



ANZIPTTR Report 2017

Australia and New Zealand Islet and Pancreas Transplant Registry data 1984-2016

This report is a compilation of data provided by Pancreas transplant units in Australia and New Zealand. The registry is funded in part by a grant from the Commonwealth Department of Health and Ageing www.anziptr.org

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Summary

Introduction

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We thank all contributors who have made the registry what it is and whose work has made this report possible.

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Governance structure

This report is a compilation of data provided by the three current solid-organ Pancreas transplant units in Australia and New Zealand: Auckland Renal Transplant Group, New Zealand; National Pancreas Transplant Unit Monash Medical Centre, Victoria; and National Pancreas Transplant Unit, Westmead Hospital, NSW, and the three Islet transplanting units. The ANZIPTR registry is funded in part by a grant from the Commonwealth Department of Health and Ageing.

Data release guidelines

The registry can provide de-identified data for free to Transplant Physicians, Transplant Units, research projects and Government Departments. The registry will not provide any personally identifiable data.

The clinical data provided contains potentially sensitive information and should be used only within agreed guidelines. If data are further published elsewhere ANZIPTR permission is necessary prior to submission for publication, and ANZIPTR should be identified as the source of the data. If data provided by ANZIPTR is the primary source of data, then a copy of publication should be provided to ANZIPTR.

Data provided by ANZIPTR should be utilised by requesting parties only, further data sharing with other parties or projects is not permitted without prior approval from ANZIPTR. The data supplied will be in accordance with ANZIPTR data specifications. Please see www.anziptr.org for our data dictionary.

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Analysis and Methods

The aim of this report is to record all pancreas transplant activity in Australia and New Zealand. Data included in this report was extracted from RISC (Renal Information System Catalogue) on the 6th April 2017, for all people transplanted up to the end of 2016. Please note new data is added to the registry regularly, and corrections are made where previous data is missing or where errors are discovered. This year's report continues with the new format and contents started in 2015. During 2016 we were able to correct many of the missing and problematic data we identified during 2015.

A functioning pancreas transplant is defined as a recipient free of exogenous insulin dependence; thus a pancreas transplant failure is declared when either a pancreatectomy is performed, or when the recipient returns to permanent insulin therapy. Kidney transplants are defined as functioning if recipients are dialysis free. All causes of death are included in the mortality analyses.

Kaplan-Meier survival curves were used to illustrate the survival distributions, and these were generated using Stata software version 14 (StataCorp, College Station, TX USA). Transplant survival is analysed and presented both including and excluding death with a functioning transplant as a failed graft. For patients receiving a second transplant, in calculating mortality, time was measured from time of first transplant.

Glossary

SPK	Simultaneous Kidney Pancreas Transplant
PTA	Pancreas Transplant Alone
PAK	Pancreas after Kidney Transplant
ITA	Islet Transplant Alone
PLK	Pancreas Liver Kidney
PLI	Pancreas Liver Intestine

Synopsis

A total of 756 solid organ pancreas transplants have been performed in Australia and New Zealand (ANZ), in 738 individuals from 1984-2016 (excluding islet transplants).

In 2016, 55 people received a pancreas transplant, by centre this was; Auckland (4); Monash (22); Westmead (29). In 2016, 50 transplants were SPK while 4 were PAK and 1 was PTA.

From 2002-2016, 92 Islet transplants have been performed in 53 patients.

New items

In 2015 ANZIPTR developed its own website: www.anziptr.org which describes the registry structure and function, outlines the procedure for data requests, and provides a download area for past reports. A slide set of results will be added this year to complement this report

The ANZIPTR welcomes suggestions for improvement or specific analyses you would like to see in the next annual report.

Chapter 1: Waiting List

Authors: Angela Webster, Paul Robertson, Abhijit Patekar, James Hedley, Patrick Kelly

Overview of waiting list activity

Definitions

Patients join the waiting list on the date they are referred to the transplanting centre; however this may occur some time before their kidneys fail. Patients are therefore classified as “under consideration” until they medically require a kidney pancreas transplant. Once they require a kidney pancreas transplant they are classified as “active” on the list while they remain medically fit. The “under consideration” classification also captures people recently referred to the transplant centre, who are still undergoing assessment about their medical fitness for pancreas transplant. People referred to a transplanting centre when they are already on dialysis, become “active” on the list as soon as they are accepted as medically fit. People referred to a transplanting centre when their kidneys still function, become active once their kidney disease progresses to such a level that dialysis is planned in the near future. Once active on the waiting list, patients are transplanted in order of their waiting time, by blood group.

Patient waiting list flow

The patient waiting list activity in the last three years for Australia (Westmead and Monash Units) and New Zealand are shown in Tables 1.1 and 1.2 respectively. In Australia, although the number of transplants has increased over the last three years, the number of patients on the active waiting list has continued to increase.

Table 1.1: Waiting list activity in Australia* for the last three years

Activity	Patients (n)		
	2014	2015	2016
On active list at beginning of year	84	59	40
Added to active list during the year	38	42	123
Removed from active list during year	14	12	24
Transplants to patients on waiting list	43	45	51
Kidney only transplants to patients on waiting list	1	0	3
Transplants performed outside Australia / New Zealand	0	0	0
Died while active on list	5	4	4
Died within 12 months of removal from list	2	0	1
Under consideration but not active on list	100	97	112
Referred but declined for pancreas transplantation	0	12	19
On active waiting list at the end of year	59	40	81

* Westmead and Monash only

Table 1.2: Waiting list activity in New Zealand for the last three years

Activity	Patients (n)		
	2014	2015	2016
On active list at beginning of year	4	5	7
Transplants to patients on waiting list	5	0	4
Under consideration but not active on list	0	3	4

Distribution of active patients by state

Figure 1.1, Table 1.3, and Table 1.4 show the state of residence for people active on the pancreas waiting list, by the pancreas transplanting centre they were referred to (Australia only). For New Zealand data, there is no breakdown beyond that seen in Table 1.2.

Figure 1.1: Distribution of people active on the waiting list by state of residence, as of December 2016

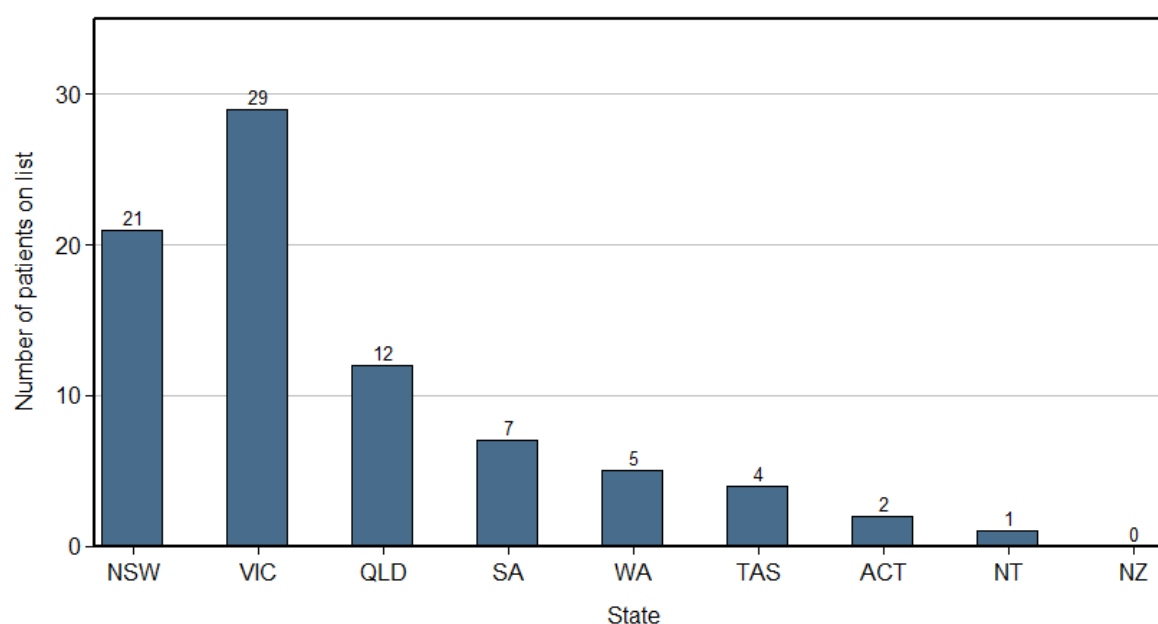


Table 1.3: Patient state of residence for people active on the list at Westmead national pancreas transplant unit (NSW), December 2016

State of residence	Patients, n (%)								Total
	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	
2016	21 (50)	0 (0)	12 (29)	1 (2)	5 (12)	0 (0)	2 (5)	1 (2)	42 (100)
2015	16 (39)	1 (2)	13 (32)	2 (5)	5 (12)	0 (0)	3 (7)	1 (2)	41 (100)
2014	23 (53)	0 (0)	11 (26)	1 (2)	5 (12)	0 (0)	1 (2)	2 (5)	43 (100)

Table 1.4: Patient state of residence for people active on the list at Monash pancreas transplant unit (VIC), December 2016

State of residence	Patients, n (%)								Total
	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	
2016	0 (0)	29 (74)	0 (0)	6 (15)	0 (0)	4 (10)	0 (0)	0 (0)	39 (100)
2015	0 (0)	32 (70)	0 (0)	12 (26)	0 (0)	2 (4)	0 (0)	0 (0)	46 (100)
2014	0 (0)	20 (59)	0 (0)	11 (32)	0 (0)	3 (9)	0 (0)	0 (0)	34 (100)

Table 1.5 and Table 1.6 show the state of residence for people who are under consideration together with people who are active on the pancreas waiting list, by the pancreas transplanting centre they were referred to, in Australia. For New Zealand data, there is no breakdown beyond that seen in Table 1.2.

Table 1.5: State of residence for people under consideration and for people active on the list at Westmead national pancreas transplant unit (NSW), December 2016

State of residence	Patients, n (row %)								<i>Total</i>
	<i>NSW</i>	<i>VIC</i>	<i>QLD</i>	<i>SA</i>	<i>WA</i>	<i>TAS</i>	<i>ACT</i>	<i>NT</i>	
2016	38 (37)	0 (0)	30 (29)	4 (4)	23 (22)	0 (0)	6 (6)	3 (3)	104 (100)
2015	38 (35)	1 (1)	28 (26)	8 (7)	26 (24)	0 (0)	5 (5)	3 (3)	109 (100)
2014	39 (37)	1 (1)	32 (30)	5 (5)	21 (20)	0 (0)	5 (5)	3 (3)	106 (100)

Table 1.6: State of residence for people under consideration and for people active on the list at Monash pancreas transplant unit (VIC), December 2016

State of residence	Patients, n (row %)								<i>Total</i>
	<i>NSW</i>	<i>VIC</i>	<i>QLD</i>	<i>SA</i>	<i>WA</i>	<i>TAS</i>	<i>ACT</i>	<i>NT</i>	
2016	0 (0)	57 (76)	1 (1)	10 (13)	0 (0)	7 (9)	0 (0)	0 (0)	75 (100)
2015	0 (0)	47 (65)	0 (0)	18 (25)	0 (0)	7 (10)	0 (0)	0 (0)	72 (100)
2014	1 (1)	46 (63)	1 (1)	17 (23)	0 (0)	8 (11)	0 (0)	0 (0)	73 (100)

New referrals received over time

Tables 1.7, 1.8 and 1.9 show the distribution of new referrals received by the transplanting units over time.

Table 1.7: New referrals received by Westmead national pancreas unit (NSW)

State of residence	Patients, n (row %)								Total
	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	
2016	24 (32)	0 (0)	23 (31)	4 (5)	16 (22)	0 (0)	5 (7)	2 (3)	74 (100)
2015	22 (38)	0 (0)	16 (28)	3 (5)	11 (19)	0 (0)	4 (7)	2 (3)	58 (100)
2014	25 (45)	1 (2)	12 (21)	4 (7)	9 (16)	0 (0)	2 (4)	3 (5)	56 (100)
2013	16 (34)	0 (0)	16 (34)	4 (9)	9 (19)	0 (0)	1 (2)	1 (2)	47 (100)
2012	14 (28)	0 (0)	13 (26)	6 (12)	12 (24)	0 (0)	3 (6)	2 (4)	50 (100)
2011	11 (27)	0 (0)	14 (34)	4 (10)	9 (22)	0 (0)	2 (5)	1 (2)	41 (100)

Table 1.8: new referrals received by Monash pancreas transplant unit (VIC)

State of residence	Patients, n (row %)								Total
	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	
2016	0 (0)	23 (64)	0 (0)	6 (17)	0 (0)	7 (19)	0 (0)	0 (0)	36 (100)
2015	0 (0)	18 (62)	0 (0)	9 (31)	0 (0)	2 (7)	0 (0)	0 (0)	29 (100)
2014	0 (0)	38 (79)	0 (0)	6 (13)	0 (0)	4 (8)	0 (0)	0 (0)	48 (100)
2013	0 (0)	30 (79)	0 (0)	5 (13)	0 (0)	3 (8)	0 (0)	0 (0)	38 (100)
2012	0 (0)	26 (81)	0 (0)	1 (3)	0 (0)	5 (16)	0 (0)	0 (0)	32 (100)
2011	0 (0)	28 (85)	0 (0)	3 (9)	0 (0)	2 (6)	0 (0)	0 (0)	33 (100)

Table 1.9: new referrals received by Auckland national pancreas transplant unit (NZ)

Year	2016	2015	2014	2013	2012	2011
Referrals	7	0	9	4	5+	5+

Patient characteristics for those active on the list in 2016

The following figures illustrate the distribution of other characteristics of those active on the waiting list in 2016, including the distribution of blood groups and patient ages.

Figure 1.2: Distribution of people active on the list by their blood group, at December 2016

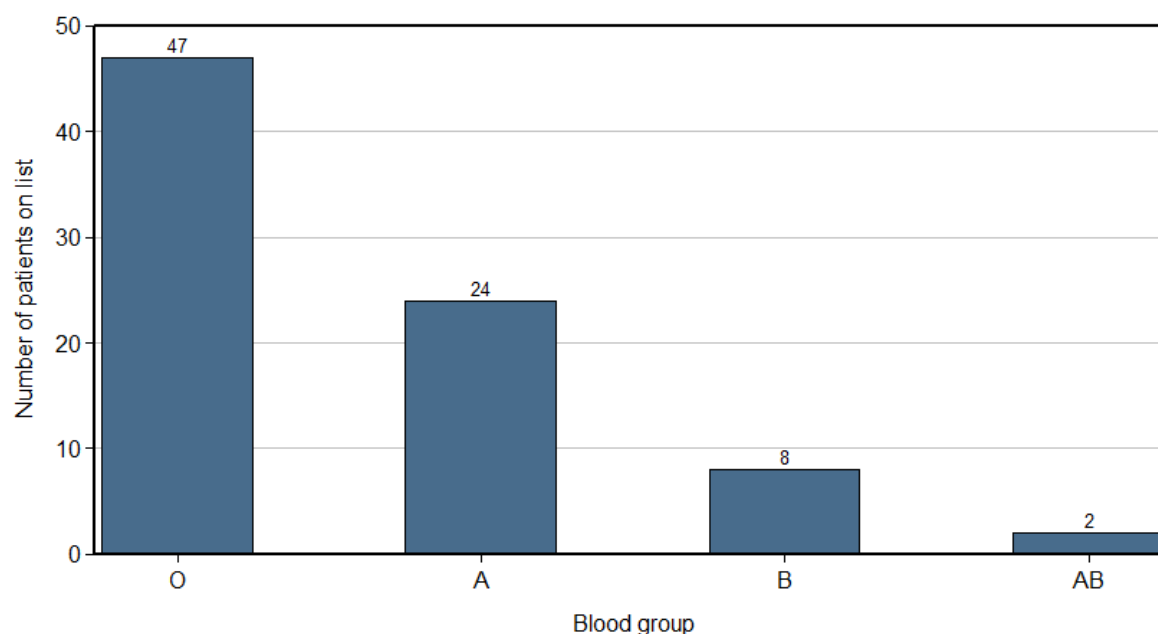
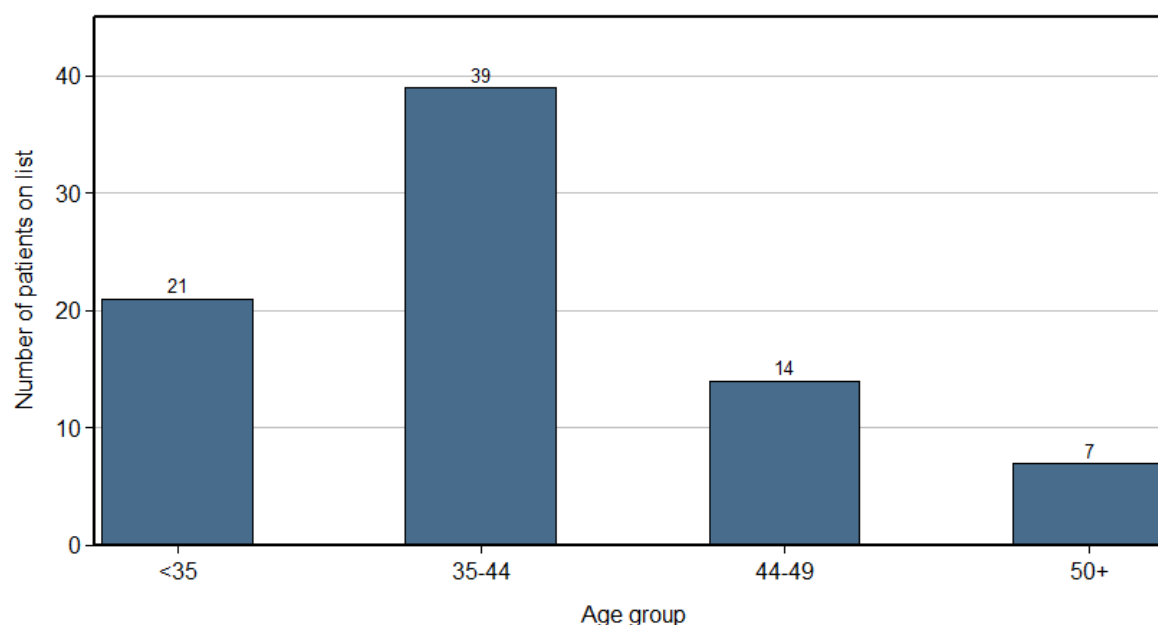


Figure 1.3: Distribution of people active on the list by their age, at December 2016



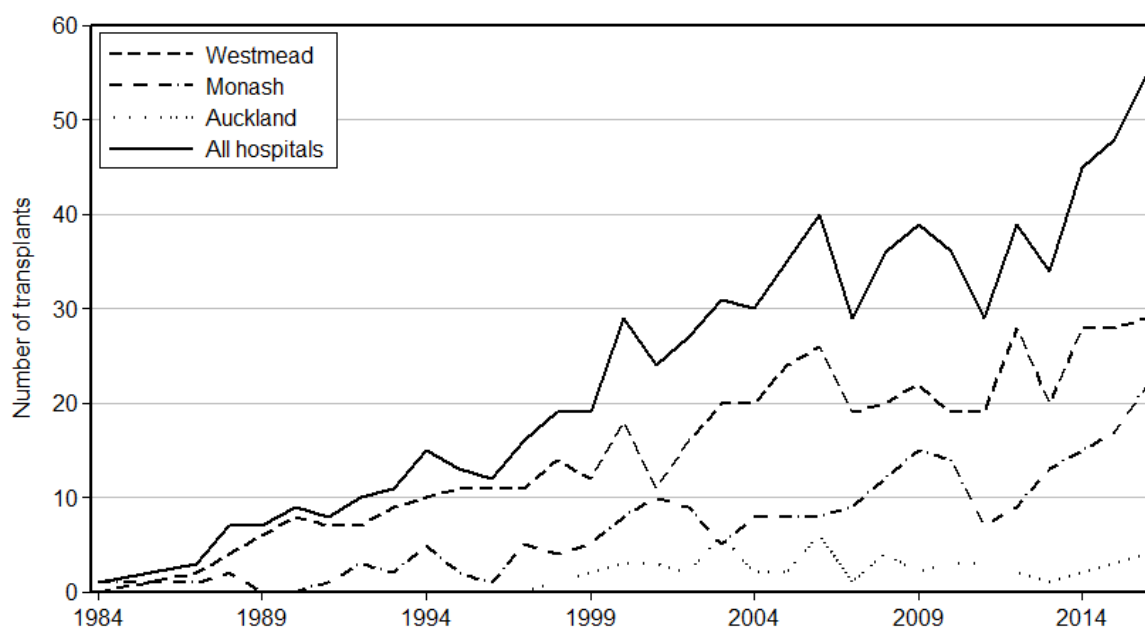
Chapter 2: Pancreas transplant recipients

Authors: Angela Webster, Paul Robertson, Abhijit Patekar, James Hedley, Patrick Kelly

Pancreas transplant incidence

A total of 756 solid organ pancreas transplants have been performed in Australia and New Zealand (ANZ) from 1984-2016. Transplants have been performed in Westmead (479), Monash (221), Auckland (52), RPA (1), RMH (1), QEH (1), and Prince Henry (1). Figure 2.1 shows pancreas transplants over time. The number of transplants has substantially increased in last decade compared to previous years.

Figure 2.1: Incidence of pancreas transplants over time, 1984-2016.



Note: There have been four transplants performed in Australia, which were not conducted by either Westmead or Monash. These occurred in 1988, 1989, 1990 and 2005.

In 2016, 55 people received a pancreas transplant, by centre this was; Auckland (4); Monash (22); Westmead (29). The number of transplants in 2016 increased by 15% compared to 2015.

Not all pancreas transplant operations are undertaken with the same organs. Simultaneous pancreas-kidney transplant (SPK) is the most common operation, representing 97% of all pancreas transplants in Australia and New Zealand. From 55 transplants performed in 2016, 50 were SPK and 4 were Pancreas after kidney (PAK), while 1 were Pancreas transplant alone (PTA). PAK operations are done for people who either had a first kidney transplant without a pancreas (most commonly from a living donor relative) and subsequently opt for a pancreas, or for people who underwent an SPK but had a pancreas transplant failure, so need a further pancreas transplant. Pancreas transplant alone (PTA) is a less common operation and occurs rarely. On rarer occasions, a multi-organ transplant is undertaken which includes a pancreas transplant. There was one simultaneous Pancreas, Liver plus Kidney transplant which was performed in 2005, one Liver, Pancreas plus Intestine transplant in 2012, and one Liver plus Pancreas transplant in 2016. The distribution of operation types is shown in Figure 2.2, and the number of transplants by operation type is shown in Table 2.1.

Figure 2.2: Pancreas transplants by type over time, Australia and New Zealand

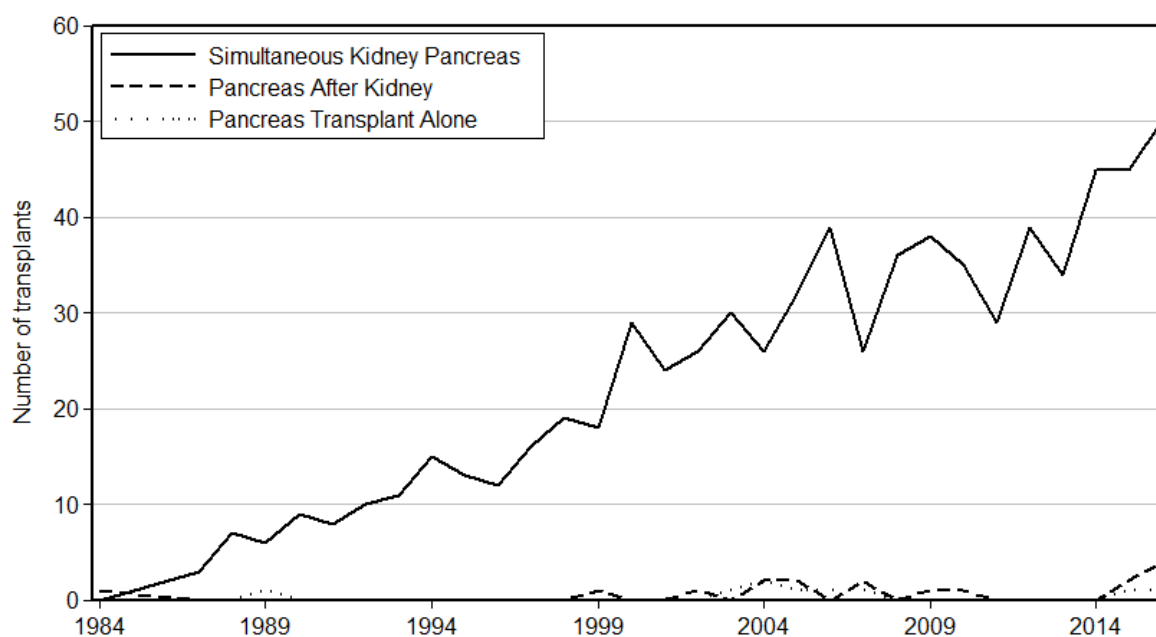


Table 2.1: Pancreas transplant operations by centre, over time

Year	Hospital and transplant type, n (row %)							Total
	Westmead			Monash			New Zealand	
	SPK	PAK	PTA	SPK	PAK	PTA	All	
2016	26 (47)	3 (5)	0 (0)	20 (36)	1 (2)	1 (2)	4 (7)	55
2015	27 (56)	1 (2)	0 (0)	16 (33)	1 (2)	0 (0)	3 (6)	48
2014	28 (62)	0 (0)	0 (0)	15 (33)	0 (0)	0 (0)	2 (4)	45
2013	20 (59)	0 (0)	0 (0)	13 (38)	0 (0)	0 (0)	1 (3)	34
2012	28 (72)	0 (0)	0 (0)	9 (23)	0 (0)	0 (0)	2 (5)	39
2011	19 (66)	0 (0)	0 (0)	7 (24)	0 (0)	0 (0)	3 (10)	29
2010	19 (53)	0 (0)	0 (0)	14 (39)	0 (0)	0 (0)	3 (8)	36
2009	22 (56)	0 (0)	0 (0)	14 (36)	1 (3)	0 (0)	2 (5)	39
2008	20 (56)	0 (0)	0 (0)	12 (33)	0 (0)	0 (0)	4 (11)	36
2007	16 (55)	2 (7)	1 (3)	9 (31)	0 (0)	0 (0)	1 (3)	29
2006	25 (63)	0 (0)	1 (3)	8 (20)	0 (0)	0 (0)	6 (15)	40
2005	21 (60)	2 (6)	1 (3)	8 (23)	0 (0)	0 (0)	2 (6)	35
2004	16 (53)	2 (7)	2 (7)	8 (27)	0 (0)	0 (0)	2 (7)	30
2003	19 (61)	0 (0)	1 (3)	5 (16)	0 (0)	0 (0)	6 (19)	31
2002	15 (56)	1 (4)	0 (0)	9 (33)	0 (0)	0 (0)	2 (7)	27
2001	11 (46)	0 (0)	0 (0)	10 (42)	0 (0)	0 (0)	3 (13)	24
2000	18 (62)	0 (0)	0 (0)	8 (28)	0 (0)	0 (0)	3 (10)	29
1999	11 (58)	1 (5)	0 (0)	5 (26)	0 (0)	0 (0)	2 (11)	19
1998	14 (74)	0 (0)	0 (0)	4 (21)	0 (0)	0 (0)	1 (5)	19
1997	11 (69)	0 (0)	0 (0)	5 (31)	0 (0)	0 (0)	0 (0)	16
1996	11 (92)	0 (0)	0 (0)	1 (8)	0 (0)	0 (0)	0 (0)	12
1995	11 (85)	0 (0)	0 (0)	2 (15)	0 (0)	0 (0)	0 (0)	13
1994	10 (67)	0 (0)	0 (0)	5 (33)	0 (0)	0 (0)	0 (0)	15
1993	9 (82)	0 (0)	0 (0)	2 (18)	0 (0)	0 (0)	0 (0)	11
1992	7 (70)	0 (0)	0 (0)	3 (30)	0 (0)	0 (0)	0 (0)	10
1991	7 (88)	0 (0)	0 (0)	1 (13)	0 (0)	0 (0)	0 (0)	8
1990	8 (89)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	9
1989	5 (71)	0 (0)	1 (14)	0 (0)	0 (0)	0 (0)	0 (0)	7
1988	4 (57)	0 (0)	0 (0)	2 (29)	0 (0)	0 (0)	0 (0)	7
1987	2 (67)	0 (0)	0 (0)	1 (33)	0 (0)	0 (0)	0 (0)	3
1984	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	1
Total	460 (61)	12 (2)	7 (1)	216 (29)	4 (1)	1 (<1)	52 (7)	756

Notes:

- SPK= simultaneous pancreas-kidney; PAK= pancreas after kidney; PTA= pancreas alone
- The above table excludes the four transplants performed in Australia outside of Westmead and Monash. These occurred in 1988, 1989, 1990, and 2005.

Patients transplanted by state

The states of origin of the people receiving pancreas transplants are shown in the following tables by transplanting centre: Table 2.2 for Westmead and Table 2.3 for Monash. Numbers for New Zealand can be found in Table 2.1.

Table 2.2: Distribution of state of residence of people receiving pancreas transplants in Australia over time at Westmead pancreas transplant unit (NSW)

Year of transplant	State, n (row %)								Total
	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	
2016	12 (41)	0 (0)	10 (34)	2 (7)	5 (17)	0 (0)	0 (0)	0 (0)	29
2015	16 (57)	0 (0)	8 (29)	1 (4)	1 (4)	0 (0)	0 (0)	2 (7)	28
2014	12 (43)	0 (0)	11 (39)	2 (7)	2 (7)	0 (0)	0 (0)	1 (4)	28
2013	7 (35)	0 (0)	8 (40)	0 (0)	3 (15)	0 (0)	1 (5)	1 (5)	20
2012	12 (43)	0 (0)	9 (32)	4 (14)	2 (7)	0 (0)	1 (4)	0 (0)	28
2011	9 (47)	0 (0)	3 (16)	4 (21)	2 (11)	0 (0)	1 (5)	0 (0)	19
Total	68 (45)	0 (0)	49 (32)	13 (9)	15 (10)	0 (0)	3 (2)	4 (3)	152

Table 2.3: Distribution of state of residence of people receiving pancreas transplants in Australia over time at Monash pancreas transplant unit (VIC)

Year of transplant	State, n (row %)								Total
	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	
2016	0 (0)	17 (77)	0 (0)	3 (14)	0 (0)	2 (9)	0 (0)	0 (0)	22
2015	0 (0)	17 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	17
2014	0 (0)	14 (93)	0 (0)	0 (0)	0 (0)	1 (7)	0 (0)	0 (0)	15
2013	1 (8)	12 (92)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	13
2012	0 (0)	5 (56)	0 (0)	2 (22)	0 (0)	2 (22)	0 (0)	0 (0)	9
2011	0 (0)	4 (57)	0 (0)	0 (0)	0 (0)	3 (43)	0 (0)	0 (0)	7
Total	1 (1)	69 (83)	0 (0)	5 (6)	0 (0)	8 (10)	0 (0)	0 (0)	83

Demographics of new pancreas transplant recipients

The characteristics of pancreas transplant recipients in 2016 and in previous years are shown in Table 2.4. The primary diagnosis causing end stage kidney disease of recipients during 2016 and historically was type I diabetes. The number of diabetic recipients with other cause of end stage kidney failure was small. The number of type II diabetics accepted for pancreas transplantation was also small, and none were transplanted in 2016.

Table 2.4: Demographics and characteristics of pancreas transplant recipients

	2016	1984-2015	Total
Age category			
0-34	13 (24)	237 (34)	250 (33)
35-44	28 (51)	305 (44)	333 (44)
45-50	7 (13)	116 (17)	123 (16)
50+	7 (13)	43 (6)	50 (7)
Sex			
Female	23 (42)	330 (47)	353 (47)
Male	32 (58)	371 (53)	403 (53)
Cause of end stage kidney disease			
Diabetes Type 1 (Insulin dependent)	54 (98)	613 (87)	667 (88)
Diabetes Type 2 (Insulin requiring)	0 (0)	6 (1)	6 (1)
Haemolytic uraemic syndrome	0 (0)	1 (<1)	1 (<1)
Interstitial nephritis	0 (0)	1 (<1)	1 (<1)
Wegener's Granulomatosis	0 (0)	1 (<1)	1 (<1)
Uncertain diagnosis	1 (2)	79 (11)	80 (11)
Ethnicity*			
Indigenous Australian	1 (2)	0 (0)	0 (0)
White	50 (91)	672 (96)	722 (96)
Asian	1 (2)	0 (0)	1 (<1)
Maori	1 (2)	4 (1)	5 (1)
Arab	0 (0)	8 (1)	8 (1)
Indian	1 (2)	12 (2)	13 (2)
Chinese	0 (0)	2 (<1)	2 (<1)
Pacific Islander	1 (2)	3 (<1)	4 (1)
Recipient blood group			
O	26 (47)	313 (45)	339 (45)
A	22 (40)	255 (36)	277 (37)
B	3 (5)	64 (9)	67 (9)
AB	4 (7)	29 (4)	33 (4)
Unknown	0 (0)	40 (6)	40 (5)
Total	55	701	756

* Ethnicity classified according to the Australian Bureau of Statistics standard classification, 2nd Edition; <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1249.02011?OpenDocument>

Balance of donor and recipient characteristics in 2016

Cross tabulations of donor and recipient blood group and gender for people transplanted in 2016 are displayed in Table 2.5 and Table 2.6. These distributions remain similar to previous years.

Table 2.5: Cross tabulation of recipient and donor blood groups for 2016

Recipient blood group	Donor blood group				Total
	<i>O</i>	<i>A</i>	<i>B</i>	<i>AB</i>	
<i>O</i>	26	0	0	0	26
<i>A</i>	0	22	0	0	22
<i>B</i>	0	0	3	0	3
<i>AB</i>	0	0	0	4	4
Total	26 (47)	22 (40)	3 (5)	4 (7)	55

For 3 recipients with missing blood type, it is assumed that this is O which is the same as the donor's

Table 2.6: Cross tabulation of recipient and donor sex for 2016

Recipient sex	Donor sex		Total
	<i>Female</i>	<i>Male</i>	
Female	8 (15)	15 (27)	23 (42)
Male	12 (22)	20 (36)	32 (58)
Total	20 (36)	35 (64)	55 (100)

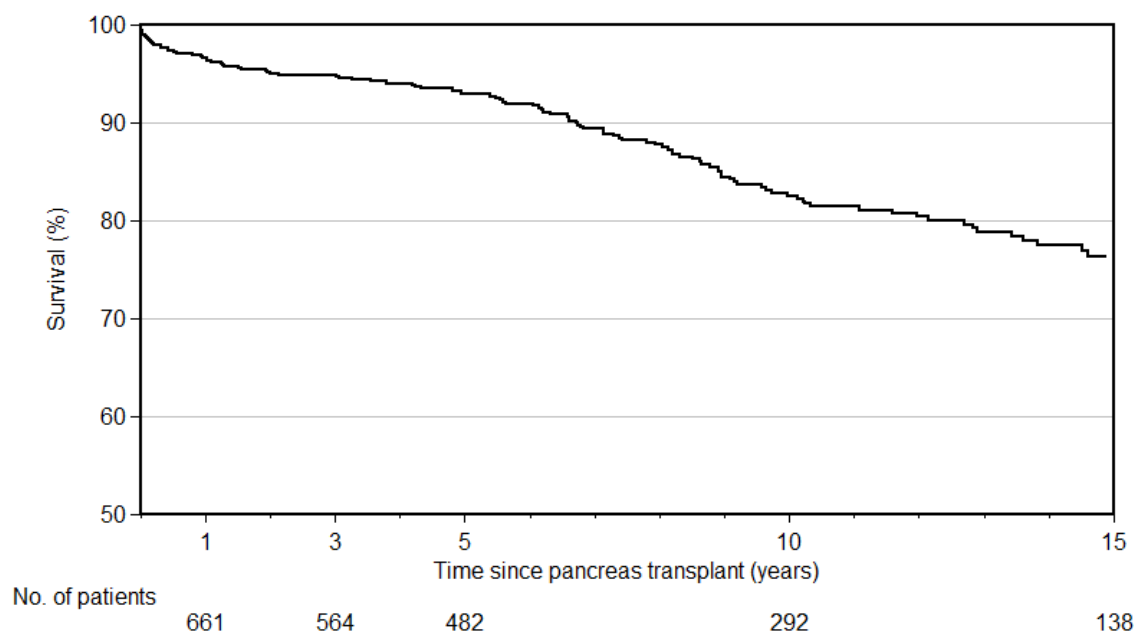
McNemar's test: $p=0.6$

Patient survival

Patient survival is calculated from the date of transplantation until death. Patients still alive at the end of the follow-up period are censored. For people who had more than one transplant, their survival is calculated from the date of their first transplant. For these analyses we had survival data for 738 patients, 18 of whom have received two pancreas transplants for a total of 756 pancreas transplants. Note that the following survival plots survival proportion on the y-axis does not always start at zero; this is to better demonstrate some observed differences.

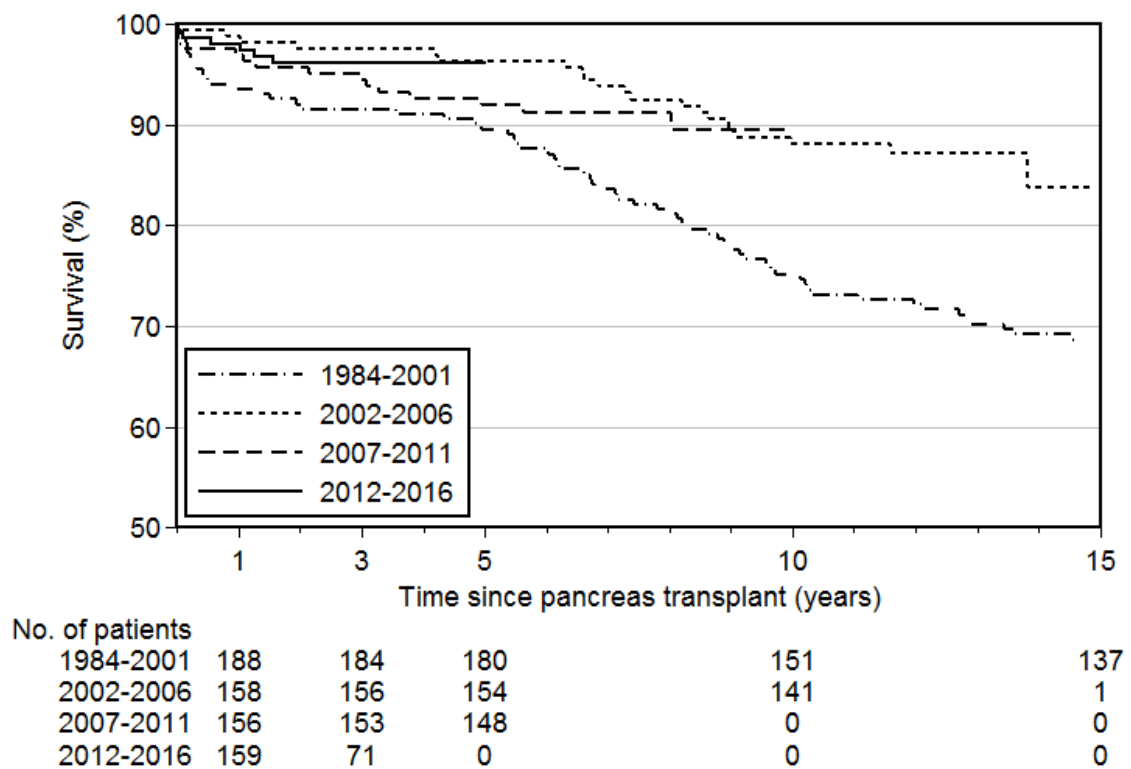
Figure 2.3 shows overall survival following pancreas transplant. There were 6,557 years of observation, and 129 people died in that time. Survival at 1 year was 96.7%, at 5 years 92.9%, at 10 years 82.6% and at 15 years 76.4%.

Figure 2.3: Patient survival following pancreas transplantation in Australia and New Zealand.



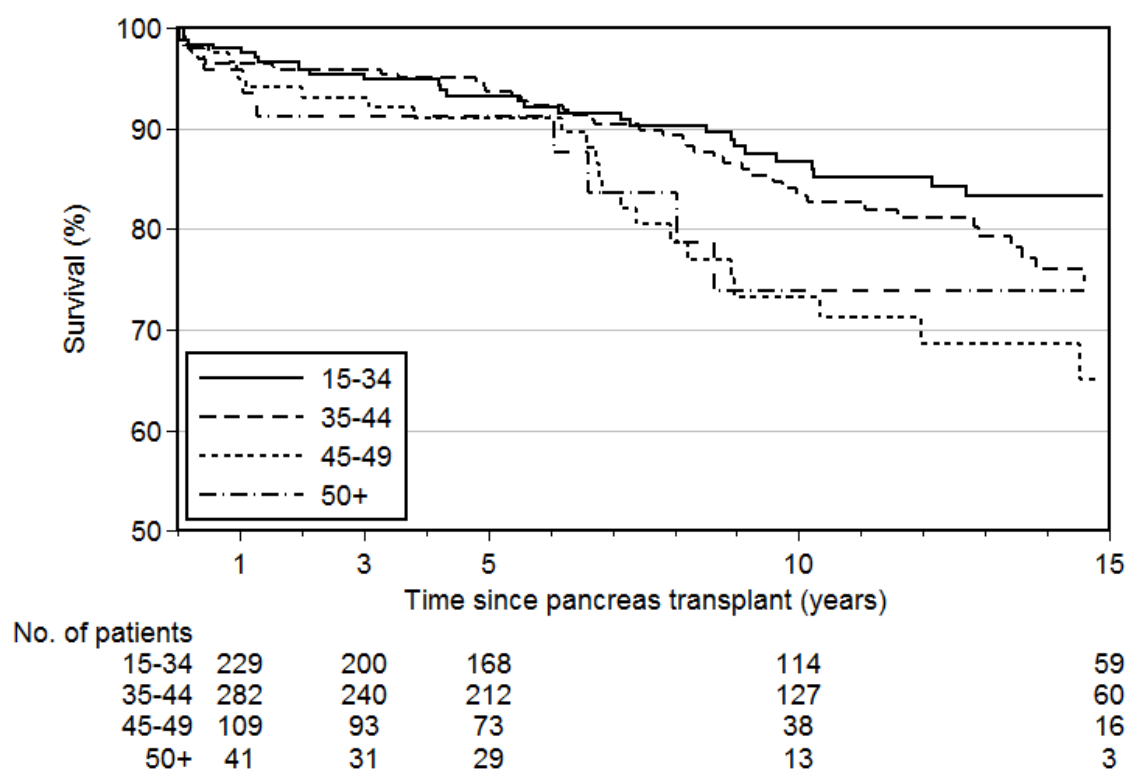
Patient survival by era of transplantation is shown in Figure 2.4. Survival has improved over time, $P < 0.001$. Survival at 1 year for people transplanted in 2000 or before 2000 was 93.2%; in recent years this has risen to 97.5%. Survival at 5 years was 88.7% for those transplanted in 2000 or before, where for those transplanted after 2005, 5 year survival was 93.5%.

Figure 2.4: Patient survival by era of transplantation



Patient survival by age at transplantation is shown in Figure 2.5. People that were older at the time of pancreas transplantation had poorer survival than those who were younger ($p=0.006$). People aged 45 and older at transplantation were over twice as likely to die as those aged 44 or younger. Survival at 1 year for recipients aged <35 years was 98.0%, and for those aged 35-44 was 96.5%, whereas for those aged 45-49 was 94.9% and those 50 or older was 95.9%. Five-year survival for those aged <35 years was 93.2%, and for those aged 35-44 was 93.7%, whereas for those aged 45-49 was 91.0% and those 50 or older was 91.1%.

Figure 2.5: Patient survival by age at transplantation



Pancreas survival

Pancreas transplant survival was calculated from the time of transplant until the time of permanent return to insulin therapy or pancreatectomy. We calculated both pancreas failure including death with a functioning pancreas and pancreas failure censored for death with a functioning graft. For pancreas graft survival we included all pancreas transplants undertaken, including those who had received a pancreas transplant twice (18 patients). At the time of this report analysis, we had complete survival records for 756 pancreas transplants.

Figure 2.6 shows pancreas survival censored for death. Over 5,412 years of observation, there were 151 pancreas graft failures (excluding people who died with a functioning transplant). Overall, 1 year pancreas graft survival was 87.2%, 5-year survival 82.1%, and 10-year survival 78.4%.

Figure 2.6: Pancreas transplant survival, excluding death with a functioning pancreas graft.

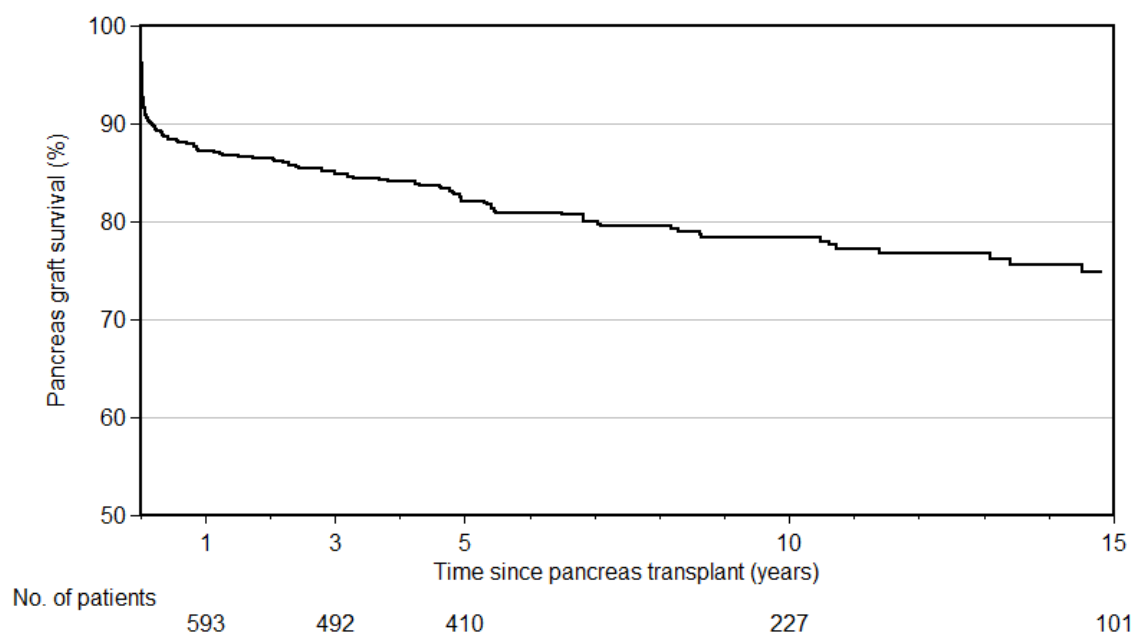
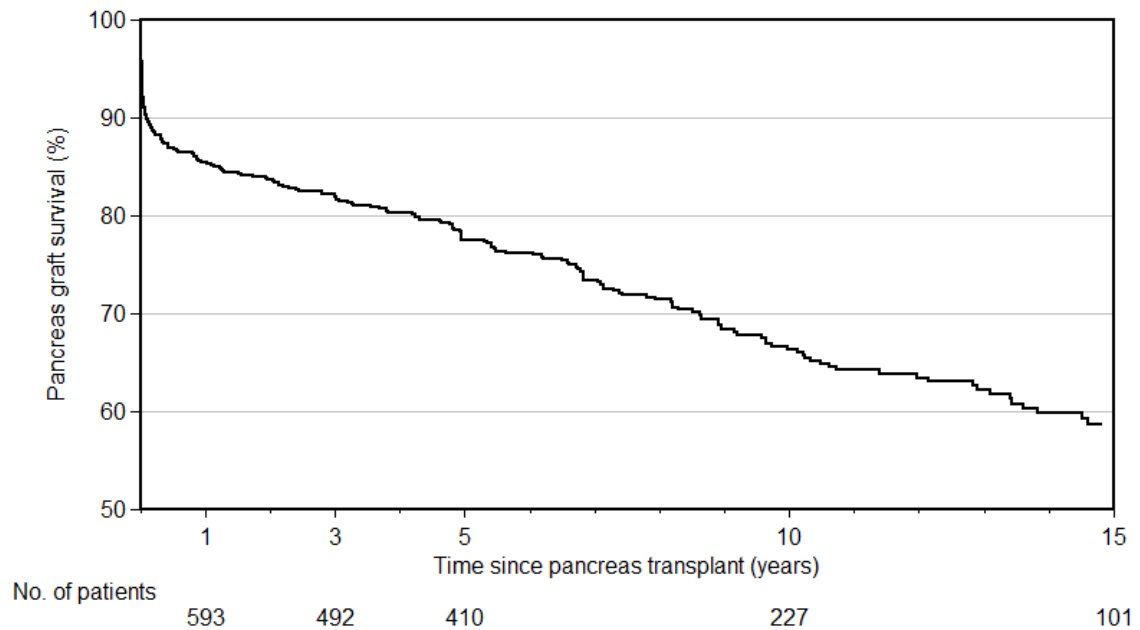


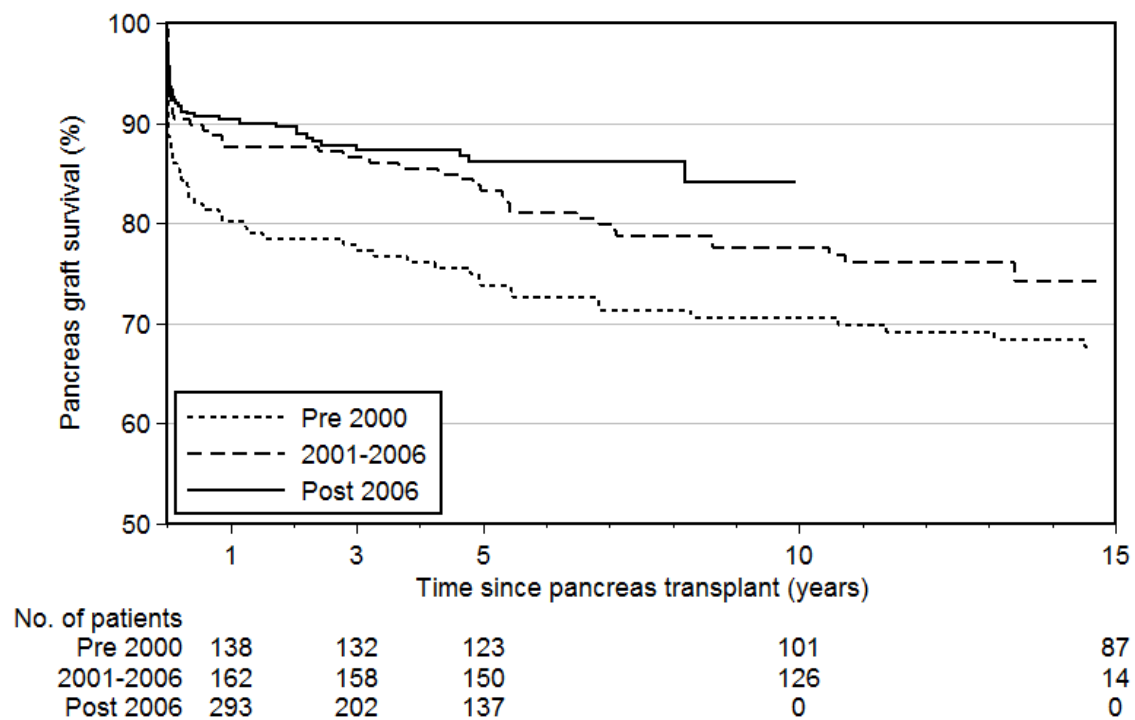
Figure 2.7 shows pancreas survival including death with a functioning pancreas. Over the same observation time there were an additional 244 recipients who died with their pancreas still functioning. One, 5 and 10-year survival were 85.4%, 77.6% and 66.4% respectively.

Figure 2.7: Pancreas transplant survival, including death with a functioning pancreas graft.



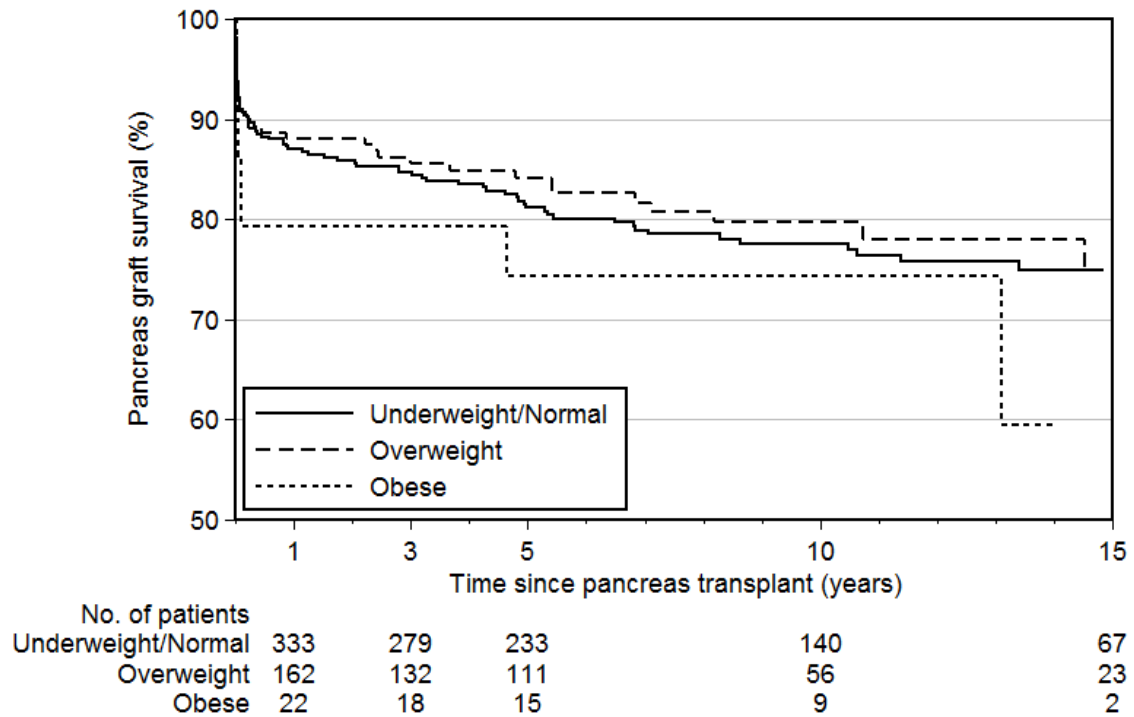
Survival of pancreas transplants varied over time, with survival markedly improving over time ($p=0.003$). For those transplanted in more recent years, risk of transplant loss was over 50.7% lower than those transplanted before 2000. This is shown in Figure 2.8. Year 2000 or prior, 1-year pancreas survival was 80.2%, and 5-year survival 73.7%. For those transplanted after 2005, 1 year survival was 90.3% and 5-year survival 86.1%.

Figure 2.8: Pancreas transplant survival over time (censored for death)



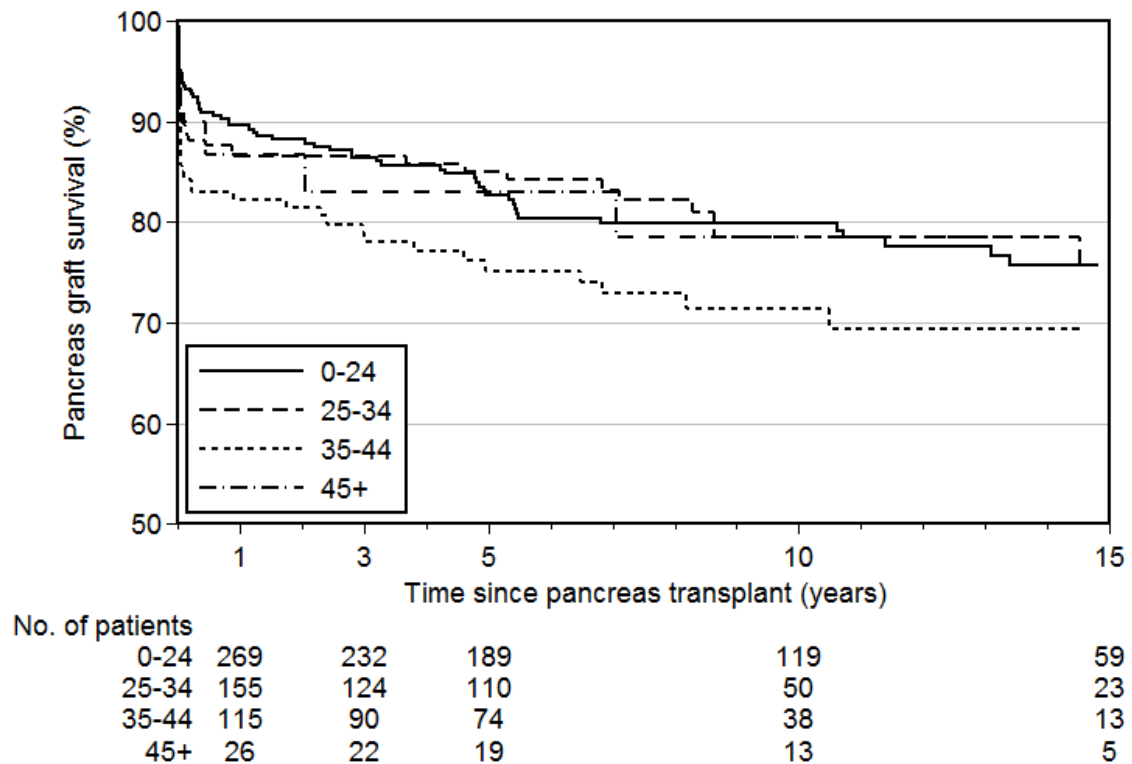
Pancreas survival by donor BMI is presented in Figure 2.9. Most donors (57%) were either underweight or normal (BMI <25). However, 27% were overweight (BMI 25-29) and 4% were obese (BMI 30+). While Figure 2.9 suggests separation of survival curves, there was no difference statistically ($p=0.6$).

Figure 2.9: Pancreas survival censored for death with pancreas function, by donor BMI



Pancreas survival by donor age is presented in Figure 2.10. The survival curves appear poorer for donors aged 35-44 compared with those 45 and older, or younger donors, but this difference was not statistically significant ($p=0.1$). We can only hypothesise that any difference may be due to donors over 45 being a more highly selected group, compared to the donors aged 35-44.

Figure 2.10: Pancreas transplant survival, censored for death with function, by donor age.



Prevalence of functioning pancreas transplants

We calculated the point prevalence of people living in Australia and New Zealand who were alive with a functioning transplant on 31st December each year for the last four years (Table 2.7). The below numbers exclude people still alive, but whose pancreas transplant has failed. The number of functioning transplants has decreased slightly over time, but appears to be stabilising between 2015 and 2016.

Table 2.7: People alive with a functioning pancreas transplant in Australia and New Zealand by year and residence, at year's end

State of residence	2013	2014	2015	2016
New South Wales	136	133	130	127
Victoria	156	151	149	149
Queensland	109	107	102	101
South Australia	32	32	32	32
Western Australia	32	30	29	28
Tasmania	21	21	20	20
Australian Capital Territory	12	12	12	12
Northern Territory	4	4	4	4
New Zealand	44	41	39	39
Total	546	531	517	512

Kidney transplant survival

Kidney transplant survival was calculated for those who received SPK transplants, from the time of transplantation until the time of return to dialysis. We calculated both kidney failure including death with a functioning kidney and kidney failure censored for death with a functioning graft. For kidney graft survival we included only SPK transplants and excluded PAK transplant recipients. We had survival records for 727 SPK transplant recipients.

Figure 2.11 shows kidney survival censored for death. Over 5,910 years of observation, there were 80 kidney graft failures (excluding people who died with a functioning transplant). Overall, 1 year kidney graft survival was 96.8%, and 5-year survival 93.2%, and 10-year survival 87.6%.

Figure 2.11: Kidney transplant survival, censored for death with kidney function, for people receiving SPK transplants.

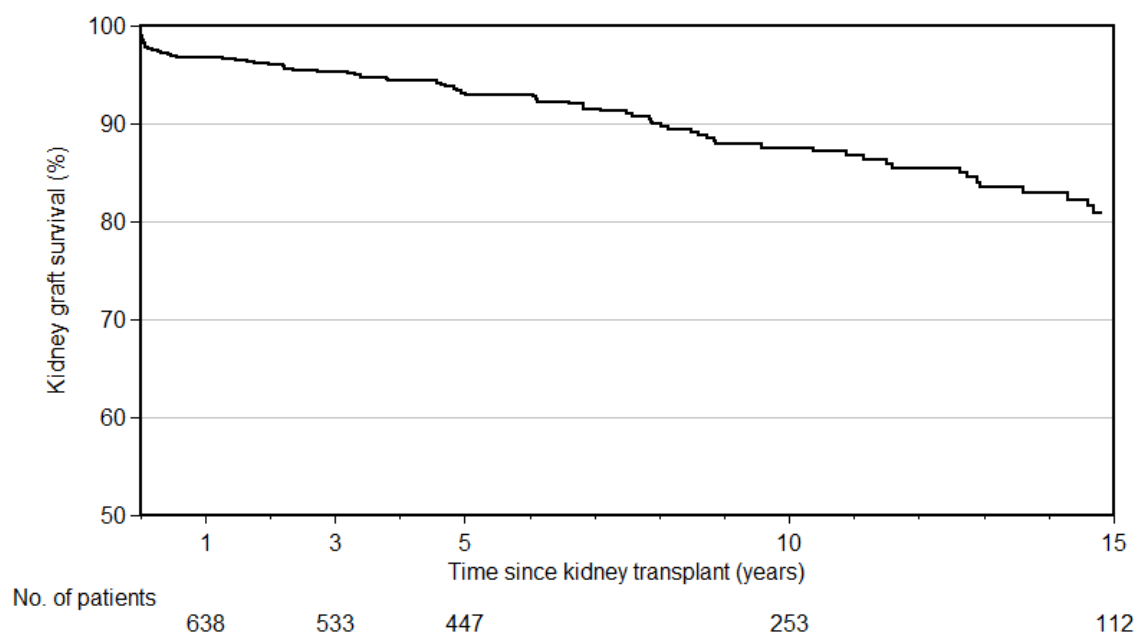
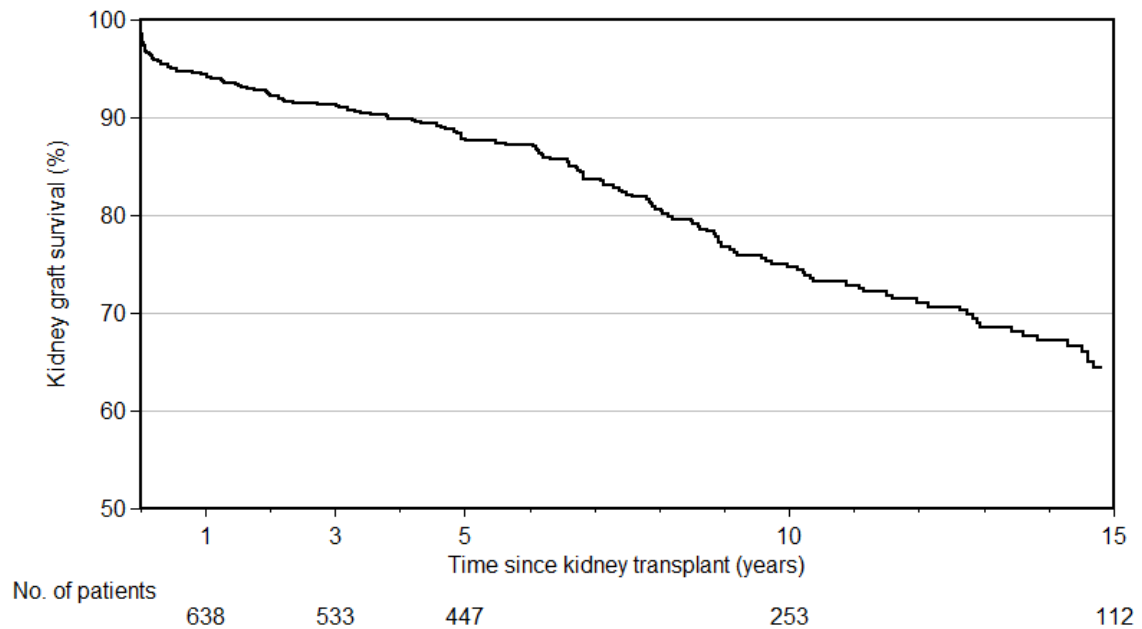


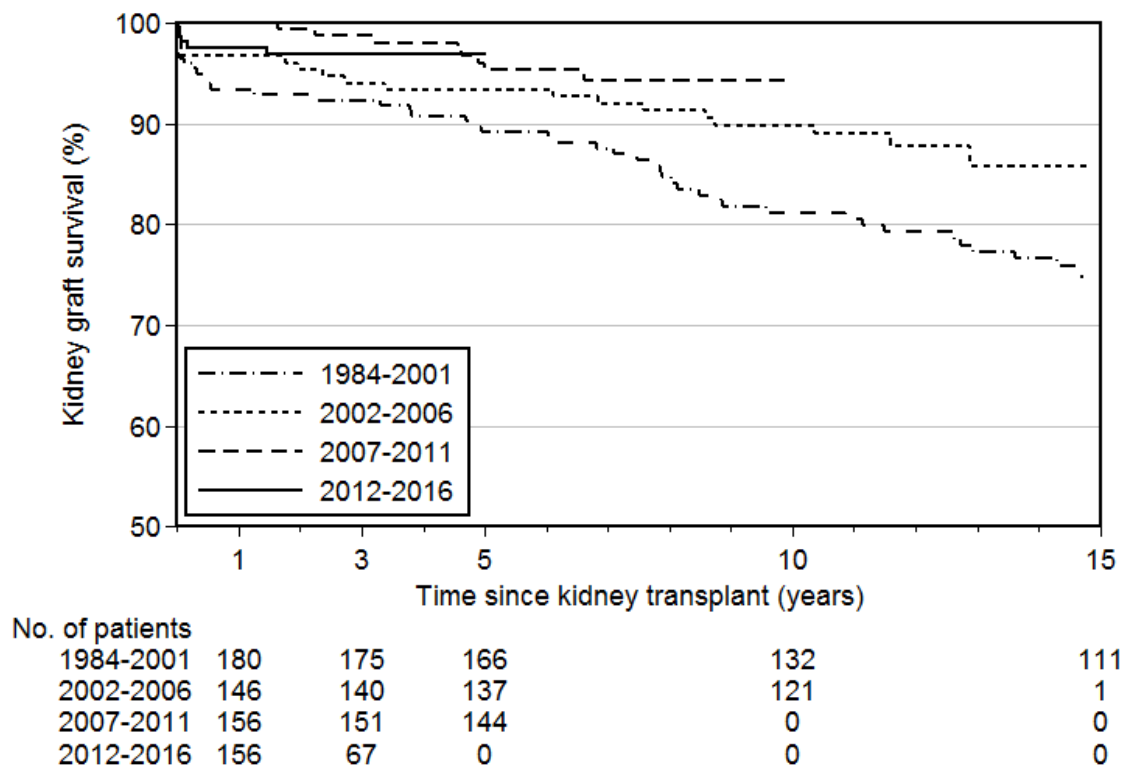
Figure 2.12 shows kidney survival including death with a functioning kidney. Over the same observation time there were an additional 97 recipients who died with their kidney still functioning. One, 5 and 10-year survival were 94.4%, 87.8% and 74.7% respectively.

Figure 2.12: Kidney transplant survival, including death with kidney function, for people receiving SPK transplants.



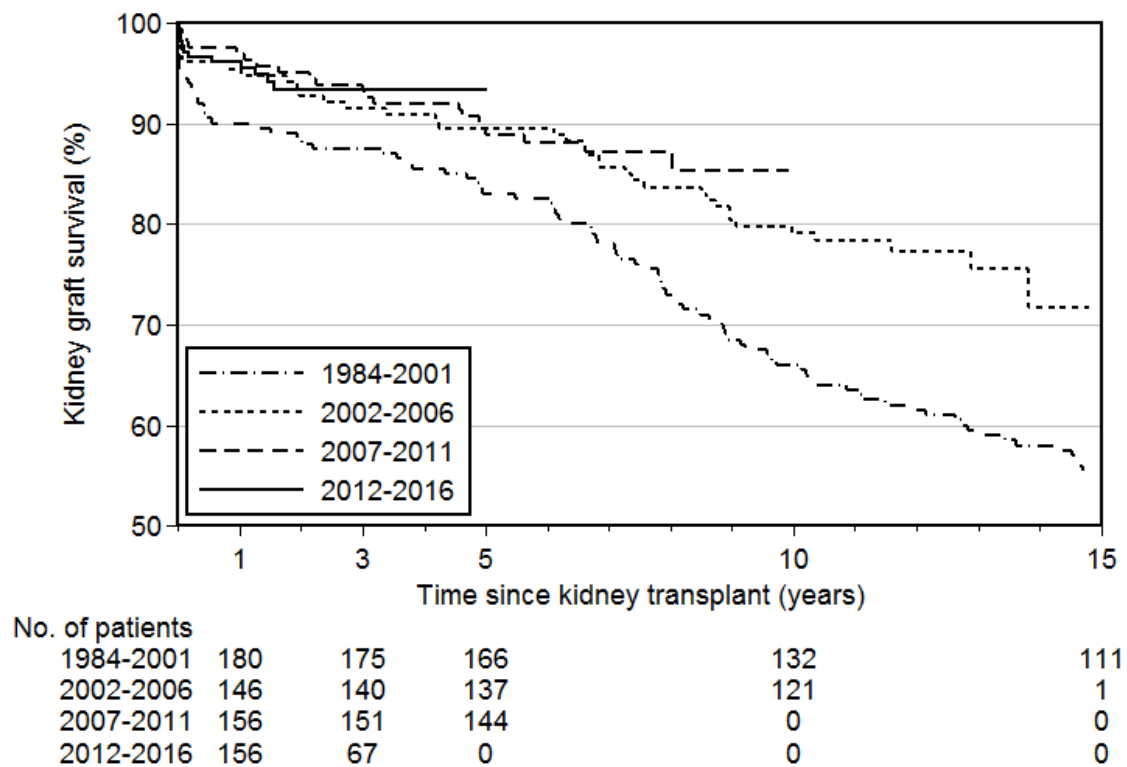
Kidney survival improved over time, with longer survival for those transplanted in more recent years ($p=0.006$). For those transplanted in 2000 or before, kidney transplant survival was 93.0% at 1 year and 89.4% at 5 years but was 98.5% at 1 year and 95.3% at 5 years for those transplanted after 2005 (Figure 2.13).

Figure 2.13: Kidney transplant survival, censored for death, for SPK recipients over time



The era effect was even stronger when considering kidney failure including death with kidney function, $p < 0.001$. For those transplanted 2000 or before, survival was 89.2% at 1 year and 82.4% at 5 years, but was 96.3% at 1 year and 89.9% at 5 years after 2005 (Figure 2.14).

Figure 2.14: Kidney transplant survival, including death with a functioning kidney, for SPK recipients over time



Pancreas transplant operative data

Characteristics of the pancreas transplant operations for 2016, previous years, and overall are shown in Table 2.8 below.

Table 2.8: Descriptive characteristics of pancreas transplant operations

	2016	1984-2015	Total
Total patients (n)	55	701	756
Pancreas graft			
Cold ischaemic time (hours)			
Patients (n)	52	632	684
Mean (SD)	11 (3.9)	10 (3.3)	10 (3.4)
Median (Range)	11 (5-26)	10 (1-24)	10 (1-26)
Anastomosis time (minutes)			
Patients (n)	53	593	646
Mean (SD)	29 (4.5)	30 (8.2)	30 (8.0)
Median (Range)	30 (20-38)	30 (0-70)	30 (0-70)
Exocrine drainage			
Enteric, n(%)	53 (96.4)	472 (67.3)	525 (69.4)
Bladder, n(%)	2 (3.6)	157 (22.4)	159 (21.0)
Unknown	0 (0.0)	72 (10.3)	72 (9.5)
Kidney graft			
Cold ischaemic time (hours)			
Patients (n)	47	606	653
Mean (SD)	11 (4.2)	10 (6.4)	10 (6.3)
Median (Range)	11 (4-25)	9 (0-142)	10 (0-142)
Anastomosis time (minutes)			
Patients (n)	47	544	591
Mean (SD)	30 (5.1)	33 (8.6)	32 (8.4)
Median (Range)	30 (19-43)	32 (0-63)	31 (0-63)
Kidney donor arteries			
1	48	514	562
2	7	55	62
More than 2	0	4	4
Unknown	0	128	128

Totals show the number of patients with complete (non-missing) data

To investigate how much the total cold ischaemic time varied dependant on the donor state, and distance travelled to the transplanting centre, Table 2.9 displays a cross tabulation of donor state of origin with transplanting centre.

Table 2.9: Comparison of cold ischaemic time of Pancreas grafts by donor state, for Australian pancreas transplants 2016

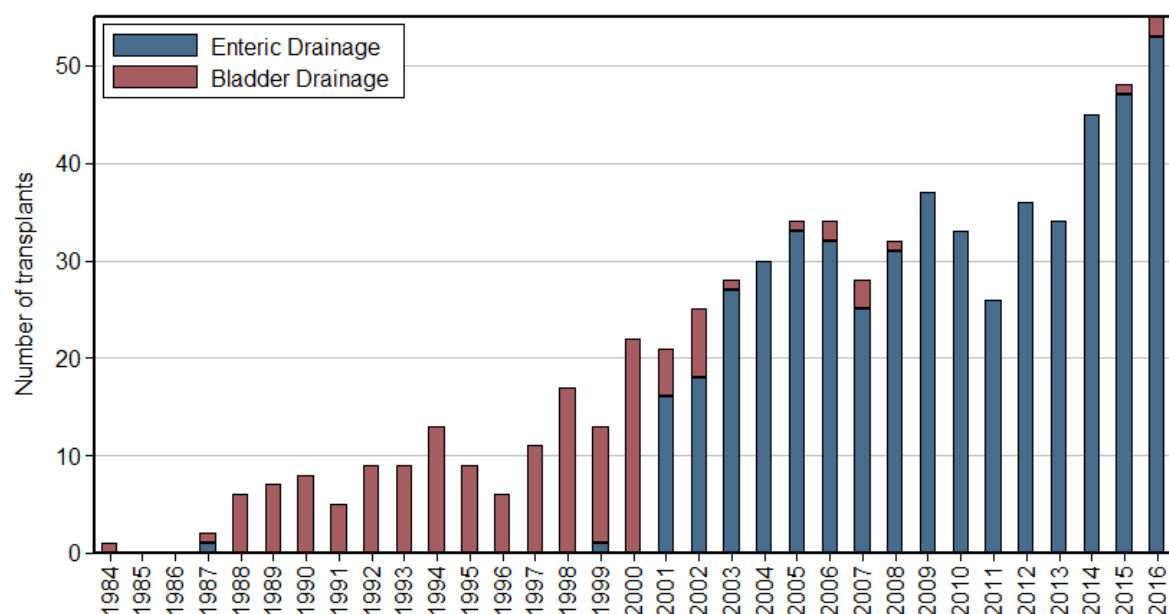
Donor state	Pancreas grafts	Cold ischaemic time in hours, mean (SD)	
		<i>Westmead (NSW)</i>	<i>Monash (VIC)</i>
New South Wales	12 ^a	8 (2.7)	16 (-)
Victoria	14	9 (-)	10 (3.3)
Queensland	10	11 (2.1)	-
South Australia	3	-	14 (4.5)
Western Australia	8	12 (1.0)	19 (7.5)
Tasmania	1	-	12 (-)
Australian Capital Territory	4	10 (1.2)	14 (-)
Northern Territory	0	-	-
Total	55	10 (2.6)	13 (4.8)

^a Includes 3 grafts with uncertain cold ischaemia time

Surgical technique

Exocrine drainage of the pancreas graft has changed over time. Enteric Drainage of the pancreas was first used in Australia and New Zealand during 2001. Figure 2.15 illustrates the number of transplants by pancreas duct management. Since 2001, most pancreas transplants have used enteric drainage of the pancreas duct.

Figure 2.15: Change in management of exocrine drainage of the pancreas over time



The site of donor vessel anastomoses onto the recipient vessels is dependent on many things, including but not limited to surgeon's preference, surgical ease of access, length and relative calibre of donor vessels. The sites of anastomosis for donor arteries and veins are displayed in Figure 2.16 and Figure 2.17 below.

Figure 2.16: Site of donor artery anastomosis onto recipient vessel

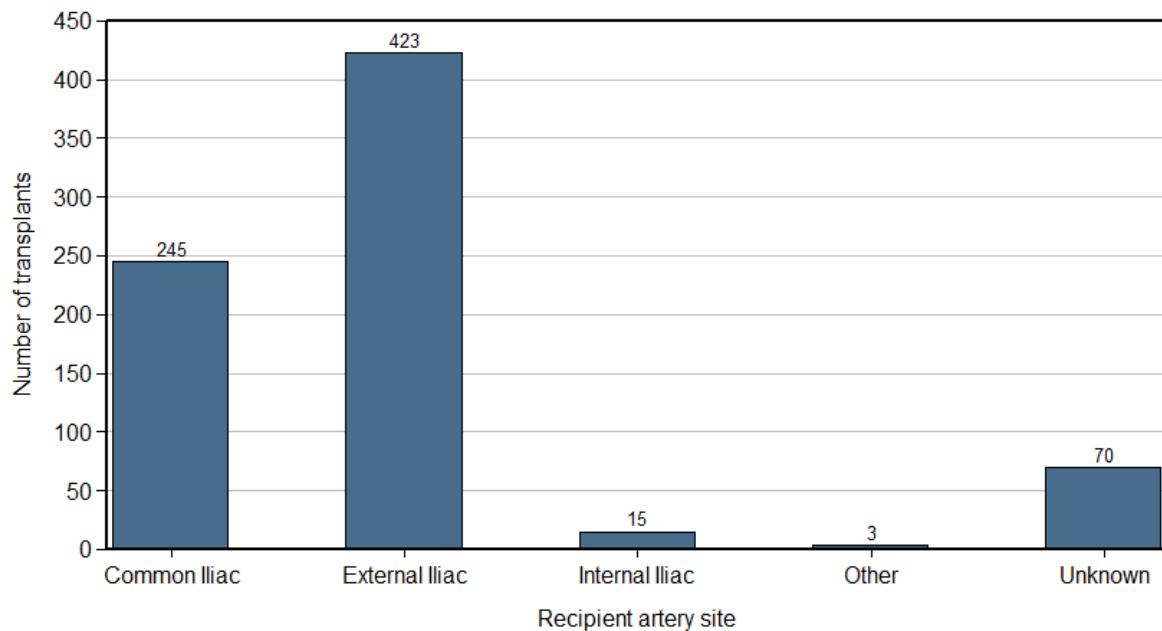
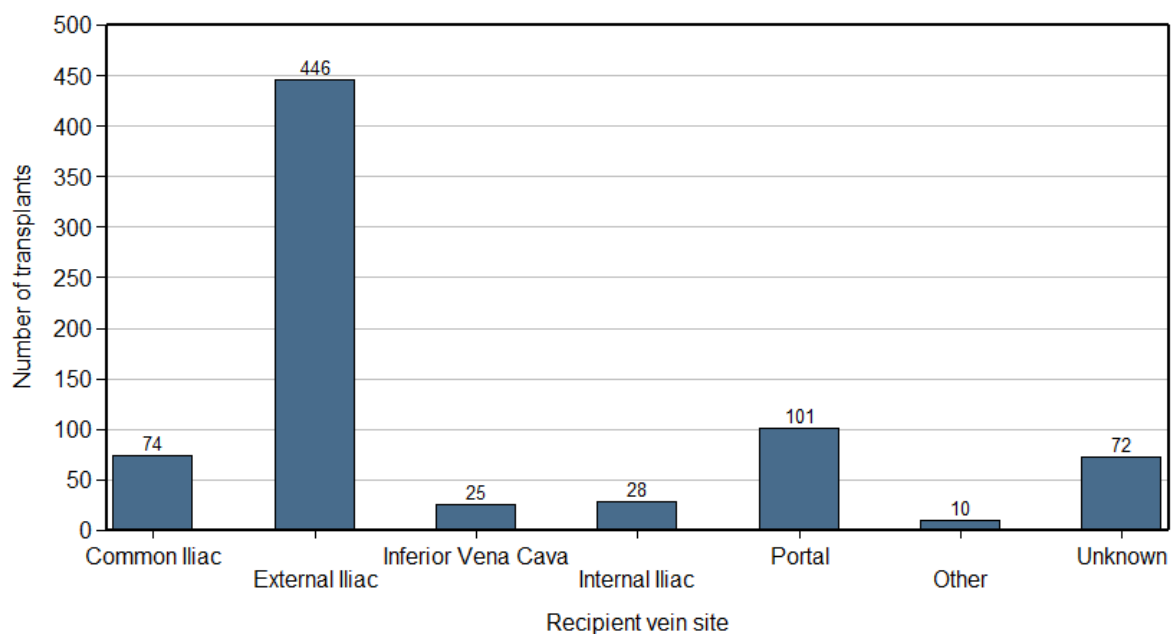


Figure 2.17: Site of donor vein anastomosis onto recipient vessel



The immunological matching of donor-recipient pairs is shown in Table 2.10, and the CMV and EBV matching is illustrated in Table 2.11.

Table 2.10: Immunological cross-matching of donor recipient pairs

	Donor-recipient pairs, n (%)	
	<i>Current</i>	<i>Peak</i>
Crossmatch		
T-cell Positive	0 (0)	2 (<1)
B-cell Positive*	3 (<1)	4 (1)
T-cell and B-cell Negative	651 (86)	636 (84)
Panel Reactive Antibodies (%)		
0-24	751 (99)	739 (98)
25-49	4 (1)	10 (1)
50+	1 (<1)	7 (1)

* One of the positive results was subsequently confirmed to be negative

Table 2.11: Infectious disease serology cross-tabulation of donor recipient pairs

Recipient serology	Donor serology, n (%)	
	Positive	Negative
CMV IgG		
Positive	116 (15)	29 (4)
Negative	392 (52)	219 (19)
EBV IgG		
Positive	126 (17)	24 (3)
Negative	273 (36)	333 (44)

CMV, cytomegalovirus; EBV, Epstein-Barr virus; IgG, immunoglobulin G antibody

Chapter 3: Pancreas donors

Authors: Angela Webster, Paul Robertson, Abhijit Patekar, James Hedley, Patrick Kelly

This chapter gives an overview of donors in 2016 and over time. Donor eligibility criteria guidelines are available in the TSANZ consensus statement

<http://www.tsanz.com.au/organallocationprotocols/> , but briefly require donors to be over 25kg, and up to the age of 45, without known diabetes mellitus or pancreatic trauma, or history of alcoholism or pancreatic trauma. Donation after cardiac death may be considered up to the age of 35. As these are guidelines, there may be occasions when there is minor deviation from these advised criteria.

Donor BMI is perceived as impacting recipient outcomes. Obese donors are more likely to have fatty pancreas, which results in more difficult surgery and increased post –operative complications, and suboptimal insulin secretion. Alcohol consumption is defined by a history of consumption of more than 40g/day. Table 3.1 describes pancreas donor characteristics in Australia and New Zealand to date.

Table 3.1: Demographics and characteristics of pancreas transplant donors

	Donors, n (%)		
	2016	1984-2015	Total
Age category			
0-24	34 (62)	311 (44)	345 (46)
25-34	13 (24)	182 (26)	195 (26)
35-44	8 (15)	146 (21)	154 (20)
45+	0 (0)	30 (4)	30 (4)
Sex			
Female	20 (36)	267 (38)	287 (38)
Male	35 (64)	407 (58)	442 (58)
BMI (kg/m2)			
Underweight/Normal (<24.9)	37 (67)	394 (56)	431 (57)
Overweight (25-29.9)	13 (24)	190 (27)	203 (27)
Obese (30+)	1 (2)	28 (4)	29 (4)
Donor type			
Brain death (DBD)	54 (98)	685 (98)	739 (98)
Circulatory death (DCD)	1 (2)	8 (1)	9 (1)
Donor mode of death			
Cerebral hypoxia/ischaemia	13 (24)	55 (8)	68 (9)
Cerebral infarct	6 (11)	182 (26)	188 (25)
Intracranial haemorrhage	8 (15)	75 (11)	83 (11)
Non-neurological condition	1 (2)	13 (2)	14 (2)
Other neurological condition	22 (40)	269 (38)	291 (38)
Traumatic brain injury	0 (0)	2 (<1)	2 (<1)
Alcohol consumption			
Current	2 (4)	35 (5)	37 (5)
Former	0 (0)	5 (1)	5 (1)
Never	53 (96)	516 (74)	569 (75)
Unknown	0 (0)	12 (2)	12 (2)
Smoking history			
Current	19 (35)	158 (23)	177 (23)
Former	2 (4)	29 (4)	31 (4)
Never	34 (62)	428 (61)	462 (61)
Unknown	0 (0)	15 (2)	15 (2)
Donor's blood group			
O	26 (47)	283 (40)	309 (41)
A	22 (40)	242 (35)	264 (35)
B	3 (5)	60 (9)	63 (8)
AB	4 (7)	24 (3)	28 (4)
Unknown	0 (0)	92 (13)	92 (12)
Kidney biopsy			
Performed	6 (11)	148 (21)	154 (20)
Not performed	49 (89)	545 (78)	594 (79)
CMV serology			
IgG positive	46 (84)	462 (66)	508 (67)
IgG Negative	9 (16)	239 (34)	248 (33)

	2016	Donors, n (%) 1984-2015	Total
EBV serology			
IgG positive	50 (91)	349 (50)	399 (53)
IgG Negative	5 (9)	352 (50)	357 (47)

DBD, deceased after brain death; DCD, deceased after circulatory death; CMV, cytomegalovirus; EBV, Epstein-Barr virus; IgG, immunoglobulin G antibody

The distribution of donor states of origin is shown in Table 3.2 and Table 3.3 by transplanting unit.

Table 3.2: Distribution of state of residence of pancreas donors in Australia over time at Westmead national pancreas transplant unit (NSW)

State	Donors, n (%)						Total
	2016	2015	2014	2013	2012	2011	
NSW	10 (34)	15 (54)	11 (39)	7 (35)	12 (43)	7 (37)	62 (41)
VIC	1 (3)	1 (4)	2 (7)	0 (0)	2 (7)	3 (16)	9 (6)
QLD	10 (34)	4 (14)	3 (11)	2 (10)	4 (14)	2 (11)	25 (16)
SA	0 (0)	3 (11)	5 (18)	5 (25)	5 (18)	3 (16)	21 (14)
WA	5 (17)	4 (14)	3 (11)	4 (20)	3 (11)	3 (16)	22 (14)
TAS	0 (0)	0 (0)	0 (0)	0 (0)	1 (4)	0 (0)	1 (1)
ACT	3 (10)	1 (4)	4 (14)	2 (10)	1 (4)	1 (5)	12 (8)
NT	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	29	28	28	20	28	19	152

Table 3.3: Distribution of state of residence of pancreas donors in Australia over time at Monash pancreas transplant unit (VIC)

State	Donors, n (%)						Total
	2016	2015	2014	2013	2012	2011	
NSW	1 (5)	1 (6)	1 (7)	6 (46)	2 (22)	1 (14)	12 (14)
VIC	13 (59)	14 (82)	11 (73)	6 (46)	6 (67)	4 (57)	54 (65)
QLD	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
SA	3 (14)	2 (12)	0 (0)	0 (0)	0 (0)	0 (0)	5 (6)
WA	3 (14)	0 (0)	1 (7)	0 (0)	0 (0)	0 (0)	4 (5)
TAS	1 (5)	0 (0)	2 (13)	1 (8)	1 (11)	2 (29)	7 (8)
ACT	1 (5)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
NT	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	22	17	15	13	9	7	83

Table 3.4 and Table 3.5 show the distribution of donor organs according to state of origin, cross-tabulated with the state of origin of the recipients who received those organs, for 2016, and from inception of the pancreas program. Note, these tables include Australian donors and recipients only.

Table 3.4: Number of pancreas transplants by donor and recipient state of residence in Australia, all years

Recipient state	Donor state (number of transplants)								Total
	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	
NSW	127	10	22	20	13	4	14	0	210
VIC	28	156	1	6	3	15	2	0	211
QLD	63	9	19	22	12	0	9	0	134
SA	15	10	5	8	3	1	4	0	46
WA	18	3	12	5	8	1	2	0	49
TAS	14	6	0	2	0	1	0	0	23
ACT	15	1	3	2	1	0	0	0	22
NT	1	0	0	1	2	0	0	0	4
Total	281	195	62	66	42	22	31	0	699

Table 3.5: Number of pancreas transplants by donor and recipient state of residence in Australia, 2016 only

Recipient state	Donor state (number of transplants)								Total
	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	
NSW	4	0	4	0	3	0	1	0	12
VIC	1	11	0	2	2	0	1	0	17
QLD	4	0	4	0	2	0	0	0	10
SA	1	2	0	0	1	0	1	0	5
WA	1	1	2	0	0	0	1	0	5
TAS	0	0	0	1	0	1	0	0	2
ACT	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0
Total	11	14	10	3	8	1	4	0	51

Chapter 4: Islet cell transplants

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Islet transplants are a treatment for type 1 diabetics who have hypoglycaemic unawareness and/or severe metabolic instability, are sensitive to insulin, but who have minimal or no kidney impairment. Whole donor pancreas organs are processed aiming to produce a concentrate of islet cells >4000 islet equivalent numbers (IEQ)/kg in a volume of <8ml. Islet transplant recipients may require more than one islet transplant to become insulin independent.

Data for islet transplant donors and recipients in Australia are still sparse. The islet transplant program started in 2002. There are three active islet transplant centres; the National Pancreas Transplant Unit at Westmead Hospital, the Royal Adelaide Hospital, and St Vincent's hospital in Melbourne. There is no islet transplant program in New Zealand.

In this year's report we have added as much data as we have available on the islet program in Australia to date, and expanded description to capture the waiting list for islet transplants, donor and recipient characteristics. We have only reported islet donors and procedures that were intended for an islet transplantation, and not islet isolation procedures that were undertaken for research purposes. Some donor isolations intended for transplantation did not proceed to transplantation.

The islet program waiting list is not long. Table 4.1 shows the islet waiting list numbers over time.

Table 4.1: Islet waiting list status data over time; Westmead Hospital (NSW), St Vincent's Hospital (VIC) Royal Adelaide Hospital (SA)

	Patients (n)		
	2016	2015	2014
Waiting list activity			
Active list at beginning of year	0	9	6
Added to active list during the year	7	5	8
Removed from active list during year	1	2	1
Death while active on list	0	0	1
Death within 12 months of removal from list	0	0	0
Active waiting list at the end of year	0	5	13
Transplants to waiting list			
Recipients	1	13	9
Transplants	1	16	10
Under consideration but not active on list (Westmead only)			
Eligible	1	1	1
Delay	1	4	1
Withdrawn	0	10	10
Long Term Follow Up	0	0	0
No Decision	1	0	0
Death	0	0	1
Other Reasons	0	5	2
Referred but declined for islet transplantation (Westmead only)			
Not eligible	5	2	1

Includes Auto and SIK

Islet isolations

Sometimes when pancreas donations are processed for islet transplantation, the resulting islets are not suitable to be used. This occurs for several reasons, and the decision to proceed with transplantation is made once the final concentration of islet cells is known.

Occasionally, islet isolation procedures occur at one hospital, with the intent that the resulting islets are used and transplanted at another hospital in the network. Table 4.2 and Table 4.3 describe the characteristics of islet cell donor isolations over time, by centre, and Table 4.4 combines isolations from Victoria and South Australia.

Table 4.2: Islet deceased donor characteristics from isolations performed in Westmead Hospital

	Patients (n)		
	2016	1984-2015	Total
Total	1	53	54
Age			
0-24	1	2	3
25-34	0	8	8
35-44	0	15	15
45+	0	28	28
Sex			
Male	1	35	36
Female	0	18	18
BMI			
Underweight (<18.5)	0	0	0
Normal weight (18.5-25)	0	13	13
Overweight (26-29)	0	16	16
Obese (30+)	1	24	25
Donor type			
Brain dead (DBD)	0	51	51
Circulatory death (DCD)	0	2	2
Donor mode of death			
Cerebral hypoxia/ischaemia	0	4	4
Cerebral infarct	0	3	3
Intracranial haemorrhage	1	25	26
Non-neurological condition	0	6	6
Other neurological condition	0	4	4
Traumatic brain injury	0	7	7
Unknown	0	4	4
Days ventilated prior to donation			
Mean	3.1	2.58	2.59
Alcohol consumption			
Current	0	7	7
Former	0	1	1
Never	1	36	37
Unknown	0	7	7
Smoking history			
Current	0	6	6
Former	0	6	6
Never	0	29	29
Unknown	0	7	7

	2016	Patients (n) 1984-2015	Total
Cultural and ethnic group			
White	1	37	38
North East Asian (Chinese)	0	0	0
South East Asian	0	0	0
South and Central Asian (Indian)	0	0	0
Middle Eastern or North African	0	0	0
Indigenous Australian or Torres Strait Islander	0	0	0
Maori and Pacific Islander	0	3	3
Other	0	0	0
Unknown	0	13	13
Blood group			
O	0	21	21
A	1	22	23
B	0	7	7
AB	0	3	3
CMV serology			
IgG positive	1	30	31
IgG negative	0	21	21
Unknown	0	2	2

2 isolations were performed at Westmead for intended use in South Australia.

Table 4.3: Islet donor characteristics for isolations performed in St Vincent's Hospital (VIC) and in Royal Adelaide Hospital (SA)

	2016	Patients (n) 1984-2015	Total
Total	5	45	50
Age			
0-24	0	5	5
25-34	0	6	6
35-44	0	7	7
45+	5	26	31
Unknown	0	1	1
Sex			
Male	2	26	28
Female	3	17	20
Unknown	0	2	2
BMI			
Underweight (<18.5)	0	0	0
Normal weight (18.5-25)	1	6	7
Overweight (26-29)	3	10	13
Obese (30+)	1	23	24
Unknown	0	6	6

	2016	Patients (n) 1984-2015	Total
Donor type			
Auto	0	1	1
Brain death (DBD)	5	44	49
Circulatory death (DCD)	0	0	0
Donor mode of death			
Cerebral hypoxia/ischaemia	0	5	5
Cerebral infarct	0	4	4
Intracranial haemorrhage	4	25	29
Non-neurological condition	1	4	5
Other neurological condition	0	0	0
Traumatic brain injury	0	4	4
Unknown	0	2	2
Days ventilated prior to donation			
Mean	3	-	-
Alcohol consumption			0
Current	0	0	0
Former	0	0	0
Never	0	27	27
Unknown	5	18	23
Smoking history			
Current	0	0	0
Former	0	0	0
Never	0	23	23
Unknown	0	22	22
Cultural and ethnic group			
White	5	42	47
North East Asian (Chinese)	0	0	0
South East Asian	0	0	0
South and Central Asian (Indian)	0	0	0
Middle Eastern or North African	0	0	0
Indigenous Australian or Torres Strait Islander	0	1	1
Maori and Pacific Islander	0	0	0
Other	0	0	0
Unknown	0	2	2
Blood group			
O	4	19	23
A	1	15	16
B	0	8	8
AB	0	0	0
Unknown	0	3	3
CMV serology			
IgG positive	2	22	24
IgG negative	1	17	18
Unknown	2	6	8

Islet isolations resulting in transplantation

Donors who provided pancreatata that resulted in islet isolations that proceeded to transplantation are summarised in Table 4.4.

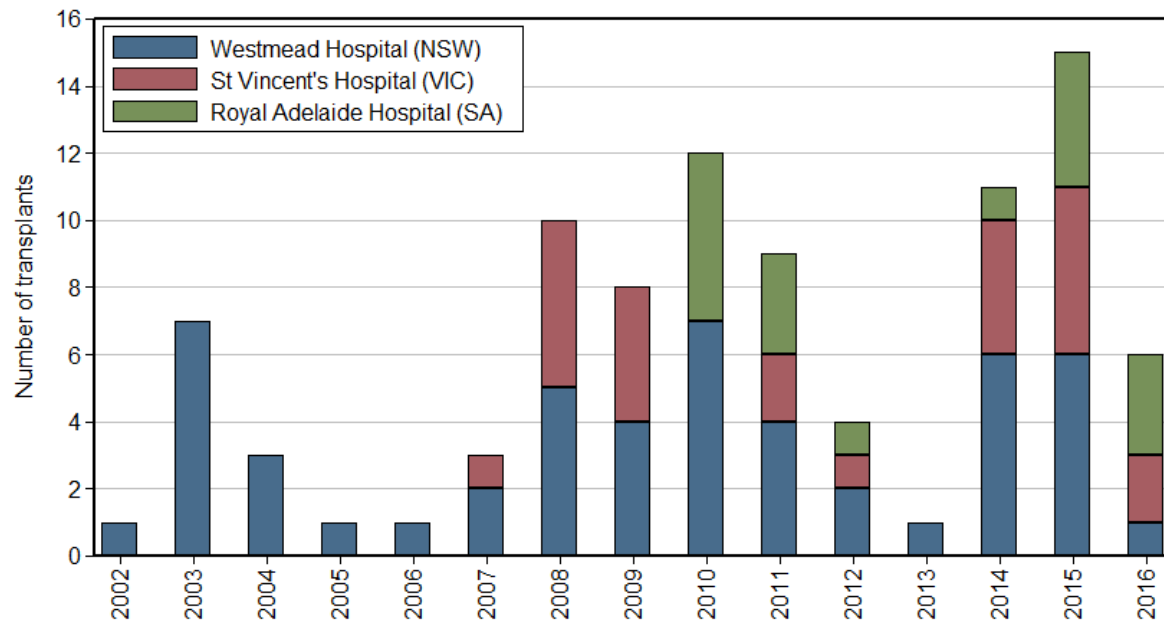
Table 4.4: Islet donor characteristics for isolations which resulted in transplantation at Westmead Hospital (NSW) and St Vincent's Hospital (VIC)

	Patients (n)		
	NSW	VIC	Total
Total	1	5	6
Age			
0-24	1	0	1
25-34	0	0	0
35-44	0	0	0
45+	0	5	5
Unknown	0	0	0
Sex			
Male	1	2	3
Female	0	3	3
Unknown	0	0	0
BMI			
Underweight (<18.5)	0	0	0
Normal weight (18.5-25)	0	0	0
Overweight (26-29)	0	2	2
Obese (30+)	1	3	4
Unknown	0	0	0
Donor type			
Auto	0	0	0
Brain dead (DBD)	1	5	6
Circulatory death (DCD)	0	0	0
Donor mode of death			
Cerebral hypoxia/ischaemia	0	0	0
Cerebral infarct	0	0	0
Intracranial haemorrhage	0	4	4
Non-neurological condition	1	0	1
Other neurological condition	0	0	0
Traumatic brain injury	0	1	1
Unknown	0	0	0
Days ventilated prior to donation			
Mean	4.00	3.00	3.17
Alcohol consumption			
Current	1	0	1
Former	0	0	0
Never	0	4	4
Unknown	0	1	1

	Patients (n)		
	<i>NSW</i>	<i>VIC</i>	<i>Total</i>
Smoking history			
Current	1	0	1
Former	0	0	0
Never	0	0	0
Unknown	0	5	5
Cultural and ethnic group			
White	1	5	6
North East Asian (Chinese)	0	0	0
South East Asian	0	0	0
South and Central Asian (Indian)	0	0	0
Middle Eastern or North African	0	0	0
Indigenous Australian or Torres Strait Islander	0	0	0
Maori and Pacific Islander	0	0	0
Other	0	0	0
Unknown	0	0	0
Blood group			
O	0	4	4
A	1	1	2
B	0	0	0
AB	0	0	0
Unknown	0	0	0
CMV serology			
IgG positive	1	2	3
IgG negative	0	1	1
Unknown	0	2	2

Figure 4.1 illustrates the number of islet cell transplants in Australia between 2002 and 2015. The transplants were performed in Westmead (50), St Vincent's (22), and Royal Adelaide (14) Hospitals. In 2015, 6 transplants were performed at Westmead, 5 at St Vincent's and 4 at the Royal Adelaide.

Figure 4.1: Islet transplant activity 2002-2016, by transplanting centre



The characteristics of donor and recipient matches according to blood group are described in Table 4.5, Table 4.6, and Table 4.7.

Table 4.5: Cross tabulation of recipient and donor blood groups, 2002-2016, from transplants undertaken in Westmead Hospital (NSW)

Recipient blood group	Donor blood group				Total
	<i>O</i>	<i>A</i>	<i>B</i>	<i>AB</i>	
O	14	0	0	0	14
A	3	15	0	0	18
B	0	0	3	0	3
AB	0	1	0	1	2
Total	17	16	3	1	37

Table 4.6: Cross tabulation of recipient and donor blood groups, 2002-2016, from transplants undertaken in St Vincent's hospital (VIC)

Recipient blood group	Donor blood group				Total
	<i>O</i>	<i>A</i>	<i>B</i>	<i>AB</i>	
O	8	0	0	0	8
A	12	21	0	0	33
B	1	0	4	0	5
AB	0	2	1	3	6
Total	21	23	5	3	52

Table 4.7: Cross tabulation of recipient and donor blood groups, 2002-2016, from transplants undertaken in Royal Adelaide Hospital (SA)

Recipient blood group	Donor blood group				Total
	<i>O</i>	<i>A</i>	<i>B</i>	<i>AB</i>	
O	8	0	0	0	8
A	1	7	0	0	8
B	0	0	2	0	2
AB	0	0	0	0	0
Total	9	7	2	0	18

The characteristics of donor and recipient matches according to state, and sex distributions are described in Table 4.8 and Table 4.9.

Table 4.8: Cross tabulation of recipient and donor sex, 2002-2016*

Recipient sex	Donor sex		Total
	Female	Male	
Female	28	42	70
Male	12	17	29
Total	40	59	99

This includes 53 isolations at Westmead, and 45 isolations at Melbourne only. Recipients received more than 1 transplant therefore recipients may be duplicated in numbers

Table 4.9: Cross tabulation of recipient and donor blood groups, 2002-2016, for islet transplants undertaken in Australia

Recipient blood group	Donor blood group				Total
	<i>O</i>	<i>A</i>	<i>B</i>	<i>AB</i>	
<i>O</i>	30	1	0	0	31
<i>A</i>	16	41	0	0	57
<i>B</i>	1	0	10	0	11
<i>AB</i>	4	5	1	4	14
Total	51	47	11	4	113

Islet Transplant recipients

Characteristics of islet transplant recipients are shown below. Most recipients receive more than one islet transplant, and so receive islets from multiple donors. Some people received an auto-transplant, which is where a person becomes their own donor. This may be indicated when an individual who is not diabetic needs to have their pancreas removed. This organ is then processed and the islet isolated, and transplanted back into the recipient. Recipient state of residence is shown in Table 4.10.

Table 4.10: Islet transplant recipients by state of residence and number of transplants received

Recipient state of residence	<i>Westmead</i>				<i>Melbourne</i>			
	<i>1st</i>	<i>2nd</i>	<i>3rd</i>	<i>Total</i>	<i>1st</i>	<i>2nd</i>	<i>3rd</i>	<i>Total</i>
NSW	1	0	0	1	0	0	0	0
VIC	0	0	0	0	0	0	0	0
QLD	0	0	0	0	0	0	0	0
SA	0	0	0	0	0	0	0	0
WA	0	0	0	0	0	0	0	0
TAS	0	0	0	0	0	0	0	0
ACT	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0
Total	1	0	0	1	0	0	0	0

The states of residence of donors and recipients for each transplantation are shown in Table 4.11, Table 4.12, and Table 4.13, stratified by the transplant centre.

Table 4.11: Cross tabulation of islet donor and recipient state of residence for activity at Westmead hospital (NSW)*

Recipient state of residence	Donor state of residence								Total
	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	
NSW	0	0	1	0	0	0	0	0	1
VIC	0	0	0	0	0	0	0	0	0
QLD	0	0	0	0	0	0	0	0	0
SA	0	0	0	0	0	0	0	0	0
WA	0	0	0	0	0	0	0	0	0
TAS	0	0	0	0	0	0	0	0	0
ACT	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0
Total	0	0	1	0	0	0	0	0	1

2 auto transplants included (1 NSW & 1 WA)

Table 4.12: Cross tabulation of islet donor and recipient state of residence at St Vincent's Hospital (VIC)

Recipient state of residence	Donor state of residence								Total
	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	
NSW	0	0	0	0	0	0	0	0	0
VIC	0	1	0	1	0	0	0	0	2
QLD	0	0	0	0	0	0	0	0	0
SA	0	0	0	0	0	0	0	0	0
WA	0	0	0	0	0	0	0	0	0
TAS	0	0	0	0	0	0	0	0	0
ACT	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0
Total	0	1	0	1	0	0	0	0	2

Table 4.13: Cross tabulation of islet donor and recipient state of residence at Royal Adelaide Hospital (SA)*

Recipient state of residence	Donor state of residence								Total
	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	
NSW	0	0	0	0	0	0	0	0	0
VIC	0	0	0	0	0	0	0	0	0
QLD	0	0	0	0	0	0	0	0	0
SA	1	0	0	1	0	0	0	0	2
WA	0	0	0	0	0	0	0	0	0
TAS	0	0	0	0	0	0	0	0	0
ACT	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0
Total	1	0	0	1	0	0	0	0	2

Characteristics of Islet recipients over time are shown in Table 4.14

Table 4.14: Characteristics of islet cell transplant recipients in Australia

	2016	Patients (n) 2002-2015	Total
Total	5	48	53
Age			
0-24	0	0	0
25-34	0	3	3
35-44	1	12	13
45+	4	33	37
Sex			
Male	1	15	16
Female	5	32	37
Number of transplants per recipient			
1	4	19	23
2	1	20	21
3	0	8	8
4	0	0	0
Insulin dependent post-transplant			
Yes	0	18	18
No	0	30	30
State of residence			
NSW	1	15	16
VIC	2	14	16
QLD	2	4	6
SA	0	8	8
WA	0	4	4
TAS	0	2	2
ACT	0	1	1
NT	0	0	0
Donor age			
0-24	0	7	7
25-34	1	13	14
35-44	0	21	21
45+	5	59	64
Donor sex			
Male	2	62	64
Female	4	30	34
Unknown	0	1	1

Insulin independence defined total daily dose insulin less than 5 units per day

A summary of Islet cell transplant activity in all Australian centres is presented in Table 4.15.

Table 4.15: Summary of Islet Cell Transplant Activity, for all centres in Australia

Transplant centre	Patients (n)				
	<i>Recipients</i>	<i>Donors</i>	<i>Islet-kidney</i>	<i>Auto</i>	<i>Procedures</i>
Westmead (NSW)	1	1	0	1	2
St. Vincent's (VIC)	2	2	0	0	2
Royal Adelaide (SA)	2	3	0	0	3
Total	5	6	0	1	7