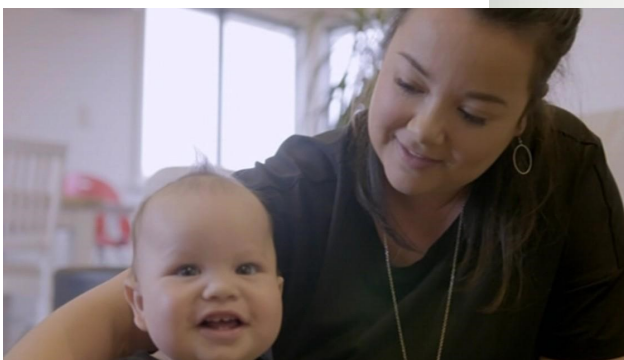

Aotearoa

New Zealand Nephrology

13th Annual Report

Reporting on treatment practices and patient outcomes of dialysis and kidney transplantation in Aotearoa New Zealand in 2018



National Renal
Advisory Board

The Aotearoa NZ Nephrology Annual Report

Welcome to the 13th New Zealand Nephrology Annual Report about treatment practices and care outcomes for adults and children who have severe kidney disease requiring treatment with dialysis or a kidney transplant in Aotearoa New Zealand in 2018.

This report is a way for health services, health funders, clinicians, and patients and whānau to examine the practice patterns and quality of dialysis and kidney transplant care across New Zealand.

The report is based on data that all New Zealand dialysis and transplant patients share with the Australia and New Zealand Dialysis and Transplant (ANZDATA) Registry, the New Zealand Peritoneal Dialysis Registry (NZPDR), the National Health Index (NHI), Statistics New Zealand and the New Zealand Blood Service. The databases are maintained through funding from government and through in-kind support by New Zealand renal clinicians.

The annual New Zealand Nephrology report has been written by dedicated nephrologists since 2005. The Standards and Audit

Working Party was the original group to write the report. The Working Group formed by the National Renal Advisory Board in 2000 generated this report with the express purpose to provide an national annual audit of nephrology practices, relevant to patient care. The audit is intended to inform planning and monitoring for adequate delivery of kidney failure services according to mandatory specialist medical service [specifications](#).

The findings of this report are reviewed by the National Renal Advisory Board. The report is also provided to the Ministry of Health.

Finally, I wish again to acknowledge the sharing of data by New Zealand patients, the support of their whānau, the dedicated ANZDATA team based in Adelaide that helps with our requested analyses, the Ministry of Health data teams, the New Zealand Blood Service, and individual clinicians at each unit who report their dialysis vascular catheter infection data. I thank also of the clinicians in New Zealand who give their time to filling out the ANZDATA forms each year — without whom this report would not be possible.

I also acknowledge the longstanding commitment to funding of ANZDATA and the New Zealand Peritoneal Dialysis Registry provided by the New Zealand Ministry of Health.

Professor Suetonia Palmer

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Health Board

About this report

WHAT

13th annual report

DATA

January 1 to December 31, 2018

SOURCES

Australia and New Zealand Dialysis and Transplant Registry (ANZDATA)

New Zealand Peritoneal Dialysis Registry (NZPDR)

New Zealand Blood Service

Statistics New Zealand

Individual New Zealand renal units



COVERING

Care by District Health Boards which provide dialysis and kidney transplantation services for New Zealand. The 11 District Health Boards are

Northland (Northland DHB)

Waitemata (Waitemata DHB)

Auckland (Auckland DHB & Starship Hospital)

Counties Manukau (Counties Manukau DHB)

Waikato (Waikato, Bay of Plenty, Lakes, and Tairāwhiti DHBs)

Hawke's Bay (Hawke's Bay DHB)

MidCentral (Whanganui and MidCentral DHB)

Taranaki (Taranaki DHB)

Capital & Coast (Capital & Coast, Hutt, Wairarapa, and Nelson Marlborough DHBs)

Canterbury (Canterbury, West Coast and South Canterbury DHBs)

Southern (Southern DHB)

POPULATION DATA

Ethnicity and District Health Board populations are based on Census populations for mid-2018 as the denominator, and adjusted for age, sex, and ethnicity where specified. In this report the data for European (NZ European and Other European, Māori, Pacific, and Asian ethnicities) are reported separately where possible.

FUNDING

The writing of this report receives no funding. The ANZDATA Registry has received important financial contributions from the New Zealand Government through the Ministry of Health/Manatū Hauora. ANZDATA also receives funding from the Australian Commonwealth and Kidney Health Australia. The work of Stephen McDonald, Phil Clayton, Kylie Hurst, and Chris Davies at ANZDATA is acknowledged. The support of the NZ Peritoneal Dialysis Registry (NZPDR) Steering committee is also acknowledged together with funding support from District Health Boards.

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Year in summary 2018

619

Patients started treatment for end-stage kidney disease

4532

Patients being treated for kidney failure in New Zealand at end of 2018

182

Kidney transplants (36 per million)

65-74

Age group with the highest risk of starting treatment (and increasing)

251

The number of Māori patients per million starting treatment (4.3-fold higher than European patients)

11

ABO incompatible transplants

446

Patients active on the kidney transplant waiting list

2846

Number of people living on dialysis

422

Patients doing home haemodialysis

227

Commenced peritoneal dialysis in 2018

357

Commenced haemodialysis

67%

Percent of prevalent haemodialysis patients with permanent vascular access

Key findings

- 1 The rate of patients starting treatment for kidney failure matches population growth (124 per million).
- 2 Māori patients have a 4.3-fold higher rate of starting kidney replacement therapy (251 per million) than European patients (58 per million).
- 3 The incidence of dialysis among patients aged 65 to 74 years is very high (388 per million) and increasing.
- 4 Diabetes is the cause of kidney failure in 67% of Māori patients starting kidney replacement therapy. This compares with <20% of European patients starting treatment due to diabetes.
- 5 Two Māori patients, 4 Pacific patients, 1 Asian patient and 26 European patients received a pre-emptive kidney transplant.
- 6 There were 182 kidney transplants (slightly fewer than 2017) with a population rate of 36 per million.
- 7 Home haemodialysis rates are decreasing (currently 84 per million compared to 116 per million population 5 years ago).
- 8 The increased deceased kidney donor rate in 2017 has not persisted into 2018. There were 84 live donor and 98 deceased donor kidney transplants in 2018.
- 9 One-quarter of patients aged 25-44 years were referred late (within 90 days of starting dialysis) to specialist services.
- 10 There is limited growth in transplants from the kidney exchange program (4 transplants in 2018). ABO incompatible kidney transplantation numbers have plateaued.
- 11 New Zealand does not meet the tier 2 specification for 70% of prevalent haemodialysis patients to have permanent vascular access. In 2018, 67% of prevalent patients had dialysis via an arteriovenous fistula or graft.
- 12 New Zealand has a very high use of tunneled dialysis vascular access catheters in patients starting haemodialysis. No DHB meets the current national standard (80%) for permanent vascular access at start of dialysis. The percentage of patients with permanent access at first haemodialysis is <20% at many DHBs.
- 13 All DHBs are providing at least 3 sessions of haemodialysis per week. The percentage of patients receiving <4.5 hours per dialysis session is less than 75% at many DHBs.
- 14 227 patients commenced peritoneal dialysis and 357 patients commenced haemodialysis in 2018.
- 15 New Zealand currently meets the ISPD guideline recommendation of 0.5 episodes of PD peritonitis per patient year. 56.6% of PD peritonitis episodes lead to hospital admission.
- 16 Mortality rates among dialysis patients are within the expected range across all District Health Boards.

Summary

	2018	2014
People starting treatment for kidney failure, number [per million]	619 [124]	539 [127]
People treated for kidney failure, number [per million]	4532 [966]	4256 [1010]
First kidney replacement therapy, number [per million]		
Transplant (pre-emptive)	39 [8]	21 [4]
Peritoneal dialysis	225 [45]	187 [44]
Haemodialysis	355 [71]	349 [82]
Age category of starting treatment, number [per million]		
0-24 years	20 [12]	22 [13]
25-44 years	94 [72]	80 [77]
45-64 years	279 [228]	251 [221]
65-74 years	168 [389]	148 [347]
75+ years	58 [255]	56 [299]
Ethnicity of starting treatment, number of people [per million]		
Māori	187 [251]	161 [266]
Pacific	156 [400]	135 [449]
Asian	47 [63]	44 [89]
New Zealand or Other European	202 [58]	204 [67]
Kidney transplant, number [per million]	182 [36]	138 [33]
Live donor	84 [17]	72 [17]
Deceased donor	98 [20]	66 [16]
Death from brain death	83 [17]	58 [14]
Death from cardiac death	15 [3]	8 [2]
ABO blood group incompatible transplant, number [per million]	11 [2]	7 [2]
Kidney transplants via kidney exchange, number [per million]	6 [1]	4 [1]
Multiorgan transplants including kidney	8 [1.0]	1 [0.2]
People active on waiting list for kidney transplant, number [per million]	446 [89]	435 [99]
Total people on waiting list for kidney [including those suspended]	650 [130]	636 [141]
Number of patients who received a kidney transplant for every 100 active on kidney transplant waiting list	41	32

	2018	2014
Dialysis prevalence (people living on dialysis), number [per million]	2846 [569]	2667 [635]
Facility haemodialysis	1459 [308]	948 [226]
Home haemodialysis	422 [84]	489 [116]
Automated peritoneal dialysis	476 [95]	394 [94]
Continuous ambulatory peritoneal dialysis	392 [78]	428 [102]
Home based dialysis overall, number [per million]	1290 [258]	1311 [312]
People living with transplant (prevalence), number [per million]	1966 [393]	1629 [388]
Primary PD peritonitis rate, episodes per patient-year	0.50	0.42
Exit site infection rate, episodes per patient-year	0.25	-
Number of PD catheters inserted	140	149
PD peritonitis outcomes		
Number of episodes in total	408	-
Hospitalisation, number (%)	235 [54.7%]	-
Catheter removal, number (%)	63 [15.9%]	-
Death, number (%)	82 [3.8%]	-
Cause of kidney disease for patients starting treatment, number [%]		
Diabetes	293 [47%]	260 [48%]
Glomerulonephritis	109 [18%]	85 [16%]
Hypertension	44 [7%]	50 [9%]
Adult polycystic kidney disease	33 [5%]	20 [4%]
Reflux nephropathy	12 [2%]	17 [3%]
Diabetes as cause of kidney disease		
Māori	125 [67%]	-
Pacific	100 [64%]	-
Asian	26 [55%]	-
New Zealand or Other European	37 [18%]	-
Late referral to specialist services, number [% starting treatment]	93 [14%]	76 [14%]
Starting haemodialysis with fistula or graft [% starting treatment]*	66 [24%]	106 [38%]
Prevalent haemodialysis patients with fistula or graft [% of all receiving treatment]	1328 [69%]	1412 [81%]

*Excluding those who were referred late to specialist nephrology services

Incidence and prevalence of kidney replacement therapy by District Health Board

619 adults and children started treatment with dialysis or a kidney transplant in New Zealand in 2018. This was 124 per million people and was similar to the previous year (2017). Overall, 4812 patients (962 per million of population) in New Zealand received kidney replacement therapy in 2018. This was an increase of 3.4% compared to 2017, and lower than New Zealand population growth.

The incidence and prevalence of kidney replacement therapy varied between District Health Boards. The rate of people starting treatment (incidence) ranged between 49 per million of the local DHB population at Canterbury DHB to 224 per million at Northland DHB.

Different rates are due to different populations (including those with diabetes). Incidence is also affected by local practices.

District Health Board	DHB Population 2018	Starting treatment		Prevalent dialysis		Prevalent kidney
		Number 2018 (2017)	Per million 2018 (2017)	Number 2018 (2017)	Per million 2018 (2017)	Number 2018 (2017)
Northland	183,250	41 (32)	224 (182)	175 (157)	955 (895)	100 (94)
Waitematā	639,420	66 (73)	103 (120)	284 (288)	444 (475)	214 (201)
Auckland	554,630	77 (76)	139 (145)	389 (355)	701 (678)	266 (271)
Counties Manukau	574,570	104 (121)	181 (221)	624 (616)	1086 (1127)	222 (210)
Waikato	830,505	127 (129)	153 (162)	540 (541)	650 (678)	246 (213)
Hawke's Bay	167,770	18 (21)	107 (128)	111 (117)	662 (714)	88 (92)
MidCentral	247,605	23 (19)	93 (79)	140 (126)	565 (524)	91 (82)
Taranaki	121,460	13 (13)	107 (110)	54 (59)	445 (500)	50 (47)
Capital and Coast	674,435	87 (67)	129 (102)	291 (260)	431 (398)	296 (296)
Canterbury	671,270	33 (47)	49 (73)	140 (158)	209 (246)	272 (270)
Southern	335,990	30 (17)	89 (52)	98 (91)	292 (281)	121 (114)
Total	5,000,905	619 (615)	124 (128)	2846 (2768)	569 (577)	1966 (1890)

placement therapy



ates of starting therapy are likely due
t DHB population characteristics
he specific burden of diseases such as
Residual variation may be explained
actices and other unmeasured factors.

Number starting treatment at each DHB in
2018, per million of local population

Prevalent transplant	Prevalent total	
Per million	Number	Per million
2017	2018	2017
546 (536)	275 (251)	1501 (1431)
335 (332)	498 (489)	779 (807)
480 (518)	655 (626)	1181 (1196)
386 (384)	846 (826)	1472 (1511)
296 (267)	786 (754)	946 (945)
525 (561)	199 (209)	1186 (1275)
368 (341)	231 (208)	933 (865)
412 (398)	104 (106)	856 (898)
439 (453)	587 (556)	870 (851)
405 (420)	412 (428)	614 (665)
360 (352)	219 (205)	652 (632)
393 (394)	4812 (4658)	962 (972)

DISTRICT HEALTH BOARD

DISTRICT HEALTH BOARD		Age stand- ardised	Diabetes stand- ardised
Northland	224	161	205
Waitematā	103	120	112
Auckland	139	139	151
Counties Manukau	181	121	146
Waikato	153	137	154
Hawke's Bay	107	100	106
MidCentral	93	84	93
Taranaki	107	87	101
Capital and Coast	129	142	139
Canterbury	49	51	54
Southern	89	99	96

Starting treatment

Starting kidney replacement therapy 1986-2018

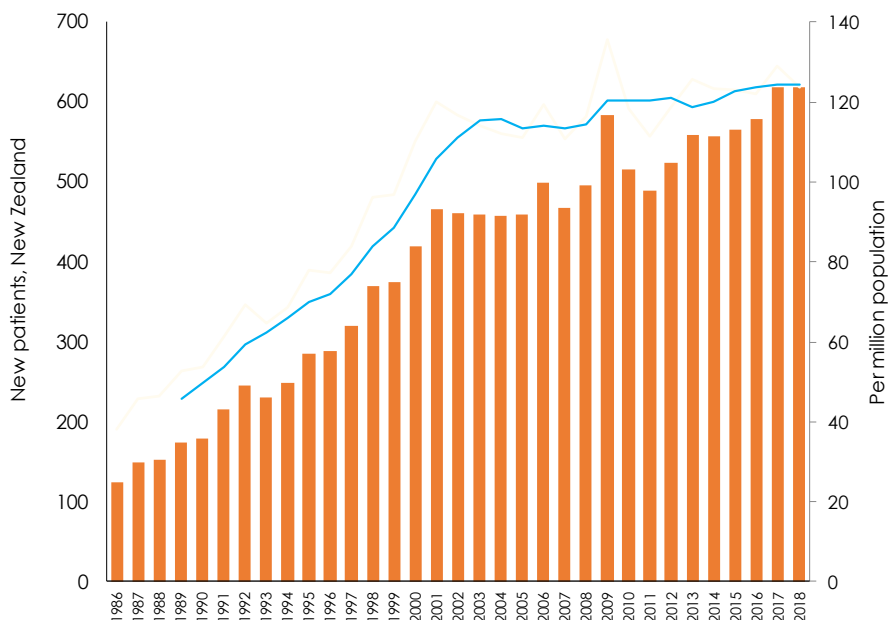


Figure: Number of new patients starting dialysis or a transplant per year (orange bars) and per million NZ population showing 5 year average (blue line).

In 2018, 619 people started dialysis or received a transplant for treatment for kidney failure with Aotearoa NZ. This was 124 people for every one million people in New Zealand. The number of people starting treatment is quite variable from year to year, but has been quite similar over the last 5 years and comparable to population growth. The number of people

requiring kidney replacement therapy increased rapidly year on year between 1986 and 2003, with a substantially slower increase in the most recent 15 years.

Modality of starting treatment in 2018

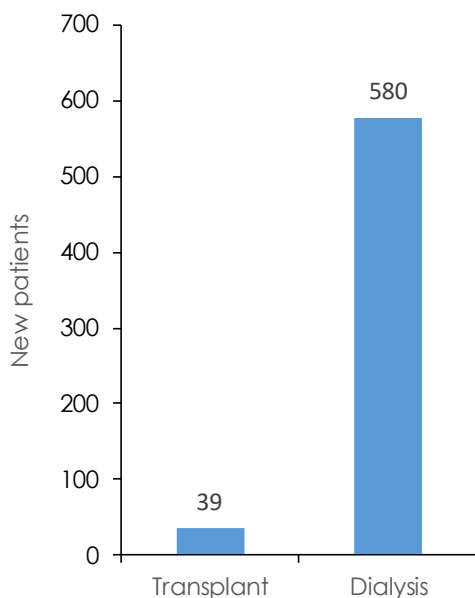


Figure: Number of people starting treatment for kidney failure with dialysis or kidney transplant in New Zealand in 2018.

94% of patients (580 people) started treatment for kidney failure with dialysis in 2018. Thirty-nine patients started treatment by receiving a kidney transplant (pre-emptive transplant). The number of people receiving a pre-emptive kidney transplant is substantially higher than any previous year (was 26 patients in 2017).

Starting treatment

Modality of starting treatment 2008-2018

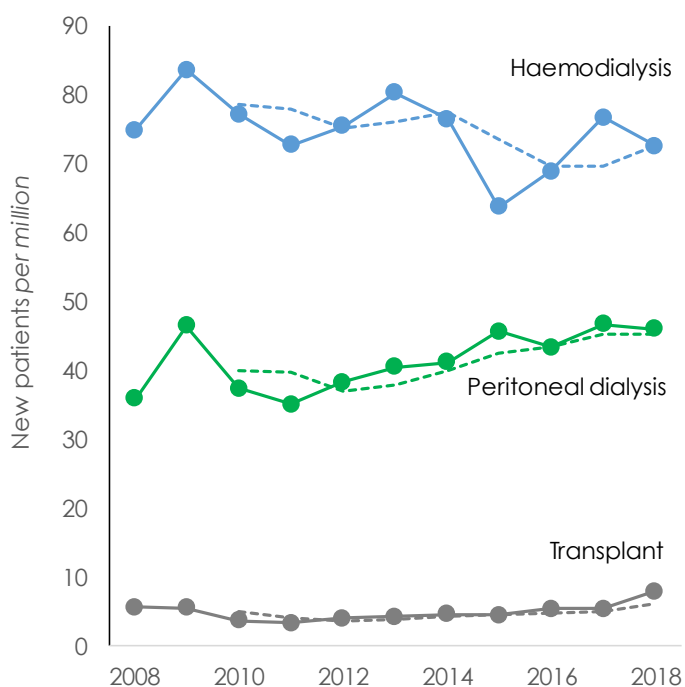


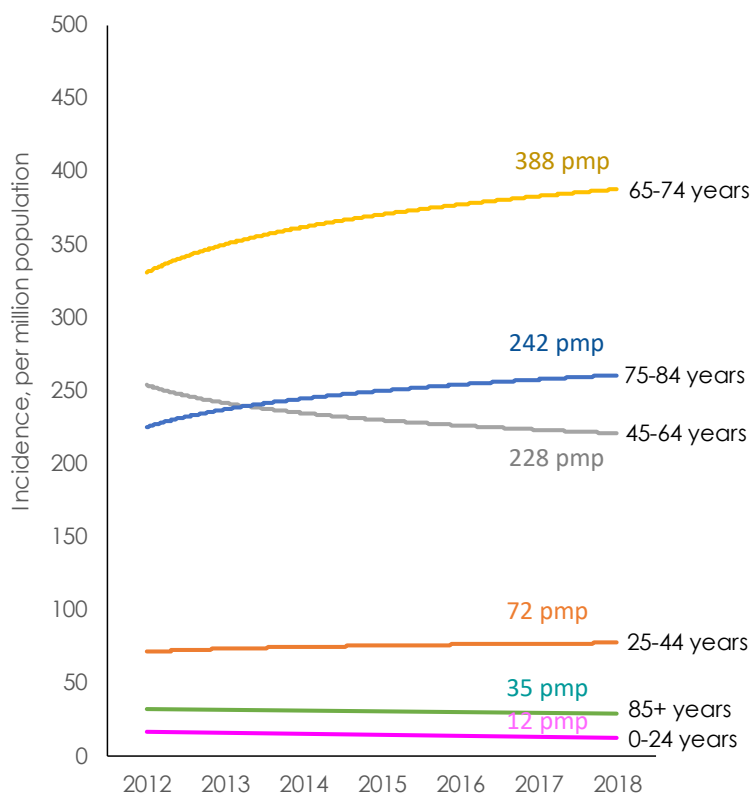
Figure: Number of new patients starting each treatment modality (haemodialysis, peritoneal dialysis and kidney transplant) as first treatment for kidney failure 2008-2018 shown as per million of total New Zealand population. Dotted lines show the 3-year moving average.

355 people started treatment with haemodialysis in 2018, 225 with peritoneal dialysis, and 39 with a kidney transplant. The rate of peritoneal dialysis is increasing year on year ahead of population growth (46 per million compared to 36 per million ten years earlier). The incidence of haemodialysis is much more variable from year to year, with an incidence very similar to a decade previously. Pre-emptive kidney transplantation is 8 per million of New Zealand population and appears to be increasing for the first time in a decade.

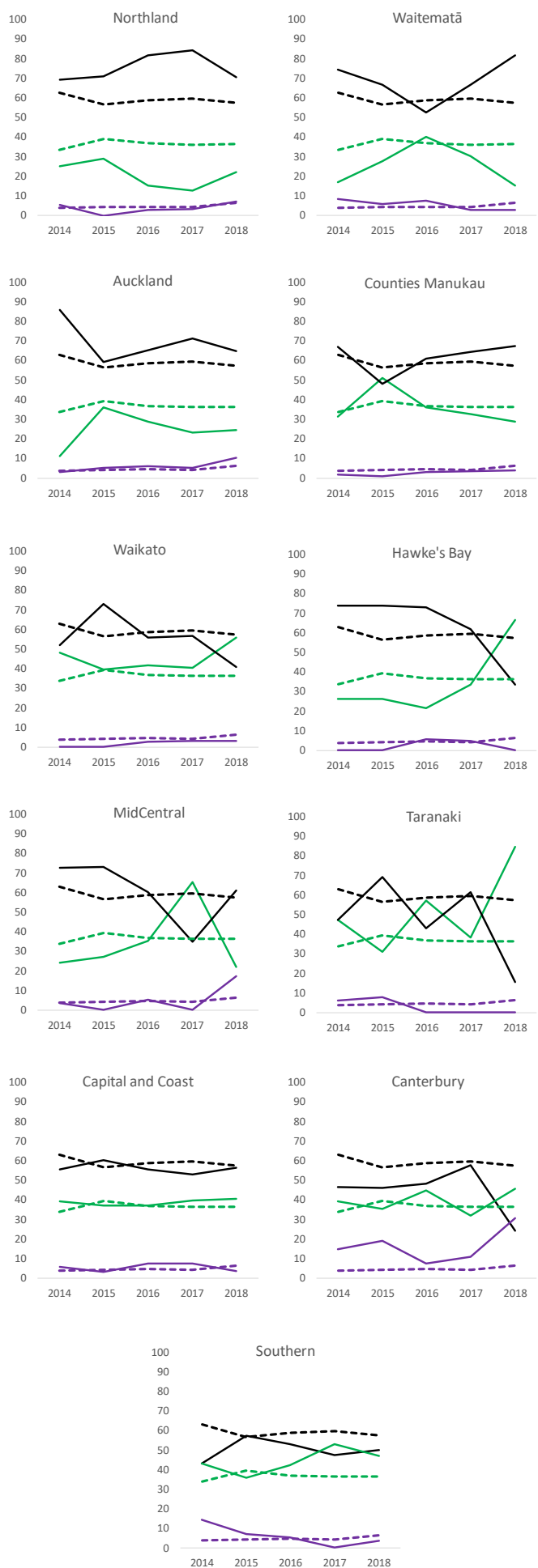
Age of starting treatment 2012-2018

Figure: Age of patients starting kidney replacement therapy 2012-2018 shown as per million of population in age group (as a trendline).

Adults aged 65 to 74 years have the highest incidence of starting kidney replacement therapy in Aotearoa NZ (388 per million) with ongoing increases in excess of population growth. Incidence in the age group of 75-84 years is increasing (currently 242 per million) and is the age group with the second highest incidence. Incidence in the youngest age groups (0-44 years) has remained steady, largely reflecting stability in causes of kidney disease in these age groups as predominantly kidney-specific such as glomerulonephritis, or genetic/developmental. Increases in older age groups are likely to reflect an ageing population, increasing acceptance and expectations of dialysis among older patients and increased prevalence of diabetes, hypertension, and cardiovascular disease. Incidence in adults older than 85 years is static (35 per million).



Starting treatment by modality and District Health Board



- Haemodialysis (dotted line NZ average)
- Peritoneal dialysis (dotted line NZ average)
- Transplant (dotted line NZ average)

Figure: Incident modality (type of treatment used as first treatment of kidney failure) shown for each DHB.

This figure shows the per cent of patients who start treatment with each of the available treatment types as a percentage of all patients at that DHB that start treatment. The treatments shown are haemodialysis (black), peritoneal dialysis (green), and kidney transplantation (purple) over each of the last 5 years (2014-2018). The national average is shown as a dotted line in the corresponding colour.

It is noticeable and expected that there is variability within each DHB from year to year and between each DHB, especially DHBs treating a smaller number of patients.

At Auckland DHB, the per cent of patients starting treatment with haemodialysis fell in 2015 and has remained stable. Peritoneal dialysis appears to be increasing at Hawke's Bay DHB and Waikato DHB. Kidney transplantation as a percentage of first treatment has increased at many units including Northland, Auckland, Waikato, MidCentral and Canterbury DHBs.

The reasons for differences between units and treatment trends cannot be determined by these analyses. Standardization by age, sex, ethnicity, and comorbidity may assist, but is unlikely to fully account for differences, which may also be influenced by local practice patterns, expertise, and preferences.

Starting treatment

Ethnicity

Starting treatment by ethnicity, expressed per million of population

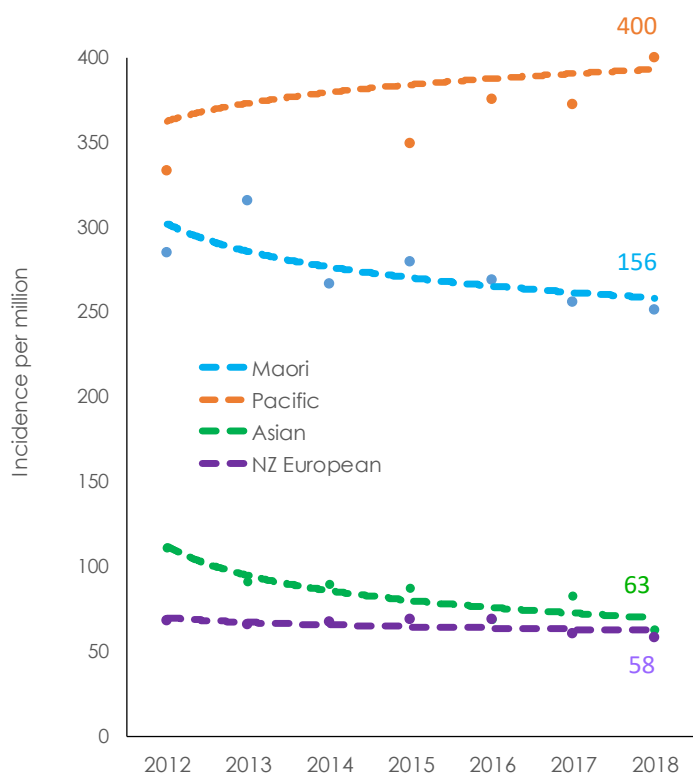


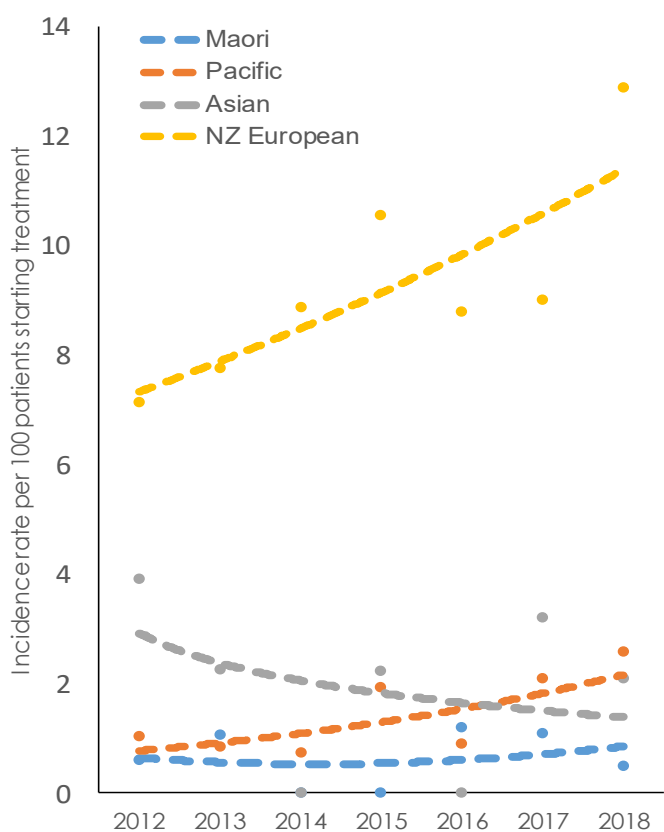
Figure: Incidence of starting kidney replacement therapy by ethnicity 2012 to 2018 (shown as trend-lines).

The number of people starting treatment for kidney failure remains markedly different for each ethnicity grouping in Aotearoa NZ.

Notably, the rate of starting treatment in 2018 was 7-fold higher for Pacific patients (400 per million) than among New Zealand European and European patients. (58 per million). The rate of starting treatment in 2018 for Māori (156 per million) was 2.7 fold higher than New Zealand European and European patients.

The incidence of treatment for kidney failure appears to be increasing for Pacific patients and decreasing for Māori and Asian patients.

*Notably, ethnicity is not self-identified in ANZDATA and patients are assigned only to a single ethnicity group.



Pre-emptive kidney transplantation by ethnicity per ethnicity-specific patients starting treatment

Figure: Incidence of pre-emptive kidney transplantation by ethnicity 2012 to 2018 (shown as trend-lines).

The number of people who received a transplant as their first treatment (*called a pre-emptive transplant*) is relatively low overall (39 overall in 2018). Even with small numbers, the proportion of patients who start treatment with a kidney transplant differs by ethnicity. New Zealand European and European patients consistently experience higher pre-emptive transplantation rates for each 100 patients starting treatment. The incidence of pre-emptive kidney transplantation is increasing for NZ European patients. Smaller increases are observed for Pacific patients.

Starting treatment

DHB-specific ethnicity

Starting haemodialysis by ethnicity and DHB, per million population

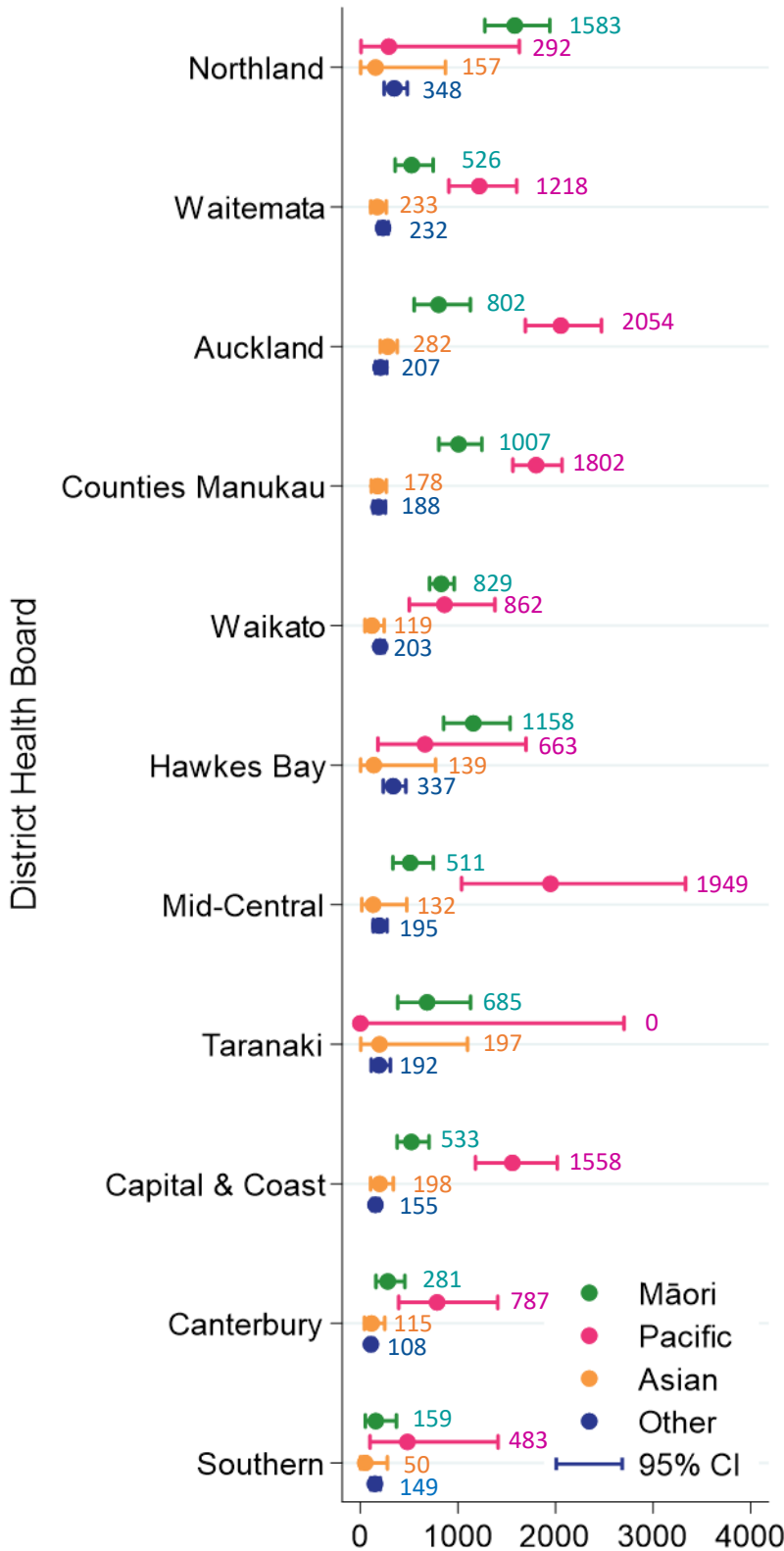


Figure: Starting haemodialysis at first treatment for kidney failure, shown by DHB and ethnicity as per million.

This additional data was requested by the Aotearoa New Zealand Nephrology group at the annual 2019 meeting on review of 2017 data.

The graph shows the number of patients starting haemodialysis as first treatment for kidney failure per million of the DHB-ethnicity specific population in 2018.

Māori patients have a very high incidence of haemodialysis as first treatment for kidney failure (>1000 per million) at Northland, Counties Manukau and Hawke’s Bay DHBs.

Pacific patients have a very high incidence of starting haemodialysis for kidney failure (>1500 per million) at Auckland, Counties Manukau, MidCentral and Capital and Coast DHBs and >1000 per million at Waitematā DHB.

These findings suggest a high uptake of haemodialysis predominantly by Māori and Pacific patients when starting dialysis compared with peritoneal dialysis (next page) and reflect DHB-specific populations and modality choices for starting dialysis care.

Rates of haemodialysis (compared to peritoneal dialysis) are particularly high (>3-fold) for Māori patients at Northland and Waitematā DHBs. Similarly, rates of haemodialysis (compared to peritoneal dialysis) are particularly high (>3-fold) for Pacific patients at Waitematā, Auckland, MidCentral and Canterbury DHBs.

Starting treatment

DHB-specific ethnicity

Starting peritoneal dialysis by ethnicity and DHB, per million population

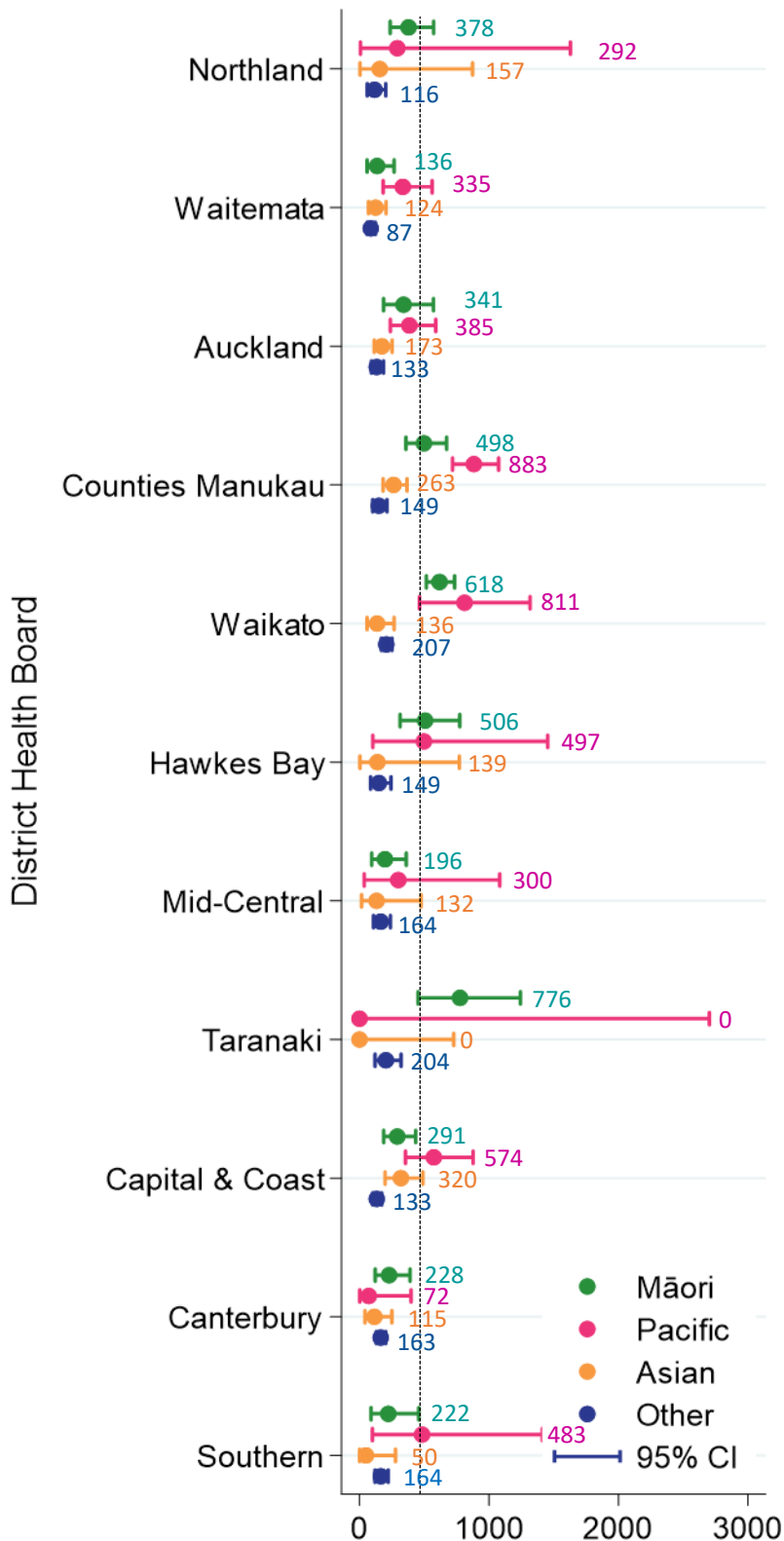


Figure: Starting peritoneal dialysis at first treatment for kidney failure, shown by DHB and ethnicity as per million

This additional data was requested by the Aotearoa New Zealand Nephrology group at the annual 2019 meeting on review of 2017 data.

The graph shows the number of patients starting peritoneal dialysis as their first treatment for kidney failure per million of the DHB-ethnicity specific population in 2018.

Māori patients have a high incidence of peritoneal dialysis as first treatment for kidney failure (>500 per million) at Counties Manukau, Waikato, Hawke's Bay and Taranaki.

Pacific patients have a high incidence of starting peritoneal dialysis at onset of kidney failure (>500 per million) at Counties Manukau, Hawke's Bay and Capital and Coast DHBs.

Relative to haemodialysis, high rates of peritoneal dialysis at start of treatment for Māori patients are noted at Waikato, Taranaki, Canterbury and Southern DHBs. Relative to haemodialysis, high rates of peritoneal dialysis at start of treatment are noted for Pacific patients at Northland and Waikato DHBs.

Starting treatment

Ethnicity and age

Starting renal replacement therapy according to age and ethnicity

Figure: Age at commencement of kidney replacement therapy by ethnicity 2014-2018

The age at starting kidney replacement therapy differs by ethnicity.

A larger proportion of Māori and Pacific patients start treatment between 45 and 64 years.

Among European and Asian patients, approximately half commence therapy at 65 years or older. Very small proportions of Māori and Pacific patients commence dialysis in the 75+ year age group, consistent with

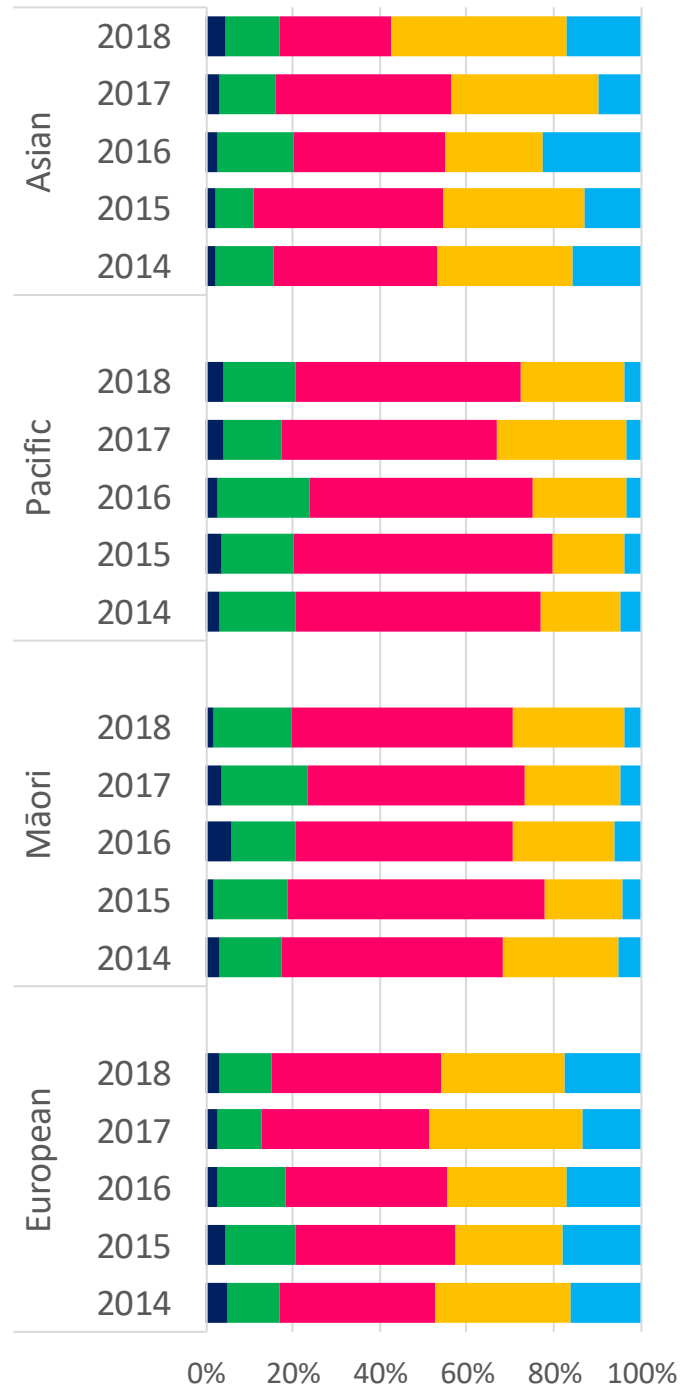
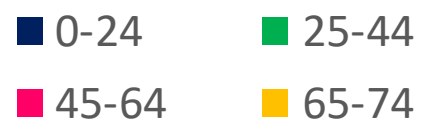


Table: Age at commencement of kidney replacement therapy 2014-2018 by ethnicity, Mean (SD)

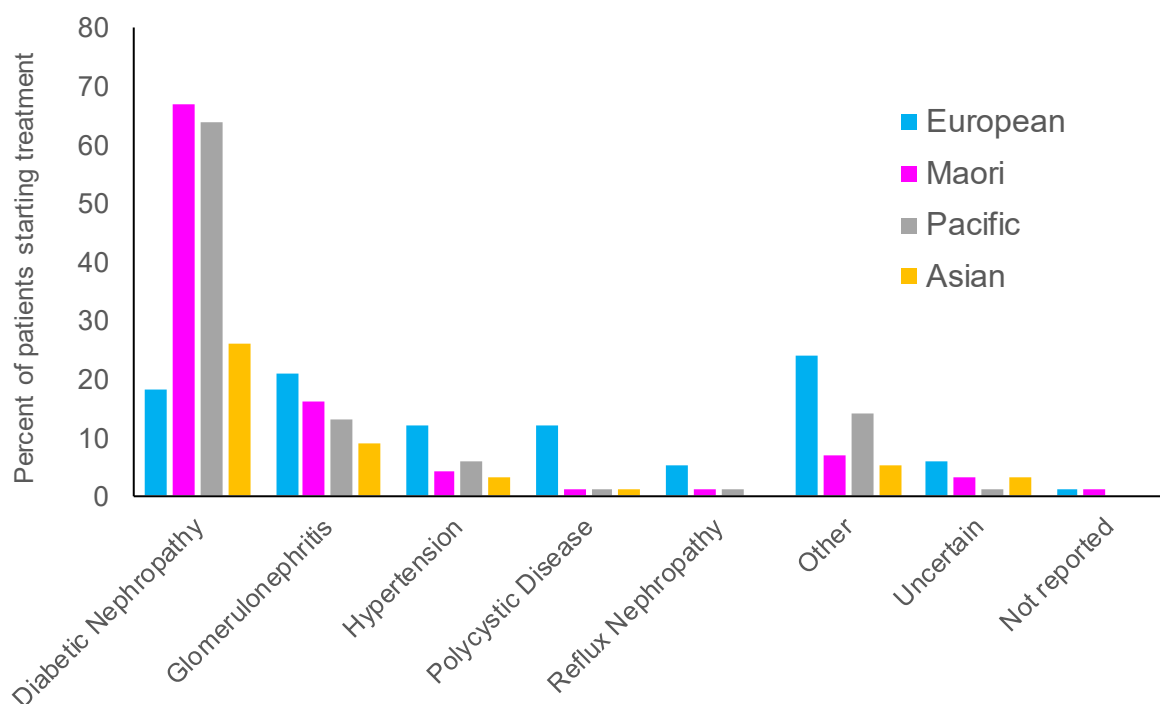
Ethnicity	2014	2015	2016	2017	2018
European	59.8 (16.1)	58.5 (16.6)	59.1 (16.8)	59.7 (15.6)	59.3 (17.2)
Māori	56.2 (14.7)	55.4 (13.0)	55.3 (15.1)	53.8 (14.6)	55.1 (13.4)
Pacific	54.3 (13.9)	53.3 (13.5)	53.6 (13.6)	55.3 (14.0)	54.7 (14.2)
Asian	59.5 (15.7)	61.1 (13.1)	59.5 (16.7)	58.3 (15.6)	61.7 (18.0)



Starting treatment

Primary renal disease

Cause of kidney disease at start of treatment, by ethnicity



In previous years, we have reported the overall percentage of patients who start treatment due to each disease type. This obscured the substantial differences in disease risks for each ethnicity, and renders a summary estimate for all New Zealanders meaningless. Therefore, since 2017 we have reported the cause of kidney failure for each ethnicity separately.

Diabetes is the cause of kidney failure in 64% Pacific patients who start treatment, 67% of Māori patients and 55% of Asian patients. Glomerulonephritis also shows differences in the contribution to kidney failure by ethnicity, with the lowest among Pacific and Maori patients, although this is likely not necessarily due to differences in underlying rates of disease,

but the competing impact of diabetes. Similar trends are noted for all other disease categories.

This finding suggests that population health measures to prevent, manage, and treat diabetes is likely to be necessary to address inequitable rates of kidney failure by ethnicity in New Zealand. These statistics are also likely to account for differences in access to live donor and pre-emptive kidney transplantation due to comorbidity for both transplant recipient and potential live kidney donors.

Prevalence

Number of people living on dialysis or with kidney transplant in New Zealand

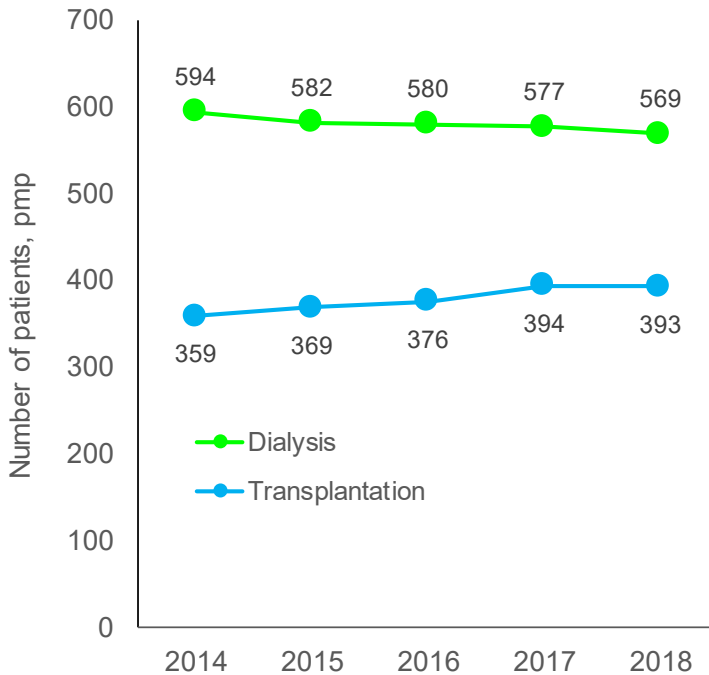


Figure: Prevalence of dialysis and transplantation in New Zealand 2014-2018 shown per million NZ population

At the end of 2018, 4812 people were receiving treatment with dialysis or a kidney transplant. This is 962 people for every million living in New Zealand.

Most people receiving kidney replacement therapy are treated with dialysis. In 2018, there were 2846 patients treated with dialysis on the census date of 31 December 2017 (569 per million). 1966 people were living with a kidney transplant (393 per million).

The number of people living on dialysis is slowly decreasing relative to population growth, and the number of people living with a kidney transplant is gradually increasing. It may be that these two observations are directly related.

Location of dialysis

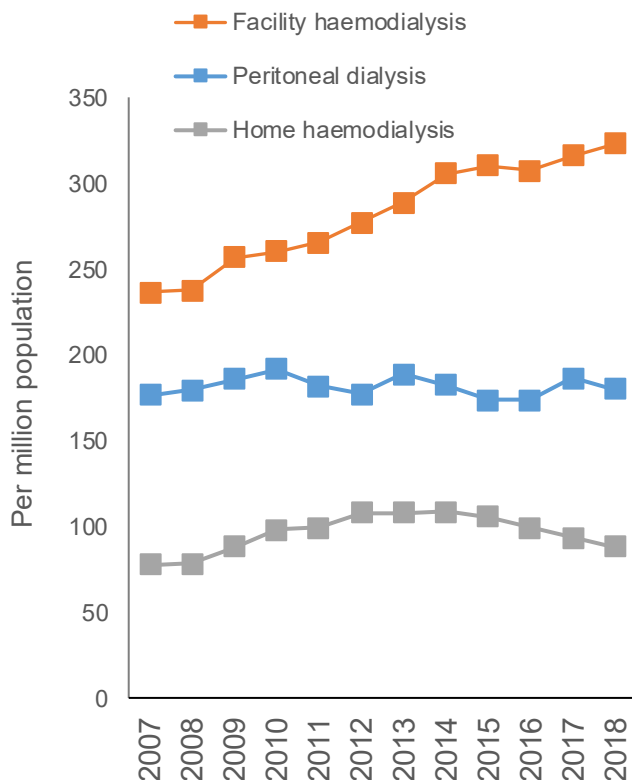


Figure: Location of dialysis care in New Zealand 2007 to 2018 shown as per million NZ population

Facility based haemodialysis as the main location of dialysis care in New Zealand (hospital or community facility, not including community houses) is continuing to increase faster than population growth. Overall, facility based haemodialysis represents 54.7% of all dialysis. This has increased from 48.3% a decade earlier (2009). When expressed as per million of population, the increase in facility haemodialysis appears to be correlated to a decrease in peritoneal dialysis use.

Home hemodialysis increased toward 2013-2014 (18.5% of all dialysis patients) and has since decreased. (now 14.8% of all dialysis patients).

Prevalence

By District Health Board

People living on dialysis or with transplant in New Zealand, shown by District Health Board and per

Figure: Prevalent patients treated with dialysis or recipient of kidney transplant by DHB 2014-2018

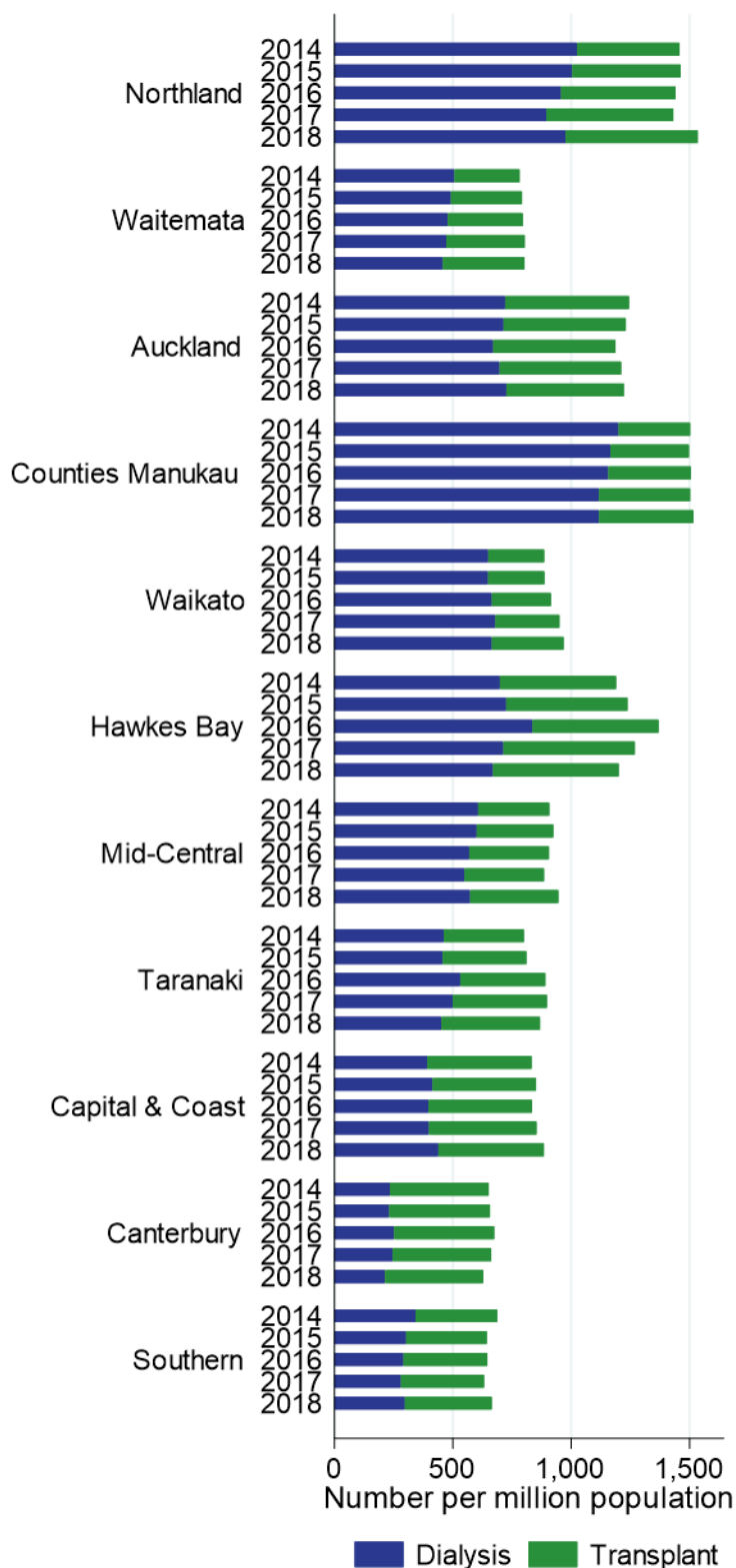
The prevalence of treated end-stage kidney disease varies markedly by District Health Board, likely to reflect the burden of long term conditions (especially diabetes) in each region.

Most patients with kidney failure at Capital and Coast, Canterbury, and Southern DHBs are treated with a kidney transplant.

A substantial majority of patients at the two DHBs with the highest prevalence of kidney failure (Northland and Counties Manukau) are treated with dialysis. Capital and Coast and Waikato DHBs are showing steady increases compared to population growth.

Dialysis prevalence appears to be falling while transplantation prevalence is increasing at many DHBs.

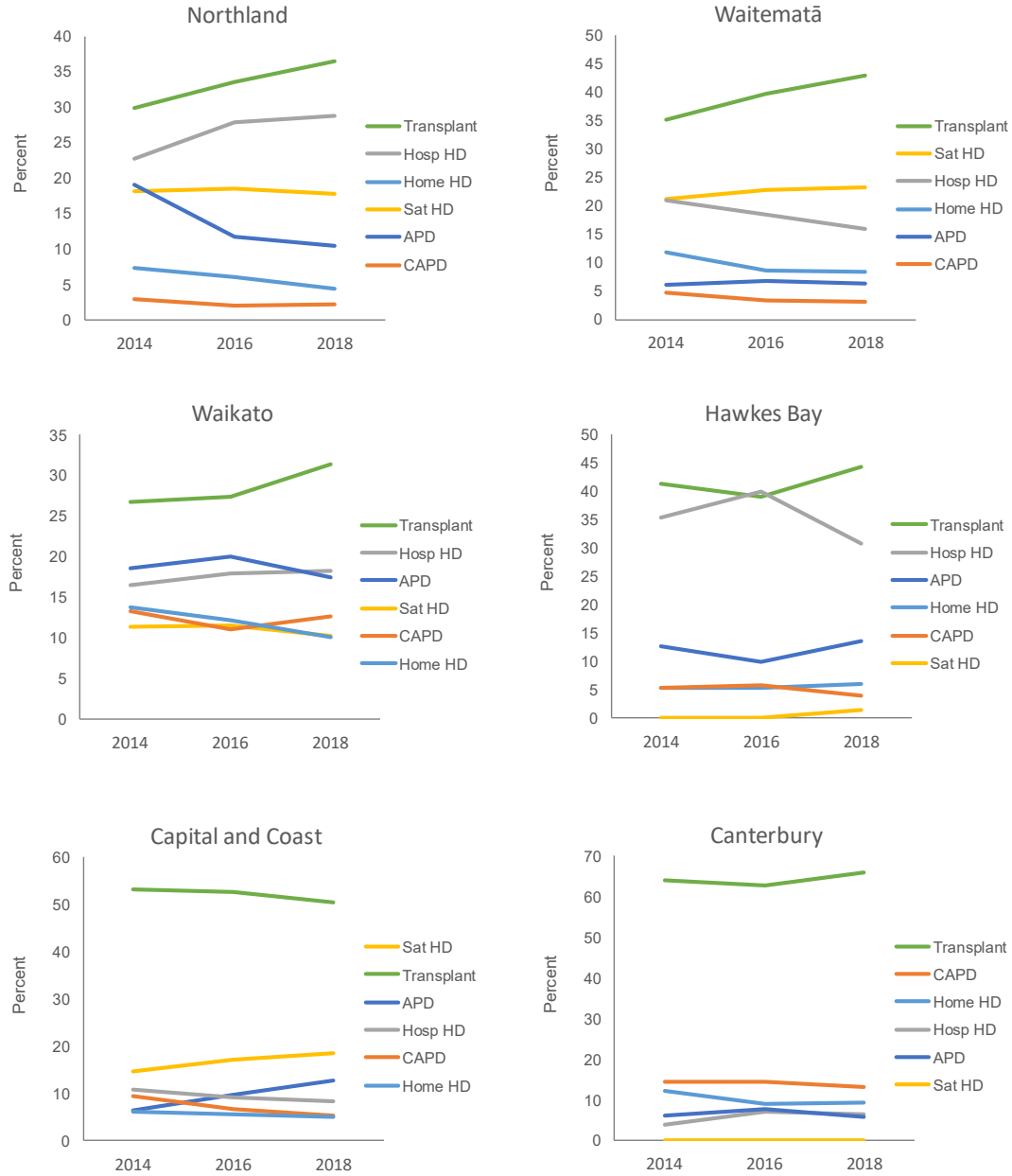
These estimates have not been adjusted for local rates of diabetes, or for age, sex, or ethnicity.



Prevalence

Modality of treatment for kidney failure by District Health Board

Figure: Treatment modality for kidney failure shown for each DHB 2014-2018



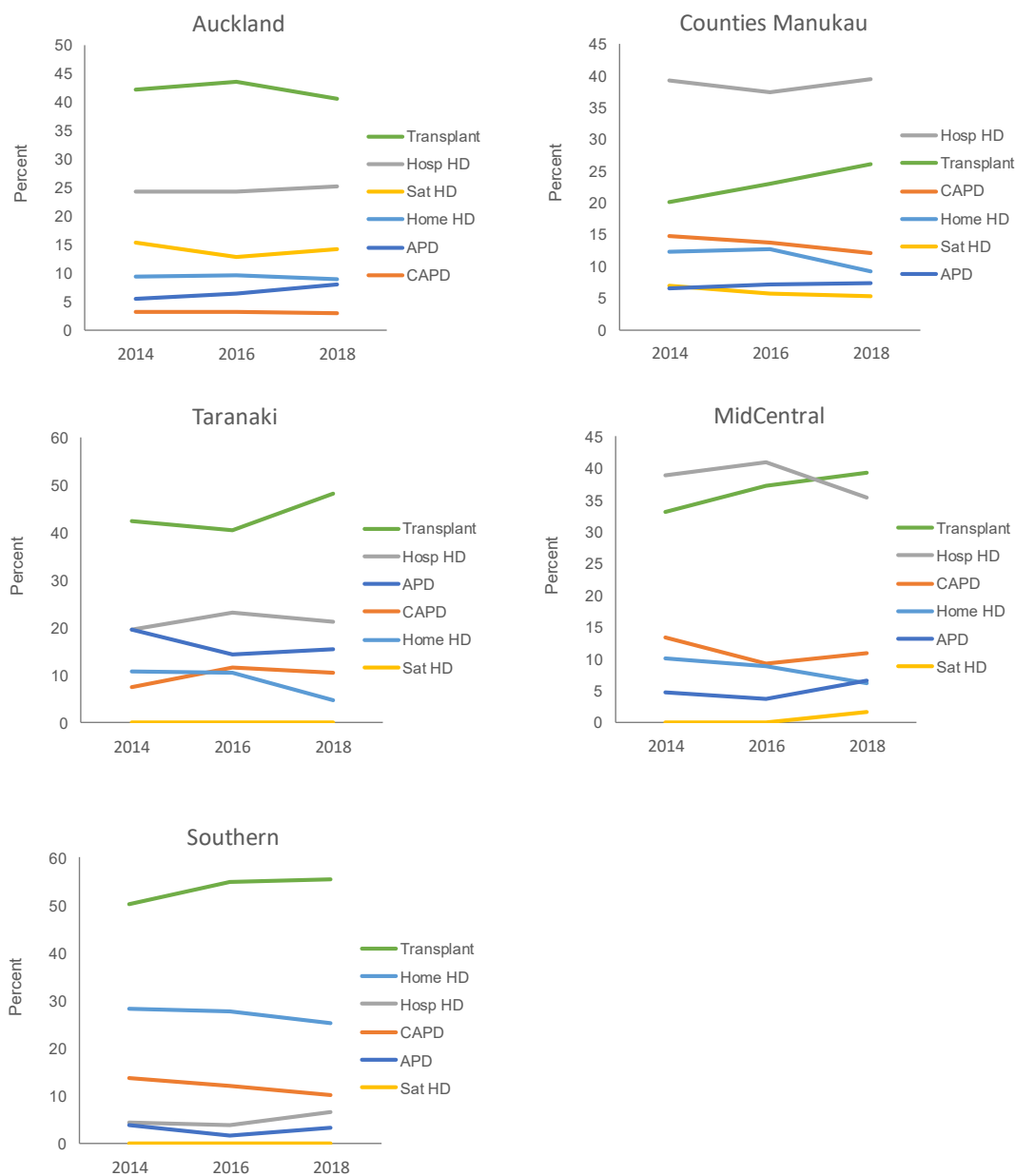
The figure shows the percentage of patients who are treated with each form of dialysis or a kidney transplant as prevalent patients 2014-2018 at each District Health Board. It is notable that many District Health Boards do not provide satellite haemodialysis (supervised haemodialysis at a satellite rather than hospital facility).

In Northland DHB, increasing transplantation and hospital HD prevalence is noted with decreasing home dialysis (especially APD and haemodialysis). At Waitematā DHB, increased transplantation prevalence has occurred, with decreasing hospital haemodialy-

sis. Home haemodialysis has stabilized. Prevalence at Waitematā DHB is stable.

Counties Manukau DHB has a high hospital haemodialysis prevalence and decreased proportion of patients treated with transplant. Waikato has shown increased transplantation prevalence and decreased proportions treated with APD.

Board



Prevalence of treatment modalities at Auckland
 haemodialysis population, increased trans-
 of patients treated with CAPD and home
 d proportions of patients with a transplant
 and home haemodialysis.

Hawke's Bay DHB appears to show increased transplantation and APD prevalence and decreased hospital haemodialysis. Capital and Coast DHB have a high transplantation prevalence and increases in APD prevalence. Southern DHB appears to have a high but decreasing prevalence of home haemodialysis, with an increasing transplantation prevalence and small increase in hospital haemodialysis.

APD = automated peritoneal dialysis, CAPD = continuous ambulatory peritoneal dialysis, Sat = satellite haemodialysis, Hosp HD = hospital haemodialysis.

Late specialist assessment

“First specialist nephrologist assessment occurring within 90 days of starting renal replacement therapy”.

Late assessment prevents timely preparation for renal replacement therapy including placement of dialysis vascular access or peritoneal dialysis catheter and adequate time to prepare for kidney transplantation

Figure: Patients referred late to specialist nephrology services by DHB

The frequency of late referral to specialist services varies across DHBs. Counties Manukau, Waikato, Hawke’s Bay and Southern appear to have decreasing proportions of patients referred late to nephrology services. Canterbury, Northland and MidCentral appear to have increasing rates.

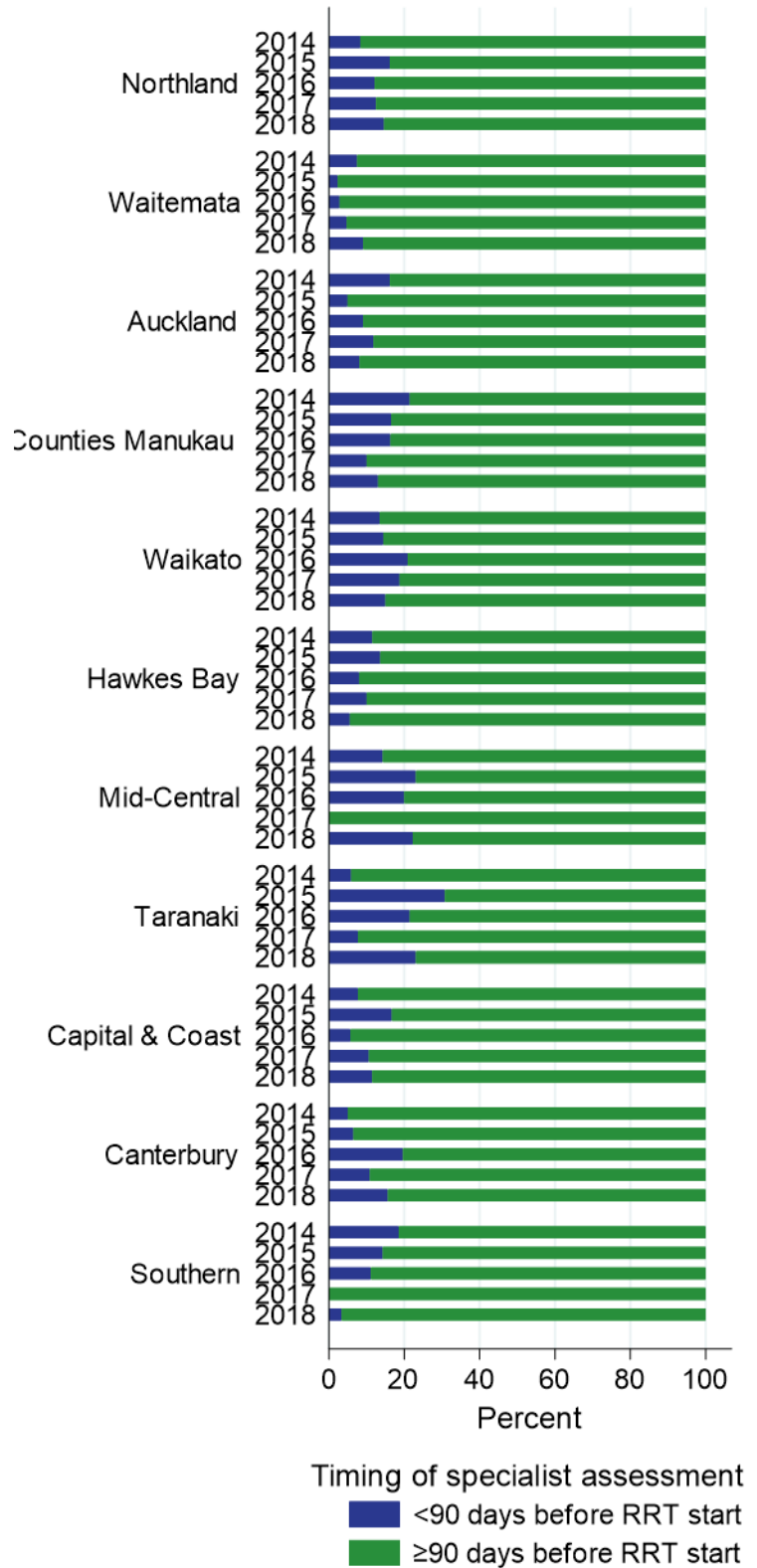


Table: Patients referred late to nephrology services, by ethnicity shown as percentage

Year	European	Māori	Pacific	Asian
2014	13	8	20	18
2015	15	16	11	2
2016	14	13	18	11
2017	12	14	9	8
2017	12	14	9	8

The proportion of Māori patients who are referred to nephrology specialist services within 3 months of commencing dialysis appears high and not decreasing.

Table: Patients referred late to specialist nephrology services by age group

Year	Age	% referred late
2014	0-24	35
	25-44	16
	45-64	11
	65-84	14
	85+	25
2015	0-24	29
	25-44	12
	45-64	13
	65-84	13
	85+	.
2016	0-24	25
	25-44	24
	45-64	13
	65-84	10
	85+	20
2017	0-24	38
	25-44	15
	45-64	11
	65-84	7
	85+	100
2018	0-24	18
	25-44	23
	45-64	13
	65-84	7
	85+	0

Younger patients (aged 24 years or younger) are at higher risk of late referral to specialist services. In 2018, patients in the 25-44 year age group appears to have a higher rate of late referral to specialist services prior to commencing dialysis.

Transplantation

Number of kidney transplants by donor source in New Zealand

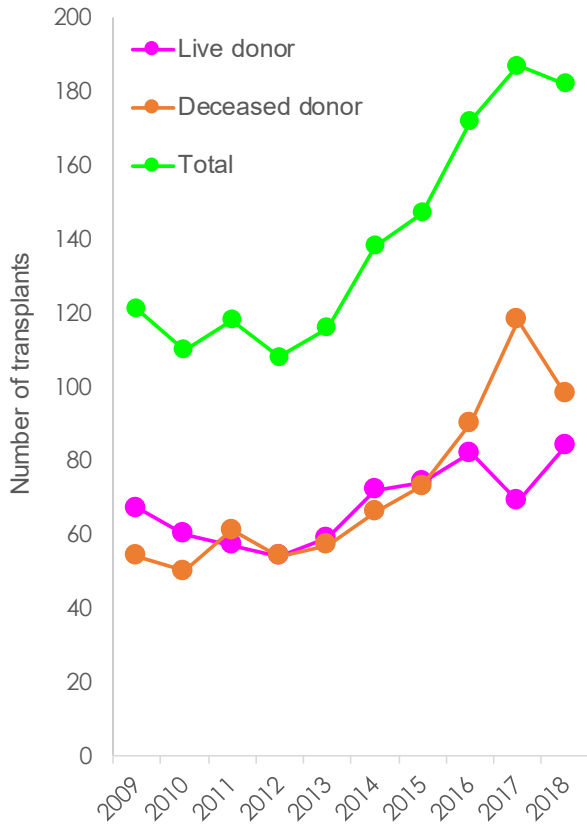


Figure: Kidney transplants by donor and overall in New Zealand 2009-2018

182 patients received a kidney transplant in New Zealand in 2018. Patients received 84 live donor and 98 deceased donor transplants. One deceased donor recipient received a dual transplant (two kidneys)

Deceased donor kidney transplants have exponentially increased since 2013-2014. This is likely to relate to quality improvements in processes in critical care settings throughout New Zealand.

The transplantation rate in New Zealand in 2018 was 37.2 per million, slightly lower than the highest recorded in 2017 of 39.0 per million.

The transplantation rate is growing at substantially faster rate than population growth, and compares with only 26 kidney transplants per million in 2013.

There were more live donor transplants recorded in a single year (84), higher than the previous highest in 2016 (82).

Number of patients active on kidney transplant waiting list

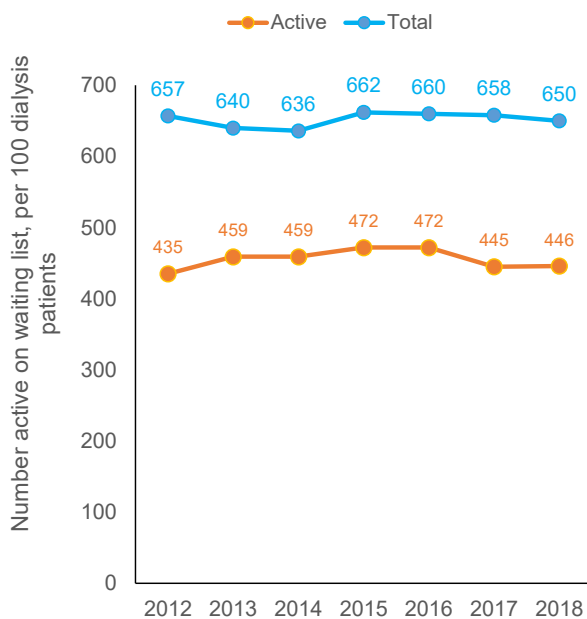


Figure: Active on the deceased donor kidney transplant waiting list in New Zealand 2012-2018

446 patients were active on the kidney transplant waiting list at 15 January 2019. 650 patients were on the overall waiting list at that date and 204 patients were temporarily suspended from the waiting list.

Transplantation

ABO incompatible, kidney exchange, multiorgan, and non-directed donor kidney transplantation

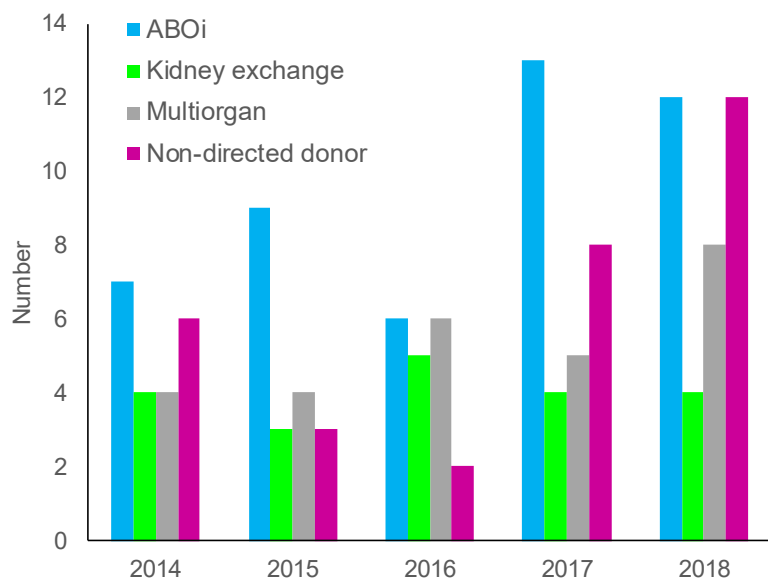


Figure: Sources of kidney transplantation in 2018

12 patients received an ABO incompatible kidney transplant (10 at Auckland and 2 at Christchurch). 4 patients received a kidney transplant in the kidney exchange program. 8 patients had a multiorgan transplant that included a kidney transplant at Auckland DHB.

12 donors provided a non-directed donor kidney transplant.

Transplants by sex and ethnicity, shown as number per million of population

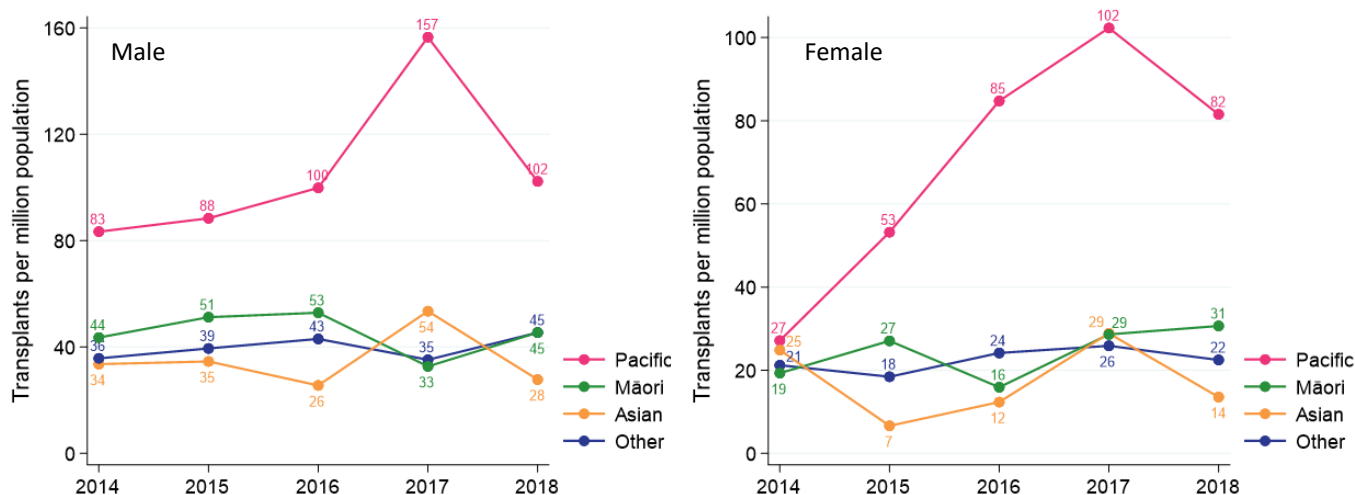


Figure: Incidence of kidney transplantation per million by sex and ethnicity in 2018

Pacific men and women had a lower kidney transplantation rate in 2018 compared to previous years. Both Māori men and women have a low kidney transplantation rate proportional to the incidence of kidney failure.

Transplantation

Kidney transplantation by District Health Board

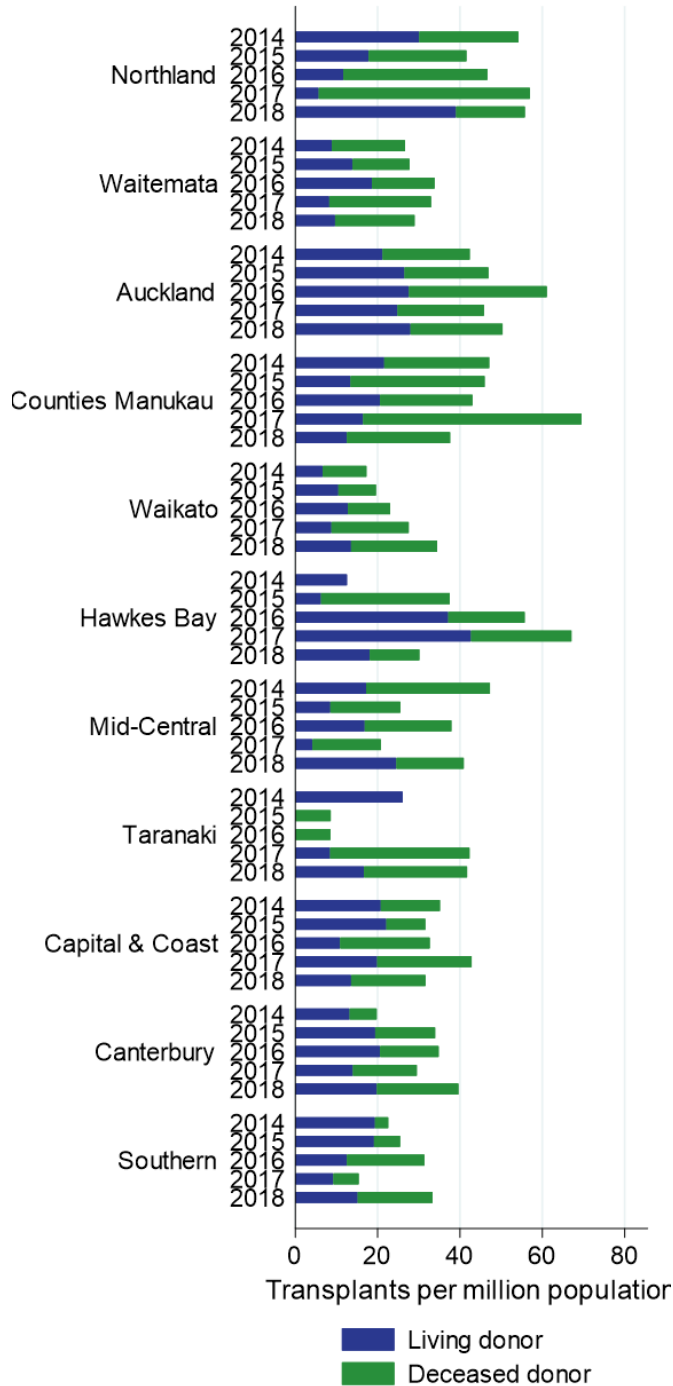


Figure: Number of kidney transplants per million of population at DHBs

All units had a kidney transplantation rate of more than 30 per million in 2018. Northland DHB had a higher live donor rate in 2018 than previous years and continues to have one of the highest transplantation rates in the country (56 per million). Waikato DHB has shown year on year increases in kidney transplantation, achieving a populations rate similar to the national average. Hawke’s Bay continues to have a high live donor transplant rate. Increased transplantation at Taranaki DHB due to deceased donor kidney transplantation has been sustained over 2 consecutive years (42 per million overall).

Transplantation

Immunosuppression

Antibody use for induction immunosuppression

Table: Antibody use for induction immunosuppression 2014-2018; number of kidney transplant recipients receiving each agent by year (% of new transplants)

Type of agent	2014	2015	2016	2017	2018
Intravenous immunoglobulin	-	1 (0.7%)	-	-	-
Anti-CD25	133 (96.4%)	142 (96.6%)	167 (97.1%)	185 (98.9%)	182 (100.0%)
Rituximab	9 (6.5%)	9 (6.1%)	5 (2.9%)	11 (5.9%)	10 (5.5%)
T cell depleting polyclonal Ab	2 (1.4%)	1 (0.7%)	6 (3.5%)	7 (3.7%)	2 (1.1%)
Other	-	1 (0.7%)	-	-	1 (0.5%)
Not reported	-	-	1 (0.6%)	-	-
Total new transplants	138	147	172	187	182

Rejection rates at six months after transplantation

Table: Rejection rates at six months post transplant 2008-2017

Donor Type	Graft Number	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Living donor	First	16.7%	15.3%	20.3%	11.5%	16.3%	10.5%	26.9%	23.5%	16.0%	17.7%
	Living donor Second and subsequent	33.3%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	16.7%	14.3%	0.0%
Deceased donor	First	22.2%	32.0%	33.3%	13.8%	10.0%	5.6%	18.6%	10.8%	7.5%	15.2%
	Deceased donor Second and subsequent	0.0%	0.0%	0.0%	33.3%	25.0%	0.0%	57.1%	12.5%	10.0%	16.7%

Antibody mediated rejection rates at six months after transplantation

Table: Antibody-mediated rejection rates at six months after kidney transplantation

Donor Type	Graft Number	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Living donor	First	1.5%	0.0%	0.0%	0.0%	2.0%	0.0%	1.5%	0.0%	0.0%	0.0%
	Living donor Second and subsequent	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Deceased donor	First	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	1.7%	1.5%	0.0%	0.0%
	Deceased donor Second and subsequent	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%

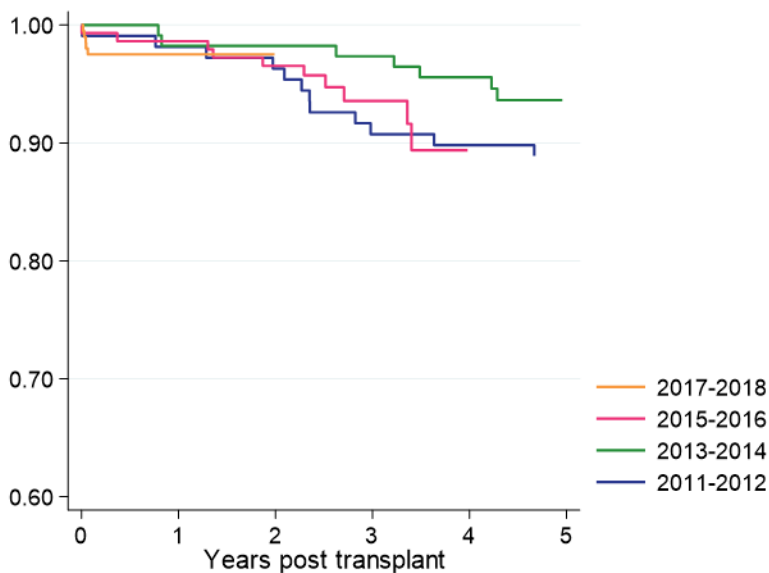
All kidney transplant recipients in New Zealand received anti-CD25 agent for induction of immunosuppression in 2018. 17.7% recipients had rejection in the first six months after their first live donor kidney transplant. 15.2% recipients had rejection in the first six months after their deceased donor transplant. No recipient had antibody-mediated rejection at six months after a kidney transplanted in 2017.

Transplantation

Survival—deceased donor

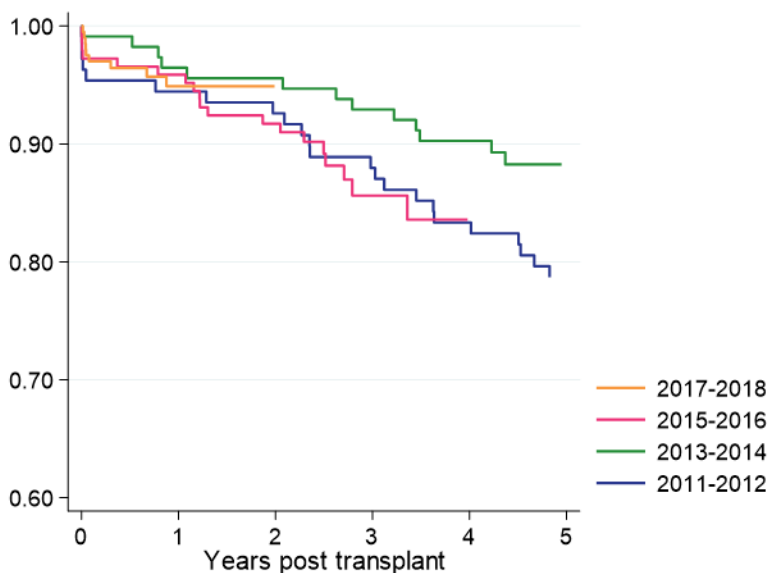
Table: Primary deceased donor transplants—2011-2018

Outcome	Era	1 month	6 months	1 year	5 years
Patient survival	2011-2012 (n=108)	99 (94, 100)	99 (94, 100)	98 (93, 100)	89 (81, 94)
	2013-2014 (n=113)	100	100	98 (93, 100)	94 (87, 97)
	2015-2016 (n=145)	99 (95, 100)	99 (95, 100)	99 (95, 100)	-
	2017-2018 (n=201)	98 (94, 99)	98 (94, 99)	98 (94, 99)	-
Graft survival	2011-2012 (n=108)	95 (89, 98)	95 (89, 98)	94 (88, 97)	79 (70, 85)
	2013-2014 (n=113)	99 (94, 100)	99 (94, 100)	96 (91, 99)	88 (81, 93)
	2015-2016 (n=145)	97 (93, 99)	97 (92, 99)	96 (91, 98)	-
	2017-2018 (n=201)	97 (93, 99)	96 (93, 98)	95 (90, 97)	-



Patient survival

The graphic shows the patient survival after a first deceased donor kidney transplant in New Zealand. 98% of recipients survived to 1 year and 94% survived to 5 years.



Graft survival

The graphic shows the graft survival after a deceased donor kidney transplant in New Zealand. This is the number of patients who have a functioning transplant.

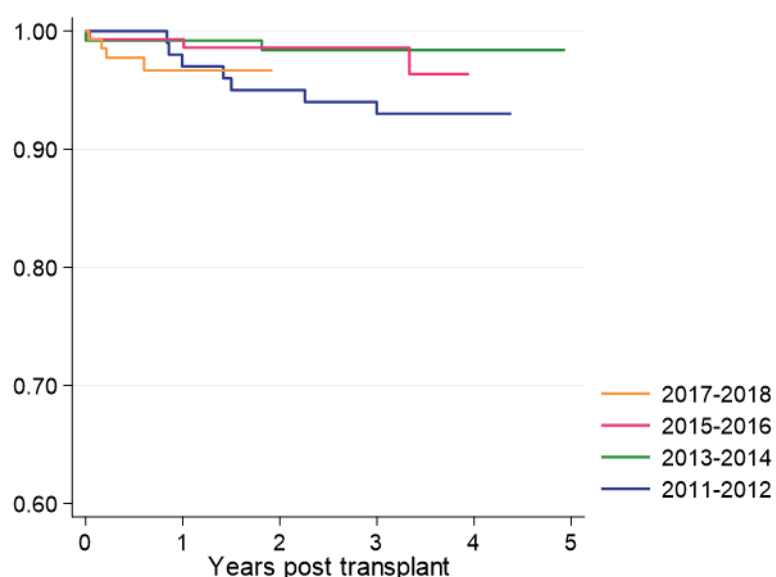
At 5 years after a deceased donor kidney transplant in 2011-2012 in New Zealand, 79% of patients had a functioning transplant. 95% of recipients of a kidney transplant from 2017-2018 had a functioning transplant at 1 year.

Transplantation

Survival—live donor

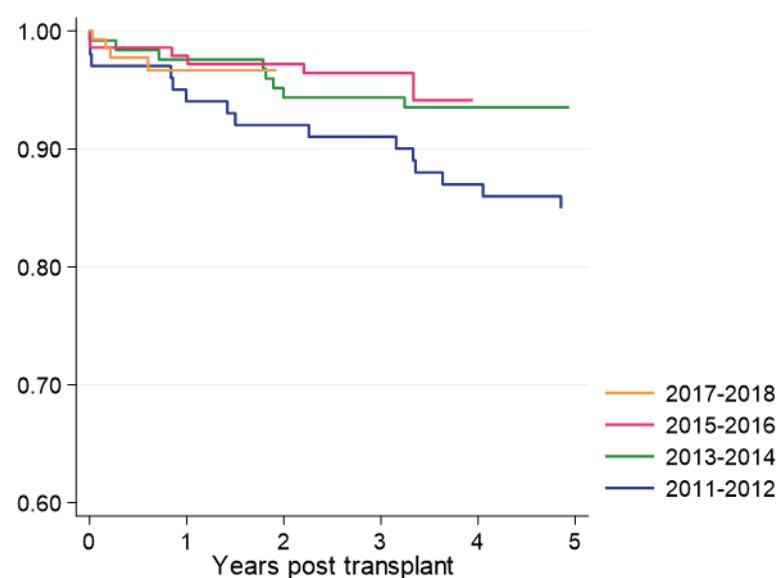
Table: Primary live donor transplants—2011-2018

Outcome	Era	1 month	6 months	1 year	5 years
Patient survival	2011-2012 (n=101)	100	100	97 (91, 99)	93 (86, 97)
	2013-2014 (n=124)	99 (94, 100)	99 (94, 100)	99 (94, 100)	98 (94, 100)
	2015-2016 (n=143)	99 (95, 100)	99 (95, 100)	99 (95, 100)	-
	2017-2018 (n=143)	99 (95, 100)	98 (93, 99)	97 (91, 99)	-
Graft survival	2011-2012 (n=101)	97 (91, 99)	97 (91, 99)	94 (87, 97)	85 (76, 91)
	2013-2014 (n=124)	99 (94, 100)	98 (94, 100)	98 (93, 99)	94 (87, 97)
	2015-2016 (n=143)	99 (95, 100)	99 (95, 100)	98 (94, 99)	-
	2017-2018 (n=143)	99 (95, 100)	98 (93, 99)	97 (91, 99)	-



Patient survival

The graphic shows the patient survival after a live donor kidney transplant in New Zealand. Approximately 93% of patients receiving a live donor kidney transplant in 2011-2012 survived for at least 5 years and 97% survived 1 year after a primary live donor kidney transplant after transplantation in 2017-2018.



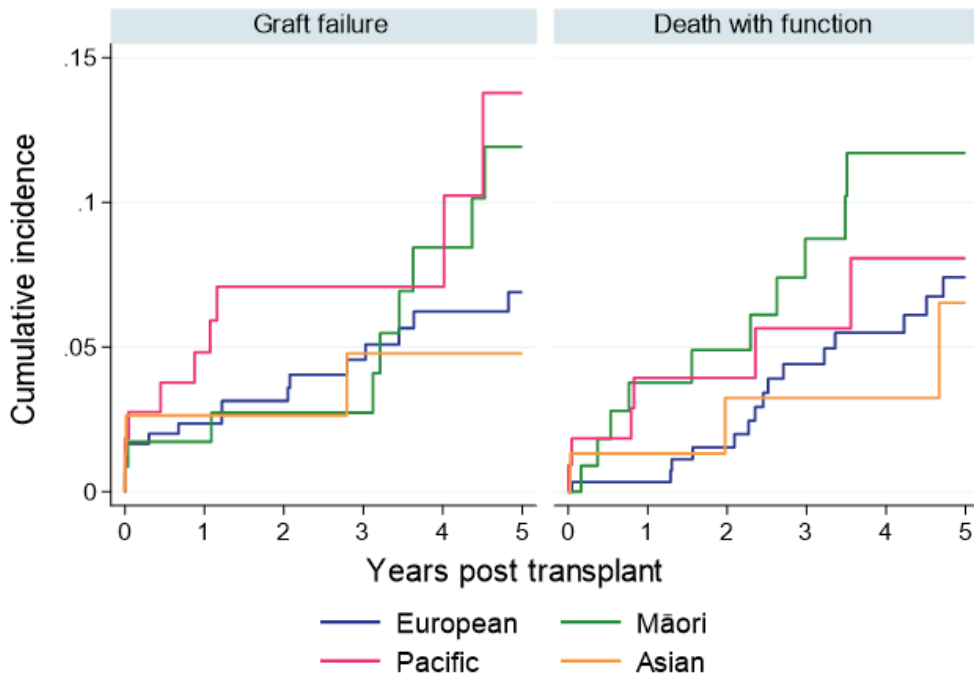
Graft survival

The graphic shows the graft survival after a live donor kidney transplant in New Zealand. This is the number of patients who have a functioning transplant. At 5 years after a first live donor kidney transplant in 2011-2012 in New Zealand, 85% of patients have a functioning transplant. 97% have a functioning a graft at 1 year after a primary live donor kidney transplant in 2017-2018.

Transplantation

Survival—by ethnicity

Transplant outcomes of primary deceased donor kidney-only transplants 2009-2018



The graphic shows the incidence of transplant failure and patient death (with a functioning kidney transplant) for deceased donor kidney only transplants in New Zealand between 2009-2018. Māori and Pacific patients appear to have a high risk of graft failure beyond 3 years after kidney transplantation.

Haemodialysis

Trends in haemodialysis in New Zealand 2014-2018

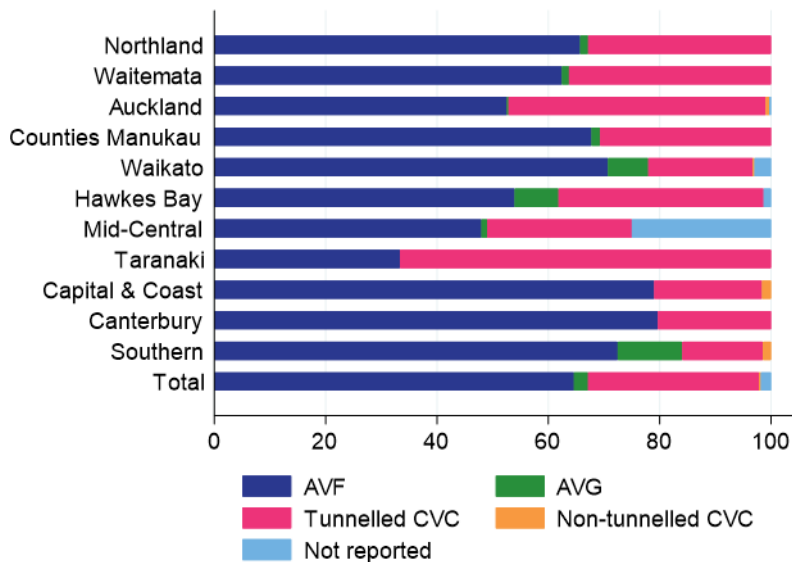
	2014	2015	2016	2017	2018
All patients who commenced HD					
First dialysis treatment or returning after renal recovery	353	322	345	373	357
Transfer from PD (no prior HD)	89	100	106	77	96
Transfer from PD (prior HD)	57	77	60	44	64
Failed Transplant (no prior HD)	5	7	9	7	10
Failed Transplant (prior HD)	25	15	15	21	21
Total	529	521	535	522	548
All patients who ceased HD					
Received kidney transplant	67	76	93	96	81
Transfer to PD	124	111	131	122	124
Renal recovery	10	9	7	15	14
Deaths	225	278	288	299	274
Total	426	474	519	532	493
Total patients on HD at 31 December	1870	1919	1934	1917	1978
Patients on HD at home at 31 December (% of all HD patients)	489 (26.1%)	484 (25.2%)	469 (24.3%)	441 (23.0%)	422 (21.3%)

The table shows the trends in haemodialysis treatment in New Zealand between 2014 and 2018. Dialysis modality changes lasting less than 30 days are not included.

Haemodialysis

Vascular access

Prevalent haemodialysis vascular access in 2018



The Tier 2 specification for haemodialysis vascular access suggests that at least 70% of prevalent patients treated with haemodialysis have permanent vascular access (either an arteriovenous fistula or a graft).

The national standard of 70% of prevalent haemodialysis patients **was not achieved** (67%) in 2018.

Notably, Taranaki District Health Board has a permanent access prevalence of substantially <40%, which has been noted in previous years, and warrants examination of local vascular access processes and services. MidCentral DHB has a low prevalence of permanent vascular access and a substantial proportion of missing data.

Haemodialysis

Vascular access

Incident haemodialysis vascular access in 2018 (excluding patients who are referred late to specialist services)

The national standard for dialysis vascular access at the time a patient permanently started haemodialysis is 80% of all patients with an arterio-venous fistula or graft, excluding those patients who were referred to specialist services within the previous 90 days.

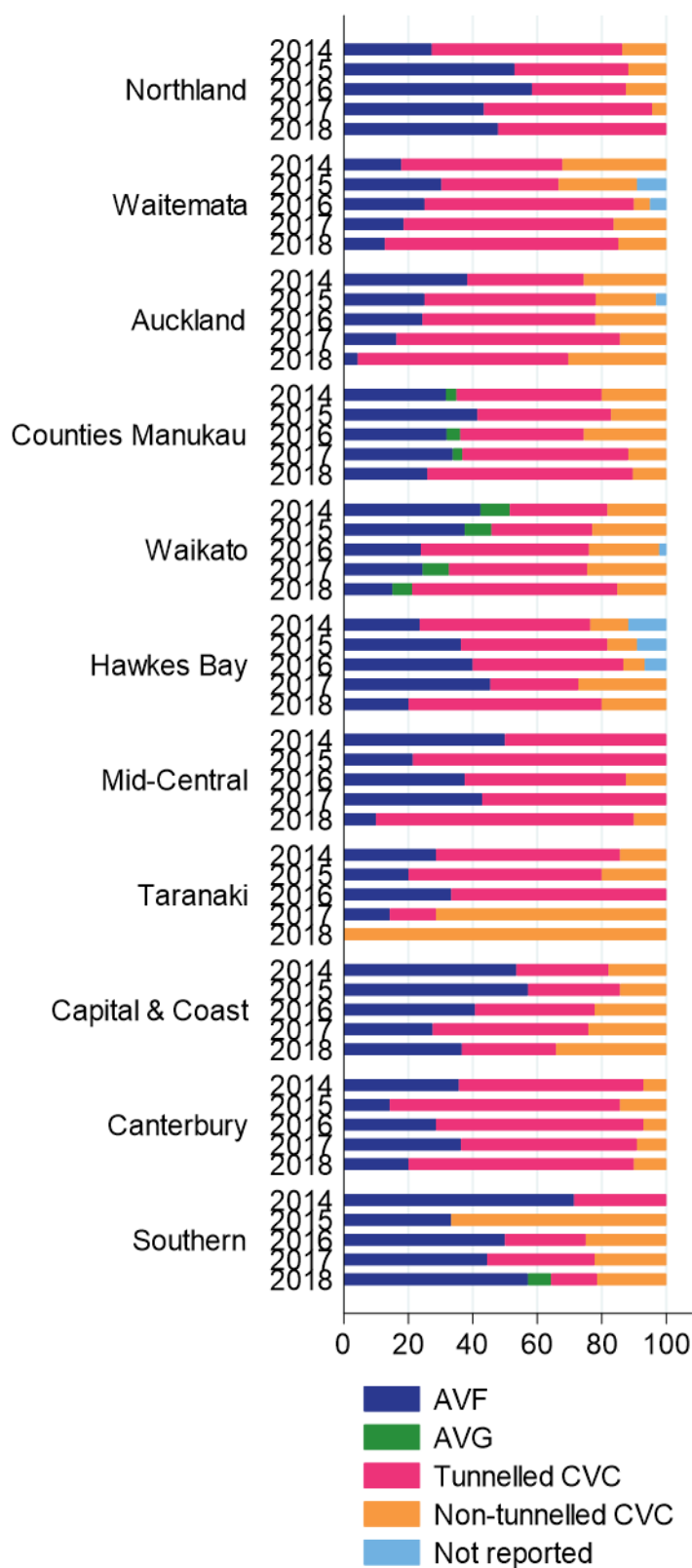
This standard has not been met by all District Health Boards repeatedly.

Tunnelled dialysis vascular catheters are the most frequent form of dialysis access at start of haemodialysis at all centres. No patient at Taranaki DHB had permanent dialysis at dialysis start.

Notably, reporting is generally complete and has improved at the Hawke's Bay District Health Board.

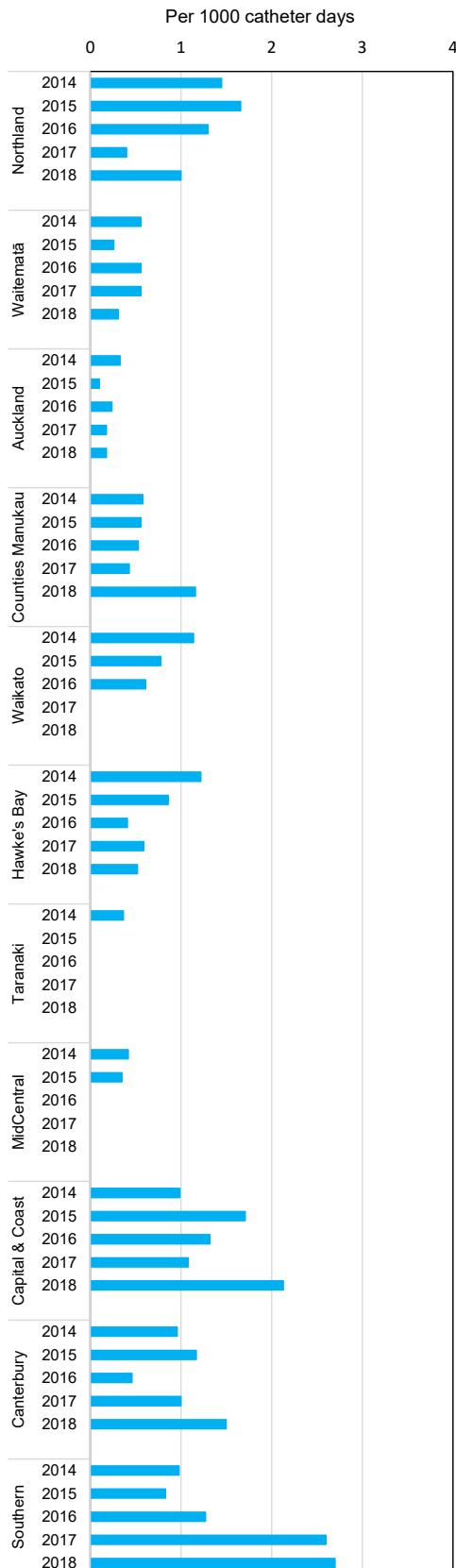
The proportion of patients commencing haemodialysis with a fistula has decreased markedly at Auckland, Waikato, Capital and Coast, MidCentral and Taranaki DHBs.

A national or regional response is recommended including review of the tier 2 specification standard.



Haemodialysis

Catheter-associated blood stream infections



The rate of central-line associated blood stream infections (CLABSI) for each District Health Board is shown. This is an important quality measure as it reflects several intersecting dialysis unit practices including handwashing, dressing policies and procedures, adherence to protocols, patient education, and wider dialysis unit quality and safety practices.

The CLABSI rate is provided by each District Health Board unit on request each year. Three DHBs did not supply data for 2018.

Auckland DHB has a sustained low rate. Hawke's Bay DHB has sustained their recent improvements. Counties Manukau has shown progressive year or year decreases.

Capital and Coast DHB, Canterbury DHB and Southern DHB have a somewhat higher rate than other DHBs.

Haemodialysis

Duration

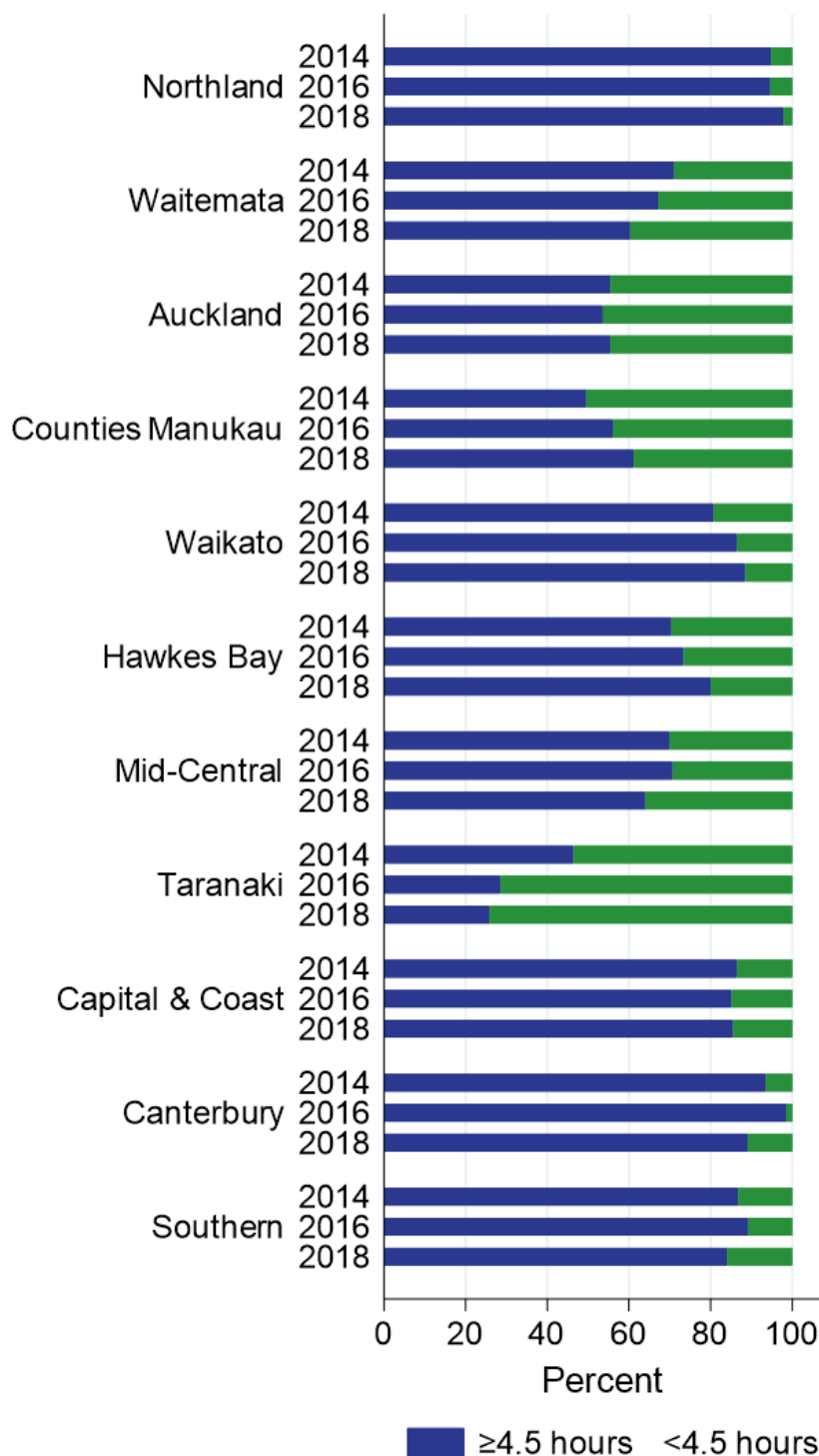
Duration of haemodialysis sessions by District Health Board

The proportion of haemodialysis patients who receive at least 4.5 hours per dialysis session at each District Health Board is shown.

Northland, Waikato, Hawke's Bay, Capital and Coast, Canterbury, and Southern District Health Boards provide at least 4.5 hours of haemodialysis for over 80% of their patients.

The proportion of adequate hours dialysis has fallen markedly at Taranaki District Health Board and is now provided to <25% of patients. The rate is decreasing at MidCentral DHB.

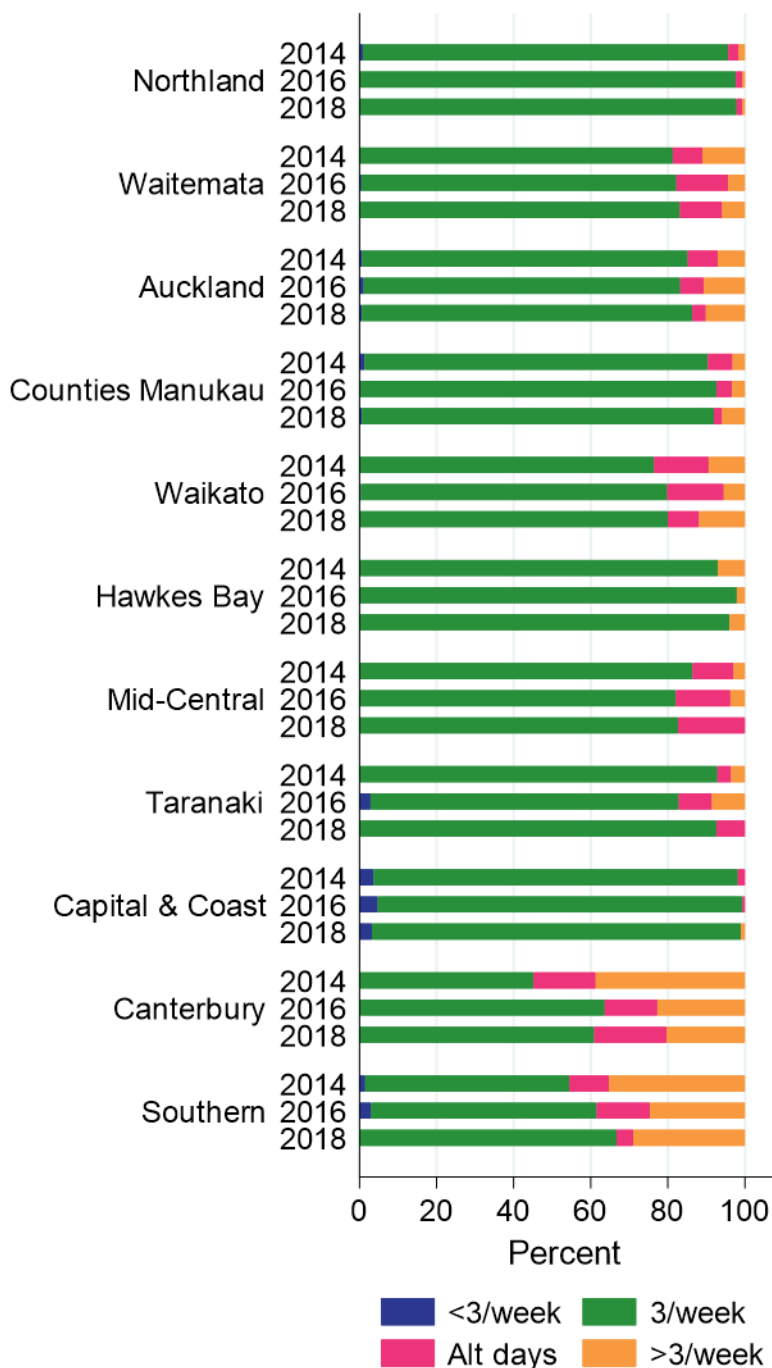
Auckland and Counties Manukau District Health Boards provide at least 4.5 hours per dialysis session in <60% of patients.



Haemodialysis

Frequency

Haemodialysis frequency by District Health Board



All patients in New Zealand received 3 or more sessions of haemodialysis each week.

Notably, alternate day haemodialysis is infrequent. Haemodialysis performed on >3 sessions per week appears to be highest in the southernmost District Health Boards which have a higher prevalence of home based dialysis.

Haemodialysis

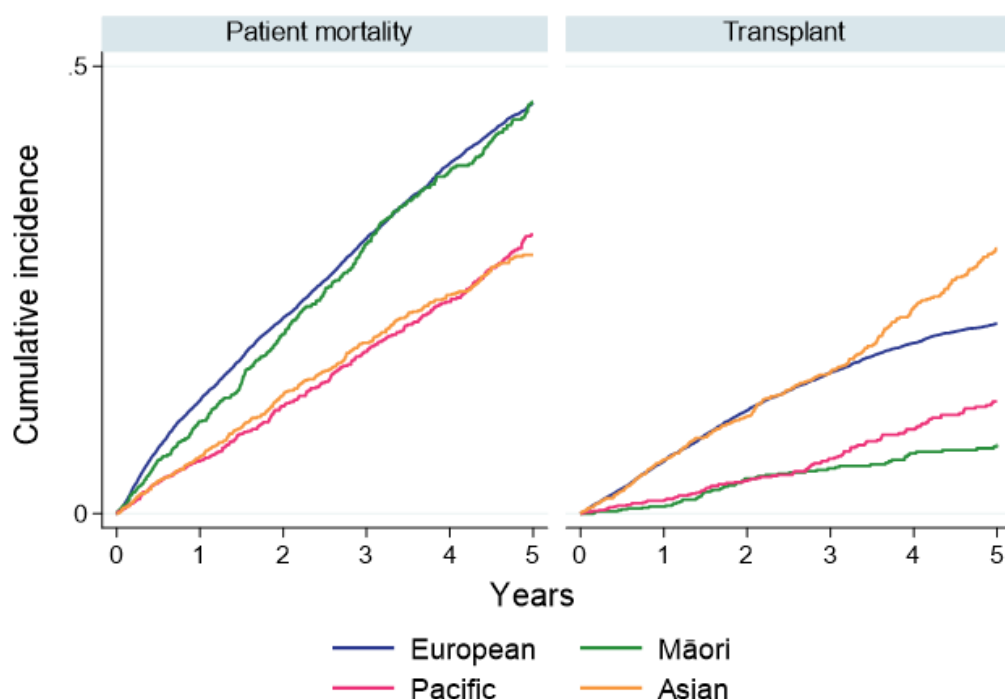
Survival

Patient survival on haemodialysis by age group (censored for transplant)

Table: Patient survival by age group from haemodialysis start—censored for a kidney transplant 2007-2018 [95% confidence interval]

Age Group	Number of Patients	Survival			
		6 months	1 year	3 years	5 years
<40 years	489	99 [97, 99]	96 [93, 98]	89 [84, 92]	79 [72, 84]
40-59 years	1662	95 [94, 96]	93 [91, 94]	79 [76, 82]	62 [58, 65]
60-74 years	1527	92 [91, 94]	87 [85, 89]	63 [60, 66]	45 [41, 49]
≥75 years	393	85 [81, 88]	75 [70, 80]	44 [38, 50]	20 [15, 26]

Patient survival on haemodialysis by ethnicity (censored for transplant) and transplantation



There are different rates of survival on haemodialysis based on ethnicity. These are likely in part to relate to patient characteristics such as age (European patients on dialysis tend to be older), and burden of disease including diabetes and vascular disease (higher for Māori and Pacific patients). European and Asian patients are markedly more likely to be transplantation during dialysis treatment. Māori experience the highest dialysis mortality and lowest transplantation rates during the first 5 years of dialysis.

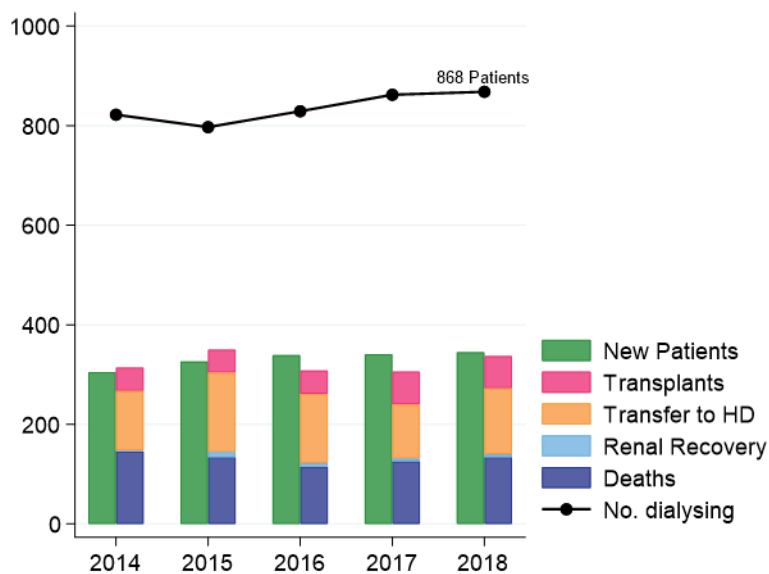
Peritoneal dialysis

Patterns of peritoneal dialysis use in New Zealand, 2014-2018

Table: Peritoneal dialysis patients in New Zealand 2014-2018

	2014	2015	2016	2017	2018
All patients who commenced PD					
First dialysis treatment or returning after renal recovery	192	222	216	225	227
Transfer from HD (no prior PD)	90	85	96	96	83
Transfer from HD (prior PD)	18	12	15	18	20
Failed Transplant (no prior PD)	2	4	4	1	8
Failed Transplant (prior PD)	3	3	8	1	7
Total	305	326	339	341	345
All patients who ceased PD					
Received kidney transplant	47	46	47	66	65
Transfer to HD	119	160	139	109	132
Renal recovery	2	10	7	5	6
Deaths	146	134	115	126	134
Total	314	350	308	306	337
Total patients on PD at 31 December	822	797	829	862	868

Figure: Peritoneal dialysis patients in New Zealand 2014-2018



305 patients started peritoneal dialysis in 2018. In total, 868 patients were treated with peritoneal dialysis in New Zealand at 31 December 2018.

Of the 337 patients that discontinued peritoneal dialysis, 39% were transplanted.

Peritoneal dialysis

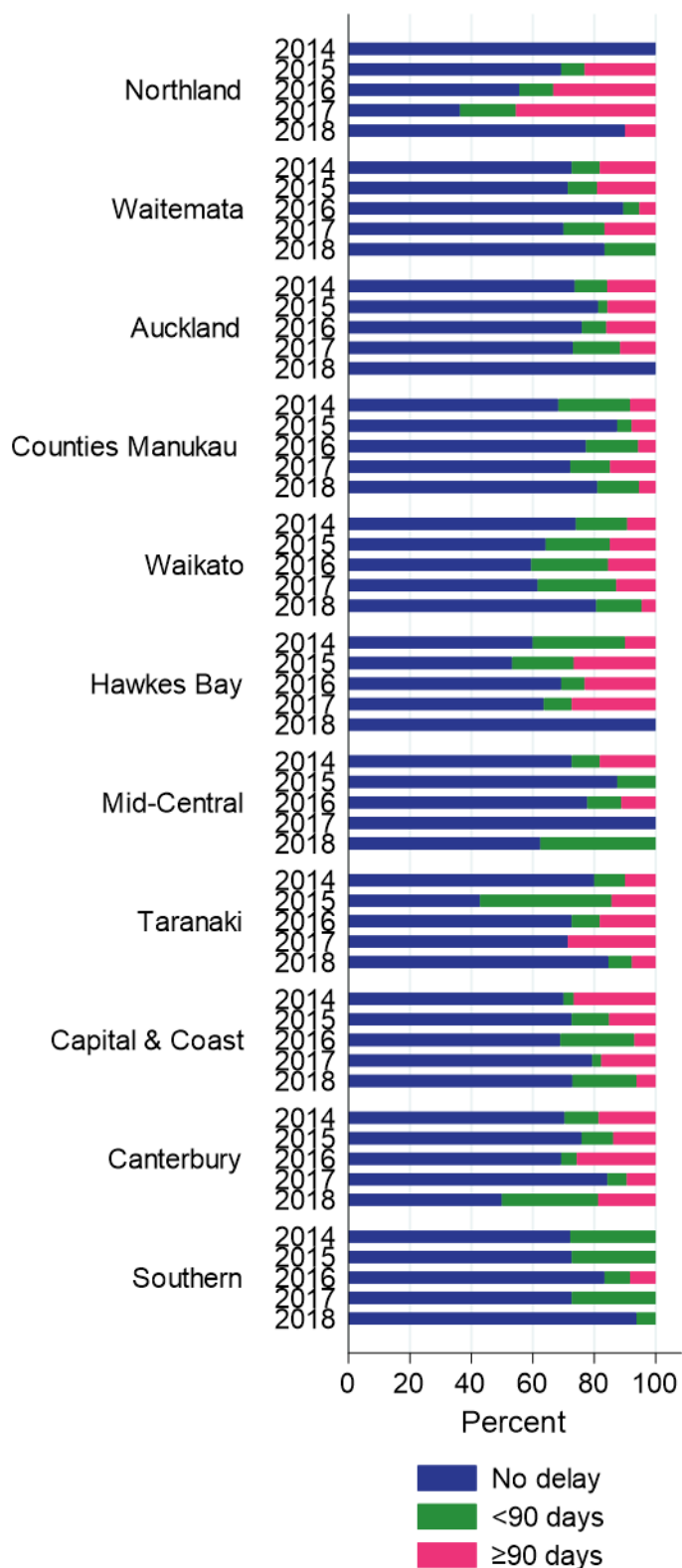
Delay in starting peritoneal dialysis

Patients who have chosen peritoneal dialysis as their preferred modality may require haemodialysis first. This is referred to as a delay in starting peritoneal dialysis. Delay can be due to late referral to dialysis services, technical issues with a PD catheter or delays in insertion of a PD catheter.

Delay is measured as up to 90 days after starting dialysis and beyond 90 days.

Delay in starting PD was substantially improved in 2018 at Northland, Auckland, Waikato, Hawke's Bay and Taranaki DHBs.

Increasing delays in starting peritoneal dialysis emerged in 2018 at Canterbury DHB.



Peritoneal dialysis

Peritoneal dialysis infection

Primary PD peritonitis rate per patient-year by District Health Board in 2018

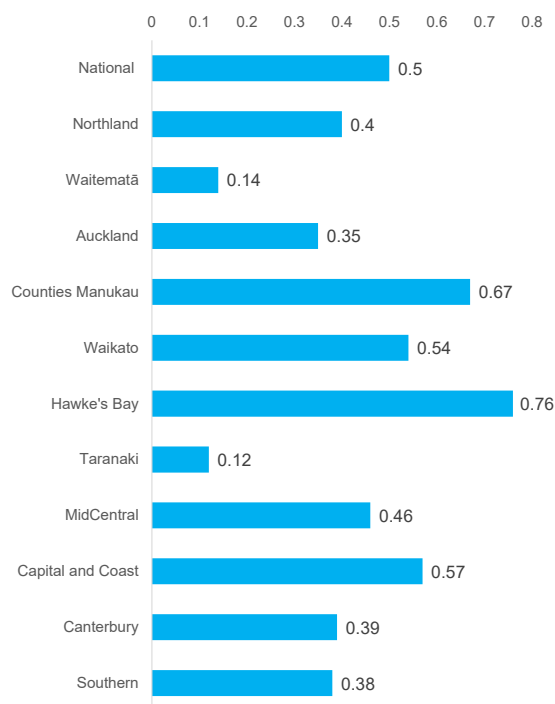


Figure: Primary PD peritonitis rate measured as per patient treated for a year.

There were 425 episodes of primary PD peritonitis in 2018 in NZ. There were 13 episodes of PD peritonitis that were a relapse or a recurrence of a previous infection.

The PD peritonitis rate varies by District Health Board from 0.76 per patient-year on dialysis at Hawke's Bay to 0.12 at Taranaki.

Seven DHBs (Northland, Waitematā, Auckland, Taranaki, MidCentral, Canterbury, and Southern) had peritonitis rates lower than ISPD guideline recommendations.

The ISPD guidelines recommend each PD centre has a continuous quality improvement (CQI) program in place to reduce peritonitis rates.

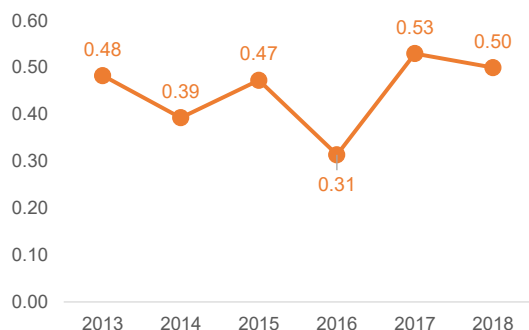


Figure: New Zealand PD peritonitis rate measured as episodes per patient each year. The national NZ peritonitis rate in 2018 was **0.50**. This is equal to the International Society for Peritoneal Dialysis (ISPD) recommendation that the overall peritonitis rate should be no more than 0.5 episodes per year. A rate of 0.50 indicates that a patient will on average experience 1 episode every 2 years of treatment.

Exit-site infection rate by District Health Board, 2018

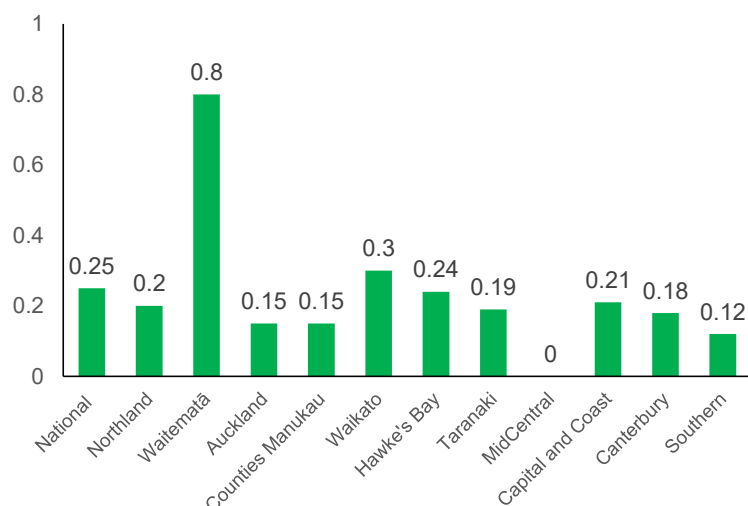


Figure: Exit-site infection by District Health Board in 2018 measured as episode per patient treated with PD for a year.

Exit-site infection rates at DHBs were highly variable. The reasons for variation are not discernible.

Peritoneal dialysis

Outcomes of PD peritonitis

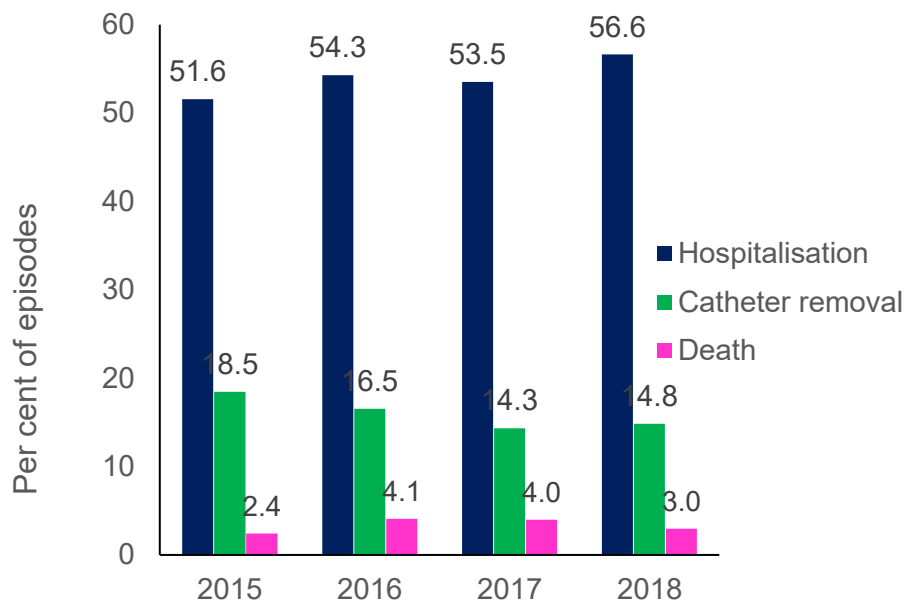


Figure: Percentage of PD peritonitis episodes leading to hospital admission, PD catheter removal and death 2015-2018.

Of the 438 total episodes of PD peritonitis in 2018, 248 episodes (56.6%) resulted in hospitalisation, 77 (4.8%) resulted in removal of the PD catheter and 13 (3%) were associated with death.

Reasons for removal of PD catheter

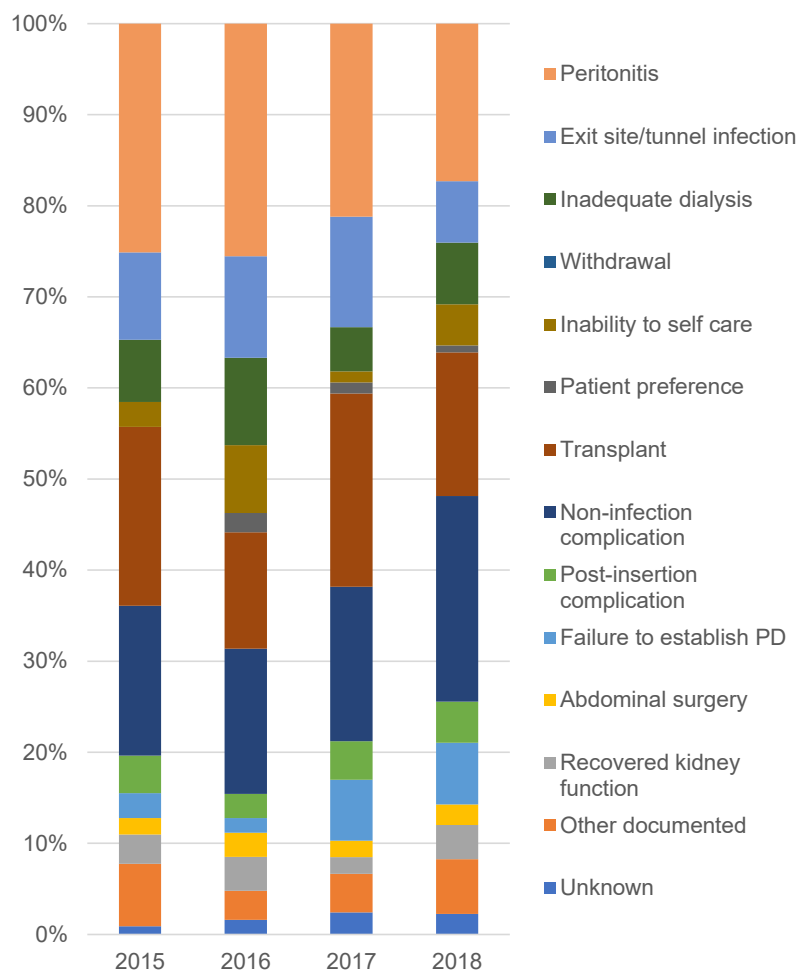


Figure: Reasons for removal of PD catheter 2015-2018.

Overall, 142 PD dialysis catheters were removed in 2018. The most common reason for PD catheter removal was a non-infectious technical complication. Peritonitis was the second most common reason for removal. Transplantation and failure to establish PD were other more frequent reasons for catheter removal.

Peritoneal dialysis

PD catheter outcomes

PD catheter insertion by operator

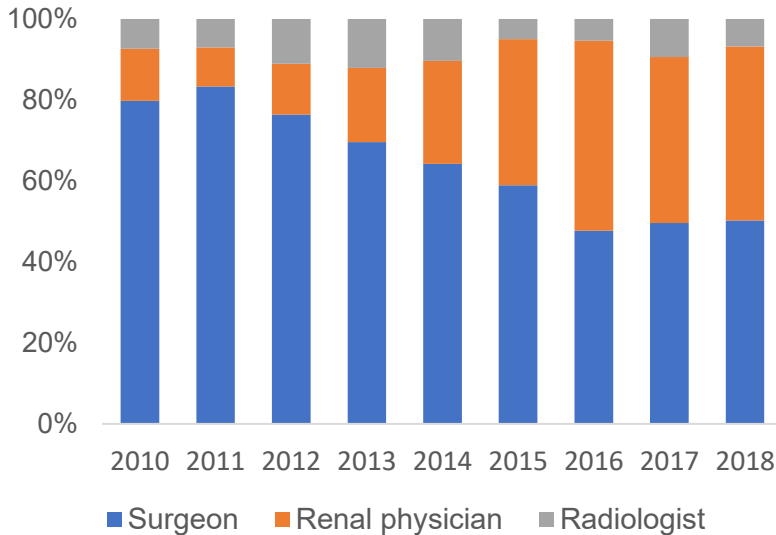


Figure: PD catheter insertion by operator type 2010 to 2018.

PD catheters are inserted by surgeons, radiologists, and nephrologist in NZ. The proportion of catheters inserted by renal physicians increased between 2011 to 2016 and appears to have stabilised. The proportion inserted by renal physicians was 38%, by surgeons was 52% and by radiologist was 10%.

PD catheter survival

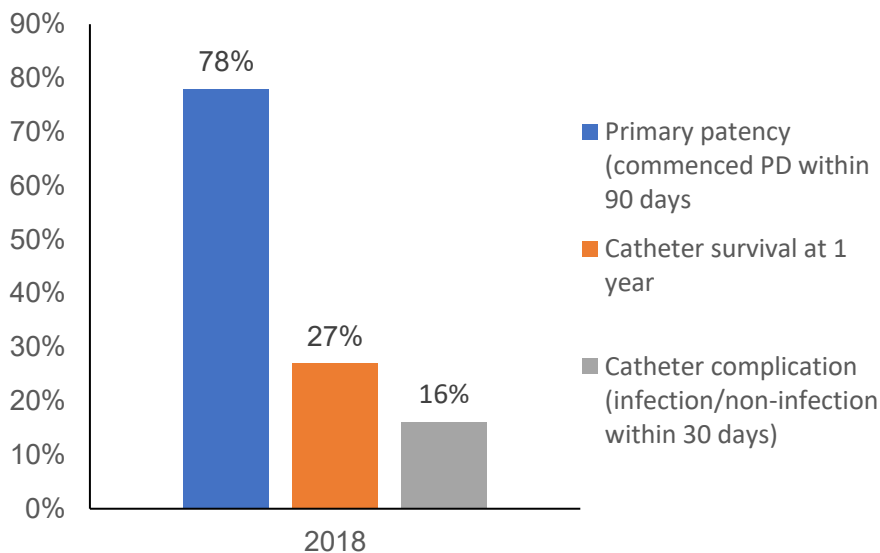


Figure: Complications of PD catheter insertion in 2018

The primary patency for a PD catheter (patient able to commence PD within 90 days) was 78% in 2018.

The catheter survival at 1 year was 27%.

The catheter complication rate measured at 30 days was 16%.

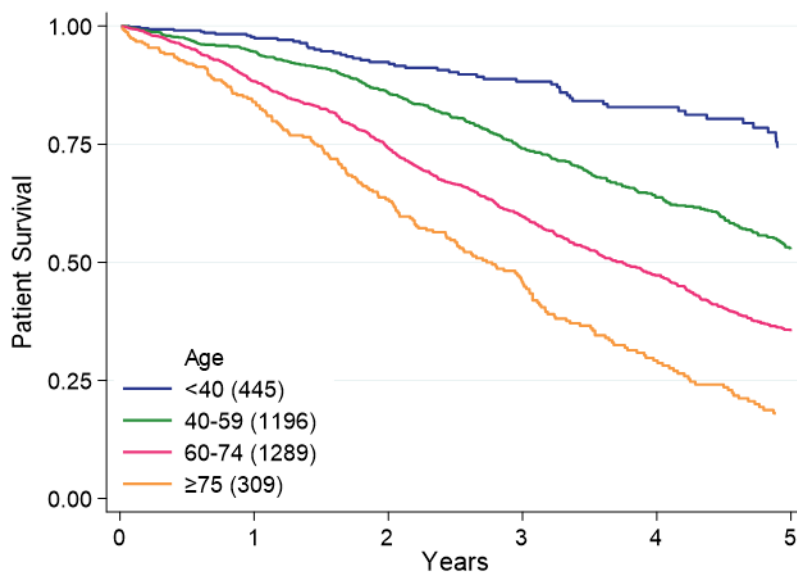
Peritoneal dialysis

Survival

Patient survival on peritoneal dialysis censored for transplant

Table: Patient survival on peritoneal dialysis by age group—peritoneal dialysis within 365 days of kidney replacement therapy start—2007-2018; censored for transplant

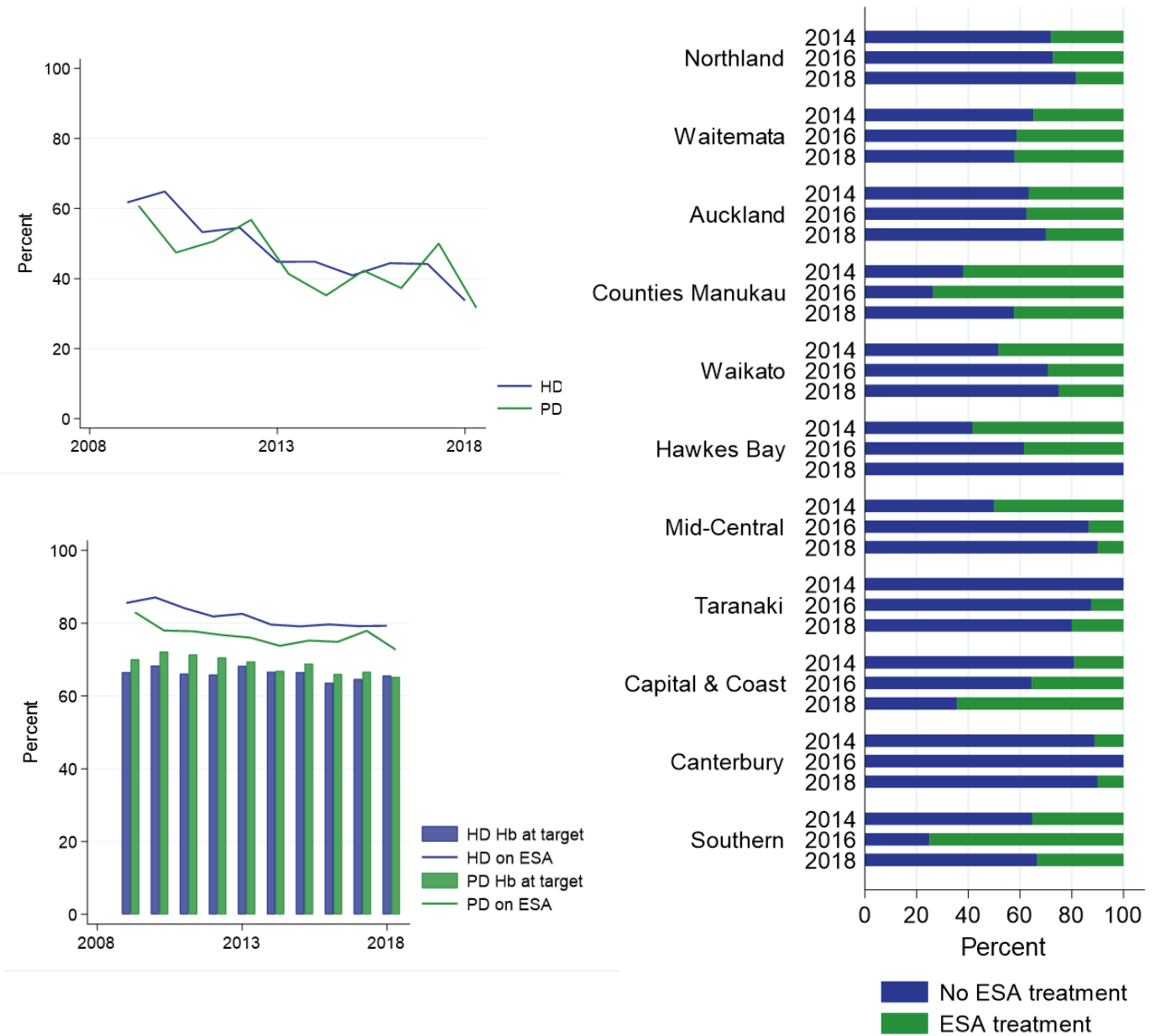
Age Group	Number of Patients	Survival			
		6 months	1 year	3 year	5 year
<40	445	99 [98,100]	98 [96,99]	88 [84,92]	74 [67,81]
40-59	1196	97 [96,98]	95 [93,96]	74 [71,77]	53 [49,57]
60-74	1289	96 [94,97]	88 [86,90]	60 [57,63]	35 [32,39]
≥75	309	92 [88,95]	84 [79,88]	46 [40,52]	18 [13,24]



Survival on peritoneal dialysis is not unexpectedly related to age. People starting peritoneal dialysis at younger than 40 years of age have a 74% survival on dialysis after 5 years, while those over 75 years of age have a 5 year survival of 18%.

Anaemia treatment

Erythropoiesis-stimulating agent (ESA) use among patients with a haemoglobin above 130 g/l



The number of patients with kidney failure who receive treatment with an erythropoiesis-stimulating agent with a haemoglobin level above 130 g/l is progressively decreasing, although remains >30% (top left panel). Canterbury, Hawke's Bay and MidCentral DHBs have the lowest use of an ESA in patients with a haemoglobin >130 g/l, while use in this patient group is increasing at Capital and Coast DHB (top right panel).

80% of patients on haemodialysis have a haemoglobin level at target (100-120 g/l). Approximately 70% of dialysis patients receive treatment with an erythropoiesis-stimulating agent (lower left panel)

Overall survival

Table: Survival among people who commenced kidney replacement therapy in New Zealand 2009-2018

Age at RRT start	Years	Survival
0-24	1	97 (94, 99)
	2	94 (89, 97)
	5	91 (85, 95)
25-44	1	96 (95, 97)
	2	92 (90, 94)
	5	79 (75, 82)
45-64	1	94 (93, 95)
	2	86 (84, 87)
	5	59 (57, 62)
65-74	1	87 (85, 89)
	2	74 (71, 77)
	5	38 (34, 41)
75-84	1	83 (79, 86)
	2	66 (61, 70)
	5	20 (16, 25)
85+	1	76 (56, 88)
	2	47 (28, 64)
	5	9 (2, 24)

Overall survival for New Zealand patients who started kidney replacement therapy in the period 2009 to 2018 is shown. These data are not censored for a kidney transplant.

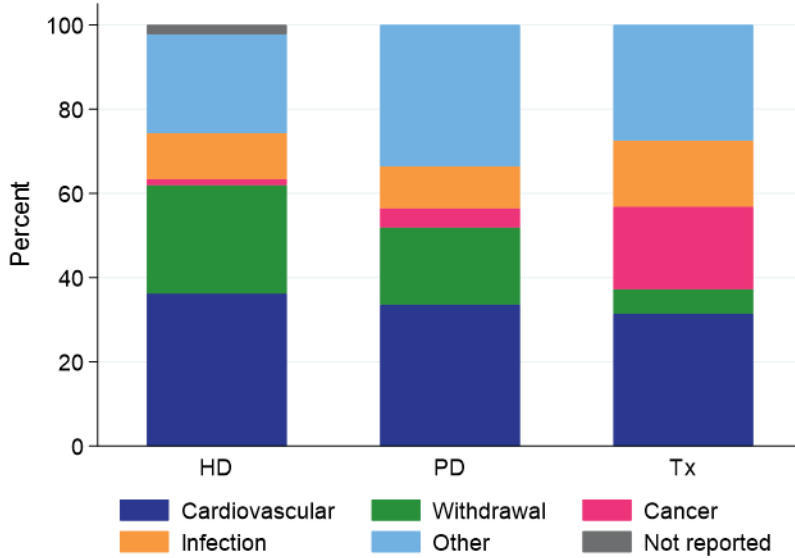
Table: Deaths per 100 patient-years during kidney replacement therapy New Zealand 2018

Category	Level	Dialysis			Transplant		
		Rate	Lower CI	Upper CI	Rate	Lower CI	Upper CI
Overall		14.6	13.2	16.1	2.7	2.0	3.6
Age	<25	0.0	0.0	5.9	0.0	0.0	4.5
	25-44	5.2	3.3	7.8	0.3	0.0	1.5
	45-64	12.7	10.7	14.8	1.9	1.2	3.0
	65-74	20.6	17.4	24.2	5.0	3.0	7.9
	75+	26.3	20.6	33.0	17.6	9.4	30.0
Gender	Male	16.3	14.4	18.4	3.0	2.1	4.2
	Female	12.3	10.4	14.5	2.3	1.3	3.7
Diabetes status	Non-diabetic	11.8	10.0	13.9	2.5	1.8	3.4
	Type 1 diabetes	19.2	11.4	30.4	1.3	0.0	7.5
	Type 2 diabetes	16.6	14.6	18.9	5.3	2.4	10.1
Coronary disease	No	11.7	10.2	13.3	2.7	2.0	3.6
	Yes	22.6	19.3	26.3	3.5	1.0	9.0
Ethnicity	European	17.5	14.7	20.7	3.0	2.1	4.1
	Māori	17.5	14.9	20.4	2.8	1.0	6.2
	Pacific	9.8	7.7	12.3	1.8	0.4	5.1
	Asian	9.6	6.2	14.2	1.7	0.3	4.8

This table includes all episodes of dialysis and transplantation and deaths are attributed to the modality being used at the time of death. For this table, episodes of treatment include all people treated in 2018. Mortality rates are higher with older age, diabetes and coronary artery disease.

Causes of death

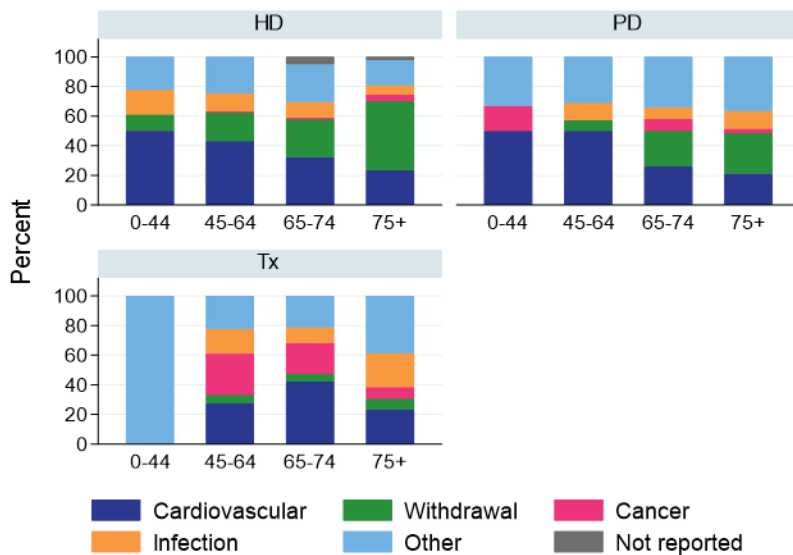
Cause of death—deaths occurring in 2018



The causes of death with each treatment modality are shown. A greater proportion of deaths among patients with kidney transplants are due to cancer, although the most common cause is cardiovascular disease in one-third of patients.

In dialysis patients, cardiovascular death and withdrawal from therapy are the most common causes of death.

Cause of death by treatment modality and age at death—deaths occurring in 2018

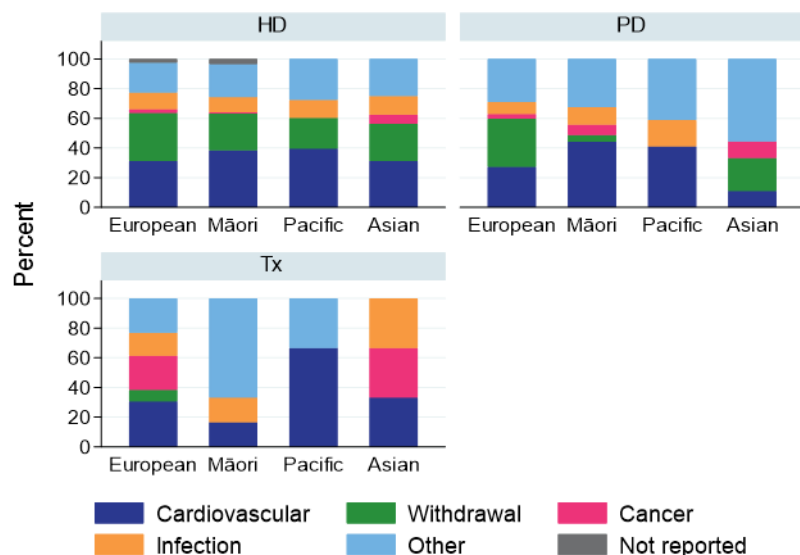


Among young dialysis patients, cardiovascular disease is the most frequent cause of death, with withdrawal causing a larger number of deaths in older patients on dialysis.

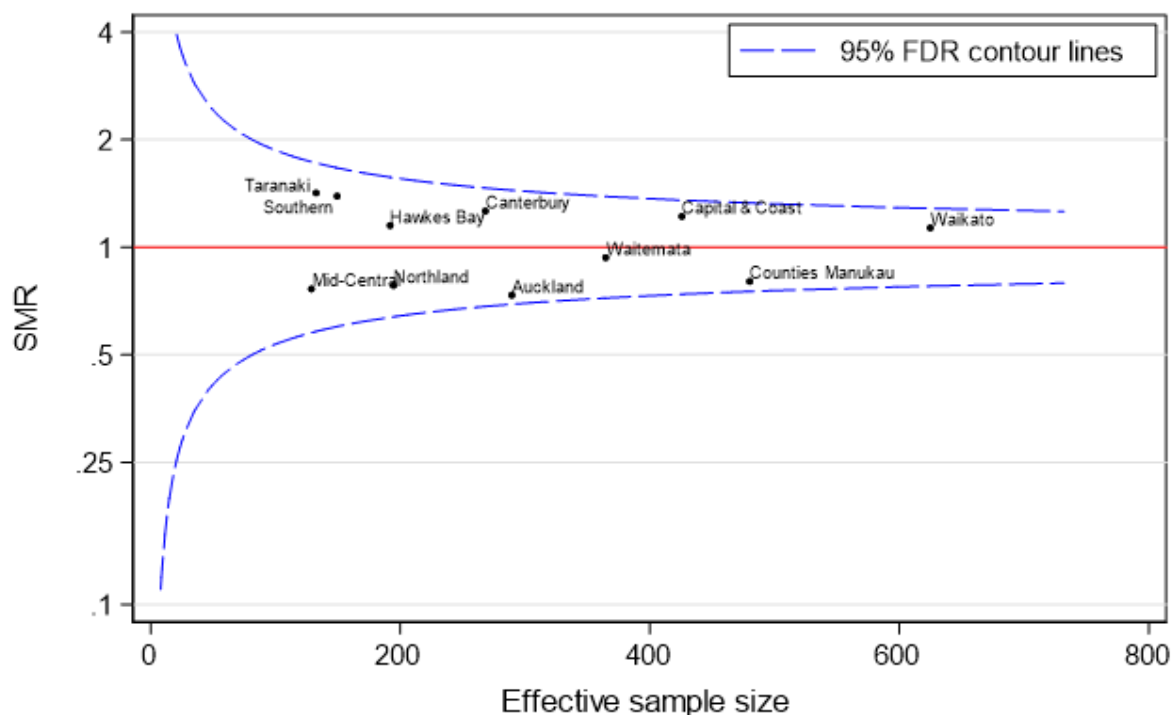
In transplant patients, cancer is a common cause of death in the 45-64 year age group, whereas cardiovascular death is more frequent in older recipients of a transplant.

Overall survival

Cause of death by treatment modality and ethnicity



The standardised mortality ratio (SMR) below is the ratio of actual deaths to expected deaths within each District Health Board among patients on dialysis for at least 90 days during 2013-2018 and older than 18 years. The chance of a DHB having a mortality outside the dotted blue lines (either a high or low rate) is 5%. Note that all District Health Boards have an standardized mortality ratio within this limit. Therefore, there are no District Health Boards in NZ that have a mortality rate among dialysis patients that are higher or lower than expected.



Observations with missing values are dropped from the model



Aotearoa New Zealand ANZDATA 13th Annual Report

Written by Suetonia Palmer

Reporting data collected January to December 2018

Data collected by the Australia and New Zealand Dialysis and Transplant Registry (ANZDATA), New Zealand Blood Service, Renal Units and the NZ Peritoneal Dialysis Registry

Written on behalf of the National Renal Advisory Board (NRAB)

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