



# ANZIPTR Report 2021

Australia and New Zealand Islet and Pancreas Transplant Registry data 1984-2020

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 Organ and Tissue Authority  
[www.anziptr.org](http://www.anziptr.org)

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# Summary

## Introduction

This report is produced and edited by: Professor Angela Webster, James Hedley, Juliet Byrnes and Associate Professor Patrick Kelly.

Chapters 1-3 are authored by: Angela Webster, Paul Robertson, Tia Mark, Helen Pilmore, Danielle Stephenson, James Hedley, Juliet Byrnes and Patrick Kelly

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

## Suggested Citation

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## **Governance structure**

This report is a compilation of data provided by the four 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; National Pancreas Transplant Unit, Westmead Hospital, NSW; South Australian/Northern Territory Transplant Service, Royal Adelaide Hospital, SA; and the three Islet transplanting units in Australia: Westmead Hospital (New South Wales), St. Vincent's Hospital Melbourne (Victoria), and Royal Adelaide Hospital (South Australia). The ANZIPTR registry is funded in part by a grant from the Organ and Tissue Authority.

## **Data release guidelines**

The registry can provide de-identified data for free to Transplant Physicians, Transplant Units, and Government Departments. Release of data for academic or clinical research projects is provisional on an agreed project plan and proof of ethical oversight. 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](http://www.anziptr.org) for our data dictionary.

## Participating Centres

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Dr Kenneth Chan	Interventional Radiographer

## **Analysis and Methods**

The aim of this report is to record all pancreas and islet transplant activity in Australia and New Zealand. Data included in this report was locked on 3<sup>rd</sup> May 2021, for all people transplanted up to the end of 2020. Data for the islets waiting list, donors, and recipients was provided by each centre by 18<sup>th</sup> May 2021. Please note new data is added to the registry regularly, and corrections are made where previous data are missing or where errors are discovered.

Kaplan-Meier survival curves were used to illustrate the survival distributions, and these were generated using Stata software version 16 (StataCorp, College Station, TX USA). Transplant survival is analysed and presented both including and excluding death with a functioning transplant. For patients receiving a second transplant, in calculating mortality, time was measured from time of first transplant.

## Definitions

### Pancreas transplant

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.

### Islet transplant

An islet transplant is the infusion of islet cells that have been isolated from a donor pancreas into a recipient with poorly controlled type 1 diabetes who has recurrent severe hypoglycaemia and hypoglycaemia unawareness. In the case of an islet auto-transplant, the recipient is also the donor. Auto-islet transplantation is the re-infusion of islet cells from isolated from the recipient's own pancreas after the pancreas has been removed. This procedure is done to eradicate the severe pain of chronic or hereditary pancreatitis, to better control blood glucose after the pancreas is removed. In this report "islet transplant" refers to islet cell infusion from a cadaveric donor only; when discussing auto-islet transplantation "auto-islet" is always specified.

A functioning islet transplant is defined as stable blood glucose levels, cessation of severe hypoglycaemia, positive blood C-Peptide levels and reduction in insulin usage. Insulin independence may or may not be achieved and is not the aim of the procedure. Insulin independence is defined as being free from insulin use for 14 or more consecutive days. Note that the definition used here is different from the international Collaborative Islet Transplant Registry (CITR, <https://citregistry.org/>), which defines insulin independence as less than 7 units of insulin per day.

## 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
DBD	Donor after Brain Death
DCD	Donor after Circulatory Death
CMV	Cytomegalovirus
EBV	Epstein-Barr Virus
IgG	Immunoglobulin G antibody
IEQ	Islet Equivalent Units
GMP	Good Manufacturing Procedures
TGA	Therapeutic Goods Administration (Australia)
TP-IAT	Total Pancreatectomy – Islet Auto Transplant
HbA1c	Glycosylated haemoglobin A1c
SF36	36 Item Short Form Health Survey
SD	Standard Deviation
IQR	Interquartile Range
SVHM	St. Vincent's Hospital Melbourne
SVI	St. Vincent's Institute
NSW	New South Wales
VIC	Victoria
QLD	Queensland
SA	South Australia
WA	Western Australia
TAS	Tasmania
ACT	Australian Capital Territory
NT	Northern Territory
NZ	New Zealand



## Synopsis

A total of 961 solid organ pancreas transplants have been performed in Australia and New Zealand (ANZ), in 938 individuals from 1984-2020 (excluding islet transplants).

In 2020, 49 pancreas transplants were performed, by centre this was; Auckland (2); Monash (14); Westmead (31); and Adelaide (2). In 2020, 48 transplants were SPK while none were PAK and one was PTA.

From 2002-2020, there have been 132 Islet transplants in 65 patients (excluding auto-islets), and 7 TP-IAT procedures performed in Australia.

## Accessing report data

In 2015 ANZIPTR developed its own website: [www.anziptr.org](http://www.anziptr.org) which describes the registry structure and function, outlines the procedure for data requests, and provides a download area for past reports. Since 2017, a slide set of key registry data tables and plots is available for download, to complement the ANZIPTR 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, Juliet Byrnes, James Hedley, Paul Robertson, Tia Mark, Helen Pilmore, Danielle Stephenson, 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 decreased over the last three years, the number of patients on the active waiting list has also decreased.

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

Activity	Patients (n)		
	2018	2019	2020
On active list at beginning of year	91	78	72
Added to active list during the year	51	48	34
Removed from active list during year	7	7	5
Pancreas transplants to patients on waiting list	50	40	47
Kidney only transplants to patients on waiting list	5	3	2
Transplants performed outside Australia/New Zealand	0	0	0
Died while active on list	2	4	2
On active waiting list at the end of year	78	72	50
Died within 12 months of removal from list	0	0	0
Under consideration but not active on list	185	173	163
Referred but declined for pancreas transplantation	2	2	2

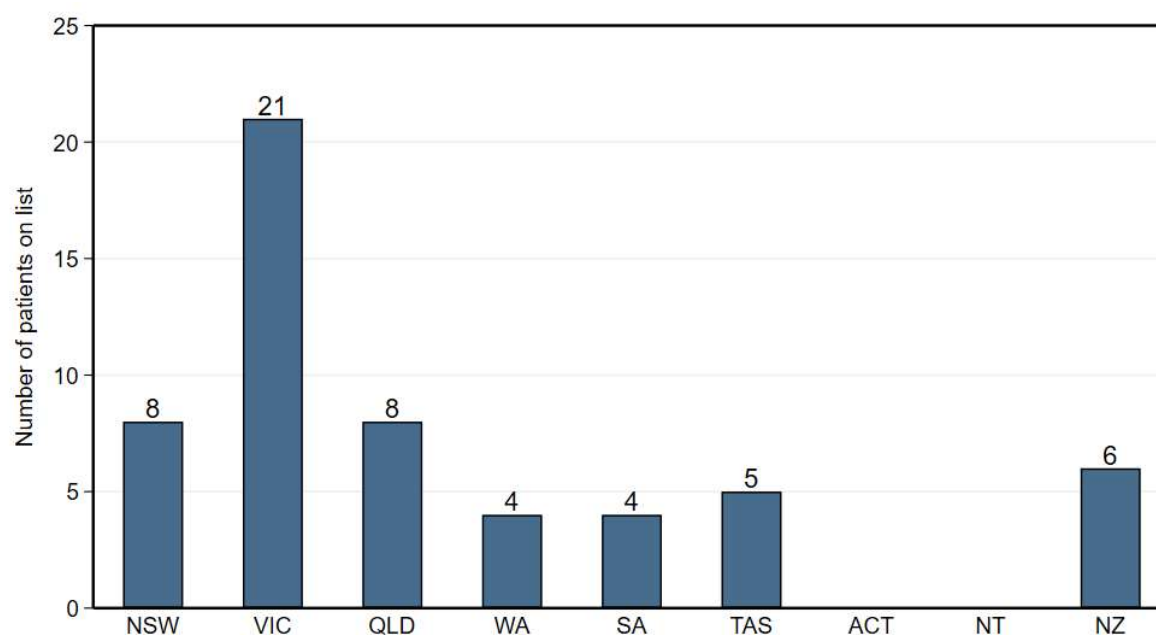
**Table 1.2: Waiting list activity in New Zealand for the last three years**

Activity	Patients (n)		
	2018	2019	2020
On active list at beginning of year	7	3	5
Added to active list during the year	5	6	4
Removed from active list during year	3	0	1
Transplants to patients on waiting list	6	4	2
Kidney only transplants to patients on waiting list	0	0	0
Transplants performed outside Australia/New Zealand	0	0	0
Died while active on list	0	0	0
On active waiting list at the end of year	3	5	6
Died within 12 months of removal from list	0	0	0
Under consideration but not active on list	9	6	10
Referred but declined for pancreas transplantation	2	0	0

## Distribution of active patients by state

Figure 1.1 and Table 1.3 show the state and country of residence for people active on the pancreas waiting list, by year and the pancreas transplanting centre they were referred to (Australia only).

**Figure 1.1: Distribution of people active on the waiting list by state or country of residence, as of December 2020**



**Table 1.3: Patient state of residence by Australian pancreas transplant unit for people active on the list at the end of the year for the past three years**

State of residence, n (row %)									
Year	NSW	VIC	QLD	WA	SA	TAS	ACT	NT	Total
Westmead (NSW)									
2020	6 (32)	0 (0)	8 (42)	4 (21)	1 (6)	0 (0)	0 (0)	0 (0)	19
2019	11 (33)	1 (3)	14 (42)	6 (18)	1 (3)	0 (0)	0 (0)	0 (0)	33
2018	13 (35)	1 (3)	15 (41)	7 (23)	1 (3)	0 (0)	0 (0)	0 (0)	37
Monash (VIC)									
2020	2 (7)	21 (72)	0 (0)	0 (0)	1 (3)	5 (17)	0 (0)	0 (0)	29
2019	1 (3)	26 (74)	0(0)	0 (0)	2 (6)	6 (17)	0 (0)	0 (0)	35
2018	1 (2)	30 (75)	0 (0)	0 (0)	3 (8)	6 (15)	0 (0)	0 (0)	40
Royal Adelaide (SA)									
2020	0 (0)	0 (0)	0 (0)	0 (0)	2 (100)	0 (0)	0 (0)	0 (0)	2
2019	0 (0)	0 (0)	0 (0)	0 (0)	4 (100)	0 (0)	0 (0)	0 (0)	4
2018	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	1

Table 1.4 shows 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 1.4: Patient state of residence by Australian pancreas transplant unit for people under consideration and active on the list at the end of the year for the past three years**

State of residence, n (row %)									
Year	NSW	VIC	QLD	WA	SA	TAS	ACT	NT	Total
Westmead (NSW)									
2020	33 (31)	0 (0)	29 (28)	35 (33)	7 (7)	1 (<1)	0 (0)	0 (0)	105
2019	48 (36)	1 (<1)	39 (29)	38 (28)	7 (5)	1 (<1)	0 (0)	0 (0)	134
2018	55 (37)	1 (<1)	45 (30)	39 (26)	7 (5)	1 (<1)	0 (0)	0 (0)	148
Monash (VIC)									
2020	3 (3)	79 (76)	1 (<1)	0 (0)	7 (7)	13 (13)	0 (0)	1 (<1)	104
2019	3 (3)	82 (77)	1 (<1)	0 (0)	8 (8)	11 (10)	0 (0)	1 (<1)	106
2018	4 (4)	84 (76)	1 (<1)	0 (0)	10 (9)	11 (10)	0 (0)	1 (<1)	111
Royal Adelaide (SA)									
2020	0 (0)	0 (0)	0 (0)	0 (0)	3 (100)	0 (0)	0 (0)	0 (0)	3
2019	0 (0)	0 (0)	0 (0)	0 (0)	5 (100)	0 (0)	0 (0)	0 (0)	5
2018	0 (0)	0 (0)	0 (0)	0 (0)	4 (100)	0 (0)	0 (0)	0 (0)	4

## New referrals received over time

Table 1.5 shows the number of new referrals received by transplanting units in Australia and New Zealand over time, and by state of residence (for Australian units only).

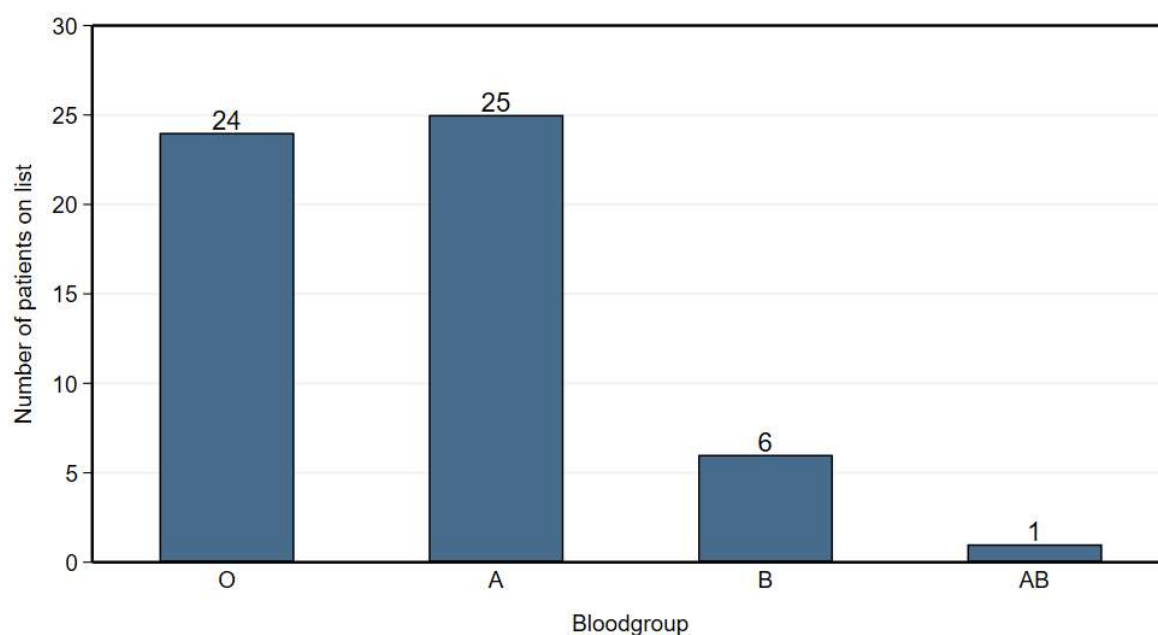
**Table 1.5: New referrals received over time by pancreas transplant unit and state of residence**

by residence									
	State of residence, n (row %)								
Year	NSW	VIC	QLD	WA	SA	TAS	ACT	NT	Total
Westmead (NSW)									
2020	1 (50)	0 (0)	1 (50)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2
2019	9 (64)	0 (0)	4 (29)	1 (7)	0 (0)	0 (0)	0 (0)	0 (0)	14
2018	6 (38)	1 (6)	7 (44)	1 (6)	1 (6)	0 (0)	0 (0)	0 (0)	16
Monash (VIC)									
2020	0 (0)	23 (82)	0 (0)	0 (0)	0 (0)	5 (18)	0 (0)	0 (0)	28
2019	0 (0)	27 (90)	0 (0)	0 (0)	0 (0)	3 (10)	0 (0)	0 (0)	30
2018	3 (8)	26 (72)	1 (3)	0 (0)	2 (6)	4 (11)	0 (0)	0 (0)	36
Royal Adelaide (SA)									
2020	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	1
2019	0 (0)	0 (0)	0 (0)	0 (0)	4 (100)	0 (0)	0 (0)	0 (0)	4
2018	0 (0)	0 (0)	0 (0)	0 (0)	4 (100)	0 (0)	0 (0)	0 (0)	4
Auckland (NZ)									
2020	-	-	-	-	-	-	-	-	8
2019	-	-	-	-	-	-	-	-	3
2018	-	-	-	-	-	-	-	-	11

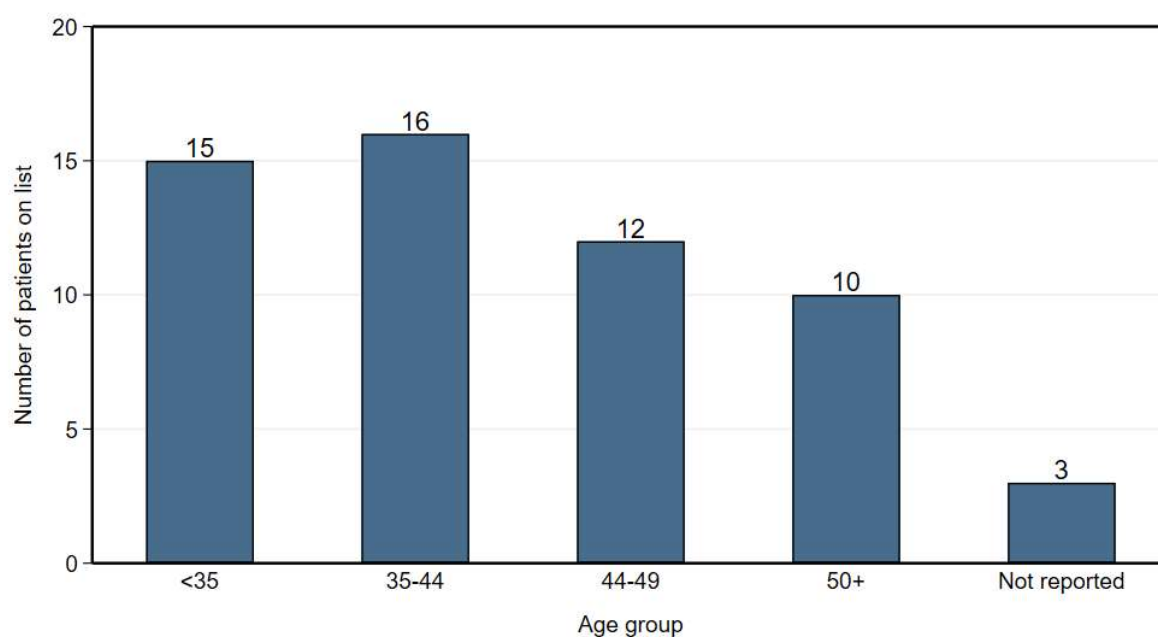
## Patient characteristics for those active on the list in 2020

The following figures illustrate the distribution of other characteristics of those active on the waiting list in 2020, 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 2020**



**Figure 1.3: Distribution of people active on the list by their age, at December 2020**



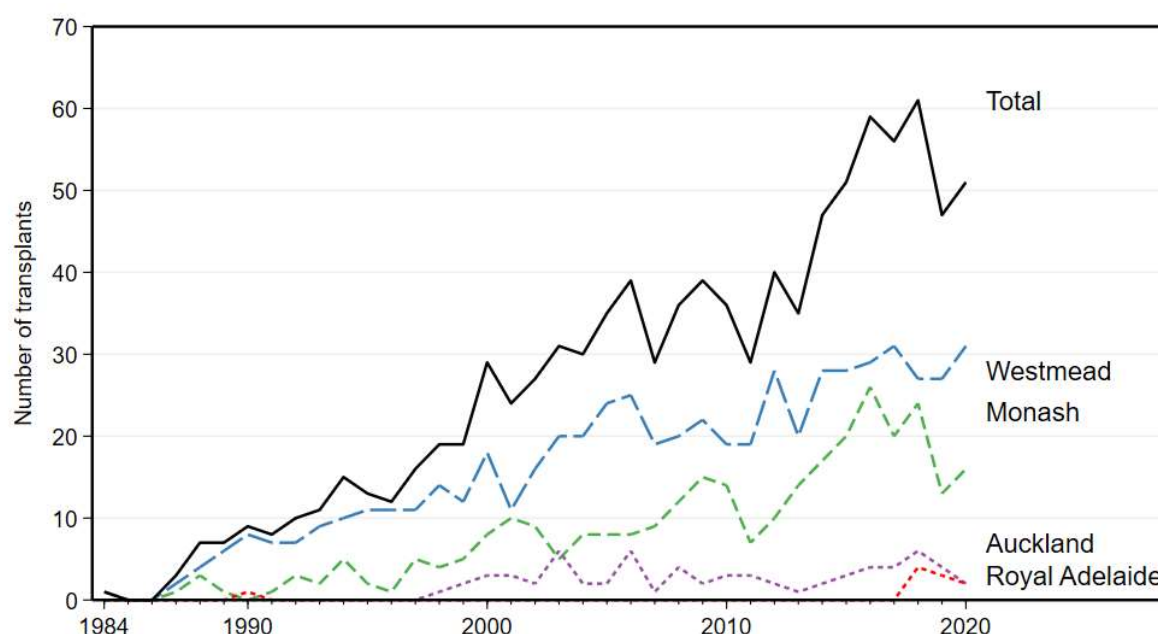
## Chapter 2: Pancreas transplant recipients

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### Pancreas transplant incidence

A total of 961 solid organ pancreas transplants have been performed in Australia and New Zealand (ANZ) from 1984-2020. Transplants have been performed in Westmead (591), Monash (288), Auckland (68), and Royal Adelaide (10). In 2019 the Royal Adelaide Hospital recommenced pancreas transplantation in South Australia and the Northern Territory using an ATG based steroid free protocol. There have also been multi-organ transplants including pancreas at Royal Prince Alfred (1), Royal Melbourne Hospital (1), Queen Elizabeth Hospital (1), and Austin Hospital (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, 1984-2020**



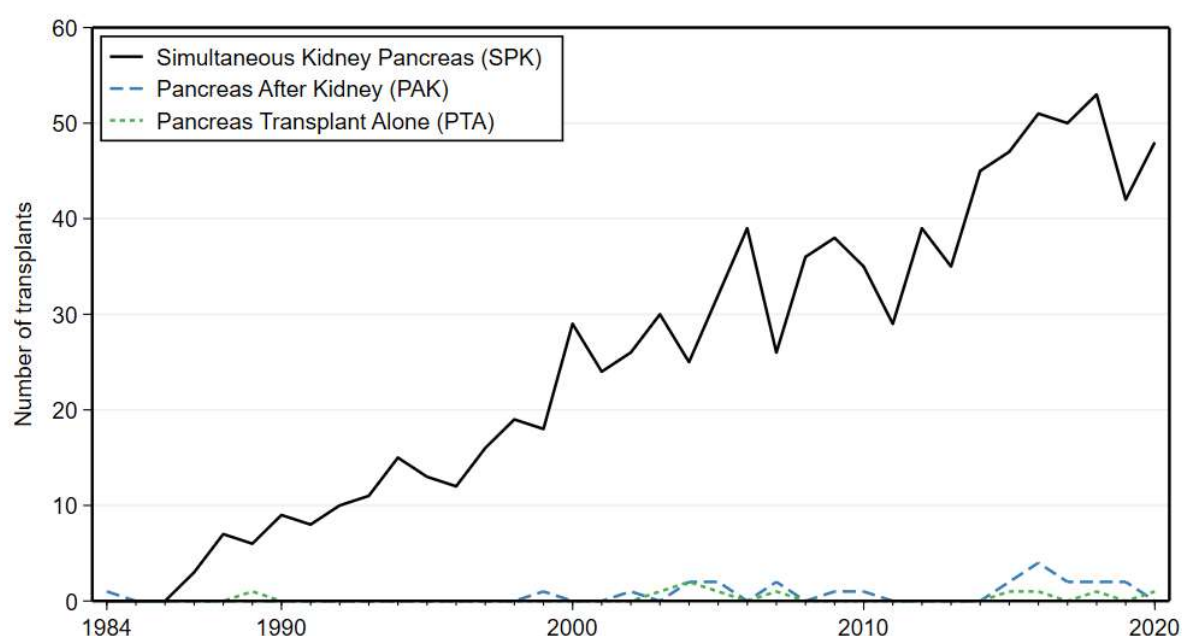
Note: There have been four pancreas transplants performed in Australia, which were not conducted by either Westmead, Monash, or Royal Adelaide. These occurred in 1988, 1990, 2005, and 2017



In 2020, 49 people received a pancreas transplant, by centre this was; Monash (14), Westmead (31), Royal Adelaide (2), and Auckland (2). The number of transplants in 2020 increased by 11% compared to 2019.

Not all pancreas transplant operations are undertaken with the same organs. Simultaneous pancreas-kidney transplant (SPK) is the most common operation, representing 99% of all pancreas transplants in Australia and New Zealand. From 49 transplants performed in 2020, 48 were SPK, 1 was Pancreas transplant alone (PTA), and none were Pancreas after kidney (PAK). PAK operations are done for type 1 diabetic 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 and have good kidney transplant function, but had a pancreas transplant failure, so need a further pancreas transplant. Pancreas transplant alone (PTA) is a less common operation and occurs very rarely. Its indications include management of patients with hypoglycaemic unawareness or brittle diabetes that have failed best medical therapy. On rarer occasions, a multi-organ transplant is undertaken which includes a pancreas transplant. There was one simultaneous pancreas, liver, and kidney transplant which was performed in 2005, one liver, pancreas, and intestine transplant in 2012, one liver and pancreas transplant in 2016, and one liver, kidney, pancreas, stomach and intestine transplant in 2017. The distribution of operation types is shown in **Error! Reference source not found.**, and the number of transplants by operation type is shown in Table 2.1.

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





**Table 2.1: Pancreas transplant operations over time, by transplant hospital**

Hospital and transplant type, n (row %)									
Year	Westmead			Monash			Royal Adelaide	New Zealand	Total
	SPK	PAK	PTA	SPK	PAK	PTA	All	All	All
2020	30 (61)	0 (0)	1 (2)	13 (27)	0 (0)	0 (0)	3 (6)	2 (4)	49
2019	26 (59)	1 (2)	0 (0)	10 (23)	0 (0)	0 (0)	3 (7)	4 (9)	44
2018	24 (43)	2 (4)	0 (0)	20 (36)	0 (0)	0 (0)	4 (7)	6 (11)	56
2017	30 (58)	0 (0)	0 (0)	16 (31)	2 (4)	0 (0)	0 (0)	4 (8)	52
2016	26 (46)	3 (5)	0 (0)	21 (38)	1 (2)	1 (2)	0 (0)	4 (7)	56
2015	27 (54)	1 (2)	0 (0)	18 (36)	1 (2)	0 (0)	0 (0)	3 (6)	50
2014	28 (62)	0 (0)	0 (0)	15 (33)	0 (0)	0 (0)	0 (0)	2 (4)	45
2013	20 (57)	0 (0)	0 (0)	14 (40)	0 (0)	0 (0)	0 (0)	1 (3)	35
2012	28 (72)	0 (0)	0 (0)	9 (23)	0 (0)	0 (0)	0 (0)	2 (5)	39
2011	19 (66)	0 (0)	0 (0)	7 (24)	0 (0)	0 (0)	0 (0)	3 (10)	29
2010	19 (53)	0 (0)	0 (0)	14 (39)	0 (0)	0 (0)	0 (0)	3 (8)	36
2009	22 (56)	0 (0)	0 (0)	14 (36)	1 (3)	0 (0)	0 (0)	2 (5)	39
2008	20 (56)	0 (0)	0 (0)	12 (33)	0 (0)	0 (0)	0 (0)	4 (11)	36
2007	16 (55)	2 (7)	1 (3)	9 (31)	0 (0)	0 (0)	0 (0)	1 (3)	29
2006	25 (64)	0 (0)	0 (0)	8 (21)	0 (0)	0 (0)	0 (0)	6 (15)	39
2005	21 (62)	2 (6)	1 (3)	8 (24)	0 (0)	0 (0)	0 (0)	2 (6)	34
2004	15 (52)	2 (7)	2 (7)	8 (28)	0 (0)	0 (0)	0 (0)	2 (7)	29
2003	19 (61)	0 (0)	1 (3)	5 (16)	0 (0)	0 (0)	0 (0)	6 (19)	31
2002	15 (56)	1 (4)	0 (0)	9 (33)	0 (0)	0 (0)	0 (0)	2 (7)	27
2001	11 (46)	0 (0)	0 (0)	10 (42)	0 (0)	0 (0)	0 (0)	3 (13)	24
2000	18 (62)	0 (0)	0 (0)	8 (28)	0 (0)	0 (0)	0 (0)	3 (10)	29
1999	11 (58)	1 (5)	0 (0)	5 (26)	0 (0)	0 (0)	0 (0)	2 (11)	19
1998	14 (74)	0 (0)	0 (0)	4 (21)	0 (0)	0 (0)	0 (0)	1 (5)	19
1997	11 (69)	0 (0)	0 (0)	5 (31)	0 (0)	0 (0)	0 (0)	0 (0)	16
1996	11 (92)	0 (0)	0 (0)	1 (8)	0 (0)	0 (0)	0 (0)	0 (0)	12
1995	11 (85)	0 (0)	0 (0)	2 (15)	0 (0)	0 (0)	0 (0)	0 (0)	13
1994	10 (67)	0 (0)	0 (0)	5 (33)	0 (0)	0 (0)	0 (0)	0 (0)	15
1993	9 (82)	0 (0)	0 (0)	2 (18)	0 (0)	0 (0)	0 (0)	0 (0)	11
1992	7 (70)	0 (0)	0 (0)	3 (30)	0 (0)	0 (0)	0 (0)	0 (0)	10
1991	7 (88)	0 (0)	0 (0)	1 (13)	0 (0)	0 (0)	0 (0)	0 (0)	8
1990	8 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	8
1989	5 (71)	0 (0)	1 (14)	1 (14)	0 (0)	0 (0)	0 (0)	0 (0)	7
1988	4 (67)	0 (0)	0 (0)	2 (33)	0 (0)	0 (0)	0 (0)	0 (0)	6
1987	2 (67)	0 (0)	0 (0)	1 (33)	0 (0)	0 (0)	0 (0)	0 (0)	3
1986	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
1985	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
1984	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	1
<b>Total</b>	569 (60)	15 (2)	7 (<1)	280 (29)	6 (<1)	1 (<1)	10 (1)	68 (7)	956

SPK, simultaneous pancreas-kidney; PAK, pancreas after kidney; PTA, pancreas alone

The above table excludes the four transplants performed in Australia outside of Westmead, Monash, or Royal Adelaide in 1988, 1990, 2005, and 2017.

The above table also excludes one combined liver-pancreas transplant performed at Monash in 2016.

## Patients transplanted by state

The states of origin of the people receiving pancreas transplants at each transplant unit in Australia over time are shown in Table 2.2.

**Table 2.2: Distribution of state of residence of people receiving pancreas transplants over time**

	State of residence, n (row %)								
Year	NSW	VIC	QLD	WA	SA	TAS	ACT	NT	Total
Westmead (NSW)									
2020	16 (52)	1 (3)	11 (35)	3 (10)	0 (0)	0 (0)	0 (0)	0 (0)	31
2019	15 (56)	0 (0)	10 (37)	2 (7)	0 (0)	0 (0)	0 (0)	0 (0)	27
2018	15 (58)	0 (0)	6 (23)	3 (12)	2 (8)	0 (0)	0 (0)	0 (0)	26
Monash (VIC)									
2020	0 (0)	12 (86)	0 (0)	0 (0)	1 (7)	1 (7)	0 (0)	0 (0)	14
2019	0 (0)	7 (70)	0 (0)	0 (0)	1 (10)	2 (20)	0 (0)	0 (0)	10
2018	0 (0)	17 (85)	0 (0)	0 (0)	2 (10)	1 (5)	0 (0)	0 (0)	20
Royal Adelaide (SA)									
2020	0 (0)	0 (0)	0 (0)	0 (0)	2 (100)	0 (0)	0 (0)	0 (0)	2
2019	0 (0)	0 (0)	0 (0)	0 (0)	3 (100)	0 (0)	0 (0)	0 (0)	3
2017	0 (0)	0 (0)	0 (0)	0 (0)	4 (100)	0 (0)	0 (0)	0 (0)	4
Auckland (NZ)									
2020	-	-	-	-	-	-	-	-	2
2019	-	-	-	-	-	-	-	-	4
2018	-	-	-	-	-	-	-	-	6

## Demographics of new pancreas transplant recipients

The characteristics of pancreas transplant recipients in 2020 and in previous years are shown in Table 2.3. The primary diagnosis causing end stage kidney disease of recipients during 2020 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 only one received a transplant in 2020.

**Table 2.3: Demographics and characteristics of pancreas transplant recipients<sup>1</sup>**

Patients, n (column %)	2020	1984-2019	Total
<b>Age category</b>			
Median (IQR)	42 (37, 46.5)	39 (33, 44)	39 (33, 44)
0-34	8 (16)	285 (31)	293 (30)
35-44	26 (53)	417 (46)	443 (46)
45-50	8 (16)	149 (16)	157 (16)
50+	7 (14)	60 (7)	67 (7)
Not reported	0 (0)	1 (<1)	1 (<1)
<b>Sex</b>			
Female	17 (35)	428 (47)	445 (49)
Male	32 (65)	484 (53)	516 (54)
<b>Cause of end stage kidney disease</b>			
Diabetes type 1	48 (98)	890 (98)	938 (98)
Diabetes type 2	1 (2)	1 (<1)	2 (<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)
No kidney disease <sup>1</sup>	0 (0)	18 (2)	18 (2)
Not reported	0 (0)	2 (<1)	2 (<1)
<b>Ethnicity<sup>2</sup></b>			
Indigenous Australian	0 (0)	2 (<1)	2 (<1)
Maori	0 (0)	8 (<1)	8 (<1)
Pacific islander	0 (0)	10 (1)	10 (1)
White	44 (90)	858 (94)	902 (94)
North Asian	1 (2)	3 (<1)	4 (<1)
South-East Asian	1 (2)	0 (0)	1 (<1)
Southern and Central Asian	2 (4)	17 (1)	19 (2)
North African and Middle Eastern	1 (2)	9 (1)	13 (1)
Other	0 (0)	1 (<1)	1 (<1)
Not reported	0 (0)	1 (<1)	1 (<1)
<b>Blood group</b>			
O	18 (37)	425 (47)	443 (46)
A	22 (45)	360 (39)	382 (40)
B	6 (12)	84 (9)	90 (9)
AB	3 (6)	42 (5)	45 (5)
Not reported	0 (0)	1 (<1)	1 (<1)
<b>Total</b>	<b>49</b>	<b>912</b>	<b>961</b>

<sup>1</sup> Includes 23 pancreas transplants after kidney (PAK) and 10 pancreas transplants alone (PTA).

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

The type of pancreas transplants and the types of donors for transplants performed in 2020 is presented in Table 2.4, stratified by country and sex.

**Table 2.4: Transplant and donor types in 2020 by country and sex<sup>1</sup>**

	Australia		New Zealand		Overall		Total
	Female	Male	Female	Male	Female	Male	
<b>Pancreas alone</b>	0	1	0	0	0	1	1
<i>DBD</i>	0	1	0	0	0	1	1
<i>DCD</i>	0	0	0	0	0	0	0
<i>Living donor</i>	0	0	0	0	0	0	0
<b>SPK</b>	15	27	1	1	16	28	48
<i>DBD</i>	14	24	1	1	15	25	41
<i>DCD</i>	1	2	0	0	1	2	3
<i>Living donor</i>	0	1	0	0	0	1	1
<i>Not reported</i>	0	0	0	0	0	0	3

DBD, donor after brain death; DCD, donor after circulatory death; SPK, simultaneous pancreas-kidney

<sup>1</sup> There were 3 SPK transplants for which neither donor type nor sex were reported; in addition there was one SPK transplant from a donor after brain death for which sex was not reported.

## Balance of donor and recipient characteristics in 2020

Cross tabulations of donor and recipient blood group and gender for people transplanted in 2020 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 2020**

Recipient blood group	Donor blood group <sup>2</sup> , n (row %)					Total
	O	A	B	AB	Not reported	
O	18 (100)	0 (0)	0 (0)	0 (0)	0 (0)	18
A	0 (0)	22 (100)	0 (0)	0 (0)	0 (0)	22
B	1 (17)	0 (0)	5 (83)	0 (0)	0 (0)	6
AB	0 (0)	0 (0)	0 (0)	2 (67)	1 (33)	3
<b>Total</b>	19 (39)	22 (45)	5 (10)	2 (4)	1 (2)	49

<sup>1</sup> Donor blood group not reported for 3 transplants.

**Table 2.6: Cross tabulation of recipient and donor sex for 2020**

Recipient sex	Donor sex <sup>1</sup> , n (row %)			Total
	<i>Female</i>	<i>Male</i>	<i>Not reported</i>	
Female	6 (35)	10 (59)	1 (6)	17
Male	10 (31)	19 (59)	3 (9)	32
<b>Total</b>	16 (33)	29 (59)	4 (8)	49

McNemar's test for difference p=1.0

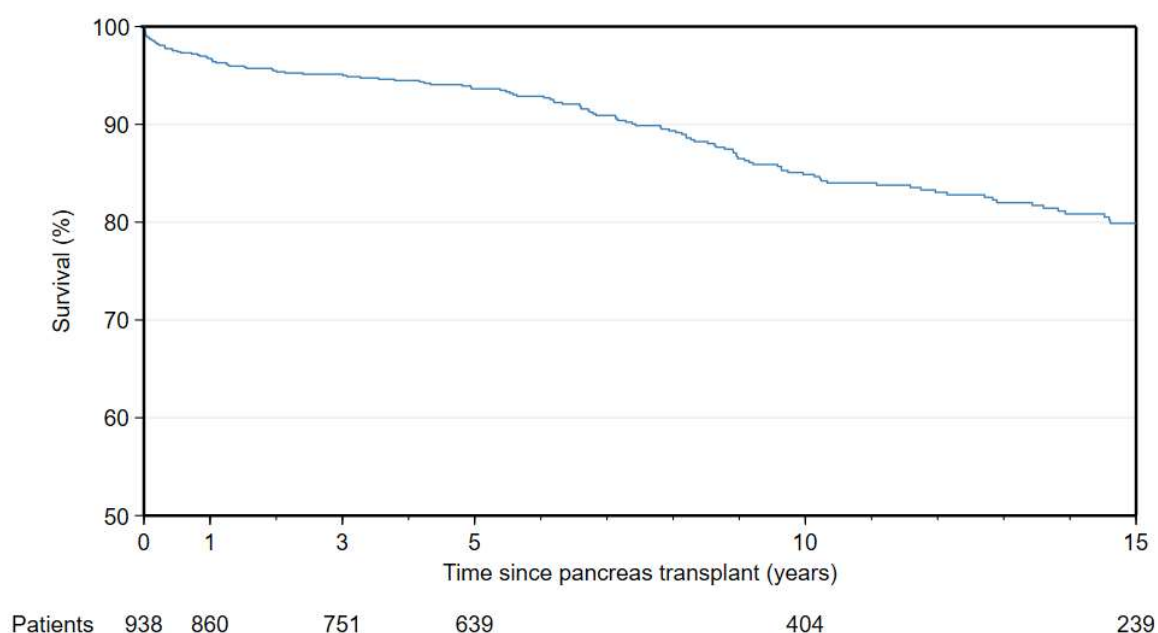
<sup>1</sup> Donor sex not reported for 4 transplants.

## 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 938 patients, 22 of whom have received a second pancreas transplant and 1 of whom has received a third pancreas transplant, for a total of 961 pancreas transplants. Note that for 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 9336 years of follow-up, and 151 people died in that time. Survival at 1 year was 96.8%, at 5 years 93.6%, at 10 years 84.9% and at 15 years 80.0%.

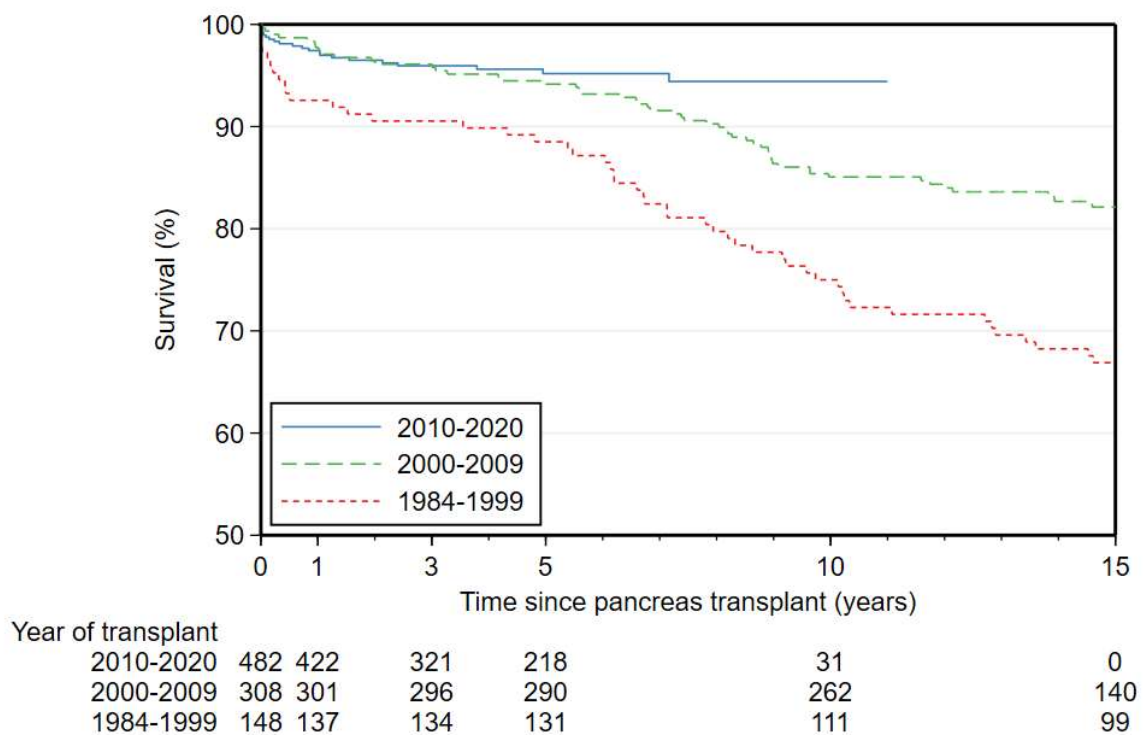
**Figure 2.3: Patient survival following pancreas transplantation in Australia and New Zealand.**





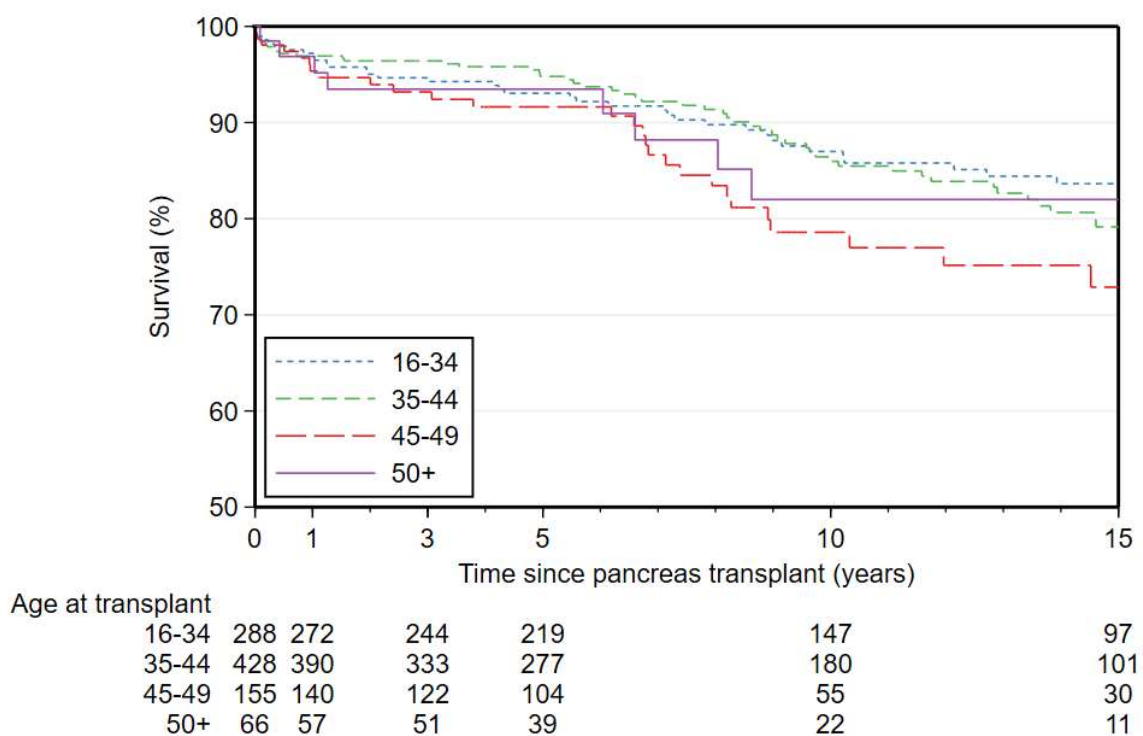
Patient survival by era of transplantation is shown in Figure 2.4. Survival has improved over time ( $p < 0.001$ ). Survival at 1 year for people transplanted before 2000 was 92.6%; in recent years this has risen to 97.4%. Survival at 5 years was 88.5% for those transplanted before 2000, where for those transplanted in 2010 or later, 5-year survival was 95.2%.

**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 ( $p=0.06$ ). Survival at 1 year for recipients aged <35 years was 97.2%, and for those aged 35-44 was 96.9%, whereas for those aged 45-49 was 95.4% and for those 50 or older was 96.9%. Survival at 5 years for those aged <35 years was 93.1%, and for those aged 35-44 was 94.8%, whereas for those aged 45-49 was 91.6% and for those 50 or older was 93.5%. The greater survival for the 50 years and older group may be because these recipients are a more highly selected population.

**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 at death with a functioning transplant. For pancreas transplant survival we included all pancreas transplants undertaken, including those who had received a pancreas transplant twice (23 patients). At the time of this report, we had survival records for 961 pancreas transplants.

Figure 2.6 shows pancreas transplant survival censored at death. Over 8011 years of follow-up, there were 152 pancreas transplant failures (excluding people who died with a functioning transplant). Overall, 1-year pancreas transplant survival was 91.1%, 5-year survival 86.4%, and 10-year survival 83.1%.

**Figure 2.6: Pancreas transplant survival (censored at death)**

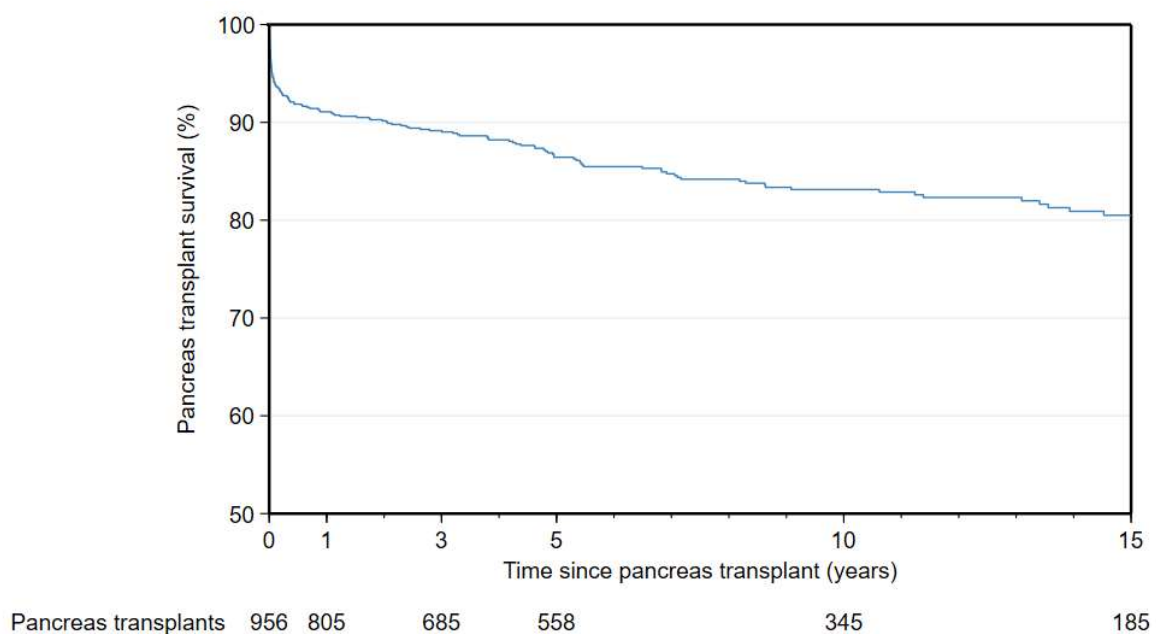
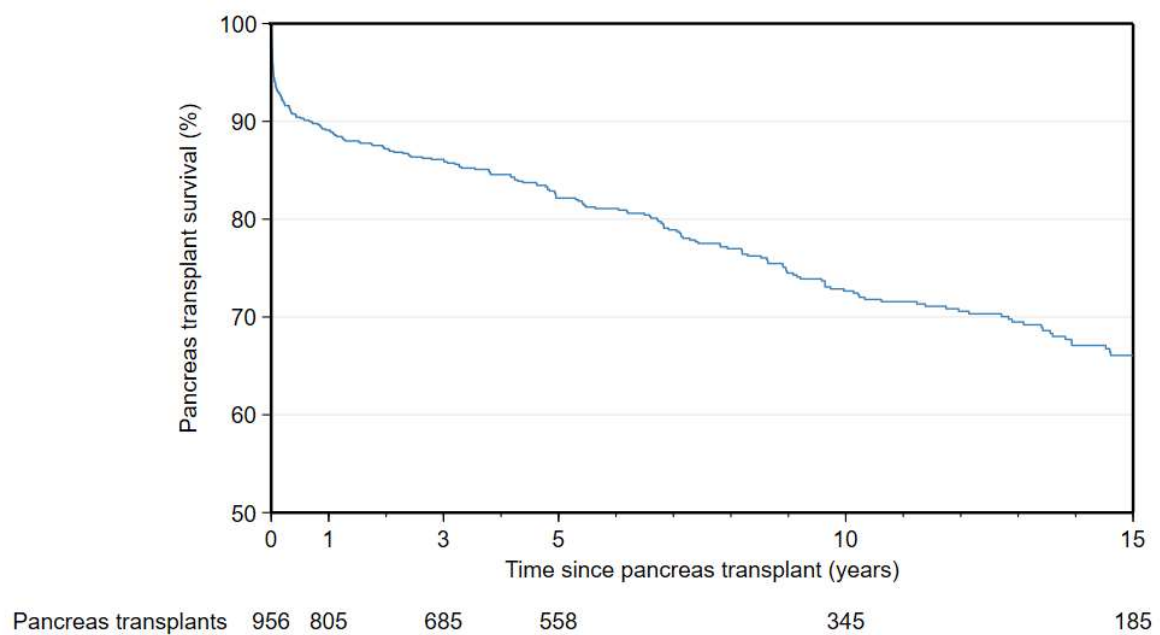


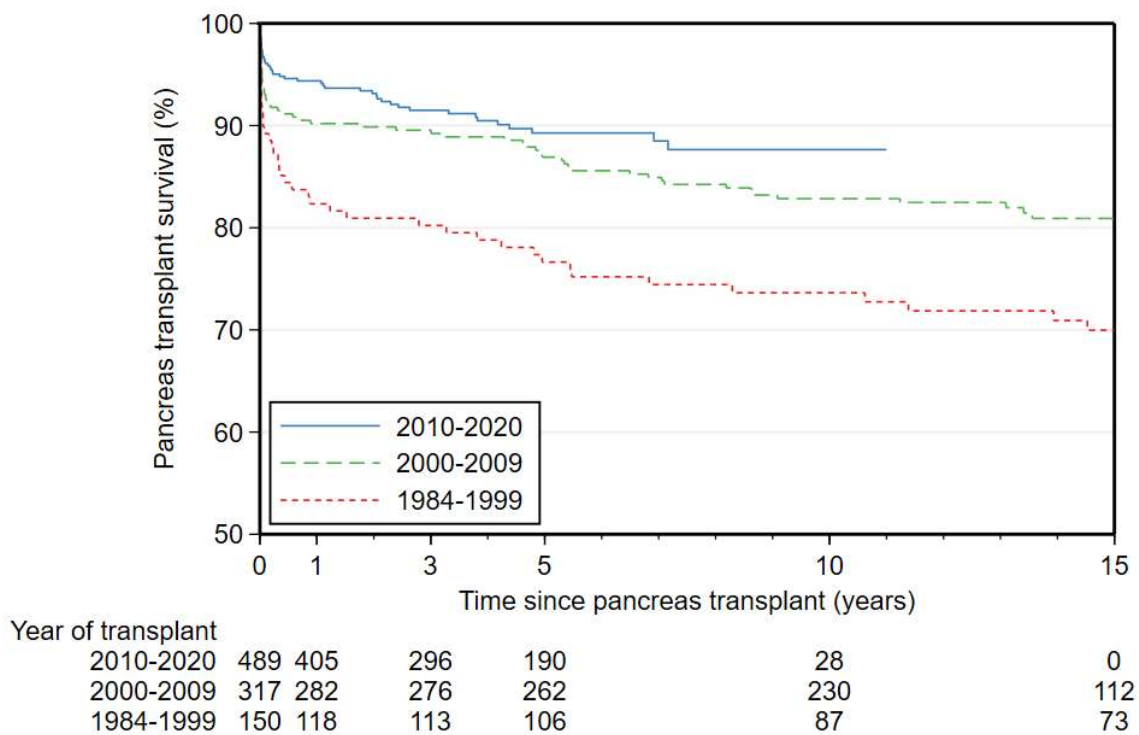
Figure 2.7 shows pancreas transplant survival including death with a functioning pancreas. Over the same observation time there were 264 recipients who either died or experienced pancreas transplant failure. Survival at 1, 5 and 10 years was 89.1%, 82.2% and 72.7% respectively.

**Figure 2.7: Pancreas transplant survival (including death as transplant failure)**



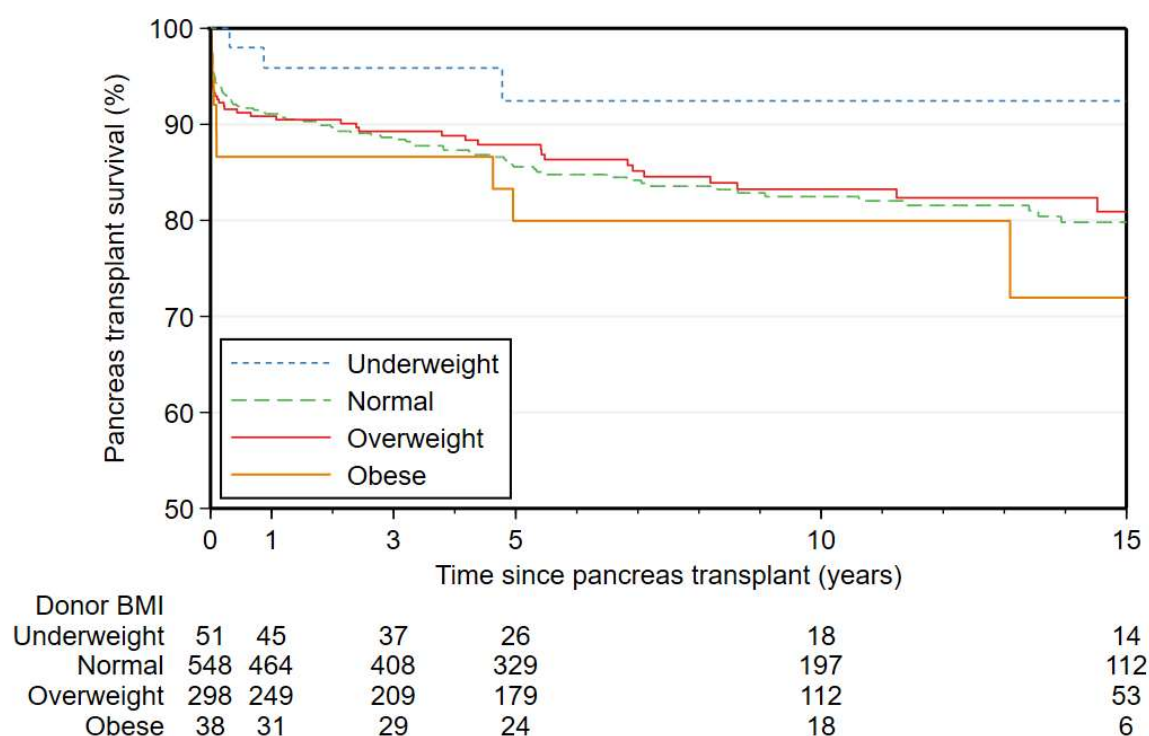
Survival of pancreas transplants has changed over time, as shown in Figure 2.8. Survival improved markedly over time ( $p=0.004$ ). For those transplanted prior to 2000, 1-year pancreas transplant survival was 82.3%, and 5-year survival 76.6%. For those transplanted in 2010 or later, 1-year survival was 94.4% and 5-year survival 89.3%.

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



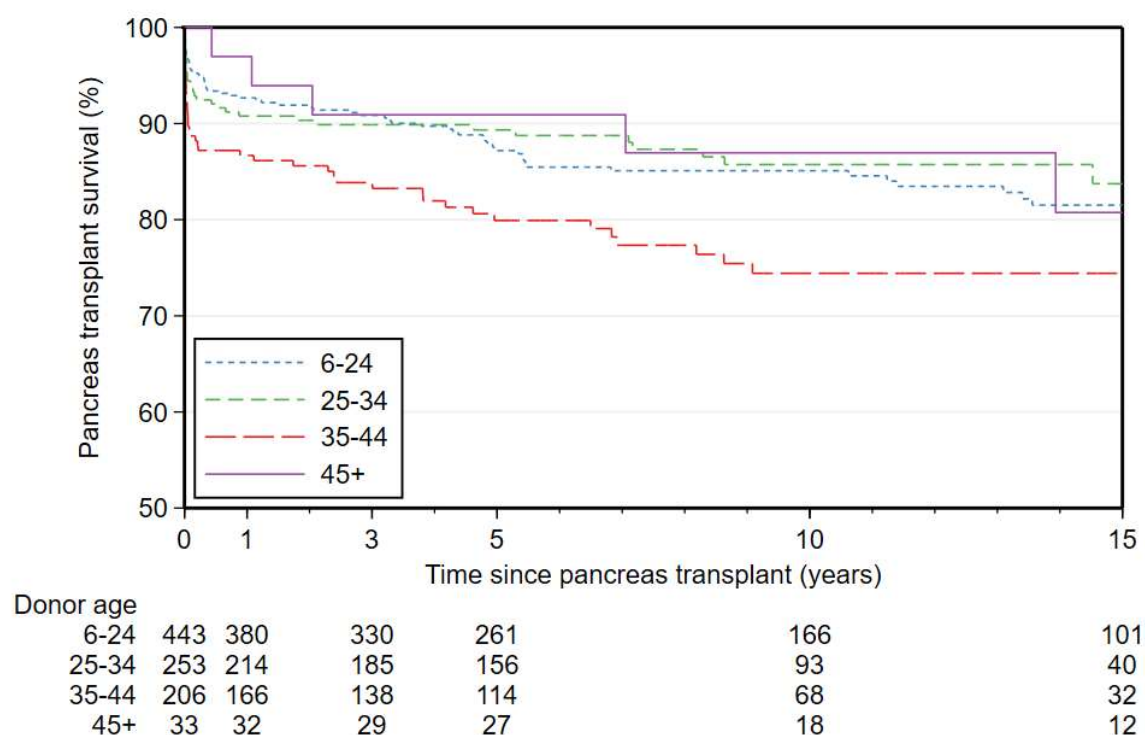
Pancreas transplant survival by donor BMI is presented in Figure 2.9. Most donors (59%) were normal weight (BMI 18.5-25). However, 5% were underweight (BMI <18.5), 31% were overweight (BMI 25-29) and 5% were obese (BMI 30+). While Figure 2.9 suggests separation of survival curves, there was no statistical association between donor BMI and pancreas survival ( $p=0.4$ ). Pancreas transplant survival at 1 year was 91.1% for transplants where the donor was normal weight normal BMI, 95.9% for transplants where the donor was underweight, 90.1% for transplants where the donor was overweight, and 86.6% where the donor was obese.

**Figure 2.9: Pancreas transplant survival by donor BMI (censored at death)**



Pancreas transplant survival by donor age is presented in Figure 2.10. The survival curves are poorer for donors aged 35-44 compared with those 45 and older, or younger donors ( $p=0.03$ ). 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. Pancreas transplant survival at 1 year was 92.7% for transplants from donors aged 6-24 years, 90.8% for donors aged 25-34 years, 86.7% for donors aged 35-44 years, and 97.0% for donors aged 45+ years.

**Figure 2.10: Pancreas transplant survival by donor age (censored at death)**



Pancreas transplant survival at 1 year and 5 years post-transplant, censored at death and stratified by country and era of transplantation is presented in Table 2.7.

**Table 2.7: Pancreas transplant survival censored at death, by country and era**

Year of transplant	Australia					New Zealand				
	N	1-year		5-year		N	1-year		5-year	
		n	%	n	%		n	%	n	%
2011-2016	240	216	91.98%	152	86.66%	15	14	93.33%	9	86.67%
2012-2017	263	237	93.03%	131	87.86%	16	15	93.75%	6	87.50%
2013-2018	276	251	94.11%	103	90.09%	20	19	95.00%	4	88.67%
2014-2019	282	259	94.96%	77	92.16%	23	22	95.65%	3	88.82%
2015-2020	286	223	96.35%	44	93.90%	23	21	100.00%	2	92.31%

## 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 31<sup>st</sup> December each year for the last five years (Table 2.8). The below numbers exclude people still alive, but whose pancreas transplant has failed. The number of functioning transplants is increasing over time, possibly because of increased survival of pancreas transplants while the number of new transplants performed remains relatively steady over time.

Table 2.8: People alive with a functioning pancreas transplant in Australia and New Zealand by year and residence, at year's end

State/country of residence	2016	2017	2018	2019	2020
New South Wales	130	140	153	167	183
Victoria	154	167	184	191	205
Queensland	102	109	116	126	137
Western Australia	29	28	30	32	35
South Australia	37	40	47	50	53
Tasmania	24	25	27	29	29
Australian Capital Territory	14	15	15	15	15
Northern Territory	4	4	4	4	4
New Zealand	35	38	44	48	48
<b>Total</b>	<b>529</b>	<b>566</b>	<b>620</b>	<b>662</b>	<b>709</b>



## 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 at death with a functioning graft. For kidney transplant survival we included only SPK transplants and excluded PAK transplant recipients. We had survival records for 877 SPK transplants.

Figure 2.11 shows kidney survival censored at death. Over 7,729 years of observation, there were 88 kidney transplant failures (excluding people who died with a functioning kidney transplant). Overall, 1-year kidney transplant survival was 97.2%, 5-year survival 94.5%, and 10-year survival 90.0%.

**Figure 2.11: Kidney transplant survival for people receiving SPK transplants (censored at death)**

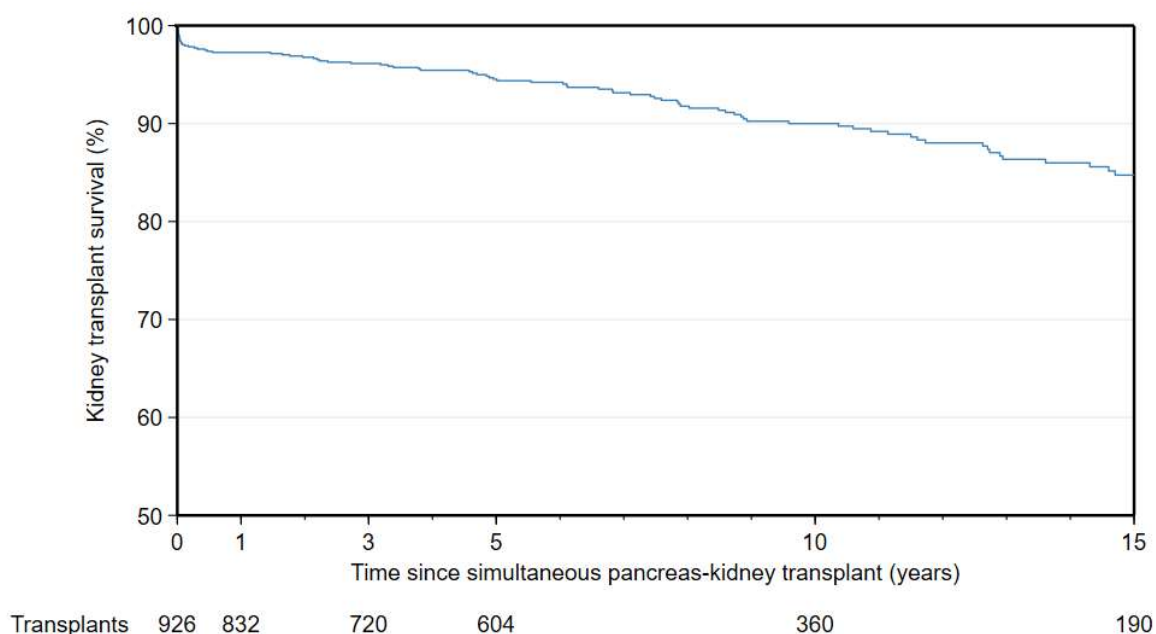
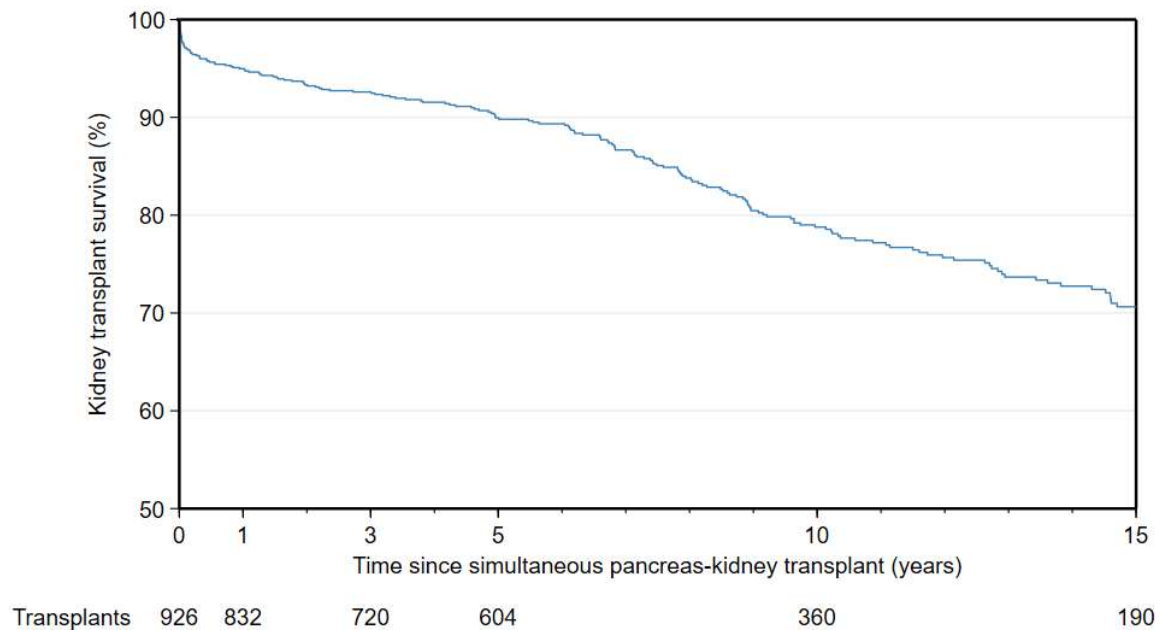


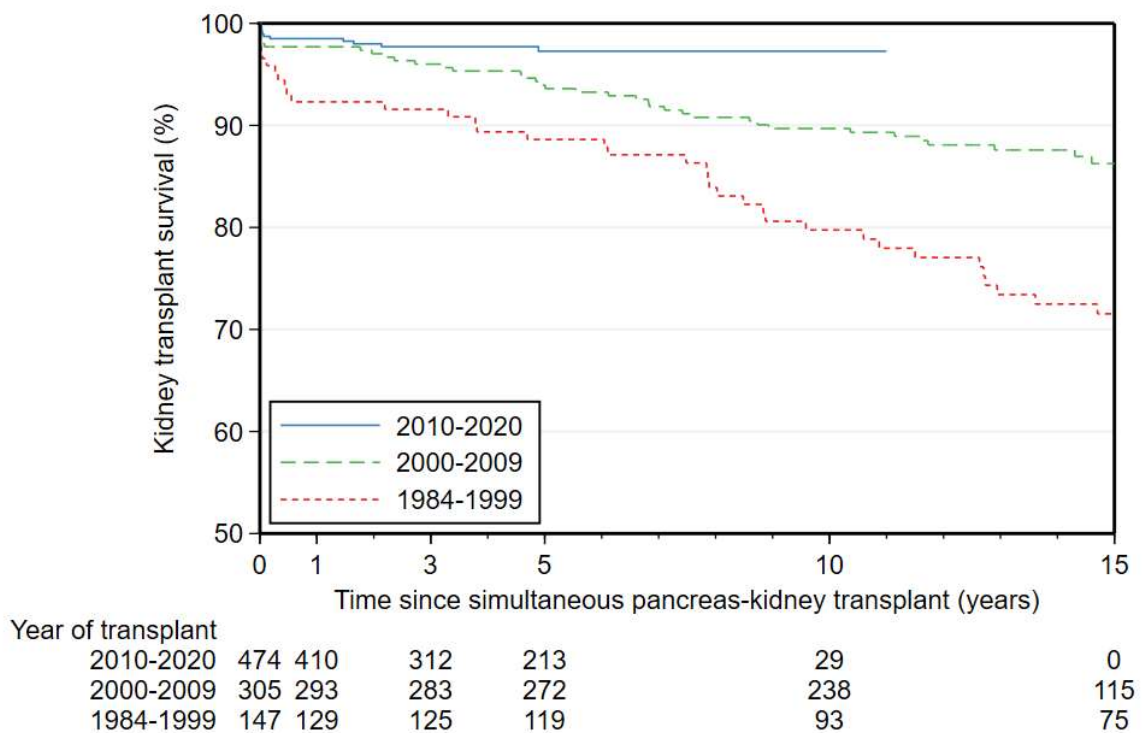
Figure 2.12 shows kidney survival including death with a functioning kidney. Over the same observation time there were 196 recipients who either died with kidney transplant function or experienced kidney transplant failure. Kidney transplant survival at 1, 5 and 10 years was 95.0%, 90.0% and 78.8% respectively.

**Figure 2.12: Kidney transplant survival for people receiving SPK transplants (including death as a kidney transplant failure)**



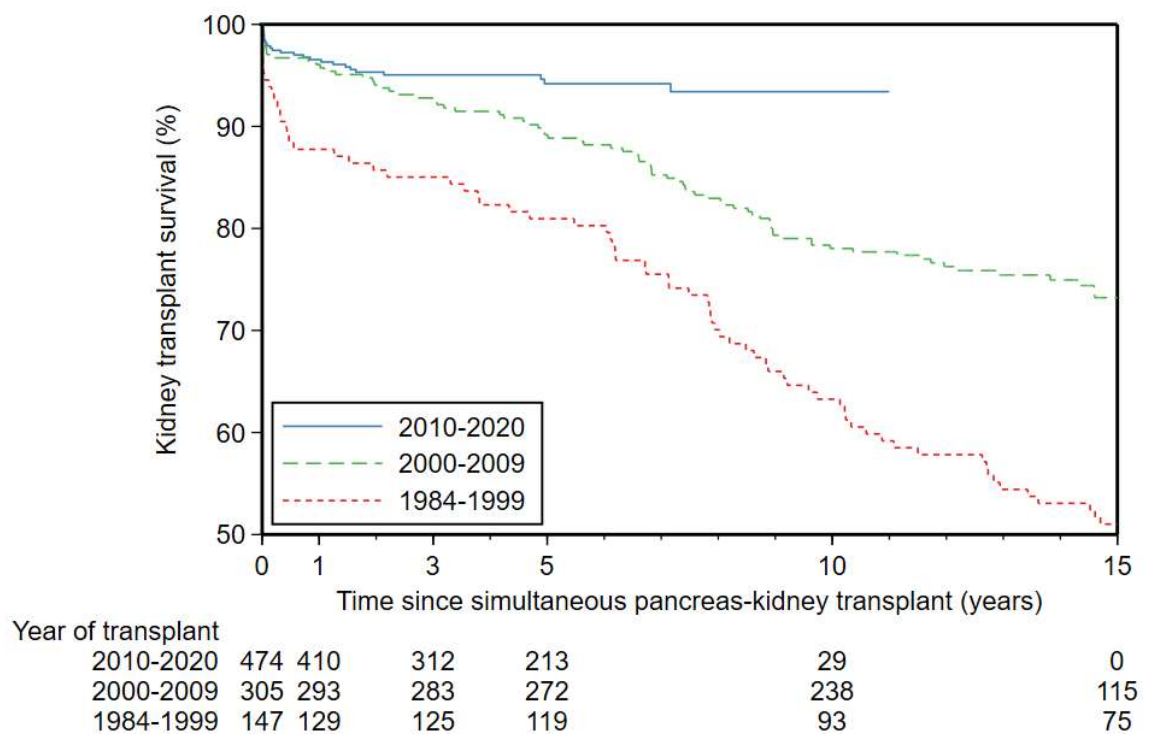
Kidney transplant survival improved over time, with longer survival for those transplanted in more recent years ( $p < 0.001$ ). For those transplanted before 2000, kidney transplant survival was 92.3% at 1 year and 88.6% at 5 years but was 98.5% at 1 year and 97.3% at 5 years for those transplanted in 2010 or later (Figure 2.13).

**Figure 2.13: Kidney transplant survival for SPK recipients over time (censored at death)**



The era effect was even stronger when considering kidney failure including death with kidney function ( $p < 0.001$ ). For those transplanted before 2000, survival was 87.8% at 1 year and 81.0% at 5 years but was 96.6% at 1 year and 94.2% at 5 years for those transplanted in 2010 or later (Figure 2.14).

**Figure 2.14: Kidney transplant survival for SPK recipients over time (including death as a kidney transplant failure)**



## Pancreas transplant operative data

Characteristics of the pancreas transplant operations for 2019, previous years, and overall are shown in Table 2.9 below.

**Table 2.9: Descriptive characteristics of pancreas transplant operations**

	2020	1984-2019	Total
<b>Pancreas transplant</b>			
Total pancreas transplants	49	912	961
Cold ischaemic time (hours)			
Patients (%)	36 (73)	728 (80)	764 (80)
Mean (SD)	8.3 (2.8)	11.2 (19.2)	11.1 (18.8)
Median (IQR)	8 (6, 10.8)	10.6 (8, 12.8)	10.5 (7.9, 12.7)
Anastomosis time (minutes)			
Patients (%)	17 (35)	696 (76)	713 (74)
Mean (SD)	20.1 (6.3)	29.6 (8.1)	29.4 (8.2)
Median (IQR)	19 (17, 24)	30 (25, 34)	30 (25, 34)
Exocrine drainage			
Enteric, n (%)	46 (94)	675 (74)	721 (75)
Bladder, n (%)	0 (0)	164 (18)	164 (17)
Not reported, n (%)	3 (6)	73 (8)	76 (8)
<b>Kidney transplant</b>			
Total SPK transplants	48	878	926
Cold ischaemic time (hours)			
Patients (%)	35 (71)	700 (77)	735 (76)
Mean (SD)	8.4 (2.8)	11.2 (19.6)	11.1 (19.1)
Median (IQR)	8 (6, 11)	10.7 (8, 12.8)	10.5 (7.9, 12.6)
Anastomosis time (minutes)			
Patients (%)	7 (14)	668 (73)	685 (71)
Mean (SD)	20.1 (6.3)	29.7 (8.0)	29.5 (8.0)
Median (IQR)	19 (17, 24)	30 (25, 34)	30 (25, 34)
Kidney donor arteries			
None, n (%)	0 (0)	2 (<1)	2 (<1)
One, n (%)	29 (59)	637 (70)	666 (69)
Two, n (%)	4 (8)	69 (8)	73 (8)
Three, n (%)	0 (0)	4 (<1)	4 (<1)
Not reported, n (%)	15 (31)	166 (18)	181 (19)

SPK, simultaneous pancreas-kidney

To investigate how much the total cold ischaemic time varied dependant on the donor state, and distance travelled to the transplanting centre, Table 2.10 displays a cross tabulation of donor state of origin with transplanting centre.

**Table 2.10: Comparison of cold ischaemic time of pancreas transplants by donor state, for Australian pancreas transplants 2020**

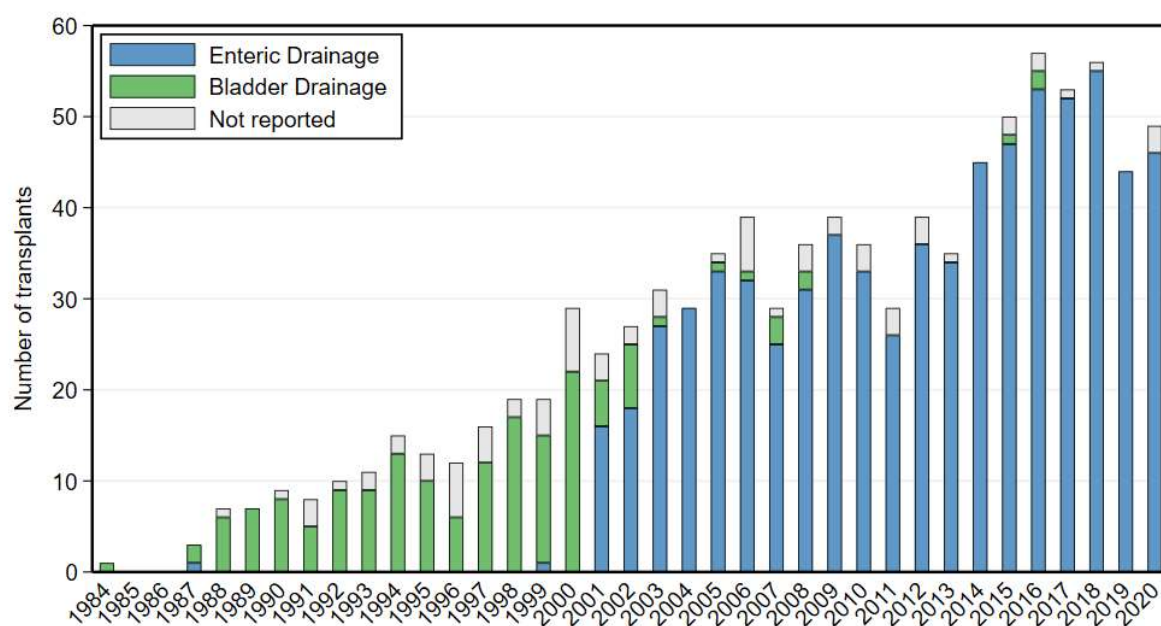
Donor state	Cold ischaemic time in hours					
	Westmead (NSW)		Monash (VIC)		Royal Adelaide (SA)	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
New South Wales	15	6.1 (1.3)	0	-	0	-
Victoria	1	9 (-)	2	7 (2.8)	0	-
Queensland	8	10 (1.6)	0	-	0	-
Western Australia	5	11.8 (1.3)	0	-	0	-
South Australia	0	-	1	8 (-)	1	6 (-)
Tasmania	1	7 (-)	1	10.5 (-)	0	-
Australian Capital Territory	1	15 (-)	0	-	0	-
Northern Territory	0	-	0	-	0	-
<b>Total</b>	<b>31</b>	<b>8.4 (2.9)</b>	<b>4</b>	<b>8.1 (2.3)</b>	<b>1</b>	<b>6 (-)</b>

Note: There is a lot of missing data for cold ischaemic times, hence data in this table may not be representative of all pancreas transplants

## Surgical technique

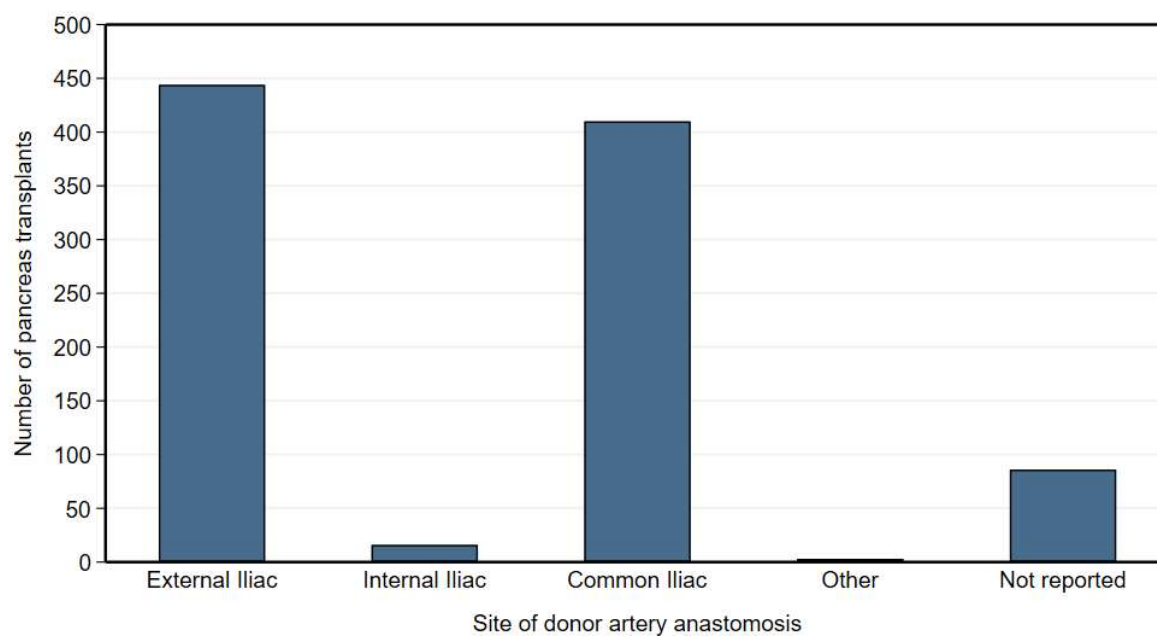
Exocrine drainage of the pancreas transplant has changed over time. Enteric drainage of the pancreas was first used in Australia and New Zealand during 2001. Figure 2.15 illustrates the number of transplants by pancreas duct management. Since 2001, most pancreas transplants have used enteric drainage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

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

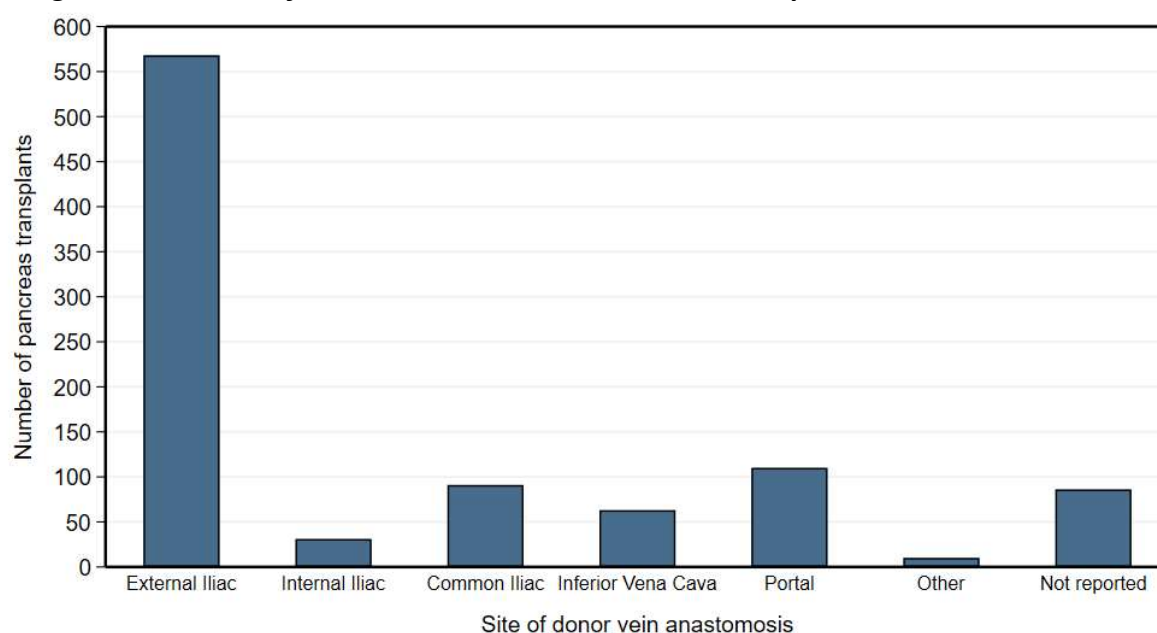


The site of donor vessel anastomoses onto the recipient vessels is dependent on many things, including but not limited to surgeon's preference, surgical ease of access, length and relative calibre of donor vessels. The sites of anastomosis for donor arteries and veins are displayed in Figure 2.16 and 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 2.11, and the cytomegalovirus (CMV) and Epstein-Barr virus (EBV) matching is illustrated in Table 2.12.

**Table 2.11: Immunological cross-matching of donor recipient pairs**

	Donor-recipient pairs, n (column %)	
	<i>Current</i>	<i>Peak</i>
<b>Crossmatch</b>		
T-cell Positive	0 (0)	2 (<1)
B-cell Positive	3 (<1)	4 (<1)
T and B cell Negative	748 (78)	730 (76)
DTT Negative	1 (<1)	1 (<1)
Not reported	209 (22)	224 (23)
<b>Panel Reactive Antibodies (%)</b>		
0-49	135 (14)	132 (14)
50+	1 (<1)	9 (<1)
Not reported	825 (86)	820 (85)

**Table 2.12: Infectious disease serology cross-tabulation of donor-recipient pairs**

Recipient serology	Donor serology, n (column %)		
	<i>Positive</i>	<i>Negative</i>	<i>Not reported</i>
<b>Cytomegalovirus (CMV)</b>			
Positive	103 (19)	47 (14)	7 (9)
Negative	20 (4)	10 (3)	2 (3)
Not reported	430 (78)	272 (83)	70 (89)
<b>Epstein-Barr virus (EBV)</b>			
Positive	127 (23)	19 (23)	37 (11)
Negative	3 (<1)	0 (0)	3 (<1)
Not reported	411 (76)	65 (77)	296 (89)



## Chapter 3: Pancreas donors

*Authors: Angela Webster, Paul Robertson, Tia Mark, Helen Pilmore, Danielle Stephenson, James Hedley, Patrick Kelly*

This chapter gives an overview of donors in 2019 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.

## Pancreas donor characteristics

**Table 3.1: Demographics and characteristics of pancreas transplant donors**

	Donors, n (column %)		
	2020	1984-2019	Total
<b>Total (row %)</b>	49 (100)	912 (100)	961 (100)
<b>Age category</b>			
0-24	20 (41)	425 (47)	445 (46)
25-34	15 (31)	241 (26)	256 (27)
35-44	7 (14)	199 (22)	206 (21)
45+	0 (0)	33 (4)	33 (3)
Not reported	7 (14)	14 (2)	21 (2)
<b>Sex</b>			
Female	16 (33)	517 (57)	533 (55)
Male	29 (59)	384 (42)	413 (43)
Not reported	4 (8)	11 (1)	15 (2)
<b>BMI (kg/m2)</b>			
Underweight/Normal (<24.9)	29 (59)	575 (63)	604 (63)
Overweight (25-29.9)	15 (31)	283 (31)	298 (31)
Obese (30+)	2 (4)	36 (4)	38 (4)
Not reported	3 (6)	18 (2)	21 (2)
<b>Donor type</b>			
Brain death (DBD)	42 (86)	893 (98)	935 (97)
Circulatory death (DCD)	3 (6)	18 (2)	21 (2)
Not reported	4 (8)	1 (<1)	5 (<1)
<b>Donor mode of death</b>			
Cerebral hypoxia/ischaemia	18 (37)	115 (13)	133 (14)
Cerebral infarct	1 (2)	17 (2)	18 (2)
Intracranial haemorrhage	10 (20)	239 (26)	249 (26)
Non-neurological condition	1 (2)	194 (21)	195 (20)
Other neurological condition	0 (0)	20 (2)	20 (2)
Traumatic brain injury	16 (33)	313 (34)	329 (34)
Not reported	3 (6)	14 (2)	17 (1)
<b>Alcohol consumption</b>			
Never	27 (55)	670 (73)	697 (73)
Former	0 (0)	7 (<1)	7 (<1)
Current	10 (20)	60 (7)	70 (7)
Not reported	12 (24)	175 (19)	187 (19)
<b>Smoking history</b>			
Never	21 (43)	534 (59)	555 (58)
Former	2 (4)	37 (4)	39 (4)
Current	14 (29)	222 (24)	236 (25)
Not reported	12 (24)	119 (13)	131 (14)

<b>Donor's blood group</b>			
O	17 (35)	461 (51)	478 (50)
A	22 (45)	338 (37)	360 (37)
B	5 (10)	87 (10)	92 (10)
AB	2 (4)	21 (2)	23 (2)
Not reported	3 (6)	5 (<1)	8 (<1)
<b>Kidney biopsy</b>			
Performed	12 (24)	202 (22)	214 (22)
Not performed	20 (41)	679 (74)	699 (73)
Not reported	17 (35)	31 (3)	48 (5)
<b>Cytomegalovirus (CMV)</b>			
Positive	15 (31)	538 (59)	553 (58)
Negative	4 (8)	325 (36)	329 (34)
Not reported	30 (61)	49 (5)	79 (8)
<b>Epstein-Barr virus (EBV)</b>			
Positive	9 (18)	532 (58)	541 (56)
Negative	1 (2)	83 (9)	84 (9)
Not reported	39 (80)	293 (33)	336 (335)

DBD, donor after brain death; DCD, donor after circulatory death

The distribution of donor states of origin by transplanting unit for Australian pancreas donors is shown in Table 3.2.

**Table 3.2: Distribution of state of residence of pancreas donors in Australia over time, by national pancreas transplant unit**

State	Donors, n (column %)					
	2020	2019	2018	2017	2016	2015
<b>Westmead (NSW)</b>						
NSW	15 (48)	14 (52)	13 (50)	14 (47)	10 (34)	15 (54)
VIC	1 (3)	3 (11)	1 (4)	0 (0)	1 (3)	1 (4)
QLD	8 (26)	4 (15)	7 (27)	4 (13)	10 (34)	4 (14)
WA	5 (16)	4 (15)	2 (8)	7 (23)	5 (17)	4 (14)
SA	0 (0)	1 (4)	0 (0)	1 (3)	0 (0)	3 (11)
TAS	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
ACT	1 (3)	1 (4)	3 (12)	3 (10)	3 (10)	1 (4)
NT	0 (0)	0 (0)	0 (0)	1 (3)	0 (0)	0 (0)
<b>Monash (VIC)</b>						
NSW	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)	0 (0)
VIC	5 (36)	9 (90)	17 (85)	16 (89)	16 (67)	16 (84)
QLD	1 (7)	0 (0)	0 (0)	1 (6)	0 (0)	0 (0)
WA	0 (0)	0 (0)	1 (5)	1 (6)	3 (13)	0 (0)
SA	1 (7)	1 (10)	1 (5)	0 (0)	2 (8)	3 (16)
TAS	2 (14)	0 (0)	0 (0)	0 (0)	1 (4)	0 (0)
ACT	0 (0)	0 (0)	0 (0)	0 (0)	1 (4)	0 (0)
NT	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Not reported	5 (36)	0 (0)	0 (0)	0 (0)	1 (4)	0 (0)

State	Donors, n (column %)					
	2020	2019	2018	2017	2016	2015
<b>Royal Adelaide (SA)</b>						
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 -
WA	0 (0)	0 (0)	0 (0)	0 -	0 -	0 -
SA	2 (100)	2 (67)	3 (75)	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)	1 (33)	1 (25)	0 -	0 -	0 -

## Donor and recipient state/territory

Table 3.3 shows 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 2020, and from inception of the pancreas program. Note, these tables include Australian donors and recipients only.

**Table 3.3: Number of pancreas transplants by donor and recipient state of residence in Australia for 2020 and all years**

Recipient state	Donor state (number of transplants)									Total
	NSW	VIC	QLD	WA	SA	TAS	ACT	NT	Not reported	
<b>2020 only</b>	15	6	9	5	3	3	1	0	5	47
NSW	10	1	2	2	0	1	0	0	0	16
VIC	0	5	2	0	0	2	0	0	4	13
QLD	5	0	4	1	0	0	1	0	0	11
WA	0	0	1	2	0	0	0	0	0	3
SA	0	0	0	0	3	0	0	0	0	3
TAS	0	0	0	0	0	0	0	0	1	1
ACT	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0
<b>All years (1984-2020)</b>	333	255	86	63	77	26	39	3	9	891
NSW	161	12	30	21	22	5	18	0	0	269
VIC	22	196	3	5	7	18	2	0	8	261
QLD	79	9	33	17	23	0	12	1	0	174
WA	21	5	13	12	5	1	2	0	0	59
SA	17	20	3	5	16	1	5	2	0	69
TAS	16	12	1	0	1	1	0	0	1	32
ACT	16	1	3	1	2	0	0	0	0	23
NT	1	0	0	2	1	0	0	0	0	4

## Chapter 4: Islet cell transplants

*Authors: Patricia Anderson, Natasha Rogers, Henry Pleass, James Hedley, Angela Webster, on behalf of the Australian Islet Consortium*

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 <9ml. Islet transplant recipients generally 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 two islet isolation facilities in Australia; St Vincent's Hospital Melbourne in Victoria, and Westmead hospital in New South Wales. There are three active islet transplant centres; the National Pancreas Transplant Unit at Westmead Hospital, St Vincent's Hospital Melbourne, and the Royal Adelaide Hospital. There is no islet transplant program in New Zealand. This chapter contains information about allogenic islet transplants (i.e. islets from a deceased donor), whereas Chapter 5 contains information about autologous islet transplants (i.e. islets isolated from the recipient's own pancreas).

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 to be used for an islet transplantation, and not islet isolation procedures that were undertaken only for research purposes. Some donor isolations intended for transplantation did not proceed to transplantation, generally because the pancreas processing failed set release criteria, with the major reason being insufficient concentration of islet cells.

The islet program waiting list is intentionally not long. Table 4.1 shows the number of patients referred for their first islet transplant in 2020 by state of residence and the transplant centre they were referred to. Table 4.2 shows the number of patients accepted onto an islet waiting list during 2019, while Table 4.3 shows the islet waiting list activity over time.

**Table 4.1: Initial referrals for allogenic islet transplant during 2020 by state of residence and transplant centre**

State of residence	Westmead	St. Vincent's	Royal Adelaide	Total
New South Wales	10	0	0	10
Victoria	0	4	0	4
Queensland	0	0	0	1
Western Australia	1	0	0	1
South Australia	0	0	0	0
Tasmania	0	0	0	0
Australian Capital Territory	0	0	0	0
Northern Territory	0	0	0	0

\*Excludes one referral for a patient living in NZ for Westmead Hospital

**Table 4.2: Patients accepted for their first allogenic islet transplant during 2020 (03/06) by state of residence and transplant centre**

State of residence	Westmead	St. Vincent's	Royal Adelaide	Total
New South Wales	3	-	1	4
Victoria	0	-	0	0
Queensland	0	-	0	0
Western Australia	0	-	0	0
South Australia	0	-	0	0
Tasmania	0	-	0	0
Australian Capital Territory	0	-	0	0
Northern Territory	0	-	0	0

**Table 4.3: Islet waiting list status over time; Westmead Hospital (NSW), St Vincent's Hospital (VIC), and Royal Adelaide Hospital (SA)**

	Patients (n)				
	2020	2019	2018	2017	2016
<b>Waiting list activity</b>					
Active list at beginning of year	10	11	17	11	11
Added to active list during the year	4	8	9	12	4
<i>First transplant</i>	4	5	7	7	4
<i>Second transplant</i>	0	3	2	4	1
<i>Third transplant</i>	0	1	2	2	0
Removed from active list during year	1	0	3	1	1
<i>First transplant</i>	0	0	0	1	0
<i>Second transplant</i>	0	0	2	0	2
<i>Third transplant</i>	1	0	0	0	0
<i>Fourth transplant</i>	0	0	1	0	0
Death while active on list	0	0	0	0	0
Death within 12 months of removal from list	0	0	0	0	0
Active waiting list at the end of year	11	10	11	17	9
<b>Transplants to waiting list</b>					
Recipients	4	11	10	9	6
Transplants	4	15	14	11	7
<b>Under consideration but not active on list</b>	48	34	18	7	4
<b>Referred but declined for islet transplantation</b>	12	3	3	3	4

Note: Includes simultaneous islet kidney transplants. Some patients with multiple transplants in the same year were added and removed multiple times and this only considers net addition or removal.

Note 2: Some patients are occasionally referred to the solid pancreas transplantation program after being referred to the allograft islets program, or do not wish to proceed with an islet transplant for other reasons.

## Islet isolations

Sometimes when pancreas donations are processed for islet transplantation, the resulting islets do not meet transplant release criteria. The decision to proceed with transplantation is made once release testing is complete and the quality and quantity of islet cells is known. Islet isolation procedures follow good manufacturing procedure (GMP) guidelines as set out by the Australian Therapeutic Goods Administration (TGA). Isolations occur at one of two dedicated isolation facilities at Westmead (Sydney) and St. Vincent's Institute (SVI, Melbourne), both associated with their respective local hospitals Westmead and St. Vincent's Hospital. Occasionally preparations are sent between Melbourne and Sydney, however Royal Adelaide Hospital has no islet isolation facility and is dependent on islets from either Westmead or St. Vincent's Institute, with the latter being its main provider of islets. A summary of islet cell isolation activity by centre and year is presented in Table 4.4.



**Table 4.4: Summary of allogenic islet cell isolation activity, for all centres in Australia**

Activity	2020	2002-2019	Not recorded	Total
<b>Westmead (NSW)</b>				
Pancreata donations discarded before isolation	1	0	1	2
Islet isolations				
<i>Islet isolations used for transplant</i>	3	66	0	69
<i>Islet isolations discarded</i>	0	0	219	219
Islet recipients	3	32	0	35
<b>St. Vincent's (VIC)</b>				
Pancreata donations discarded before isolation	0	0	0	0
Islet isolations				
<i>Islet isolations used for transplant</i>	1	64	1	66
<i>Islet isolations discarded</i>	2	54	0	56
Islet recipients	1	33	0	33

Some recipients with multiple transplants have received islets from both Westmead and St. Vincent's.

***The donor characteristics of islet cell donor isolations are presented in***

Table 4.5 (Westmead Hospital), Table 4.6 (St. Vincent's Hospital), and Table 4.7 (Westmead and St Vincent's hospitals combined). Donor characteristics are influenced in part by the Australian donor pancreas allocation policy which allocates pancreata for both pancreatic islet isolation and for whole pancreas transplantation. This policy is available at <https://www.tsanz.com.au/organallocationguidelines/index.asp>

**Table 4.5: Donor characteristics from allogenic islet isolations performed in Westmead Hospital (NSW)**

	Donors (n)		
	2020	2002 – 2019	Total
<b>Total</b>	5	80	85
<b>Age</b>			
Mean (SD)	47.2 (9.6)	44.2 (11.1)	44.4 (11.0)
0-24	0	5	5
25-34	0	12	12
35-44	2	20	22
45+	3	42	45
Not reported	0	1	1
<b>Sex</b>			
Female	3	27	30
Male	2	49	51
Not reported	0	4	4
<b>BMI kg/m<sup>2</sup></b>			
Mean (SD)	31.7 (10.5)	33.2 (15.8)	33.1 (15.5)
Underweight (<18.5)	0	0	0
Normal weight (18.5-24)	1	13	14
Overweight (25-29)	1	26	27
Obese (30+)	3	40	43
Not reported	0	1	1
<b>State of residence</b>			
New South Wales	3	38	41
Victoria	0	15	15
Queensland	2	12	14
Western Australia	0	2	2
South Australia	0	9	9
Tasmania	0	5	5
Australian Capital Territory	0	1	1
Northern Territory	0	1	1
Not reported	0	2	2
<b>Donor type</b>			
Brain dead (DBD)	5	65	70
Circulatory death (DCD)	0	0	0
Not reported	0	0	0
<b>Donor mode of death</b>			
Cerebral hypoxia/ischaemia	1	8	9
Cerebral infarct	2	6	8
Intracranial haemorrhage	2	33	35
Non-neurological condition	0	7	7
Other neurological condition	0	0	0
Traumatic brain injury	0	15	15
Not reported	0	11	11
<b>Days ventilated prior to donation</b>			
Mean (SD)	3.6 (1.3)	3.1 (3.0)	3.1 (2.9)

	Donors (n)		
	2020	2002 – 2019	Total
<b>Alcohol consumption</b>			
Never	1	39	40
Former	0	1	1
Current	4	21	25
Not reported	0	19	19
<b>Smoking history</b>			
Never	3	39	42
Former	1	3	4
Current	1	21	22
Not reported	0	17	17
<b>Cultural and ethnic group</b>			
Indigenous Australian or Torres Strait Islander	0	0	0
Maori or Pacific Islander	0	2	2
White	4	68	72
North East Asian (Chinese)	0	0	0
South East Asian	0	1	1
South and Central Asian (Indian)	0	0	0
Middle Eastern or North African	1	0	1
Other	0	1	1
Not reported	0	8	8
<b>Blood group</b>			
O	4	38	42
A	0	31	31
B	1	7	8
AB	0	3	3
Not reported	0	1	1
<b>CMV serology</b>			
Negative	1	32	33
Positive	4	43	47
Not reported	0	5	5

**Table 4.6: Donor characteristics for allogenic islet isolations performed in St Vincent's Hospital (VIC)**

		Donors (n)	
		2020	2002 – 2019
Total		2	45
Age			
	Mean (SD)	52.5 (2.1)	49.0 (13.8)
	0-24		
	25-34		
	35-44		
	45+		
Sex			
	Female		
	Male		
BMI kg/m <sup>2</sup>			
	Mean (SD)		
	Underweight (<18.5)		
	Normal weight (18.5-24)		
	Overweight (25-29)		
	Obese (30+)		
State of residence			
	New South Wales		
	Victoria		
	Queensland		
	Western Australia		
	South Australia		
	Tasmania		
	Australian Capital Territory		
	Northern Territory		
	Not reported		
Donor type			
	Brain dead (DBD)		
	Circulatory death (DCD)		
Donor mode of death			
	Cerebral hypoxia/ischaemia		
	Cerebral infarct		
	Intracranial haemorrhage		
	Non-neurological condition		
	Other neurological condition		
	Traumatic brain injury		
	Not reported		
Days ventilated prior to donation			
	Mean (SD)		

	<b>Donors (n)</b>	
	<b>2020</b>	<b>2002 – 2019</b>
<b>Total</b>		
<b>Alcohol consumption</b>		
Never		
Former		
Current		
Not reported		
<b>Smoking history</b>		
Never		
Former		
Current		
Not reported		
<b>Cultural and ethnic group</b>		
Indigenous Australian or Torres Strait Islander		
Maori or Pacific Islander		
White		
North East Asian (Chinese)		
South East Asian		
South and Central Asian (Indian)		
Middle Eastern or North African		
Other		
Not reported		
<b>Blood group</b>		
O		
A		
B		
AB		
Not reported		
<b>CMV serology</b>		
Negative		
Positive		
Not reported		

**Table 4.7: Donor characteristics for allogenic islet isolations (all centres)**

	Donors (n)		
	2019	2002 - 2018	Total
<b>Total</b>	30	418	448
<b>Age</b>			
Mean (SD)	48.8 (11.3)	46.5 (12.9)	46.7 (12.8)
0-24	1	33	34
25-34	2	48	50
35-44	8	77	85
45+	19	259	278
Not reported	0	1	1
<b>Sex</b>			
Female	12	184	196
Male	11	153	164
<b>BMI kg/m<sup>2</sup></b>			
Mean (SD)	30.1 (3.9)	28.7 (6.4)	28.8 (6.3)
Underweight (<18.5)	3	54	57
Normal weight (18.5-24)	6	138	144
Overweight (25-29)	13	138	151
Obese (30+)	8	87	95
Not reported	3	14	17
<b>State of residence</b>			
New South Wales	7	122	129
Victoria	4	52	56
Queensland	7	75	82
Western Australia	1	44	45
South Australia	0	15	15
Tasmania	1	10	11
Australian Capital Territory	1	4	5
Northern Territory	0	0	0
Not reported	15	150	165
<b>Donor type</b>			
Brain dead (DBD)	13	242	255
Circulatory death (DCD)	5	40	45
Not reported	6	11	17
<b>Donor mode of death</b>			
Cerebral hypoxia/ischaemia	2	33	35
Cerebral infarct	0	22	22
Intracranial haemorrhage	13	135	148
Non-neurological condition	0	52	52
Other neurological condition	0	3	3
Traumatic brain injury	4	23	27
Not reported	0	40	40
<b>Days ventilated prior to donation</b>			
Mean (SD)	3.5 (2.3)	2.9 (2.3)	2.9 (2.3)

<b>Alcohol consumption</b>			
Never	5	54	59
Former	0	2	2
Current	13	182	195
Not reported	4	127	131
<b>Smoking history</b>			
Never	3	89	92
Former	1	3	4
Current	10	136	146
Not reported	0	72	72
<b>Cultural and ethnic group</b>			
Indigenous Australian or Torres Strait Islander	0	1	1
Maori or Pacific Islander	0	1	1
White	15	212	227
North East Asian (Chinese)	0	1	1
South East Asian	0	5	5
South and Central Asian (Indian)	0	90	90
Middle Eastern or North African	0	0	0
Other	8	94	102
Not reported	3	85	88
<b>Blood group</b>			
O	8	134	142
A	7	112	119
B	1	17	18
AB	4	54	58
Not reported	11	56	67
<b>CMV serology</b>			
Negative	4	116	120
Positive	11	85	96
Not reported	0	20	20



Donors who provided pancreata that resulted in islet isolations that proceeded to transplantation are summarised in Table 4.8.

**Table 4.8: Donor characteristics for allogenic islet isolations which resulted in transplantation in 2019**

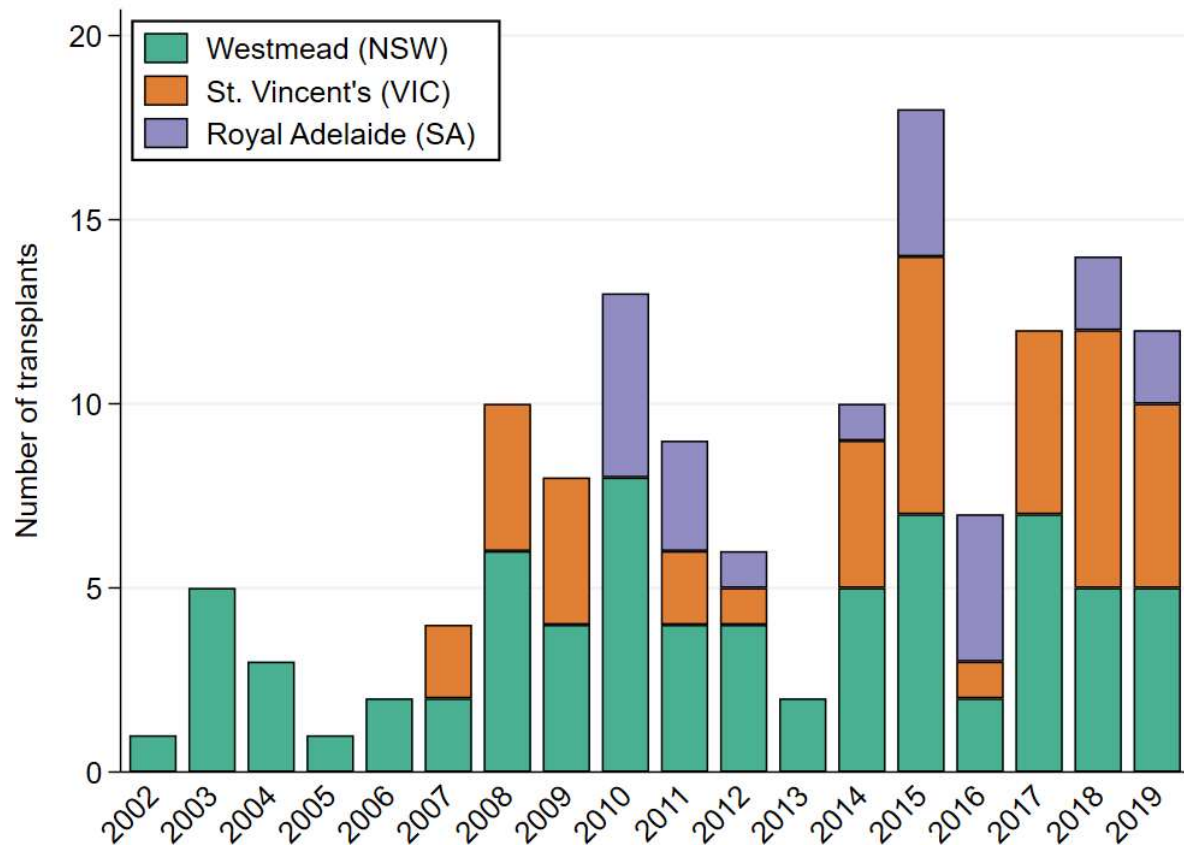
	Donors (n)		
	Westmead	St Vincent's	Total
<b>Total</b>	9	7	16
<b>Age</b>			
Mean (SD)	39.0 (9.2)	50.9 (12.3)	44.2 (12.0)
0-24	1	0	1
25-34	1	1	2
35-44	4	1	5
45+	3	5	8
<b>Sex</b>			
Female	1	3	4
Male	8	4	12
<b>BMI kg/m<sup>2</sup></b>			
Mean (SD)	30.9 (3.6)	30.3 (5.3)	30.6 (4.3)
Underweight (<18.5)	0	0	0
Normal weight (18.5-24)	0	2	2
Overweight (25-29)	4	1	5
Obese (30+)	5	4	9
<b>State of residence</b>			
New South Wales	5	2	7
Victoria	2	3	5
Queensland	1	0	1
Western Australia	0	0	0
South Australia	0	2	2
Tasmania	1	0	1
Australian Capital Territory	0	0	0
Northern Territory	0	0	0
<b>Donor type</b>			
Brain dead (DBD)	8	7	15
Circulatory death (DCD)	1	0	1
<b>Donor mode of death</b>			
Cerebral hypoxia/ischaemia	1	0	1
Cerebral infarct	0	3	3
Intracranial haemorrhage	5	0	5
Non-neurological condition	0	0	0
Other neurological condition	0	0	0
Traumatic brain injury	3	4	7
<b>Days ventilated prior to donation</b>			
Mean (SD)	3.6 (2.9)	3.0 (1.2)	3.3 (2.3)

	Donors (n)		
	<i>Westmead</i>	<i>St Vincent's</i>	<i>Total</i>
<b>Alcohol consumption</b>			
Never	5	1	6
Former	0	0	0
Current	4	6	10
<b>Smoking history</b>			
Never	2	4	6
Former	1	2	3
Current	6	1	7
<b>Cultural and ethnic group</b>			
Indigenous Australian or Torres Strait Islander	0	0	0
Maori or Pacific Islander	0	0	0
White	9	7	16
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
Other	0	0	0
<b>Blood group</b>			
O	4	5	9
A	4	1	5
B	1	0	1
AB	0	1	1
<b>CMV serology</b>			
Negative	2	1	3
Positive	7	6	13

## Islet transplant recipients

Figure 4.1 illustrates the number of islet cell transplants in Australia between 2002 and 2019. The transplants were performed in Westmead (73), St Vincent's (30), and Royal Adelaide (18) Hospitals. In 2019, 5 transplants were performed at Westmead, 5 at St Vincent's and 2 at the Royal Adelaide.

**Figure 4.1: Allogenic islet transplant activity 2002-2018, by transplanting centre**



The characteristics of donor and recipient matches according to blood group are presented in Table 4.9, Table 4.10, and Table 4.11.

**Table 4.9: Cross tabulation of recipient and donor blood groups, 2002-2019, from allogenic islet 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>	<i>Not reported</i>	
<i>O</i>	4	0	0	0	19	23
<i>A</i>	0	2	0	0	39	41
<i>B</i>	0	0	0	0	4	4
<i>AB</i>	0	3	1	0	5	9
<b>Total</b>	4	5	1	0	67	77

Recipients received more than 1 transplant therefore recipients may be duplicated in numbers

**Table 4.10: Cross tabulation of recipient and donor blood groups, 2002-2019, from allogenic islet 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>	<i>Not reported</i>	
<i>O</i>	10	0	0	0	1	11
<i>A</i>	3	10	0	0	0	13
<i>B</i>	4	0	2	0	1	7
<i>AB</i>	1	1	0	2	0	4
<b>Total</b>	18	11	2	2	2	35

Recipients received more than 1 transplant therefore recipients may be duplicated in numbers

**Table 4.11: Cross tabulation of recipient and donor blood groups, 2002-2019, from allogenic islet 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>	<i>Not reported</i>	
<i>O</i>	9	0	0	0	1	10
<i>A</i>	2	4	0	0	2	8
<i>B</i>	0	0	1	0	1	2
<i>AB</i>	0	0	0	0	0	0
<b>Total</b>	11	4	1	0	4	20

Recipients received more than 1 transplant therefore recipients may be duplicated in numbers

The characteristics of donor and recipient matches according to sex and blood group distributions for all centres are presented in Table 4.12 and Table 4.13.

**Table 4.12: Cross tabulation of recipient and donor sex, 2002-2019**

Recipient sex	Donor sex			Total
	Female	Male	Not reported	
Female	23	24	42	89
Male	3	10	30	43
<b>Total</b>	26	34	72	132

Recipients could receive more than one transplant and therefore may be duplicated in numbers

**Table 4.13: Cross tabulation of recipient and donor blood groups, 2002-2019, for allogenic islet transplants undertaken in Australia**

Recipient blood group	Donor blood group					Total
	O	A	B	AB	Not reported	
O	23	0	0	0	21	44
A	5	16	0	0	41	62
B	4	0	3	0	6	13
AB	1	4	1	2	5	13
<b>Total</b>	33	20	4	2	73	132

Recipients could receive more than one transplant and therefore may be duplicated in numbers

State of residence of recipients receiving an islet transplant in 2019, by the order of their transplant is presented in Table 4.14.

**Table 4.14: Allogenic islet transplant recipients by state of residence and number of transplants received (all centres, 2019)**

Recipient state of residence	1st	2nd	3rd	Total
New South Wales	3	1	1	5
Victoria	1	3	1	5
Queensland	0	0	0	0
Western Australia	0	0	0	0
South Australia	0	0	0	0
Tasmania	0	0	0	0
Australian Capital Territory	0	0	0	0
Northern Territory	0	0	0	0
<b>Total</b>	4	4	2	10

The states of residence of donors and recipients for each transplantation are shown in Table 4.15 and Table 4.16, stratified by year of transplant.

**Table 4.15: Cross tabulation of allogenic islet donor and recipient state of residence in 2019**

Recipient state of residence	Donor state of residence									Total
	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Not reported	
NSW	3	1	0	0	0	1	0	0	0	5
VIC	1	1	0	0	0	0	0	1	0	3
QLD	0	2	0	0	0	0	0	0	0	2
SA	0	0	0	0	0	0	0	0	0	0
WA	0	0	0	0	0	0	0	0	0	0
TAS	0	0	0	0	0	0	0	0	0	0
ACT	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	4	4	0	0	0	1	0	1	0	10

Recipients could receive more than one transplant and therefore may be duplicated in numbers

**Table 4.16: Cross tabulation of allogenic islet donor and recipient state of residence 2002-2018**

Recipient state of residence	Donor state of residence									Total
	NSW	VIC	QLD	WA	SA	TAS	ACT	NT	Not reported	
NSW	3	2	0	0	0	1	0	0	56	62
VIC	0	18	0	1	5	3	0	1	2	30
QLD	0	0	0	0	0	0	0	0	2	2
WA	0	0	0	0	0	0	0	0	8	8
SA	2	7	0	0	5	2	1	0	3	20
TAS	0	0	0	0	0	0	0	0	0	0
ACT	0	0	0	0	0	0	0	0	1	1
NT	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	5	27	0	1	10	6	1	1	72	123

Recipients could receive more than one transplant and therefore may be duplicated in numbers

Characteristics of Islet recipients over time are shown in Table 4.17.

**Table 4.17: Characteristics of allogenic islet cell transplant recipients in Australia by year of first transplant**

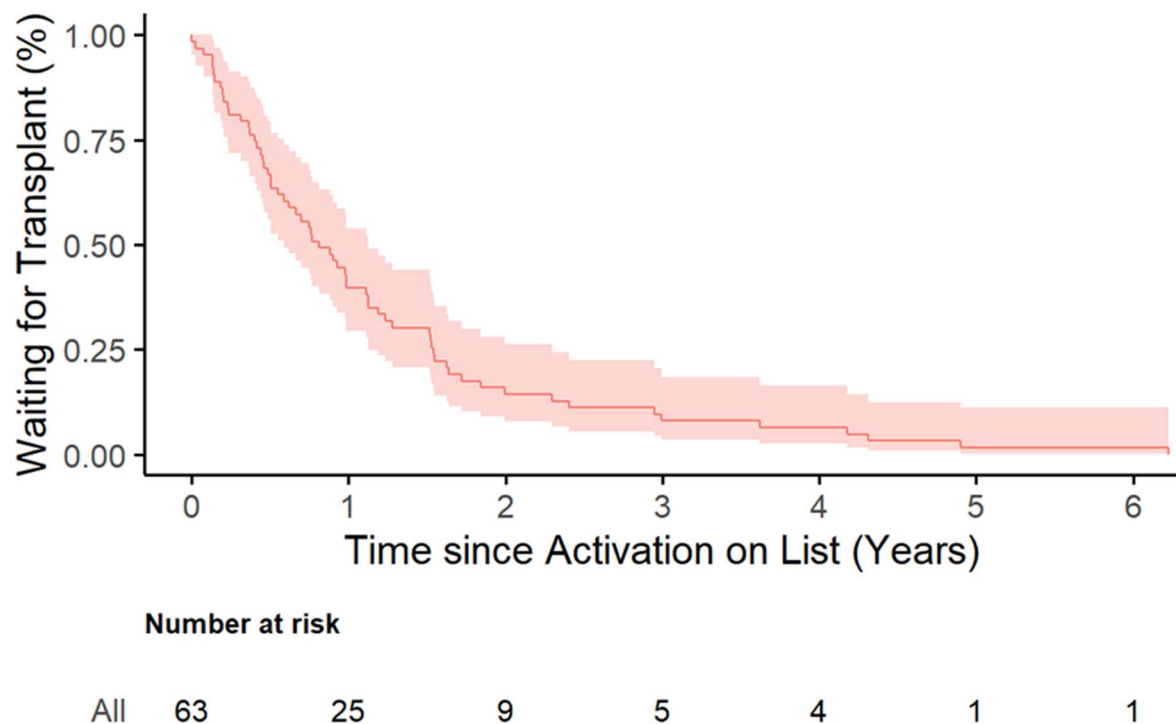
	Patients (n)		
	2019	2002-2018	Total
<b>Total</b>	7	58	65
<b>Age</b>			
Mean (SD)	56.5 (11.9)	47.2 (11.5)	48.2 (11.8)
0-24	0	2	2
25-34	1	5	6
35-44	0	15	15
45+	6	36	42
<b>Sex</b>			
Female	5	39	44
Male	2	19	21
<b>State of residence</b>			
New South Wales	3	26	29
Victoria	3	15	18
Queensland	1	2	3
Western Australia	0	4	4
South Australia	0	10	10
Tasmania	0	0	0
Australian Capital Territory	0	1	1
Northern Territory	0	0	0
<b>Blood group</b>			
O	3	21	24
A	1	26	27
B	1	7	8
AB	2	4	6
<b>Number of transplants per recipient</b>			
1	1	15	16
2	4	26	30
3	2	17	19
<b>Wait time from listing to first transplant</b>			
0-1 years	1	16	17
1-2 years	3	3	6
2+ years	3	2	5
Not reported	0	37	37
<b>Insulin independent post-transplant</b>			
Yes	5	21	26
No	2	37	39

Insulin independence defined as being free from insulin use for 14 or more consecutive days

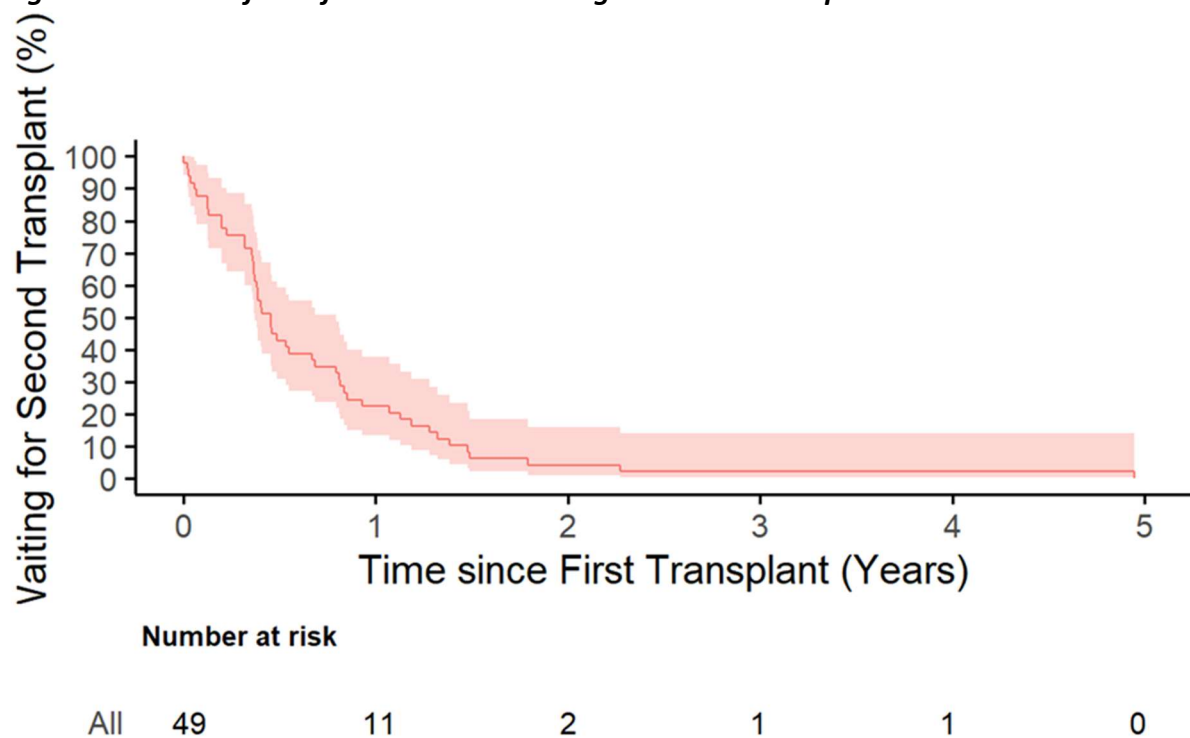


The time from activation on the waiting list to first islet transplant for 2002-2019 is presented in Figure 4.2. Data were available for 10 patients added to the waiting list before 31<sup>st</sup> December 2019, of whom 7 have received at least one transplant during this period. The median time to first transplant was 2.2 years (IQR 1.4 – 12.6).

**Figure 4.2: Time from activation on a waiting list to first allogenic islet transplant**

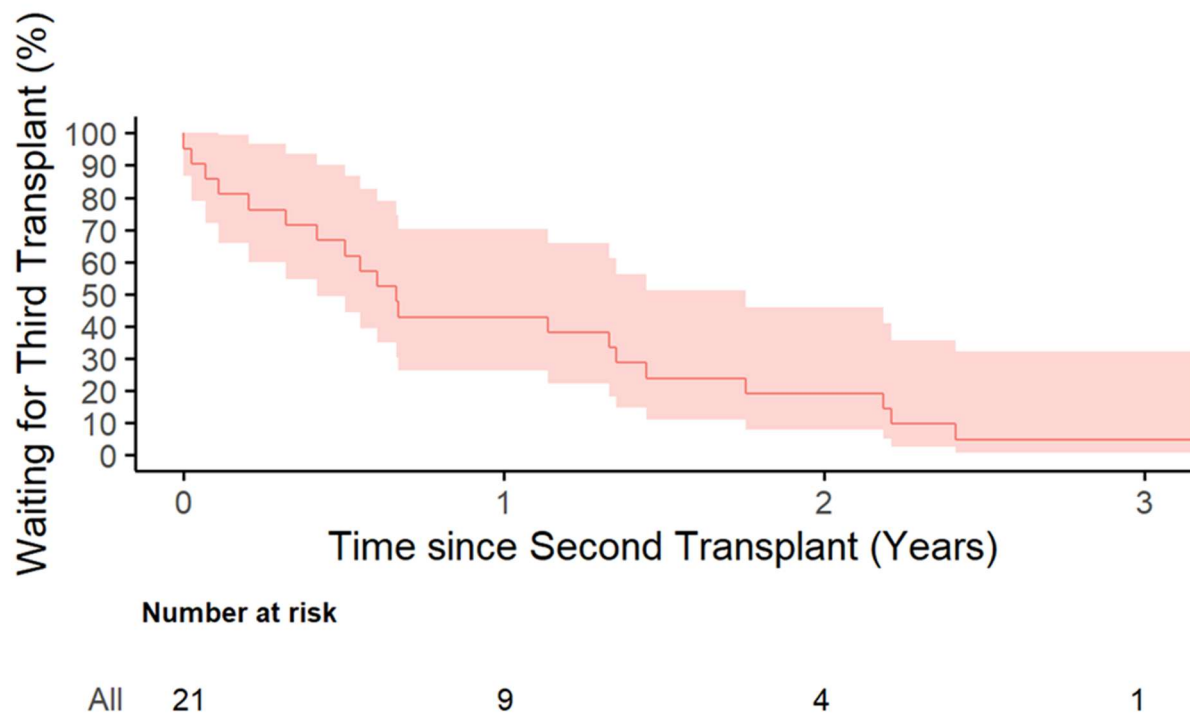


The time from first to second islet transplant for 2002-2019 is presented in Figure 4.3. Median time from first to second islet transplant was 0.8 years (IQR 0.8 – not yet reached).

**Figure 4.3: Time from first to second allogenic islet transplant**

This figure includes some patients who do not require a second transplant, and hence will never receive one

The time from second to third islet transplant for 2002-2019 is presented in Figure 4.4. The median time from second transplant to third transplant has not yet been reached.

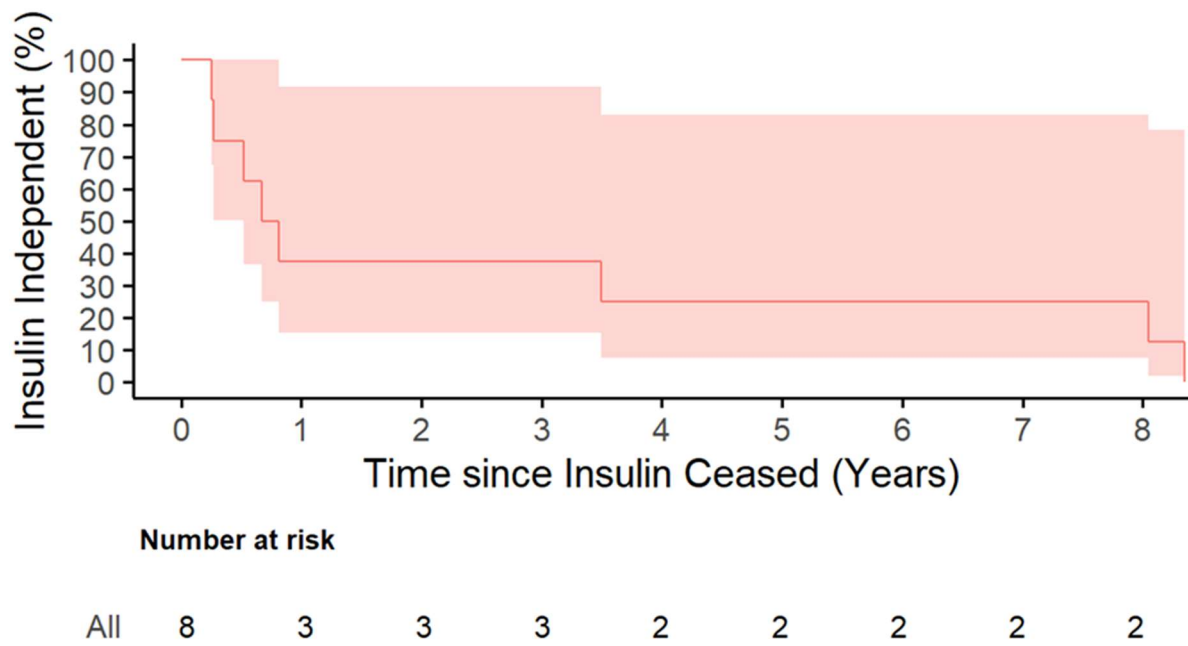
**Figure 4.4: Time from second to third allogenic islet transplant**

This figure includes some patients who do not require a third transplant, and hence will never receive one

Insulin independence is defined as a person being free from insulin use for at least 14 days.

There are 5 patients who have achieved insulin independence; 1 patient before their first transplant, 1 patient after their first transplant, and 3 patients after their third transplant.

The duration of insulin independence from the time insulin was first ceased for 2002-2019 is presented in Figure 4.5.

**Figure 4.5: Duration of insulin independence from time first ceased**

## Chapter 5: Islet auto-transplants

*Authors: Toby Coates, Henry Pleass, James Hedley, Angela Webster, on behalf of the Australian Islet Consortium*

Total Pancreatectomy and Autologous Islet Transplantation (auto-islet transplant, TP-IAT) is an important and growing program, targeting a small number of people with rare diseases. This process is a treatment for people who have certain, often inherited (Hereditary Pancreatitis, HP), diseases of the pancreas which cause them severe and chronic pain. The most common genetic causes of hereditary pancreatitis are genetic abnormalities in the PRSS-1 gene, SPINK-1 gene, and other genes in the trypsinogen pathway. Chronic pancreatitis causes prolonged inflammation in the pancreas, and this in turn causes progressive scarring. It may also cause disturbed digestion and impaired growth in children, and as the disease progresses people may become diabetic. Often, people with this problem require very high doses of strong pain killers, and have reduced quality of life. Autologous islet transplantation is a process by which a person is their own donor. An individual's own pancreas is removed, the islet cells isolated, and then transplanted back into the patient. The main reason to do this is to reduce the chronic pain people experience and to improve their quality of life. In cases where chronic pancreatitis is due to HP there is a significant risk of development of adenocarcinoma of the pancreas by middle age. In these cases, TP-IAT may also be regarded as preventing pancreatic adenocarcinoma. Up to 40% of people undergoing an auto-islet transplant are insulin independent after the procedure, and another 30% show partial independence, the rest are insulin dependent. Auto-islet transplantation occurs in two Australian centres only; Westmead in NSW and The Royal Adelaide in South Australia. Since Adelaide does not have an Islet Isolation facility, the pancreas is sent to St. Vincent's institute Isolation facility and the islets are immediately returned for transplant in Adelaide, with a turn-around time of 5-6 hours.

## Waiting list and isolation activity

Since auto-islet transplants do not require a donor, there is no waiting list for auto-islet transplant. However, not everyone referred for consideration of auto-islet transplant is suitable for the procedure. People with very long-standing chronic pancreatitis may have such a scarred pancreas that their islet cells have been destroyed. These people may benefit more from alternative treatments. For other people there may be reasons to wait a period of time before undergoing an auto-transplant. The number of patients waiting for an auto-islet transplant at each islet centre at the end of 2019 is presented in Table 5.1.

**Table 5.1: Patients waiting for an auto-islet transplant at the end of 2019, by transplant centre**

	Patients (n)
Westmead	
<i>Under consideration</i>	2
<i>Accepted on the waiting list</i>	0
Royal Adelaide	
<i>Under consideration</i>	0
<i>Accepted on the waiting list</i>	0

For auto-islet transplants occurring in Adelaide, the pancreatectomy happens in Adelaide, but the isolation procedure is done at St Vincent's hospital in Melbourne, after which the islet isolate is returned to Adelaide for the transplant to occur. The number of transplants performed in Australia by year across all islet centres is presented in Table 5.2.

**Table 5.2: Auto-islet isolation/transplant activity by year**

Year	Westmead	Royal Adelaide <sup>1</sup>	Total
2019	1	3	4
2018	1	2	2
2017	0	3	3
2016	1	1	1
2015	1	1	1
2014	0	0	0
2013	0	0	0
2012	0	0	0
2011	0	0	0
2010	1	0	0
Total	4	7	7

<sup>1</sup> Isolations performed at St. Vincent's Hospital

## Patient characteristics

The characteristics of auto-islet transplant recipients by year of transplantation are presented in Table 5.3.

***Table 5.3: Characteristics of auto-islet transplant recipients by year of transplant***

<b>Characteristic, mean (SD)</b>	<b>2019</b>	<b>2010-2018</b>	<b>Total</b>
Patients, n	4	11	15
Age, years	22.5 (12.5)	23.8 (14.2)	23.5 (13.3)
Patient weight, kg	54.8 (20.3)	55.6 (21.0)	55.4 (20.1)
Pancreas weight, g	59.0 (11.8)	39.2 (22.7)	44.5 (21.9)
Islet equivalent (IEQ) total ('000)	339 (148.7)	183 (67.1)	225 (114.5)
Islet equivalent (IEQ) per kilogram ('000)	7 (3.6)	4.0 (2.3)	4.8 (2.9)

# Appendices

## Previous ANZIPTR Reports

An abridged version of the ANZIPTR annual report for 2018 pancreas chapters (chapters 1-3) was published in Transplantation Direct, and can be viewed here:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6233667/>

The ANZIPTR annual report for 2018 pancreas chapters should be cited as follows:

*AC Webster et al., Transplantation Direct. 2018; 4(10): e390*

An abridged version of the ANZIPTR annual report for 2018 islets chapters (chapters 4-5) was also published in Transplantation Direct, and can be viewed here:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6415971/>

The ANZIPTR annual report for 2018 islet chapters should be cited as follows:

*AC Webster et al., Transplantation Direct. 2019; 5(2): e421*

## Other abstracts and publications

Data from ANZIPTR was used in the following abstracts that were presented at conferences in 2018:

**Conference:** Transplant Society of Australia and New Zealand (TSANZ) Annual Scientific Meeting

**Location:** Melbourne, Australia

**Date:** 29<sup>th</sup> April – 1<sup>st</sup> May 2018

**Authors:** Webster, A; Hedley, J; Kelly, P

**Title:** Post-Transplant Survival in Type 1 Diabetics in Australia and New Zealand

**Conference:** The Transplantation Society (TTS) Annual Scientific Meeting

**Location:** Madrid, Spain

**Date:** 30<sup>th</sup> June – 5<sup>th</sup> July 2018

**Authors:** Hedley, J; Kelly, P; Webster, A

**Title:** Post-Transplant Survival in Type 1 Diabetics in Australia and New Zealand

**Conference:** Australian and New Zealand Society of Nephrology (ANZSN) Annual Scientific Meeting



**Location:** Sydney, Australia

**Date:** 8<sup>th</sup> - 12<sup>th</sup> September 2018

**Authors:** Hedley, J; Kelly, P; Webster, A

**Title:** Kidney graft survival and patient survival in type 1 diabetics after kidney transplant alone compared to simultaneous pancreas-kidney transplant