellent, how would you rate the following aspects of your unit’s relationship with the centre?

| Support for your clinicians in managing patients on the waiting list | 1 | 2 | 3 | 4 | 5 | D/K |
| Support for your clinicians in managing patients after transplantation |   |   |   |   |   |     |
| Update information about treatment options and protocols |   |   |   |   |   |     |

Do you have any specific comments in relation to aspects of your unit’s relationship with Monash Medical Centre?

If you have referred patients to Monash Medical Centre, on a scale of 1-5, where 1 is not at all satisfactory and 5 is entirely satisfactory, how would you rate the overall service provided by Monash Medical Centre?

| Rating of overall service provided by Monash Medical Centre | 1 | 2 | 3 | 4 | 5 | D/K |

Do you have any other comments in relation to any aspect of Monash Medical Centre’s service?
Do you have any further comments in relation to any aspects of the NFC pancreas transplant program?

Thank you for completing this survey

Please return it by Friday 29 February 2008 to:

Dr Heather Wellington
DLA Phillips Fox Lawyers
heather.wellington@dlaphillipsfox.com
or fax 03 9274 5111
Attachment C

Report from Westmead National Pancreas Transplant Unit

The following document is upon documentation and information provided by WNPTU including:

- a response to the Appendix 9 review criteria;
- NFC Guidance Document Appendix 2 and 3 reports;
- A detailed presentation to the consultants on 3 March 2008;
- access to patients and carers;
- the Australia & New Zealand Pancreas Transplant Registry Report 1984-2006; and
- key peer reviewed papers written by Unit staff.

Access to Westmead National Pancreas Transplant Unit (WNPTU)

Selection criteria for simultaneous Pancreas Kidney Transplants

Individual units determine the selection criteria which will apply to the patients who are referred. Westmead uses six key criteria, however each surgeon makes a case by case assessment of risk factors, which may lead to individual variability. The criteria are;

- insulin dependence;
- age <50 years;
- Glomerular Filtration Rate (GFR) <15ml/min;
- absence of significant cardiac disease or adequately treated cardiac disease;
- body weight <120% of the ideal weight;
- patent iliac vessels.

Referral and assessment

- The patient is placed on the waiting list when the referral letter is received by the Unit.
- The referral is usually, but not always made by a nephrologist.
- A preliminary assessment of the information provided in the referral letter is made by the Unit physician or surgeon, with the referral either accepted or rejected on the basis of age or medical condition.
The patient is seen either at Westmead or at an interstate clinic, which is held at least annually in the other State capitals, except Melbourne.

The initial work-up is preferentially undertaken at WNPTU: as it is well-standardised; the diagnostic clinicians are expert at interpreting results; initial investigations are available for comparison with future investigations; and patients become familiar with the staff and Unit.

Some of the initial work-up may have occurred at the referring unit, especially if the patient is already on the renal transplant list.

Access to care is enhanced by the WNPTU holding at least annual assessment and review clinics interstate.

Interstate patients are accommodated with family support in a hospital owned hostel or hotel.

**WNPTU transplantation and waiting list data**

Table C1: Home of patients transplanted and currently waiting

<table>
<thead>
<tr>
<th>Home of recipient</th>
<th>Patients transplanted 1984-February 2008</th>
<th>Active waiting list as at February 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW</td>
<td>38%</td>
<td>25%</td>
</tr>
<tr>
<td>Victoria</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Queensland</td>
<td>24%</td>
<td>38%</td>
</tr>
<tr>
<td>Western Australia</td>
<td>8%</td>
<td>17%</td>
</tr>
<tr>
<td>South Australia</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Tasmania</td>
<td>7%</td>
<td>8%</td>
</tr>
<tr>
<td>ACT</td>
<td>10%</td>
<td>4%</td>
</tr>
<tr>
<td>NT</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Australia</td>
<td>237</td>
<td>23</td>
</tr>
</tbody>
</table>

In addition to the active waiting list there are a number of patients on a pending list, so the total list is currently about 110. The composition of the active list may be heavily influenced by the location and timing of a particular interstate assessment clinic. The patients on the active list are aggressively monitored, which is a very resource intensive process.

A minimum waiting list number is required so all available organs can be transplanted. There should be at least 6 blood group O, 4 group A, 3 group B and 1 group AB.
An average waiting time of about two years allows for the orderly functioning of the list.

**Patient demographic information**

Of the 359 recipients of a pancreas transplants performed in Australia and New Zealand in the period 1984 until 2006, 52% of recipients were male, with 61% of donors being male. The median age of donors was 23 (SD 10.5) years, with a range of 6 to 61 years. About thirty% of donors were aged 11-20 years, a similar number were aged 21-30 years and a further twenty% were aged 31-40 years. The median age of recipients was 37 (SD 7.17) years, with a range of 20 to 60 years. Almost half of recipients were aged 31-40 years, a third of recipients were aged 41-50 years and fifteen% aged 21-30 years (ANZPTR 2007).

**Category of solid pancreas transplants**

In Australia and New Zealand of the solid organ pancreas transplants performed in the period 1984-2006, 345 (96%) were simultaneous pancreas kidney transplants (SPK), eight were pancreas after kidney (PAK) transplants, six were pancreas transplants alone (PTA) and there was one pancreas/liver and kidney transplant.

**Health Outcomes**

The following data are drawn from the Australian & New Zealand Pancreas Transplant Registry (ANZPTR 2007) and represent the outcomes for all solid organ pancreas transplants in Australia and New Zealand for the specified periods.

| Table C2: Simultaneous pancreas kidney (SPK) graft and patient survival 1984-2004 |
|---------------------------------|-----------------|-----------------|
|                                 | 1 year survival | 3 year survival | 5 year survival |
| Kidney                          | 92%             | 90%             | 86%             |
| Pancreas                        | 86%             | 82%             | 78%             |
| Patient                         | 96%             | 94%             | 93%             |

| Table C3: One year SPK graft survival in Australia & New Zealand by decade |
|--------------------------|-----------------|
| Kidney                  | 83%        | 94%        |
| Pancreas                | 82%        | 87%        |
Table C4: One year Australia & New Zealand SPK graft; patient survival by age group 1984-2004

<table>
<thead>
<tr>
<th></th>
<th>Age less than 45 years</th>
<th>Age 45 years and greater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney</td>
<td>92%</td>
<td>92%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>87%</td>
<td>83%</td>
</tr>
<tr>
<td>Patient</td>
<td>96%</td>
<td>92%</td>
</tr>
</tbody>
</table>

Source: ANZPTR 2007

Until 2000 bladder drainage for the pancreatic duct was used in all transplants. In 2001 WNPTU started using enteric drainage for the pancreatic duct, by 2004 all transplants were managed this way.

Table C5: Australia & New Zealand one year graft and patient survival for bladder and enteric drainage

<table>
<thead>
<tr>
<th></th>
<th>Bladder drainage</th>
<th>Enteric drainage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney</td>
<td>91%</td>
<td>96%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>84%</td>
<td>92%</td>
</tr>
<tr>
<td>Patient</td>
<td>95%</td>
<td>96%</td>
</tr>
</tbody>
</table>

Source: ANZPTR 2007

Table C6: Westmead one year graft and patient survival for bladder and enteric drainage

<table>
<thead>
<tr>
<th></th>
<th>Bladder drainage (n=142)</th>
<th>Enteric drainage (n=43)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney</td>
<td>95%</td>
<td>100%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>78.8%</td>
<td>90.7%</td>
</tr>
<tr>
<td>Patient</td>
<td>92.2%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Post-transplantation clinical outcomes and morbidity

Unit research demonstrates that after a successful SPK transplant long-term insulin independence is achieved, with normal patterns of blood glucose concentrations being achieved in oral glucose tolerance tests.

The Westmead Eye Study found that all patients who undergo pancreas transplantation have diabetic retinopathy. After transplant after follow up of 1-4.5 years, the retinopathy had been stabilised in 81-85% of patients.
Unit patients who before transplant had nerve conduction study (NCS) outcomes in the top two quartiles demonstrated increasing improvement (up to 8 years post-surgery) in NCS results. Top quartile patients improved to the extent that average NCS results fell within the normal range five years after treatment.

Adverse consequences of autonomic neuropathy, including dizziness and gastrointestinal gastroparesis, improve after transplantation.

In summary research findings indicate that after pancreas transplantation microvascular disease including retinopathy, nephropathy, peripheral and autonomic neuropathy and microvascular skin lesions stabilise or are improved. In relation to macrovascular disease, cardiac geometry and mortality is improved, though peripheral vascular disease and carotid artery disease is unaltered.

**Reasons for graft failure**

For the period 1984-2006 the most common cause of pancreas graft failure was thrombosis which occurred in about half of cases with almost 20% of cases due to rejection. Graft thrombosis has occurred in 9.3% of enteric drained grafts compared with 16.2% of bladder drained grafts.

Kidney graft failure was caused by thrombosis in 41% of cases and rejection in 35% of failures.

**Cause of death**

Death after transplantation was caused in about 40% of cases by either cerebrovascular or cardiovascular disease. Just over 20% of deaths were caused by infections.

**Quality of life**

WNPTU uses a number of quality of life measures including the Campbell Health Scale, the Nottingham Health Profile and the Diabetes Control & Complication Trial. Quality of life is assessed both before and after transplantation.

The Campbell Health Scale is a subjective measure of well-being with scores of less than three indicating very low well-being and patients with chronic health conditions scoring more than fourteen. Prior to transplant Westmead patients had a mean score of 6.5 (+/- 1.6), after transplantation the mean score was 10.1 (+/- 1.8).

The Nottingham Health Profile measures six factors, there was an improvement on mean scores for each measure after transplant but especially for energy, social isolation and emotional reaction and less so for physical mobility, sleep and pain.

The Diabetes Control and Complications Trial (DCCT) measure found a reduction of impact and worry about healthy problems after transplantation.

WNPTU has also established a Cardiac Rehabilitation Program which for the first ten patients shows increased quality of life, improved exercise tolerance and weight maintenance on before and after measures.
Models of care and service delivery

Service scope

WNPTU provides clinical services for type 1 diabetic patients seeking solid organ pancreas transplantation including: assessment; education; transplantation; early post-transplant care; long term post-transplant care and follow-up.

WNPTU also provides pancreatic islet cell transplantation and undertakes research and education in relation to transplantation for type 1 diabetes, including islet transplantation through the development of the national islet consortium.

Organ retrieval

WNPTU surgeons work on a roster with Royal Prince Alfred Hospital to retrieve organs for transplant in NSW. A reticence on the part of interstate transplant surgeons to retrieve organs because of concerns about maintaining organ integrity mandates a larger retrieval workload for NSW surgeons, which imposes an additional burden on Unit surgeons.

In October 2007 the Unit was successful in the first Australian retrieval and transplant of a kidney and pancreas from a cardiac death donor.

The current surgical model at the WNPTU involves enteric drainage (ED) of pancreatic duct exocrine secretions and pancreatic venous drainage into the iliac vessels. The Unit has pioneered a new technique using a Linear Cutting Stapler to create a duodenostomy for the enteric drainage of the pancreas transplant, with no enteric anastomosis complications in a series of twenty consecutive cases (Lam et al 2006).

Continuum of care

Patients at WNPTU benefit from standardised treatment and investigation protocols from time of acceptance on to the waiting list, through transplantation to long term follow-up. Patients are aggressively case managed and they and their families receive intensive and on-going support. Referring doctors and units are kept informed of their patients’ progress. Patients are routinely reviewed at three and twelve months after transplant and then each year.

Key staff

The WNPTU places great emphasis on developing and retaining expertise in pancreas transplantation, as well as ensuring excellence in transplantation surgical training across Australia. The current core workforce is:

- transplant surgeons – Henry Pleass, Brendan Ryan, Richard Allen, Howard Lau, Vincent Lam;
- transplant physicians – Phil O’Connell, Brian Nankivell, Jeremy Chapman;
- senior transplant co-ordinator – Paul Roberston;
transplant perfusionist – Wayne Hawthorne;

transplant nurse practitioner – Kathy Kable.

Clinical infrastructure, equipment and facilities

The Westmead WIN program has completed a $6 million refurbishment, which has been designed as a comprehensive clinical centre for renal, transplant, urology services and WNPTU. This will complete the investment required for the next ten years for the WNPTU and ancillary programs. The WNPTU research laboratory has also been refurbished and is operational.

Relationship with, and provision of information to referring practitioners; outreach services in other jurisdictions

The WNPTU holds new patient assessment and post-transplant review clinics in each state (except Victoria) as required by demand, but at least annually. The clinic is held at a major referral centre. A physician, surgeon, the coordinator and senior nurse practitioner from the WNPTU attend. Referring clinicians receive regular follow-up information on their patients from unit clinicians. Education sessions are held for patients. Resource material is provided to referring clinicians. Unit staff also give lectures to health care professionals.

Current and future services gaps and constraints

The WNPTU is planning to bring cardiac rehabilitation on-site with additional dietician support, which would be more convenient for patients and allow more intensive therapy.

The major constraint on all organ donation programs is the deceased organ donor supply. The Final Report to the Commonwealth of the National Clinical Taskforce on Organ and Tissue Donation, chaired by Professor Chapman (released February 2008) made 51 recommendations to address this problem. The implementation of the recommendations is proceeding.

Non-inpatient services

Staff of the WNPTU are of the view that with respect to pancreas transplantation at Westmead that the distinction between inpatient and non-inpatient care is an artificial one and does not reflect the model in place, which is based on a continuum of care, no matter where the care is provided or where the patient may sleep, consequently management of patients remains at a high level of intensity.

As noted above, assessment and review clinics are held at least annually in major interstate centres.
Quality and Safety

Adherence to treatment protocols and pathways

The WNPTU has highly developed protocols and care pathways, which are under continual review and which ensure excellent patient outcomes.

Multivariate analysis for all renal transplants in Australia and New Zealand (1991-2004), when adjusted for smoking history, gender, year of transplant, recipient age, time on dialysis, recipient co-morbidities, donor age, ischaemia time, HLA mismatch and peak PRA, demonstrated the following with respect to patient survival:

Table C7: Multivariate analysis of patient survival (1991-2004)

| Covariate                  | HRatio | 95% CI       | P>|z| |
|----------------------------|--------|--------------|-----|
| No diabetes DD K           | 0.925  | (0.623 to 1.374) | 0.699 |
| No diabetes LD K           | 0.641  | (0.422 to 0.972)  | 0.036 |
| Type 1 diabetes DD K       | 2.251  | (1.567 to 3.529)  | <0.001 |
| Type 1 diabetes DD SPK     | 1      |               |     |
| Type 1 diabetes LD K       | 1.027  | (0.537 to 1.962)  | 0.936 |
| Type 2 diabetes DD K       | 1.673  | (1.109 to 2.523)  | 0.014 |
| Type 2 diabetes LD K       | 0.815  | (0.392 to 1.692)  | 0.582 |

DD: deceased donor; LD living donor; K kidney only; SPK simultaneous pancreas kidney

Adherence to agreed evaluation and reporting

The WNPTU furnishes the NFC secretariat an annual (FY) report using the agreed pro forma for annual statistical returns (Appendix 3 of the NFC guidelines)
Summary of recent Appendix 3 returns summarizing referrals and patient complications

Table C8: Summary of Appendix 3 returns

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>New referrals</td>
<td>52</td>
<td>93</td>
<td>51</td>
</tr>
<tr>
<td>Rejected before assessment</td>
<td>n/a</td>
<td>33</td>
<td>7</td>
</tr>
<tr>
<td>Not accepted</td>
<td>16</td>
<td>21</td>
<td>16</td>
</tr>
<tr>
<td>Accepted (% of assessed referrals)</td>
<td>36</td>
<td>39</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>(69%)</td>
<td>(65%)</td>
<td>(64%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected care path</td>
<td>19</td>
<td>22</td>
<td>7</td>
</tr>
<tr>
<td>Complicated care</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Death post treatment</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total cases</td>
<td>23</td>
<td>25</td>
<td>14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome measures</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nosocomial infections</td>
<td>Within expected range</td>
<td>Within expected range</td>
<td>Within expected range</td>
</tr>
<tr>
<td>Adverse clinical events</td>
<td>Within expected range</td>
<td>Within expected range</td>
<td>Within expected range</td>
</tr>
<tr>
<td>Unplanned admit to ICU</td>
<td>Blocked IVC</td>
<td>Bleeding; resp failure; PE</td>
<td>Resp failure; resp complications</td>
</tr>
<tr>
<td>Unplanned readmit post discharge</td>
<td>Within expected range</td>
<td>Within expected range</td>
<td>Within expected range</td>
</tr>
</tbody>
</table>
Patient and carer satisfaction

The Unit noted that annual statistics on patient satisfaction are meaningless in the context of small numbers, consequently collected statistics and national and international studies are needed to define true responses. The satisfaction of individuals often relates to individual outcomes. The WNPTU does not collect family response data, but there have not been complaints raised with the Unit. The individual interactions and responses from patients and families is invariably positive, but clearly distorted by the carer relationship of the WNPTU.

The WNPTU provides prospective patients with two volume information packages, which whilst comprehensive are easy to read and understand. The first volume covers the pre-operative period and the second provides information about the immediate post-operative stage, longer term issues and life at home.

Interview with patients and carers

All patients and carers who were interviewed had a consistently very positive view of the programs and staff. Features which warranted particular mention, included:

- introduction to the program for the patient, which ensured patients knew what to expect;
- support for the carer and family;
- the expertise and support provided by all clinical staff, which instilled a high level of confidence in patients and helped them maintain a positive attitude;
- the provision of contact numbers so that expert advice can be accessed at all hours; and
- the financial support provided by the program.

The interviewees also noted that:

- from their experience there appeared to be a lack of understanding amongst some community clinicians about the availability and efficacy of pancreas transplantation; and
- patients may need to source financial support for interstate travel costs from other sources, such as State-based patient transport schemes.

Teaching, Training and Research

The WNPTU is active in teaching and training, which benefits other Units in Australia and also ensures that succession planning at the WNPTU is well managed.

The WNPTU has had nine surgical fellows, seven advanced nephrology trainees who have qualified as specialist nephrologists and seven successful PhD candidates.
Research

The overarching aim of the WNPTU research program is to advance and develop new transplant therapies for patients with type 1 diabetes and identify the major clinical impediments to successful pancreas transplantation. These objectives to be achieved by developing novel solutions through research and to translate into clinical practice novel research solutions developed in the laboratory.

Research activities include:

- clinical outcome studies: quality of life; and impact of SPK on secondary complications;
- evaluation of graft outcomes and graft histology: protocol biopsy study; ultrasound predictors of transplant glomerulopathy; genomics of chronic allograft nephropathy;
- registry studies: survival data; cancer incidence.

Laboratory research activities include:

- developing pancreatic islet xenotransplantation through gene manipulation;
- novel approaches to overcoming the immediate blood inflammatory reaction and improving short term graft survival;
- understanding the role of macrophages in pancreatic islet graft rejection.

Research milestones

- Developed a new paradigm of the natural history of chronic allograft nephropathy.
- Stratified the cancer risk for CKD/dialysis/transplant recipients compared to the general population.
- Developed patient survival data in diabetic in renal failure.
- Completed Australia’s first successful trial of clinical islet transplantation.
- Identified a novel role for macrophages in islet xenograft rejection.
- Identified immune regulators that inhibit the early destruction of islet xenografts after intra-portal transplantation.
- Developed a novel source of islets for islet xenotransplantation.

WNPTU has been successful in securing $27.5 million in competitive research funding in the last five years. The Unit also has research collaborators in relation to competitive research funding at Mt Sinai Medical School (New York), Harvard Medical School (Boston), St Vincent’s Hospital (Melbourne), University of Adelaide, University of WA,
Review of NFC pancreas transplant program

Walter & Eliza Hall Institute of Medical Research (Melbourne) and Children’s Hospital Westmead.

Clinical Practice

Development of comparative treatments

The WNPTU do not foresee significant changes to clinical practice within three to five years. Islet transplantation therapy will not become a replacement for whole organ transplantation until the problems of medium term islet graft failure are resolved. There will be a slow and cautious increase in pancreas after kidney and pancreas alone transplantation, but the results do not yet merit any substantially different approach.

The WNPTU is at the forefront of developments of alternative therapy for this group of patients, therefore any advances in therapeutic options will be rapidly implemented into clinical practice with the continuation of the NFC program.

The Westmead Centre for Transplantation and Renal Research Xenotransplantation program under Professor O’Connell has the long term goal of releasing transplantation from this confine through use of engineered animal organs.

Service demand

The primary caseload for SPK transplantation is patients with type 1 diabetes, with end stage renal disease (ESRD), who are aged under 45 years.

Table C9: Acceptance of diabetic patients for treatment by dialysis in Australia 1980-2004

<table>
<thead>
<tr>
<th>5 year cohorts</th>
<th>Type 1 diabetes</th>
<th>Type 2 diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980-1984</td>
<td>142</td>
<td>70</td>
</tr>
<tr>
<td>1985-1989</td>
<td>221</td>
<td>170</td>
</tr>
<tr>
<td>1990-1994</td>
<td>300</td>
<td>529</td>
</tr>
<tr>
<td>1995-1999</td>
<td>359</td>
<td>1307</td>
</tr>
<tr>
<td>2000-004</td>
<td>324</td>
<td>2146</td>
</tr>
</tbody>
</table>

The number of people with diabetes aged less than 24 years with ESRD is falling consequent on better management of diabetes in the past ten years. The incidence between 25 and 55 years has reached a plateau in the past ten years, suggesting the demand for SPK transplants will remain static for the next ten years when the younger and better treated patients will start to see the longer term benefits of good glucose control.

The WNPTU concluded that given the current acceptance criteria there would be about 25-35 new patients accepted on to the waiting lists each year.
Cost

The current NFC allocation is $113,458 for each transplant.

The WNPTU used the original CHERE cost evaluation method to build up a picture of the current transplant costs. The expected number of transplant patients by outcome based on a five year average.

Table C10: WNPTU cost breakdown for expected annual caseload

<table>
<thead>
<tr>
<th>Patient type</th>
<th>Direct average cost</th>
<th>Expected number</th>
<th>Total direct cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rejected: discussion</td>
<td>$156</td>
<td>30</td>
<td>$4675</td>
</tr>
<tr>
<td>Rejected: assessment</td>
<td>$4076</td>
<td>25</td>
<td>$101,944</td>
</tr>
<tr>
<td>Accepted: waiting</td>
<td>$5016</td>
<td>20</td>
<td>$100,322</td>
</tr>
<tr>
<td><strong>Transplanted</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple early failure</td>
<td>$63,065</td>
<td>5%</td>
<td>$78,831</td>
</tr>
<tr>
<td>Complex late failure</td>
<td>$90,035</td>
<td>8%</td>
<td>$180,070</td>
</tr>
<tr>
<td>Simple complete</td>
<td>$70,451</td>
<td>68%</td>
<td>$1,197,667</td>
</tr>
<tr>
<td>Complex complete</td>
<td>$103,176</td>
<td>19%</td>
<td>$400,086</td>
</tr>
<tr>
<td><strong>All patients</strong></td>
<td></td>
<td></td>
<td><strong>$2,153,595</strong></td>
</tr>
<tr>
<td>External costs (travel &amp; accommodation for patients, carers &amp; staff)</td>
<td></td>
<td></td>
<td>$190,105</td>
</tr>
<tr>
<td>Program management and fixed costs</td>
<td></td>
<td></td>
<td>$478,599</td>
</tr>
<tr>
<td>Overhead costs (food services, power, linen, administration)</td>
<td></td>
<td></td>
<td>$155,100</td>
</tr>
<tr>
<td>Capital costs</td>
<td></td>
<td></td>
<td>$13,478</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>$837,282</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td></td>
<td></td>
<td><strong>$2,990,876</strong></td>
</tr>
</tbody>
</table>

At the WNPTU the total program costs are calculated at $2,990,876, which when averaged across twenty-five actual transplants is $119,635 per transplant.
Attachment D

Report from the Monash Medical Centre Pancreas Transplant Unit

The following document is based upon documentation and information provided by the MMC Unit, including:

- the Unit’s response to the Appendix 9 review criteria;
- the Unit’s NFC Guidance Document Appendix 2 and 3 reports;
- a presentation made to the consultants on 14 February 2008;
- other information provided during the presentation and site visit;
- patient and carer interviews on visit to Unit on 4 March 2008;
- the Australia & New Zealand Pancreas Transplant Registry Report 1984-2006;
- abstracts written by Unit staff.

Access to the MMC Unit at Southern Health

Selection criteria for Simultaneous Pancreas Kidney Transplants

- type 1 diabetes and kidney disease;
- low C-peptide (rare exceptions);
- generally <50 years old;
- does not have significant peripheral disease and unresolved coronary artery disease;
- accepts and understands added risks;
- able to cope psychologically and socially; and
- other factors.

Referral and assessment

- The patient is placed on the waiting list when the referral letter is received by the Unit.
- The referral is usually, but not always made by a nephrologist. The patient’s endocrinologist is also involved in the overall communication and referral process.
- The patient is seen at MMC.
The initial work-up is undertaken at MMC in line with standards protocols.

**Transplantation and waiting list data**

The MMC Unit has primarily serviced Victoria to date. Up to and including 1999, only 3-5 transplants were performed annually. Since 2000, 8-10 transplants have been undertaken each year. The 100th pancreas transplant was performed at MMC in December 2007.

Table D1: Home Unit of patients transplanted (2004 – 2008) and currently waiting

<table>
<thead>
<tr>
<th>Home Unit of recipient</th>
<th>Transplants 2004-2008</th>
<th>Active waiting list at February 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMH/Western</td>
<td>31.4%</td>
<td>11.8%</td>
</tr>
<tr>
<td>MMC</td>
<td>28.6%</td>
<td>35.3%</td>
</tr>
<tr>
<td>Austin</td>
<td>17.1%</td>
<td>5.9%</td>
</tr>
<tr>
<td>St Vincent’s</td>
<td>14.3%</td>
<td>17.6%</td>
</tr>
<tr>
<td>Alfred Hospital</td>
<td>5.7%</td>
<td>17.6%</td>
</tr>
<tr>
<td>Geelong Hospital</td>
<td>2.9%</td>
<td>11.8%</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>17</td>
</tr>
</tbody>
</table>

**Patient demographic information**

Seven of the thirty-five transplanted patients (twenty%) lived outside the Melbourne metropolitan area.

The mean age of transplant recipients was 38 years, with a range of 25 to 51 years. Seventeen (49%) of patients were male.

The total waiting list is fifty-four patients, of whom seventeen are currently on the active list. Ten of the fifty-four total waiting list patients (18.5 percent) live outside the Melbourne metropolitan area.

The mean age for total waiting list patients is 38 years, with a range of 24 to 51 years. Thirty (56 percent) of patients on waiting list are male.

Twenty-two patients referred since 2004 have been removed from the waiting list, twelve because of medical unsuitability and ten because of death.
**Category of solid pancreas organ transplants**

Table D2: Classification of current waiting list patients (2/2008)

<table>
<thead>
<tr>
<th>Proposed procedure</th>
<th>Active (ready to receive transplant)</th>
<th>Not active (not ready to receive transplant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients for SPK</td>
<td>15</td>
<td>32</td>
</tr>
<tr>
<td>Patient for PAK</td>
<td>2</td>
<td>5*</td>
</tr>
<tr>
<td>All patients</td>
<td>17</td>
<td>37</td>
</tr>
</tbody>
</table>

*all have functioning kidney transplant; future suitability to be confirmed

**Current dialysis status**

Table D3: Dialysis status for current waiting list patients (2/2008)

<table>
<thead>
<tr>
<th></th>
<th>Active (ready to receive transplant)</th>
<th>Not active (not ready to receive transplant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dialysis patients for SPK</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Pre-dialysis patient for SPK (GFR&lt;25ml/min)</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>All patients</td>
<td>17</td>
<td>32</td>
</tr>
</tbody>
</table>

**Waiting times**

Table D4: Waiting times for patients waiting transplant

<table>
<thead>
<tr>
<th></th>
<th>Median waiting time after referral (range)</th>
<th>Median waiting time on dialysis (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>23 (6-22) months</td>
<td>18 (5-30) months</td>
</tr>
<tr>
<td>Not active</td>
<td>17 (1-28) months</td>
<td>17 (8-32) months</td>
</tr>
</tbody>
</table>
Table D5: Actual waiting times for transplanted patients

<table>
<thead>
<tr>
<th></th>
<th>Median wait after referral (range) months</th>
<th>Median wait on dialysis (range) months</th>
<th>Pre-dialysis patients transplanted (no.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004 (8 patients)</td>
<td>18 (3-33)</td>
<td>10 (0-33)</td>
<td>1</td>
</tr>
<tr>
<td>2005 (8 patients)</td>
<td>19 (5-69)</td>
<td>12 (0-18)</td>
<td>1</td>
</tr>
<tr>
<td>2006 (8 patients)</td>
<td>21 (6-47)</td>
<td>29 (0-75)</td>
<td>2</td>
</tr>
<tr>
<td>2007 (9 patients)</td>
<td>28 (17-51)</td>
<td>29 (14-88)</td>
<td>0</td>
</tr>
<tr>
<td>2/2008 (2 pats)</td>
<td>30 (26-33)</td>
<td>29 (26-32)</td>
<td>0</td>
</tr>
</tbody>
</table>

**Health Outcomes**

Prior to 2001 the MMC Unit used a systemic venous-bladder drainage procedure, however since 2001 this has changed to portal venous-enteric drainage for SPK transplantations.

Table D6: Graft, patient and event-free survival

<table>
<thead>
<tr>
<th></th>
<th>2 year (n=27)</th>
<th>3 year (n=40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney</td>
<td>85.2%</td>
<td>85.3%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>71.4%</td>
<td>76.7%</td>
</tr>
<tr>
<td>Patient</td>
<td>96.0%</td>
<td>96.9%</td>
</tr>
<tr>
<td>Event-free</td>
<td>67.7%</td>
<td>74.6%</td>
</tr>
<tr>
<td>Pancreas graft thrombosis</td>
<td>7.4%</td>
<td>7.5%</td>
</tr>
</tbody>
</table>

Source: Kave et al 2006, 2007
The following three figures compare patient and graft survival for MMC and Westmead.

Figure 1: Patient survival MMC Unit and WNPTU

![Patient Survival Graph]

Number at risk
Westmead 246 142 62 20 1
Monash 102 56 19 5 0

Figure 2: Pancreas graft survival MMC Unit and the WNPTU

![Pancreas Survival Graph]

Number at risk
Westmead 245 119 48 15 2
Monash 101 42 14 6 1
Figure 3: Kidney graft survival MMC Unit and WNPTU

The MMC Unit submitted data prepared by Professor Chapman (WNPTU) as to patient and kidney graft survival.

Table D7: Graft and patient survival outcomes for all kidney transplants in Australia and New Zealand (Jan 1980-Dec 2004)

<table>
<thead>
<tr>
<th>Donor &amp; Patient characteristics</th>
<th>Number</th>
<th>10 year patient survival</th>
<th>10 year kidney graft survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living donor; non-diabetic</td>
<td>1887</td>
<td>85.1%</td>
<td>69.9%</td>
</tr>
<tr>
<td>Living donor; Type 1 diabetes</td>
<td>83</td>
<td>65.6%</td>
<td>63.8%</td>
</tr>
<tr>
<td>Living donor; Type 2 diabetes</td>
<td>99</td>
<td>63.1%</td>
<td>42.1%</td>
</tr>
<tr>
<td>Deceased donor; non-diabetic</td>
<td>3521</td>
<td>68.4%</td>
<td>48.2%</td>
</tr>
<tr>
<td>Deceased donor; Type 1 diabetes</td>
<td>159</td>
<td>32.2%</td>
<td>11.2%</td>
</tr>
<tr>
<td>Deceased donor; Type 2 diabetes</td>
<td>298</td>
<td>49.1%</td>
<td>32.2%</td>
</tr>
<tr>
<td>Deceased donor; SPK</td>
<td>245</td>
<td>76.5%</td>
<td>66.1%</td>
</tr>
</tbody>
</table>

Source: Chapman et al 2006
Model of care and service delivery including non-inpatient services

Service scope

Referred patients are assessed with a standardised protocol. The patients consider their various options in consultation with various members of the MMC Unit as well as their primary Nephrologist, Endocrinologist, GP and other interested parties. Communication is wide often involving several other specialties (e.g. Cardiologist, Ophthalmologist) as well as Allied Health and Psychiatric Services.

Family members are also actively involved in education days and during the consultation / assessment phase.

Once accepted for transplantation and placed on the waiting list, patients are reviewed to ensure current fitness for transplantation. This is continued on a 6-monthly basis until they are transplanted, generally after a 2-3 year wait. Communication with the patient’s other doctors / primary unit remains of paramount importance during this period and this is well achieved with current arrangements.

The MMC Unit undertakes post-transplant monitoring for the first 3 months, subsequently patients are usually managed by their referring unit with six monthly or annual reviews at MMC. Some patients opt to transfer care to MMC long-term (patient request, patient convenience).

Continuum of care

Patients are referred by their Nephrologist or Endocrinologist for consideration for SPK transplantation. Less frequently patients are referred for consideration for Pancreas only transplantation.

Patients undergo medical consultation(s) involving:

- general medical history and examination;
- review of investigations including renal function, diabetic control, dialysis arrangements;
- evaluation of diabetic complications — eye, neuropathy, gut function, sexual function, foot care, vascular disease;
- evaluation of risk factors for transplantation — smoking status, cancer screening, likelihood of ischaemic heart disease, presence of infections;
- discussion of options of dialysis versus kidney-alone versus SPK transplantation, including chances of success, impact on life expectancy, work and family;
- discussion of medications, side-effects and complications; and
- assessment of compliance with therapy.
Investigations to determine suitability are arranged including:

- renal function tests: only those with significant renal impairment (GFR < 25mL/min) would be considered for listing;
- nerve conduction studies;
- ophthalmology review including retinal angiography;
- arterial duplex studies of the iliac vessels;
- cardiac stress testing (Stress ECHO);
- viral serologies including Hep B & C, HIV, EBV, CMV, VCZ;
- blood group and Tissue typing;
- chest x-ray; and
- parathyroid Hormone assay, bone density scanning.

Referrals to evaluate diabetic complications are made on an as needed basis, including cardiology (e.g. for coronary angiography), ophthalmology, endocrinology, neurology.

All patients are referred for:

- psychiatric/psychological assessment including consent, compliance, comprehension, coping strategies, social supports and SF-36 assessment;
- surgical assessment, including explanation of the procedure and potential complications; and
- social worker review.

Education Day attendance is compulsory. This enables full patient education by speakers including the Physician, Surgeon, Psychiatrist, Social Worker, Dietician, Nursing Staff and other patients.

Review by Transplant physician to confirm either:

- acceptance for transplantation and placement on the waiting list; or
- need for further evaluation, such as cardiology referral; or
- exclusion from SPK listing and return to their caring physician.
Six-monthly review of those on the waiting list to ensure ongoing suitability for transplantation. 12 monthly review may be possible for patients under close watch by their primary unit and where communication is excellent.

Transplantation, including:

- hospitalisation for 14 days on average;
- transplant surgery;
- daily review by surgical & medical teams;
- high dependency nursing;
- intensive monitoring of renal, pancreatic, gut and cardiac function;
- intravenous feeding for 7-10 days (Total Parenteral Nutrition)
- prophylaxis against fungal, viral and bacterial infection, peptic ulceration and pressure sores;
- immunosuppression — quadruple therapy with Basiliximab, Tacrolimus, Mycophenolate and Prednisolone;
- patient rehabilitation and education: and
- management of any complications.

Post-transplant monitoring — months 0-3:

- regular physician review — daily initially, reduced to weekly by month 3, to review clinical status, graft function, drug levels, immunosuppression plans, compliance, complications;
- daily reporting of results. Verification of medication by transplant nurse;
- ongoing patient education;
- collection of data for quality control; and
- admission for investigation of graft dysfunction as required, including renal biopsy (Rejection is seen in 20-30% of SPK recipients, requiring urgent diagnosis and management).
Post-transplant monitoring — beyond month 3:

- return to parent renal unit between months 3-6 for regular care (unless MMC patient).
- 6-12 monthly review of non-MMC patients for patient care and quality assurance including assessment of immunosuppression, graft function, complications of diabetes, cardiovascular risk factors and events and complications of transplantation. This is continued indefinitely in most patients.

Management of complications and intercurrent illnesses as required by the referring unit. In particular, complications related to the transplant or those that may impact upon function of the transplant organs are best managed at MMC. The predicted rate of readmission to MMC, based on our experience, is 2 episodes per patient during the first 12 months post-transplant, followed by 1 readmission per 2 years thereafter.

Workforce and clinical infrastructure

- transplant surgeons - Mr Alan Saunder, Mr Roger Bell, Mr. Ming Yii
- transplant physicians - A/Prof. John Kanellis, Dr. Bill Mulley, as well as other members of the Department of Nephrology, led by Professor Peter Kerr, Director of Nephrology
- transplant Unit psychiatrist - Dr Vivienne Mak is employed half-time for transplant services, 60% of her time being dedicated to the pancreas program
- a transplant nurse dedicated to the pancreas program is employed full-time.
- a 0.5 ward clerk is also attached to the program. Allied Health input (Social Work and Dietetics mainly) is drawn from the team servicing Nephrology.

The MMC Unit has a very well established deceased-donor and living-donor kidney transplant program with around 40 renal transplants performed each year. Thus, there is strong expertise in nursing, allied health and diagnostic services to support the pancreas transplant program.

Other specialists are available at to provide their expertise for the program. These include Cardiologists, Infectious Disease physicians, Endocrinologists, Haematologists, and the Victorian Tissue-typing service.

During the organ donation surgery, 2 or 3 of the surgeons will be present for the procedure. This usually requires about 10-12 hours from the start of the deceased-donor surgery to the completion of the recipient surgery.
Relationship with referring practitioners

Close communication with referring units is maintained as much as possible. This takes the form of letters, emails and telephone conversations. Members of the team are available at all times for discussion and in order to discuss or alter management plans.

Frequent talks are given to the referring units (once every 1-2 years for each unit) by A/Prof John Kanellis and/or Dr Bill Mulley, in order to maintain close links and update the units on current practice and protocols. Since 2005, 4 lectures have been given at the other Melbourne Teaching Hospitals. Discussion at the Victorian Transplant Advisory Committee Meetings also frequently occurs. All the major units are represented at this meeting.
Quality and safety

Adherence to agreed evaluation and reporting

MMC furnishes the NFC secretariat an annual (FY) report using the agreed pro forma for annual statistical returns (Appendix 3 of the NFC Guidance Document).

Summary of recent Appendix 3 returns summarizing referrals and patient complications

Table D8: Summary of Appendix 3 returns

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Referrals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New referrals</td>
<td>34</td>
<td>28</td>
<td>16</td>
</tr>
<tr>
<td>Not accepted</td>
<td>6</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Accepted</td>
<td>13</td>
<td>22</td>
<td>15</td>
</tr>
<tr>
<td><strong>Types of outcomes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expected care path</td>
<td>7</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Complicated care</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Death post treatment</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Total cases</td>
<td>9</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td><strong>Outcome measures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nosocomial infections</td>
<td>- abdo sepsis</td>
<td>- CMV oesophagitis</td>
<td>- enterococcal septicaemia</td>
</tr>
<tr>
<td>Adverse clinical events</td>
<td>-severe rejection episode</td>
<td>- 2 pancreas graft thrombosis</td>
<td>-1 pancreas graft thrombosis - pancreatitis</td>
</tr>
<tr>
<td>Unplanned admit to ICU</td>
<td>-</td>
<td>-</td>
<td>- airway support</td>
</tr>
<tr>
<td>Unplanned readmit post discharge</td>
<td>- abdo sepsis - 2 CMV infection</td>
<td>- 3 febrile illnesses</td>
<td>- hypotension - renal biopsy</td>
</tr>
</tbody>
</table>

The protocols used at the MMC Unit for pancreas transplantation are similar to those used internationally and at the WNPTU. Close communication is maintained between the MMC Unit and the WNPTU regarding protocols, acceptance criteria, changes in practice, complications and service provision. Annual meetings are held and both solid organ pancreas and islet pancreas transplant teams present and discuss their data and recent experiences (Pancreas Standing Committee of the Transplantation Society of Australia and New Zealand). Data are provided to the Pancreas Registry and to ANZDATA on an annual basis.
Local review of outcomes occurs as part of general Quality and Governance analyses at MMC. A/Prof. John Kanellis, Prof. Peter Kerr and Mr. Alan Saunders are on committees that frequently review outcomes from within the Renal and Surgical Programs. Specific complications related to pancreas transplant patients are reviewed annually and various parties (e.g. Anaesthetic Department, ICU, Nursing etc.) are involved in these discussions and presentations. Protocols are frequently reviewed in order to maintain best practice.

International meetings are attended annually in order to review current best practice coming out of larger international units in particular those in the USA. Once again, protocols are altered where appropriate to take any new information into account (e.g. regarding acceptance criteria, anticoagulation protocols, surgical techniques, new immunosuppression).

**Patient and family/carer satisfaction**

Interviews with patients and carers were held at MMC on 4 March 2008. Results are reported in the body of the report.

**Teaching, training and research**

Advanced Trainees in Nephrology and Surgical Trainees are actively involved in the process of assessing and treating these patients and receive formal training in this specialised area. Other junior staff benefiting from the program includes those studying Infectious Diseases, Metabolic Medicine, Cardiology and Endocrinology. A/Prof. John Kanellis and Dr. Bill Mulley have both given lectures on Pancreas Transplantation at Registrar Training Symposia and as part of Course requirements in Nephrology and Transplant Training.

Comprehensive data collection for all patients under care is undertaken six-monthly, compiled and shared with the WNPTU. It is considered that any systematic data collection should be the same for the WNPTU and the MMC Unit.

Trainee projects over the last 3 years have involved analyses related to this patient group. Benjamin Kave (B. Med. Sci. student) analysed the results of all patients undergoing the new surgical technique of Portal-Enteric anastomosis and compared this to Systemic-Bladder anastomosis as part of his thesis. His work was presented at both the TSANZ (Transplantation Society of Australia and New Zealand) and the IPITA (International Pancreas and Islet Transplant Association) meetings. Dr Parvinder Chaal (Nephrology Trainee) recently analysed the pancreas donor organ offers from within Victoria and examined the criteria determining acceptance or non-acceptance of those offers in collaboration with LifeGift Victoria (project for College of Physicians). Ongoing data is being collected regarding body composition studies (in collaboration with Prof. Boyd Strauss), nerve conduction and immunological parameters.

The MMC Renal Unit has a very active Basic Research Laboratory. Areas currently being studied through PhD students, post doctoral students and senior researchers include Diabetic Renal Disease, Pancreas Injury in Diabetes as well as many other basic areas of research which have relevance to Diabetic Kidney Disease (general
mechanisms of inflammation and renal injury – role of several kinases, cytokines and macrophages).

**Clinical practice**

The main area of development in recent times has been the attempt to extend the criteria for donor acceptance (older aged donors, cardiac death donors etc.). This relates in part to the general shortage of donors and the increased waiting time generally seen. There is also a need to provide good quality organs to the islet programs that are still in development.

Solid organ pancreas transplantation remains the most effective means through which to “cure” diabetes. The risk of undertaking the transplant procedure and being subjected to the complications of immunosuppression need to be weighed up against the risk of remaining diabetic. In the context of renal failure, and with the ability to simultaneously transplant a kidney, the potential benefit far outweighs the harm in suitable patients. Islet transplantation, if it becomes safer and more successful, may ultimately be a better approach for many of the patients. At this stage however, patients selected for the islet transplantation procedure do not have significant kidney disease. The technology is likely to be at least 5-10 years away from making any impact on the patient group treated with solid organ pancreas transplantation.

Insulin pumps and new Insulin therapies have improved in recent years. This may allow better control of diabetes thereby possibly decreasing complications and possibly the need for transplantation in the future. The impact of this is yet to be seen. The referral numbers are fairly static or slowly increasing over the last few years.

There appears to be an increasing number of patients choosing live donation (kidney only) rather than waiting for the combined transplant procedure. This is mostly driven by the fact that there will be a waiting period of 2-3 years in most cases. Patients who are already on dialysis or who have rapidly deteriorating kidney function are more likely to take this option. This may result in an increased demand for PAK (pancreas after kidney transplantation) however at this stage we have not experienced this. Patients taking the live donor option tend to do very well however the medical and survival benefits of having the pancreas transplant (seen 5-10 years post transplant) are not experienced. There is however a benefit to receiving a kidney transplant earlier. In some of these cases in the future, pancreatic islet transplantation after living donor kidney transplantation, may be suitable however this is likely to be 5-10 years away at best.

**Service demand**

This is likely to remain fairly static. Solid organ pancreas transplantation remains a complex, specialised procedure with a demand for 35-40 cases to be performed per year in Australia. Organ donation rates would make it difficult to increase the rate to more than 40-50 per year. In order to maximise success and minimise risks and complications, donor pancreas organs used need to meet very strict criteria. The group being transplanted is likely to remain a small group relative to the group receiving kidneys only.
The rate of new onset type I diabetes has not significantly changed in recent years, and in particular did not undergo a significant change 20 or more years ago, given the lead time between diabetes diagnosis and the development of renal failure. It is anticipated the rate of new onset renal failure in this patient group might decrease with improved medical management but no definite trend has yet been observed.

One area of small increase in demand may be the increased acceptance of certain type 2 diabetics (with very specific criteria) for the combined kidney and pancreas transplant procedure. We recently transplanted a 25-year-old male with type 2 diabetes and kidney failure requiring dialysis. Based on certain criteria being used by units in the USA, we accepted him onto the waiting list for dual transplantation. He is now 1 month post-transplant and is on no insulin and is off dialysis. Small series recently reported in the USA, show the success of combined kidney and pancreas transplantation for some type 2 diabetics. It is envisaged that this would be a very small group of patients (estimate a current rate of 1 patient every 1-2 years).

**Cost**

The current NFC allocation is $113,458 for each transplant.

<table>
<thead>
<tr>
<th>Table D9: MMC cost breakdown for an expected caseload of 10 patients</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operational costs</strong></td>
</tr>
<tr>
<td>Direct</td>
</tr>
<tr>
<td>Indirect</td>
</tr>
<tr>
<td>Sub total</td>
</tr>
<tr>
<td><strong>Capital costs</strong></td>
</tr>
<tr>
<td>Facilities</td>
</tr>
<tr>
<td>Equipment</td>
</tr>
<tr>
<td>Sub total</td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
</tr>
</tbody>
</table>
Risk Management

The Monash Transplant Service has grown in recent years with the addition of nursing and medical infrastructure. The renal transplant service is growing with an increase need to perform living donor transplants, highly sensitised and ABO incompatible transplants. This ensures that the core personnel and infrastructures remain at a high level. The same teams are involved with kidney only as well as combined kidney and pancreas transplantation.

The number of transplants performed currently is adequate to maintain surgical and medical expertise as the pancreas transplant service is one component of the wider transplant service (performing 40 or so kidney transplants also). For training purposes (e.g. to have a surgical transplant fellow – full time) it is desirable to increase the number to at least 12-15 per year.

Increased surgical support may be necessary with an increase in transplants performed. This would need to address organ retrieval as well as performing the transplants. The need to retrieve interstate depends on the local expertise and these needs will vary from state to state. Most states now have experienced surgeons for organ retrieval and the reliance on the transplanting team to fly in and then retrieve organs may not be as high as previously. However, clear protocols and lines of duty in this regard would need to be negotiated depending on the abilities of the organ retrieval teams within each state.

Training of future Nephrologists expert in pancreas transplantation is part of the program. Since NFC funding was secured, a surgical trainee dedicated to the transplant program has been added. It will take 2-3 years to upgrade this position to an advanced trainee or fellow position.
Attachment E

Journal articles and Unit papers, WNPTU and Centre for Transplant and Renal Research

Peer Reviewed Publications 2000-2008

(Approximately 27 publications per annum)


Review of NFC pancreas transplant program


Attachment F

Peer reviewed publications, Monash Medical Centre

MMC provided a list of publications and book chapters relevant to transplantation in the past 5 years:


Kanellis J, Watanabe S, Li JH, Kang DH, Li P, Nakagawa T, Wamsley A, David Sheikh-Hamad D, Lan HY, Feng L and Johnson RJ. Uric acid stimulates MCP-
Review of NFC pancreas transplant program


33 Kanellis J, Kandane RG, Etemadmoghadam D, Fraser SA, Mount PF, Levidiotis V, Kemp BE, Power DA. Activators of the energy sensing kinase AMPK inhibit random cell movement and chemotaxis in U937 cells. *Immunology and Cell Biology*, 84 (1): 6-12, 2006


Chow FY, Nikolic-Paterson DJ, Ma F, Ozols E, Rollins BJ, Tesch GH: Monocyte chemoattractant protein-1 induced tissue inflammation is critical for the development of renal injury but not type 2 diabetes in db/db mice. Diabetologia 50:471-80, 2007


Fukuda K, Tesch GH, Yap FY, Forbes JM, Flavell RA, Davis RJ, Nikolic-Paterson DJ: MKK3 signalling plays an essential role in leukocyte-mediated pancreatic injury in the multiple low dose streptozotocin model. Lab Invest (E pub doi: 10.1038/labinvest.2008.10)


