2016

New Zealand Nephrology 11th ANNUAL REPORT

About the treatment and outcomes of end-stage kidney disease treated with dialysis and kidney transplantation in Aotearoa New Zealand in 2016

National Renal Advisory Board

ANZ DATA
AUSTRALIA & NEW ZEALAND DIALYSIS & TRANSPLANT REGISTRY

New Zealand ANZDATA 11th Annual Report

Written by **Suetonia Palmer**

on behalf of the Aotearoa New Zealand ANZDATA Working Group

reporting data collected January to December 2016

For the National Renal Advisory Board (NRAB)

Funded by the New Zealand Ministry of Health

Contact person: Professor Suetonia Palmer, suetonia.palmer@otago.ac.nz

How to cite: The Aotearoa New Zealand Working Group on behalf of the National Renal Advisory Board. New Zealand Nephrology 11th Annual Report for 2016. Available at https://www.health.govt.nz/about-ministry/leadership-ministry/expert-groups/national-renal-advisory-board/papers-and-reports.

Introduction

Welcome to the 2016 Annual Report about treatment practices and care outcomes for adults and children with end-stage kidney disease who receive dialysis or have a kidney transplant.

This report is a really important way for the health services in New Zealand to examine the practice patterns and quality of care for end-stage kidney disease in New Zealand.

This report is based on the data that all New Zealand dialysis and transplant patients share with the Australian and New Zealand Dialysis and Transplant (ANZDATA) Registry. This registry was first created in 1978 and is an incredible resource to understand and respond to issues about dialysis and transplant treatment. The Registry is indebted to all the patients and the clinicians throughout New Zealand who collect and share data each year. We have come a long way from 52 patients starting dialysis in New Zealand in 1975-1976.

This annual New Zealand report has been generated by successive dedicated nephrologists and generous patients and whānau. The 2016 report is the first report written by the newly created Aotearoa New Zealand ANZDATA Working Group. This Group is responsible for overseeing ANZDATA within New Zealand to enable ANZDATA to improve the quality of the care that New Zealand patients receive.

We hope this report is useful as a tool to understand how care is delivered within clinical centres and across the many regions in New Zealand. The 2016 report (and previous reports) highlights key differences in treatment patterns between hospitals throughout New Zealand and between groups of patients, including based on age and ethnicity. The New Zealand Working Group is seeking to develop deeper partnerships with experts in data analysis to explore this evidence of inequity to understand it better. Knowing more about the treatment practices and outcomes of renal care is the first step in finding ways to improve patient experiences and outcomes.

If you have an idea about new ways to explore the data to improve our understanding, and clinical care, then please get in touch (suetonia.palmer@otago.ac.nz) to discuss.

Our aspiration is to continue to evolve this report as a key measure of care quality. The ANZDATA Working Group supports work being done by the National Renal Transplant Service and the Dialysis Advisory Committee of the Australia and New Zealand Society of Nephrology to generate key performance indicators for dialysis and transplant care that can enable the measurement and reporting on the quality of renal care and outcomes across New Zealand and respond as a nephrology community to continuous quality improvement.

Finally, we wish again to acknowledge the sharing of data by New Zealand patients and whānau, the dedicated ANZDATA team based in Adelaide that helps with analyses, the Ministry of Health data teams, the New Zealand Peritoneal Dialysis Registry, the New Zealand Blood Service, and the New Zealand Renal Transplant Service. We thank also all the clinicians in New Zealand who give time to filling out the ANZDATA forms each year – without whom this report would not be possible. We also acknowledge the longstanding commitment to funding of ANZDATA provided by the Ministry of Health.

Suetonia Palmer

on behalf of

The Aotearoa New Zealand ANZDATA Working Group

Suetonia Palmer, Michael Collins, Mataroria Lyndon, Rachael Walker, Hari Talreja, Andrew McNally, Sarah Gleeson (trainee), Kate Richards (trainee)

About this report

This is the 11th New Zealand Care Processes and Treatment Targets report about nephrology care in New Zealand and is reporting the activity that occurred between January 1 and December 31, 2016. The data were derived from the Australia and New Zealand Dialysis and Transplant (ANZDATA) Registry, the New Zealand Blood Service, the National Renal Transplant Service, Statistics New Zealand, the New Zealand Peritoneal Dialysis Registry (NZPDR), and surveys of treating units (for catheter-associated bacterial infections).

The report is accompanied by editable graphic displays for local use, presentation, and adaptation. The raw data are provided in a Microsoft Excel file. Single-page lay summary reports are also published alongside this report .

The Starship Children's' Hospital service is represented separately for some analyses but is otherwise included within the data for the Auckland District Health Board.

The data are reported according to the District Health Boards which provide dialysis and transplantation services for New Zealand. The District Health Board populations served by the 11 named District Health Boards summarised in this report 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 DHBs), Taranaki (Taranaki DHB), Capital & Coast (Capital & Coast, Hutt, Wairarapa and Nelson Marlborough DHBs), Canterbury (Canterbury, West Coast and South Canterbury DHBs), Southern (Southern DHB).

The report aims to recognise the Principles of the Treaty of Waitangi, which includes a responsibility on the New Zealand government to provide health equity for Māori. The ethnicity data are based on Census populations for mid-2016 as the denominator information. These have been provided directly to us by the Ministry of Health. In this report we have reported data separately for NZ European, Māori, Pacific, and Asian ethnicities when possible.

The ANZDATA registry has received important financial contributions from the New Zealand Government through the Ministry of Health/Manatū Hauora. This funding is essential to maintain data collection with the aim of improving, protecting, and promoting the health of New Zealanders treated for end-stage kidney disease and their families.

ANZDATA also receives funding from the Australian Commonwealth and Kidney Health Australia.

The generation of this report receives no specific funding and is produced from in-kind support by New Zealand nephrologists. In previous years, the NZ nephrology community is indebted to leadership and contributions of Drs Kelvin Lynn, Grant Pidgeon, Mark Marshall and Tonya Kara. The work of Drs Stephen McDonald and Phil Clayton, and Kylie Hurst and Chris Davies at ANZDATA is also acknowledged.

Table of Contents

Summary

Summary of 2016 ANZDATA for New Zealand

	2016	2012
People starting treatment for kidney failure, incidence [per million]	559 [118]	520 [118]
People with treated kidney failure, prevalence [per million]	4532 [966]	3996 [907]
Newly starting therapy, number [per million]		
Transplant (pre-emptive)	26 [5.5]	18 [4.1]
Peritoneal dialysis	206 [43.4]	171 [42.9]
Haemodialysis	327 [68.9]	335 [76.0]
Age category of starting treatment, number [per million]		
0-24 years	21 [14]	29 [20]
25-44 years	92 [86]	69 [63]
45-64 years	250 [215]	273 [254]
65-74 years	134 [345]	108 [324]
75-84 years	57 [293]	40 [216]
85 + years	5 [61]	1 [14]
Ethnicity of starting treatment, number [per million]		
Māori	166 [269]	169 [285]
Pacific	117 [375]	97 [333]
Asian	37 [68]	50 [111]
New Zealand European	217 [69]	198 [68]
Kidney transplant, incidence [per million]	172 [36]	108 [25]
Living donor	82 [17]	54 [12]
Deceased donor	90 [19]	54 [12]
ABO incompatible transplant, number [per million]	6 [1.3]	0 [0]
Kidney exchange transplants, number [per million]	5 [1.0]	0 [0]
Number of patients who received kidney transplant for every 100 waiting	36	26
People active on waiting list for kidney transplant, number [per million]	472 [100]	435 [99]
Dialysis prevalence, number [per million]	2750 [586]	2475 [561]
Facility haemodialysis	1459 [308]	1222 [277]
Home haemodialysis	468 [99]	474 [108]
Automated peritoneal dialysis	426 [90]	377 [86]
Continuous ambulatory peritoneal dialysis	397 [84]	402 [91]
Home based dialysis overall, number [per million]	1291 [293]	1253 [284]
Transplantation prevalence, number [pmp]	1782 [380]	1521 [345]

Summary of 2016 ANZDATA for New Zealand (continued)

	2016	2012
Cause of renal disease for incident patients, number [%]		
Diabetes	269 [48%]	249 [49%]
Glomerulonephritis	108 [19%]	105 [20%]
Hypertension	54 [10%[	48 [9%]
ADPKD	26 [5%]	27 [5%]
Reflux nephropathy	8 [1%]	8 [2%]
Starting haemodialysis with fistula or graft, number [%]	87 [27%]	113 [34%]
Prevalent haemodialysis with fistula or graft, number [%]	1388 [74%]	1298 [77%]
Late referral to specialist nephrology services (<3 months commencing treatment)	93 [14%]	79 [15%]

Recommendations

The purpose of ANZDATA and this report is to identify ways to improve the quality of New Zealand nephrology care and patient outcomes.

A focus of the New Zealand ANZDATA Report 2016 is equity in clinical practice and outcomes across New Zealand regions and across populations based on gender, age, and ethnicity. Even in a well-designed health system and with a commitment to quality care, some patient groups — particularly Māori and Pacific patients — are disadvantaged with markedly higher rates of dialysis and lower rates of kidney transplantation.

The following are core opportunities for improvement in nephrology practices and outcomes based on the available data in 2016:

1) Increasing pre-emptive kidney transplantation for all patients, particularly for Māori and Pacific patients.
2) Increasing kidney transplantation overall for Māori and Pacific patients (and particularly for women).
3) Addressing reasons for late referral for specialist assessment at some District Health Boards.
4) Increasing opportunities for home-based dialysis, particularly for Māori and Pacific men and women.
5) Identifying reasons for falling home haemodialysis and peritoneal dialysis rates compared with facility haemodialysis.
6) Addressing variation in rates of peritoneal dialysis peritonitis and exit site infection between District Health Boards.
7) Addressing lower rates of transplantation at some centres.
8) Identifying processes to improve incidence of permanent vascular access at start of dialysis across New Zealand.
9) Addressing variation in rates of catheter-associated blood stream infections across District Health Boards.
10) Increasing availability of case-mix/comorbidity adjusted data in future reports, especially for comparisons between DHBs and ethnicities.

Key findings

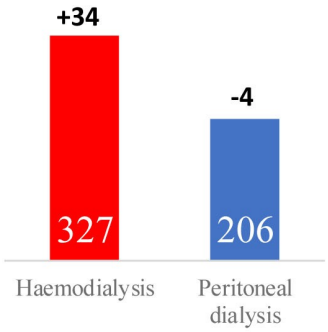
Starting treatment

PEOPLE WHO STARTED DIALYSIS

533

(113 per million New Zealanders)
This compared with 503 adults and children in 2015.

DIALYSIS MODALITY STARTED

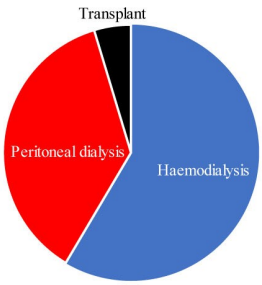


PRE-EMPTIVE KIDNEY TRANSPLANTS

26

(compared with 24 in 2015)

RELATIVE PROPORTIONS STARTING WITH DIALYSIS OR TRANSPLANTATION



Dialysis

PEOPLE TREATED WITH DIALYSIS in 2016

Two-thousand seven hundred and fifty

(increased by 275 people over last 5 years)

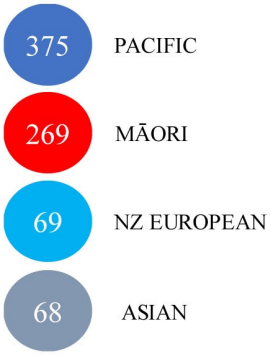
DIALYSIS INCIDENCE BY AGE GROUP *(per million)*

HOME HAEMODIALYSIS

17.0%

(percent of dialysis – compared with 18.0% in 2015)

DIALYSIS INCIDENCE BY ETHNICITY *(per million)*



Transplant

PEOPLE RECEIVING A KIDNEY TRANSPLANT

172

(an increase of 25 [15%] compared with 2015)

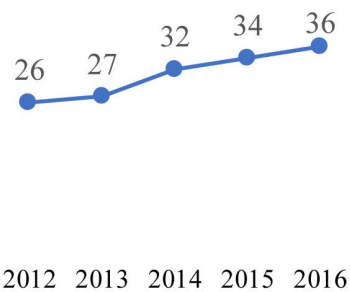
SOURCE OF KIDNEY DONATION

NUMBER OF ABO INCOMPATIBLE TRANSPLANTS

Six

(4 in Auckland and 2 in Canterbury)

NUMBER OF TRANSPLANTS *(per million)*



Key findings: Transplant

TOTAL NUMBER OF PEOPLE LIVING WITH KIDNEY TRANSPLANT

1782

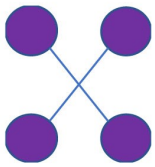
The number of people living with a transplant has reached 376 per million New Zealanders. The number is increasing by 5% each year.

NUMBER OF PRE-EMPTIVE TRANSPLANTS

26

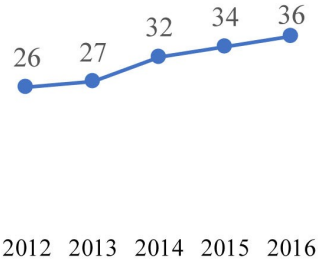
The number of pre-emptive transplants in 2016 was 2 higher than in 2015.

KIDNEY EXCHANGE PROGRAM



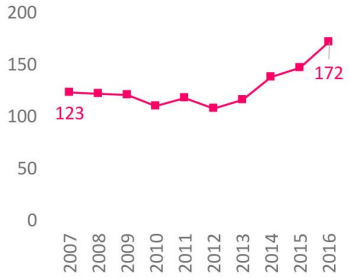
There were two kidney exchanges in 2016 providing five kidney transplants.

NUMBER OF KIDNEY TRANSPLANTS (per million)



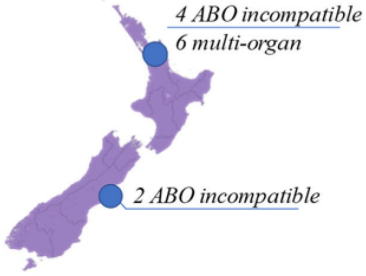
The number of kidney transplants for every million people in New Zealand is increasing year after year.

PEOPLE RECEIVING A KIDNEY TRANSPLANT



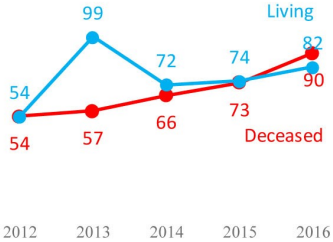
The number of kidney transplants in 2016 was 172. This is an increase of 25 (15%) on the year before and the most performed in 1 year in NZ.

ABO INCOMPATIBLE & MULTIORGAN TRANSPLANTS



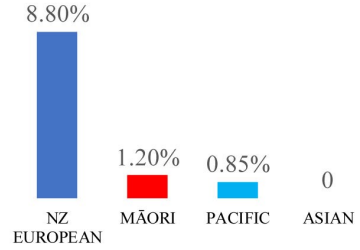
There were 6 ABO incompatible transplants to five adults & one child. There were 6 multi-organ transplants involving a kidney transplant in 2016.

PEOPLE RECEIVING A KIDNEY TRANSPLANT



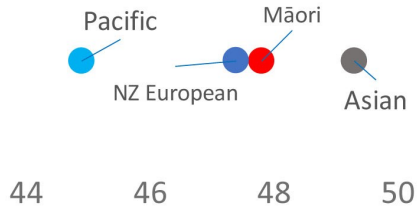
The number of kidney transplants from deceased donors is increasing steadily each year. The living donor rate appears to be more variable.

PRE-EMPTIVE TRANSPLANT BY ETHNICITY



About 9% of people who identify as NZ European starting renal replacement therapy (RRT) received a pre-emptive transplant, while approximately 1% of Māori or Pacific patients received a pre-emptive transplant. No patients identifying as Asian received a pre-emptive transplant.

AGE AT TRANSPLANTION



Adults were aged between 40 and 50 years of age on average at transplantation. Pacific patients tended to be younger and Asian patients tended to be older.

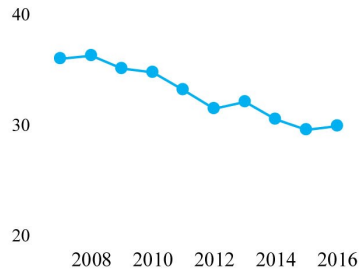
Key findings: Dialysis

TOTAL NUMBER OF PEOPLE TREATED WITH DIALYSIS

2750

In 2015, 580 people were treated with dialysis in NZ for every million people. This rate has plateaued since about 2013 after a previous period of steady increases.

TREATMENT WITH PERITONEAL DIALYSIS

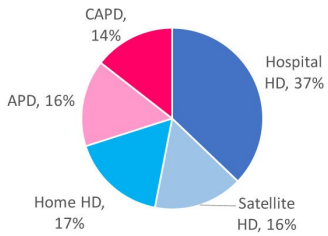


The proportion of patients treated with peritoneal dialysis is decreasing (29.9% in 2016 compared with 36.0% ten years earlier).

AGE AT START OF DIALYSIS *(per million)*

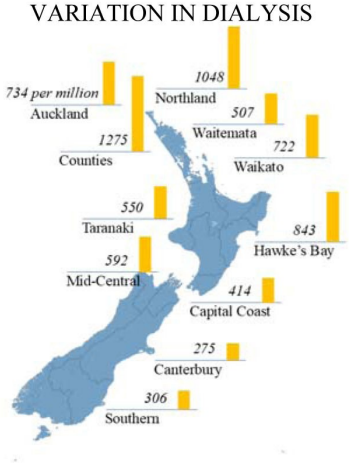
The highest incidence of starting dialysis is the 65-74-year age group (345 per million) followed by the 75-84-year age group (293 per million).

DIALYSIS MODALITY



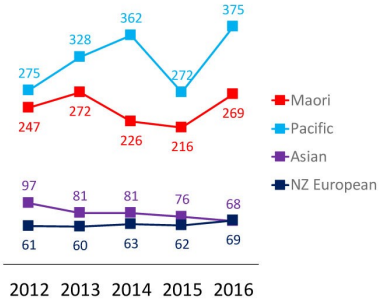
Seventy percent are treated with haemodialysis (37% hospital, 16% satellite, 17% home). Thirty percent are treated with peritoneal dialysis (14% CAPD, 16% automated PD). 47% of NZ patients do home-based dialysis.

VARIATION IN DIALYSIS



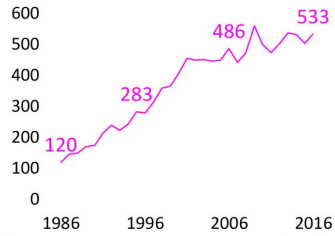
The rate of dialysis (per million people) across NZ is highly variable.

DIALYSIS INCIDENCE BY ETHNICITY



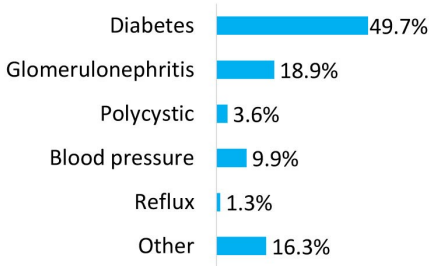
The proportion of patients identifying as Māori and Pacific who start dialysis continues to be markedly higher than for those identifying as NZ European or Asian.

STARTING DIALYSIS



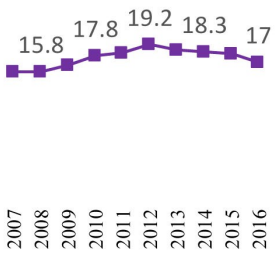
533 people started dialysis (113 per million). This is similar to Australia (112) & the UK (120) & markedly lower than the USA (360).

CAUSES OF KIDNEY FAILURE



Half of patients starting dialysis have kidney failure due to diabetes.

HOME HAEMODIALYSIS

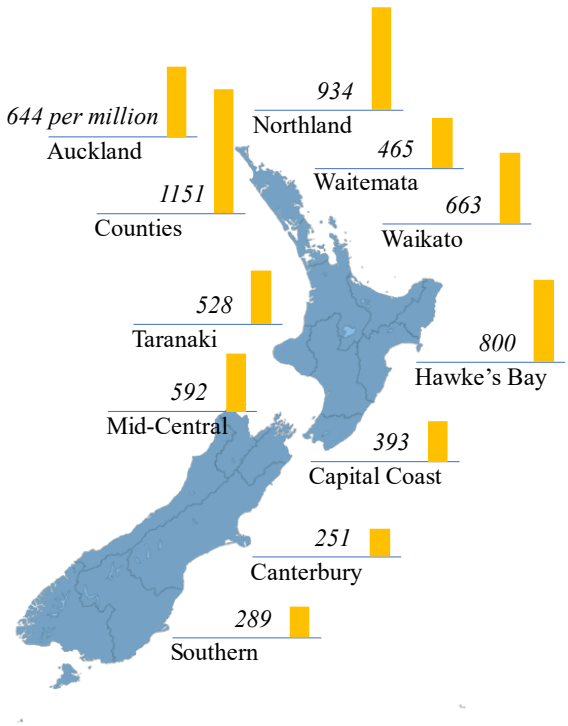


The proportion of people on home haemodialysis has been stable (≈17%).

Demographics

The incidence and prevalence of renal replacement therapy varies between District Health Boards. The number of patients starting treatment (incidence) varies between 59 per million at the Southern DHB to 228 per million at the Hawke's Bay DHB. The prevalence of dialysis varies between 251 per million at the Canterbury DHB and 1151 per million at Counties Manukau DHB. It is likely this variation is related to demographic and clinical characteristics of DHB populations, but may also represent practices and policies. As these statistics are not adjusted to account for demographic characteristics or clinical comorbidity, we cannot be confident in our knowledge of the causes of differences between DHBs.

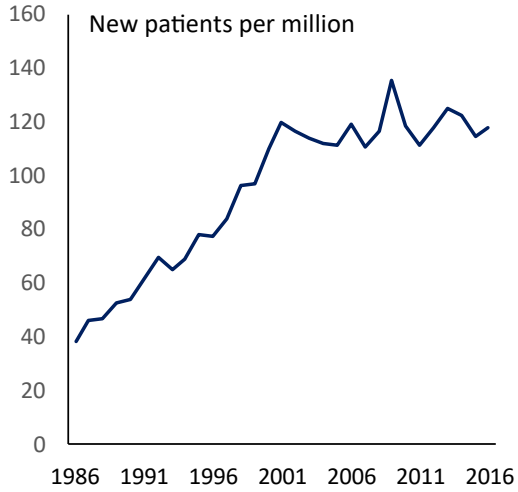
		Incident patients		Prevalent dialysis		Prevalent transplant		Prevalent renal replacement	
District Health Board	**Population**	**No.**	**pmp**	**No.**	**pmp**	**No.**	**pmp**	**No.**	**pmp**
Northland	173,380	33	190	162	934	83	479	245	1413
Waitemata	598,390	40	67	278	465	187	313	465	777
Auckland	515,380	66	128	332	644	265	514	597	1158
Counties Manukau	540,420	102	189	622	1151	181	335	803	1486
Waikato	789,335	118	149	523	663	197	250	720	912
Hawke's Bay	162,630	37	228	130	800	84	517	214	1316
MidCentral	239,035	20	84	133	556	81	339	214	895
Taranaki	117,460	14	119	62	528	42	358	104	885
Capital & Coast	648,210	54	83	255	393	282	435	537	828
Canterbury	637,305	56	88	160	251	269	422	429	673
Southern	321,610	19	59	93	289	111	345	204	634

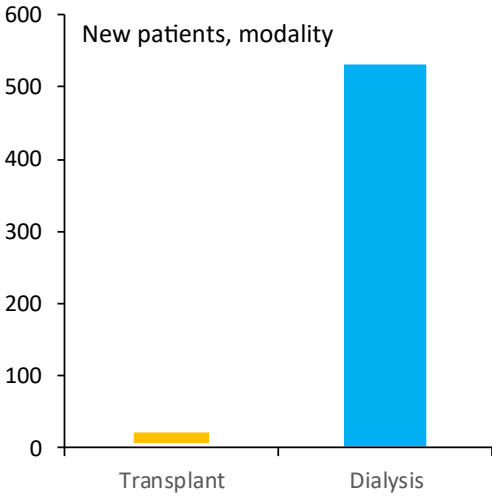


Prevalence of dialysis at New Zealand District Health Boards, shown as per million of the DHB population.

Starting treatment

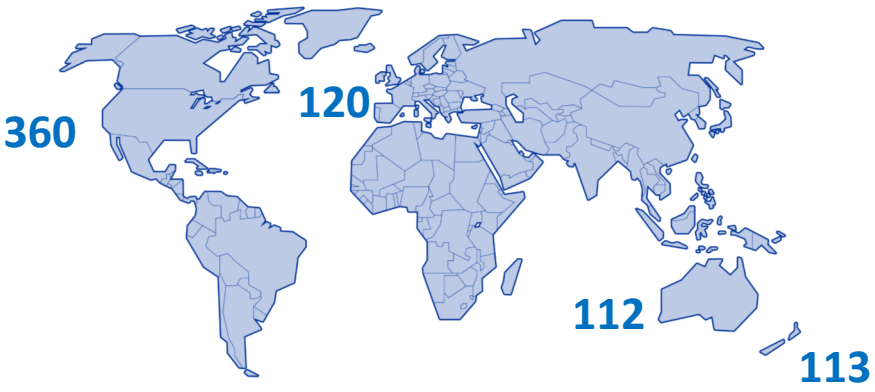
In 2016, **559** people started dialysis or received a kidney transplant as their first treatment for end-stage kidney disease. This was **118** people for every million New Zealanders. The absolute number of new patients starting renal replacement therapy has increased year on year, but appears to be currently stable in line with population growth when calculated as per million of the population. The number of new patients starting renal replacement therapy in New Zealand rose markedly during 1986-2001, and has now remained steady since that time, but with year to year variation.





The vast majority of people (**533** people) started treatment with dialysis, while **26** people had a kidney transplant as their first renal replacement therapy (*pre-emptive transplant)*.

The rate of starting dialysis was **113** per million population, which is similar to Australia (112 per million), lower than the United Kingdom (120 per million) and markedly lower than the United States (360 per million).

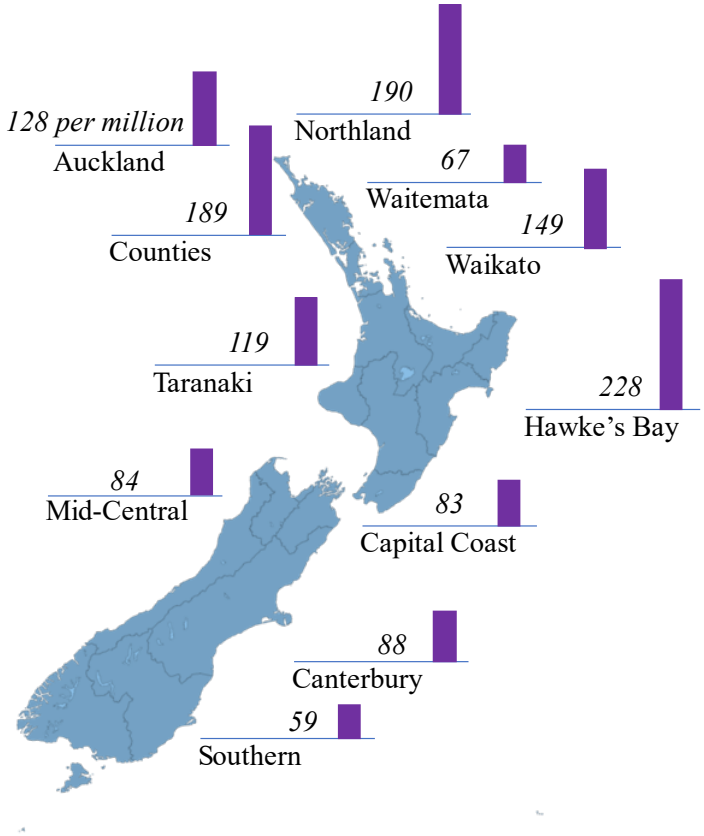


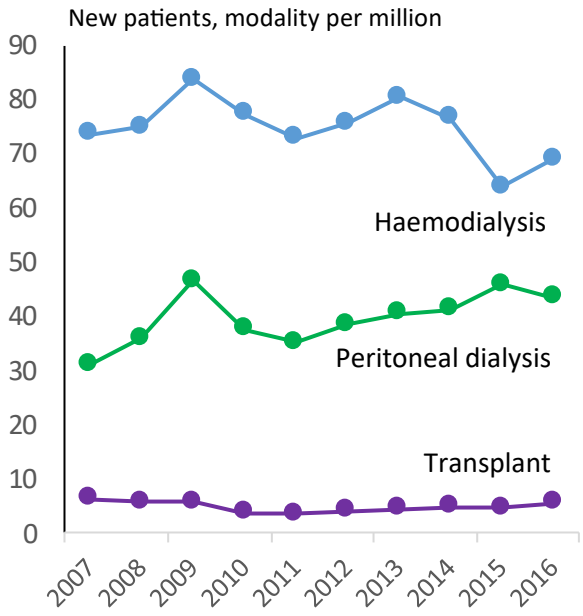
Starting treatment

Modality (dialysis or transplantation)

Incidence of renal replacement therapy in 2016 by District Health Board, expressed per million

The incidence of renal replacement therapy expressed per million of population was highly variable across District Health Boards. The incidence ranged from 59 for every million at Southern DHB to 228 per million at the Hawke's Bay DHB. It is known that incidence of renal replacement therapy is different across age and ethnicity. The differences in incidence across DHB populations is likely to be partly explained by population risk. However, as this analysis is not controlled for DHB demographic characteristics, the contributions of specific patient and population factors to the incidence is not measured.





Incident modality 2007-2016 expressed per million

Most new patients started treatment with haemodialysis. Over the last decade, the number of people starting with haemodialysis has marginally decreased from 73 per million in 2007 to 69 per million, in 2016. Those starting with peritoneal dialysis has increased (38 pmp in 2007 to 43 pmp in 2016). The number of patients starting first treatment with a pre-emptive transplant was 6 per million in 2007 and 6 per million in 2016.

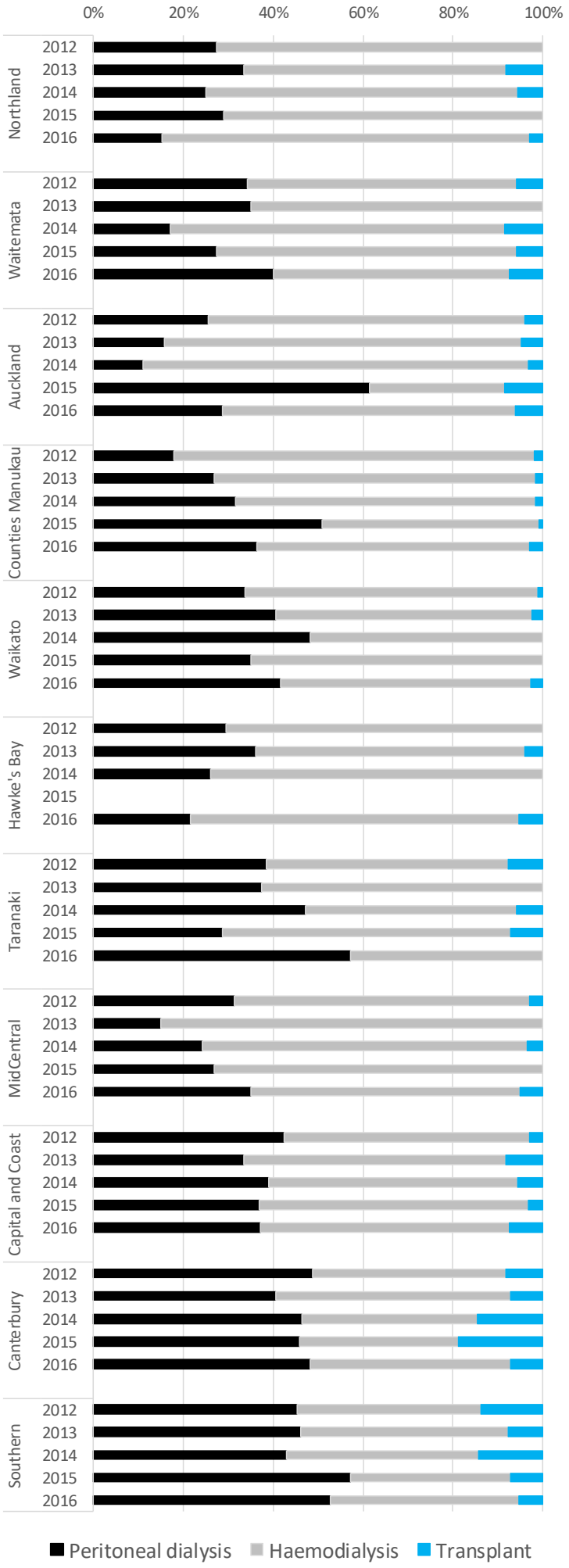
Treatment modality on starting renal replacement therapy 2012-2016 by District Health Board

This figure shows the proportion of patients who start with each modality (haemodialysis, peritoneal dialysis, or kidney transplant) at each District Health Board unit over the last 5 years.

There is both variation between units, and variation within units from year to year.

In 2016, the proportion of patients starting with peritoneal dialysis was highest in Canterbury and Southern DHBs (both units with a high home dialysis rate and no formal long-term facility haemodialysis). The proportion treated with peritoneal dialysis appears to be increasing year on year in MidCentral and Counties Manukau DHBs.

The two southernmost DHBs have a higher proportion of patients starting with a kidney transplant, although proportionally for both these centres, the percentage was lower in 2016. Auckland, Waitemata and Capital and Coast DHBs had higher proportions of patients starting with a transplant than many of the other DHBs.



Starting treatment

Ethnicity

Incidence of renal replacement therapy 2012-2016 by ethnicity expressed per million

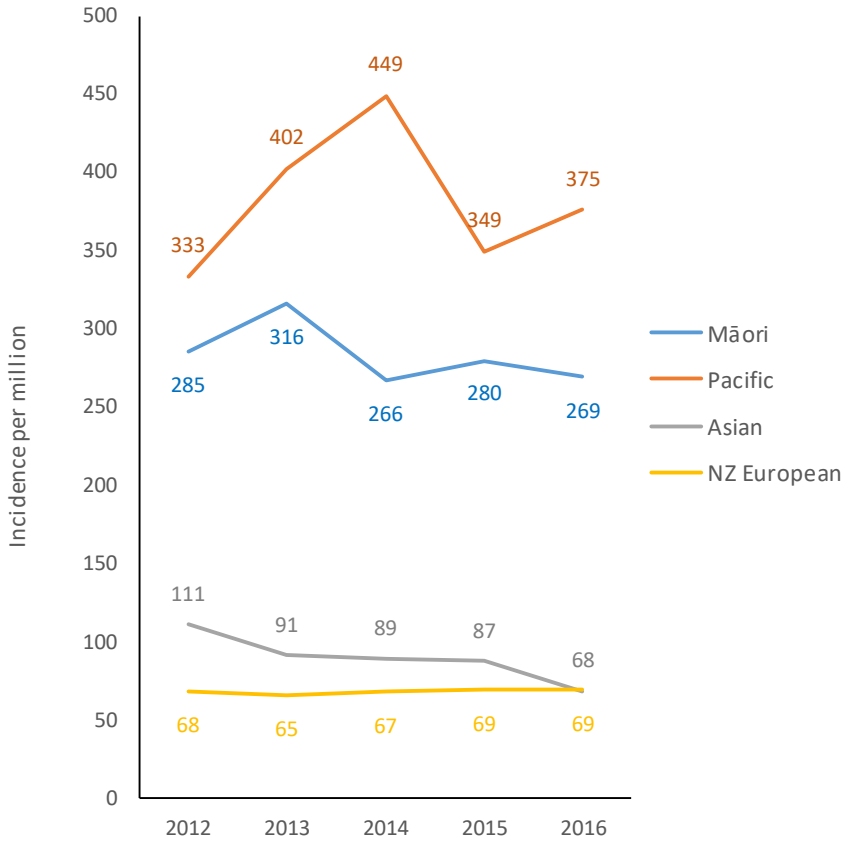
The incidence of renal replacement therapy expressed per million of population was highly disparate based on ethnicity.

In 2016, 375 Pacific people started renal replacement therapy for every million of the denominator ethnicity-specific population and 269 Māori started treatment for every million. This compares with 69 per million of the New Zealand European population.

The incidence of treated end-stage kidney disease is 5.5-fold higher for Pacific patients and 4-fold higher for Māori patients than for New Zealand European patients.

These differences are not changing.

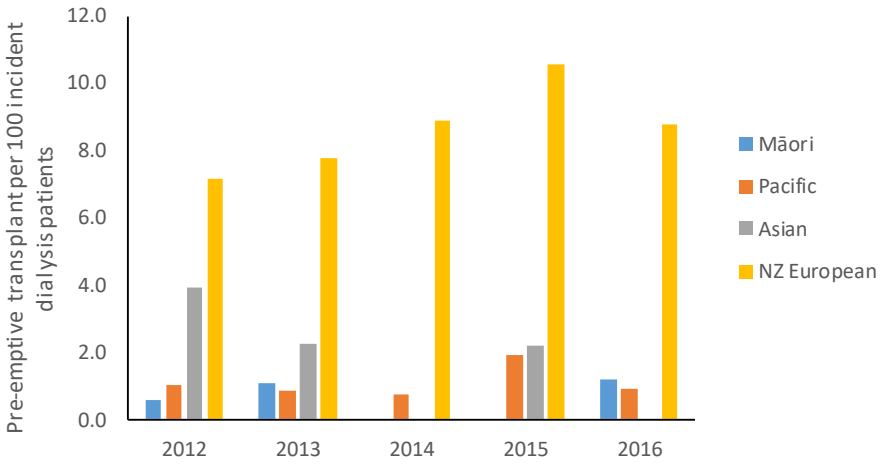
The incidence of renal replacement therapy for Asian New Zealanders has decreased markedly in the last 5 years from 111 to 68 per million.



Pre-emptive kidney transplantation by ethnicity, per 100 dialysis patients

The number of patients who receive a pre-emptive kidney transplant (for every 100 ethnicity-adjusted dialysis patients) is widely disparate. In 2016, no Asian New Zealander started renal replacement therapy with a pre-emptive kidney transplant. The proportion of Māori and Pacific patients with a pre-emptive transplant is about 8– to 10-fold lower than for New Zealand European patients.

This difference has not substantially changed over time despite increases in transplantation rates in recent years.



Starting treatment

Ethnicity and age

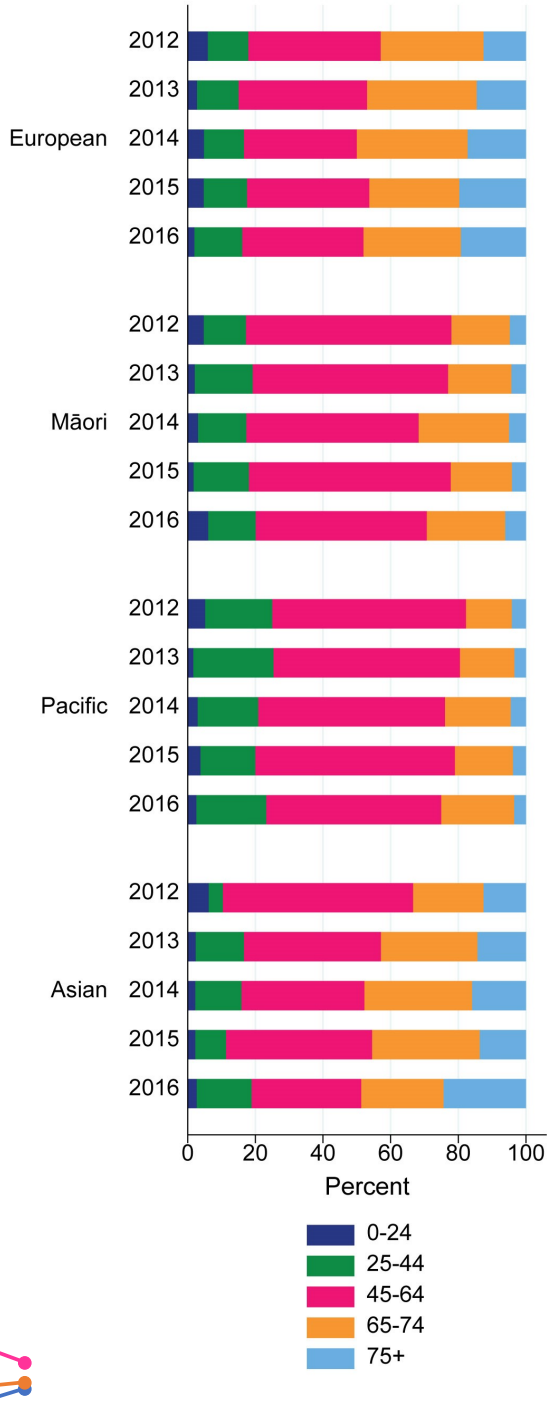
Incidence of renal replacement therapy by age and ethnicity

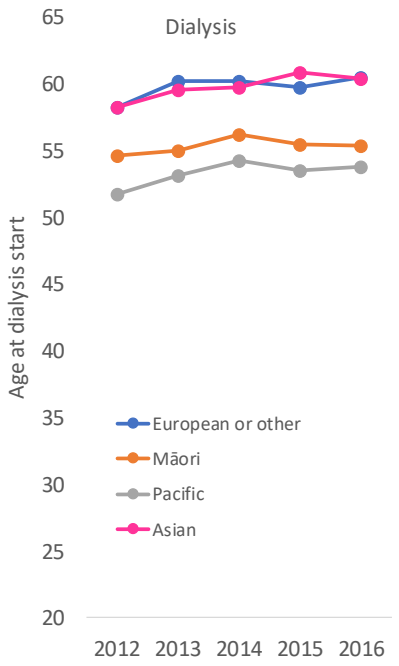
Māori and Pacific patients most commonly start renal replacement therapy when in the 45-64 year age group. There appears to have been a small increase for Māori and Pacific patients to commence renal replacement therapy when between 65-74 years in the last five years.

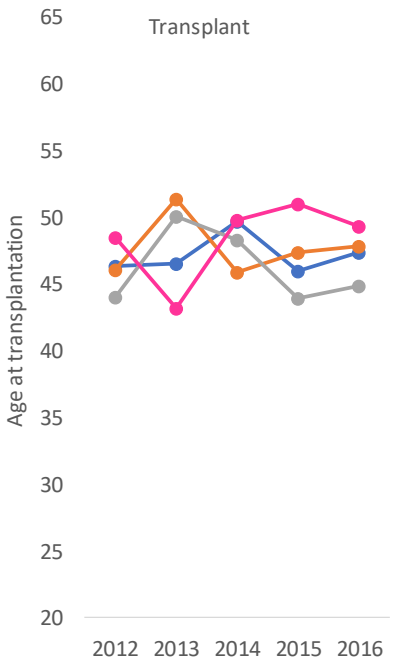
For New Zealand European patients, a substantial proportion of patients commence treatment when aged 75 years or older. Both New Zealand European and Asian patients have seen an increase in treatment commencement older than 75 years. For Asian New Zealanders, the proportion starting dialysis older than 75 years represents >20% of the ethnicity-specific population.

In 2016, a substantial proportion of Māori patients commenced dialysis younger than 25 years, while the proportion of Pacific patients starting dialysis younger than 45 years is higher than for other ethnicities.

While Māori and Pacific patients start dialysis 5-7 years younger on average than their New Zealand European and Asian peers, there is no difference between ethnicities for age at transplantation.







Starting treatment

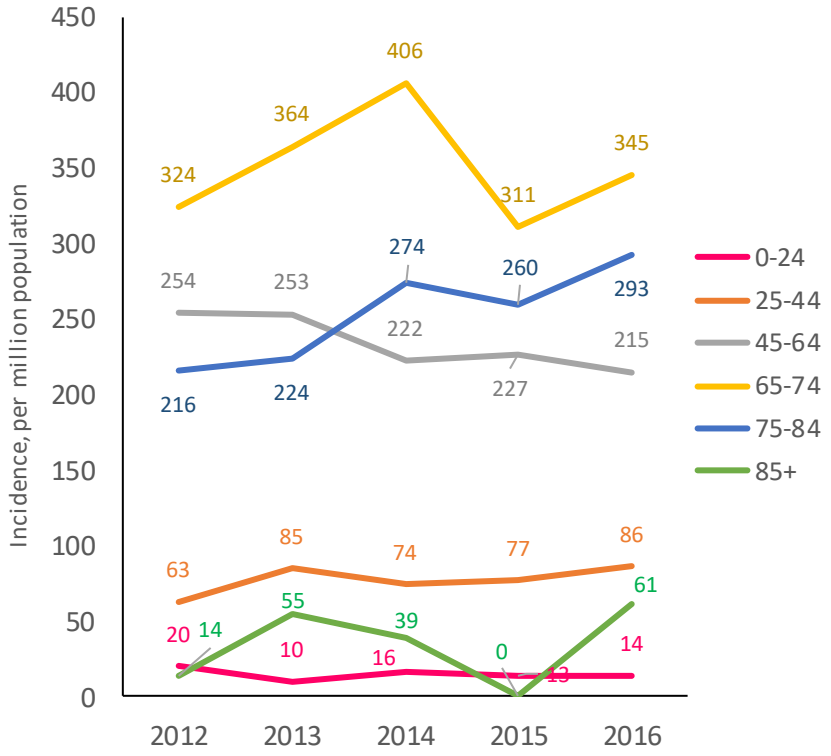
Age and primary disease

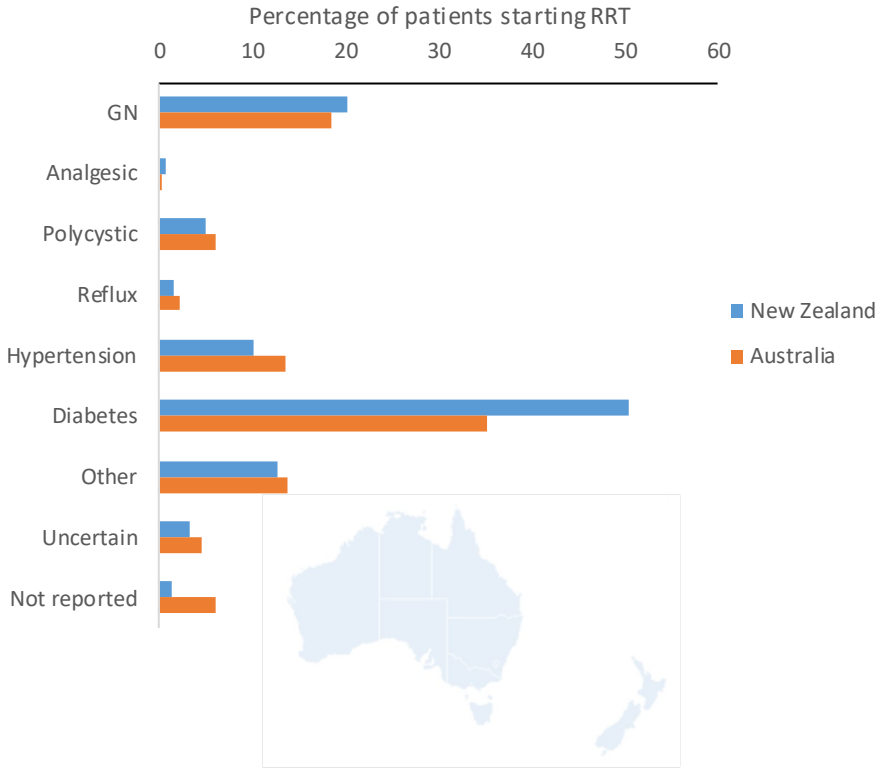
Incidence of renal replacement therapy 2012-2016 by age, expressed per million

The 65-74 year age group consistently has the highest incidence of renal replacement therapy. In 2016, the incidence for this age group was 345 per million. The incidence was also high for the 75-84 year age group, at 293 per million.

While the 85+ year age group has a lower and more variable incidence, there appears to be an increasing trend in the incidence for this group over time.

The incidence for younger patients (0 to 24 years) remains largely constant over time.





Incidence of renal replacement therapy by renal disease in 2016

Half (50%) of patients starting renal replacement therapy in 2016 had diabetes as the cause of kidney disease. This is substantially higher than for Australia (35%).

Approximately one in 5 patients start treatment due to glomerulonephritis, with a large remaining proportion starting due to hypertension.

Analgesic nephropathy is now the cause of very few patients starting treatment.

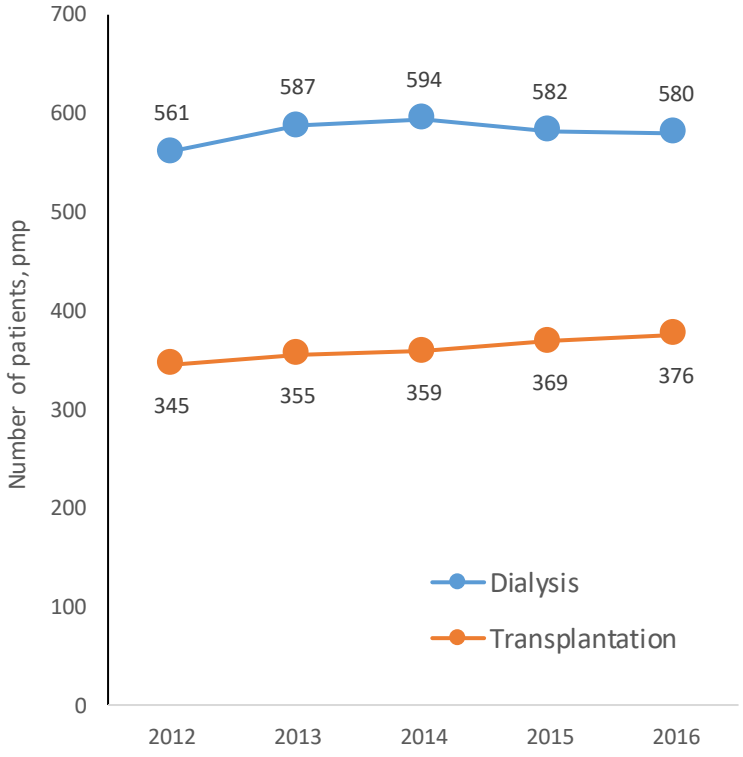
Prevalence

Prevalence of renal replacement therapy in New Zealand

At the end of 2016, 4532 people in New Zealand were receiving treatment with dialysis or had a kidney transplant. This is 956 per million of the New Zealand population.

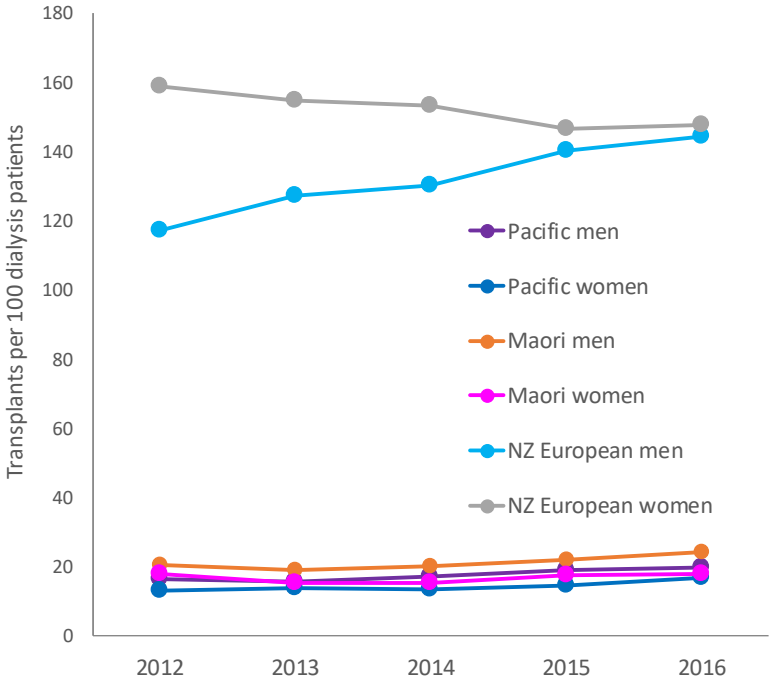
Most people on renal replacement therapy are treated with dialysis. In 2016, 2750 (580 per million) were treated with dialysis at year end. 1782 people (376 per million) had a functioning kidney transplant.

The proportion of the population with a functioning transplant has increased from 345 per million to 376 per million over the last five years. These data reflect the historically low transplant rate, and increase rate of transplantation more recently.



Prevalence of renal replacement therapy in New Zealand by sex and ethnicity expressed as transplant per 100 dialysis patients

There is nearly a 10-fold difference in the prevalence of kidney transplantation for New Zealand European men and women (when expressed as per 100 dialysis patients) compared to Māori and Pacific men and women. Pacific and Māori women have the lowest prevalence of transplantation (17 and 18 per 100 dialysis patients), while New Zealand European men and women now have similar prevalence (144 and 148 per 100 dialysis patients). More New Zealand European patients have a functioning transplant than receive dialysis each year while approximately 15-20 Māori and Pacific patients have a functioning kidney transplant for every 100 dialysis patients.



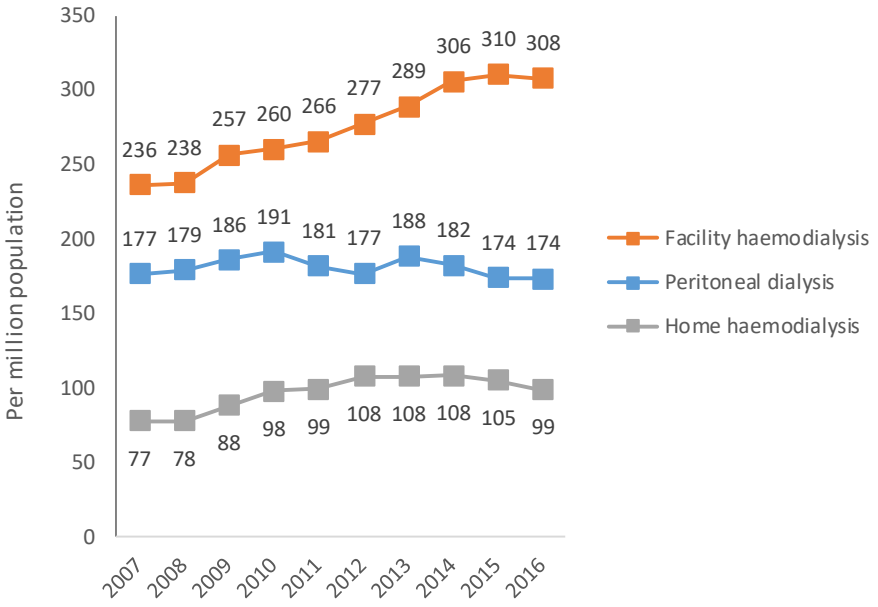
Prevalence

Modality

At year end in 2016, 1459 people (308 per million) were treated with facility haemodialysis. This proportion of the NZ population treated by facility haemodialysis has consistently increased by 7-10 percentage points year on year ahead of population growth. The proportion treated with facility haemodialysis appears to have been more static in the most recent 3 years.

In 2016, 823 people were treated with peritoneal dialysis. The prevalence of peritoneal dialysis was 174 per million at year end of 2016 and has remained largely static through the last decade.

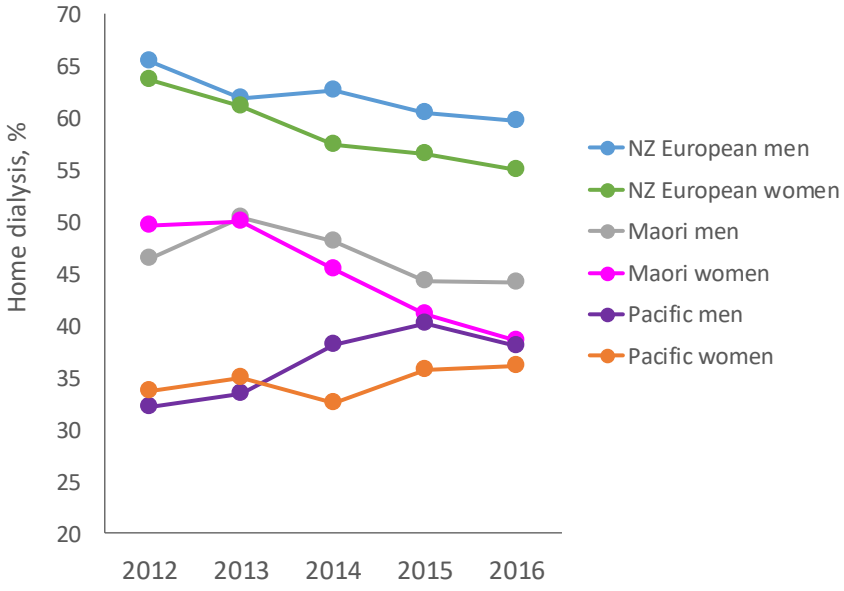
Overall, 468 people were treated with home haemodialysis at year end. Home haemodialysis prevalence showed year on year growth between 2008 and 2012, although the prevalence has decreased somewhat since a plateau across 2012 to 2014.



Percentage of home dialysis by ethnicity and gender expressed as a percentage of all dialysis patients

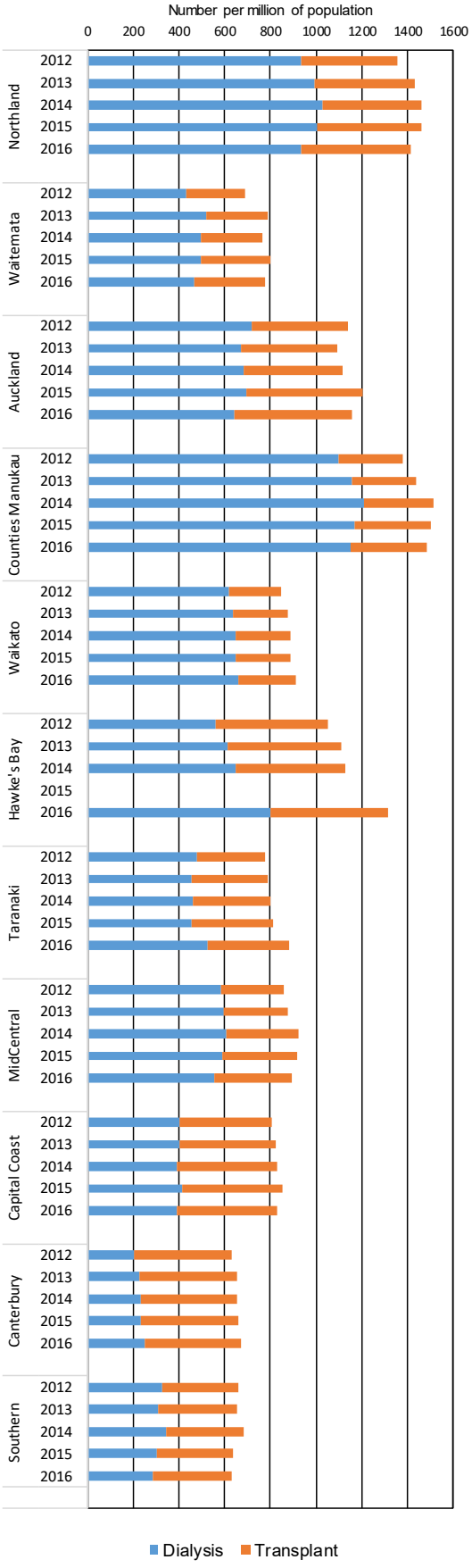
New Zealand European patients have a substantially higher use of home dialysis therapies as a proportion of all patients on dialysis. Women have lower use of home dialysis therapies than men.

Home dialysis prevalence is decreasing for New Zealand European patients and Māori women. Pacific men and women have much lower rates of home dialysis but the percentage appears stable.



Prevalence

By District Health Board



Prevalence of renal replacement therapy in New Zealand by District health Board

Not unexpectedly, the prevalence of dialysis and transplantation vary by District health Board.

Among the District Health Boards with the highest overall prevalence of end-stage kidney disease, dialysis treatment tends to represent a higher proportion of overall patients treated, while at the DHBs with smaller prevalent populations, proportionally more patients are treated with transplantation.

The Hawke's Bay DHB is experiencing marked year-on year growth ahead of the baseline population while growth at Counties Manukau DHB and Northland DHB appears to be stabilising. Growth is also evident at Taranaki and Waikato DHBs.

*Data were not available for the Hawke's Bay in 2015.

Prevalence

By District Health Board

Prevalence of renal replacement therapy in New Zealand by District health Board and modality

This figure displays the proportion (%) of patients receiving each modality of dialysis care or kidney transplant as at the end of 2016 by District health Board.

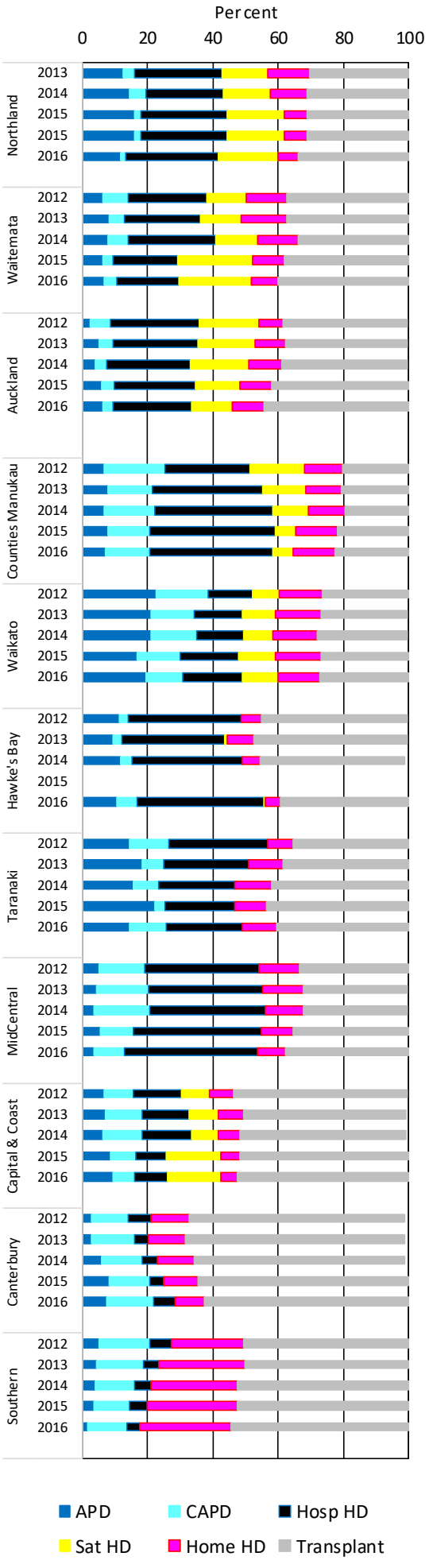
Notable is the sustained increase in satellite dialysis as a dominant proportion of dialysis care at Capital and Coast DHB.

The proportion of dialysis patients at Southern DHB is decreasing as the transplantation prevalence increases. The percentage of automated peritoneal dialysis at Southern DHB has decreased year on year.

Counties Manukau DHB has an increasing proportion of patients treated with hospital dialysis while the proportion treated with satellite haemodialysis is decreasing.

Satellite haemodialysis is not utilised at Taranaki, MidCentral, Canterbury, or Southern DHBs.

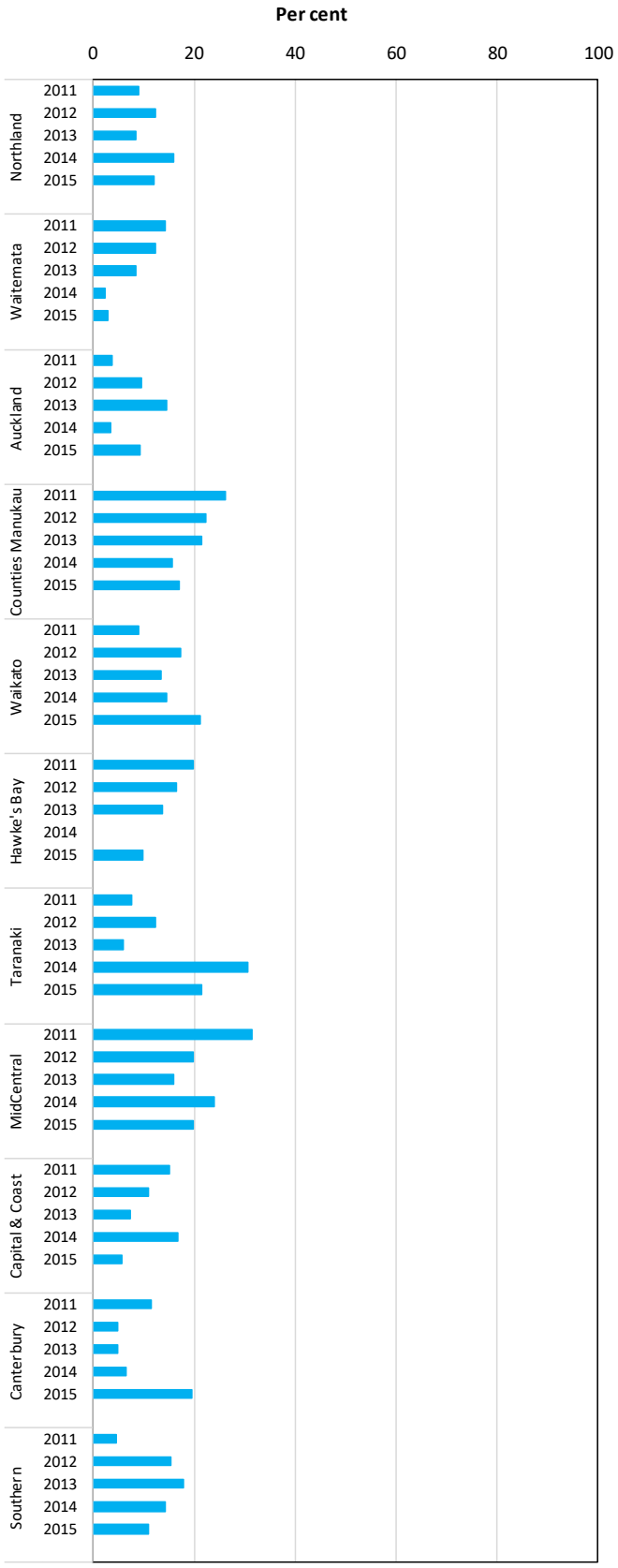
Most patients treated at the Capital and Coast, Canterbury, and Southern DHBs have a kidney transplant as renal replacement therapy.



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



Late specialist assessment 2012-2016, by District Health Board, expressed as percentage

The proportion of patients who have their first nephrology specialist assessment within 90 days of starting renal replacement therapy is decreasing at Waitemata, Counties Manukau, Hawke's Bay, Capital & Coast, and Southern District Health Boards. The percentage appears to be increasing at the Waikato DHB. There are persistent differences in late specialist assessment rates between DHBs.

*Reports in previous years have showed late referral rates according to age and ethnicity. Due to small numbers for some categories, these results are unstable and are not shown in this 2016 report.

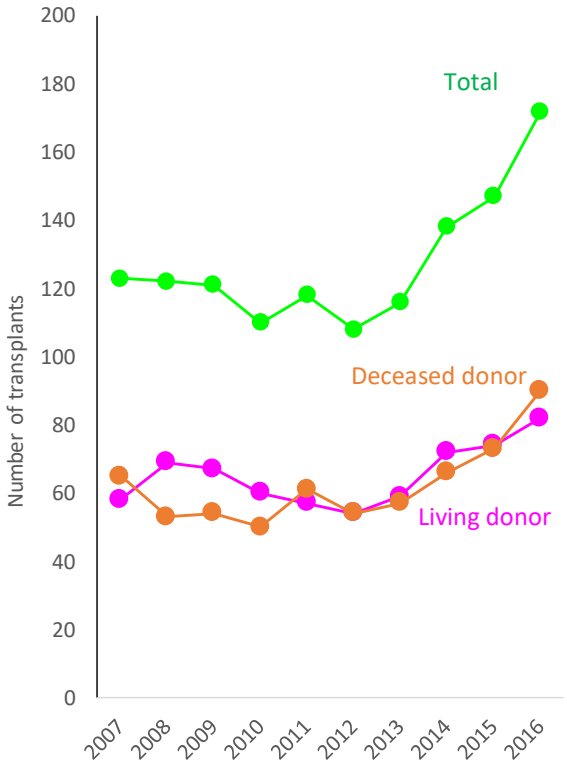
Transplantation

Number of kidney transplants per year 2007-2016

Overall, 172 people received a kidney transplant in New Zealand during 2016. This is the highest number of kidney transplants in a calendar year and represents a large year on year increase that has been evident since 2012. This is a major success in the quality of care for end-stage kidney disease in NZ.

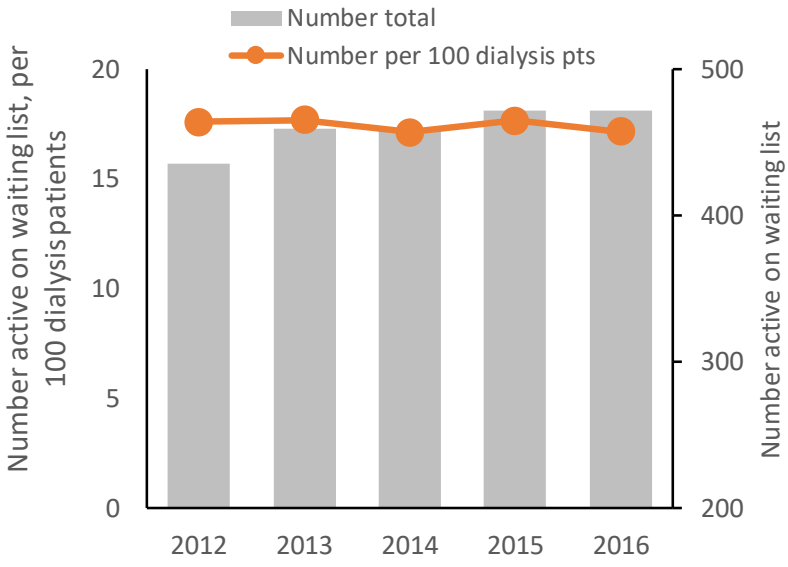
There were 82 kidney transplants from a living kidney donor and 90 transplants from a deceased kidney donor. After three years of slightly more living donor and deceased donor transplants, there were more deceased donor transplants than living donor transplants in 2016.

The transplantation rate in New Zealand is 36 per million of population. This compares with 45 per million of population in Australia in 2016. The transplantation rate increase is faster than population growth, increasing from 25 per million in 2012 (a 44% increase over 5 years).



Waiting list for kidney transplant 2012 -2016

The number of people active on the waiting list for a kidney transplant is increasing in proportion with increases in the dialysis population. At year end of 2016, 472 people were active on the kidney transplant waiting list (17 for every 100 dialysis patients). These data were provided by the NZ Blood Service.

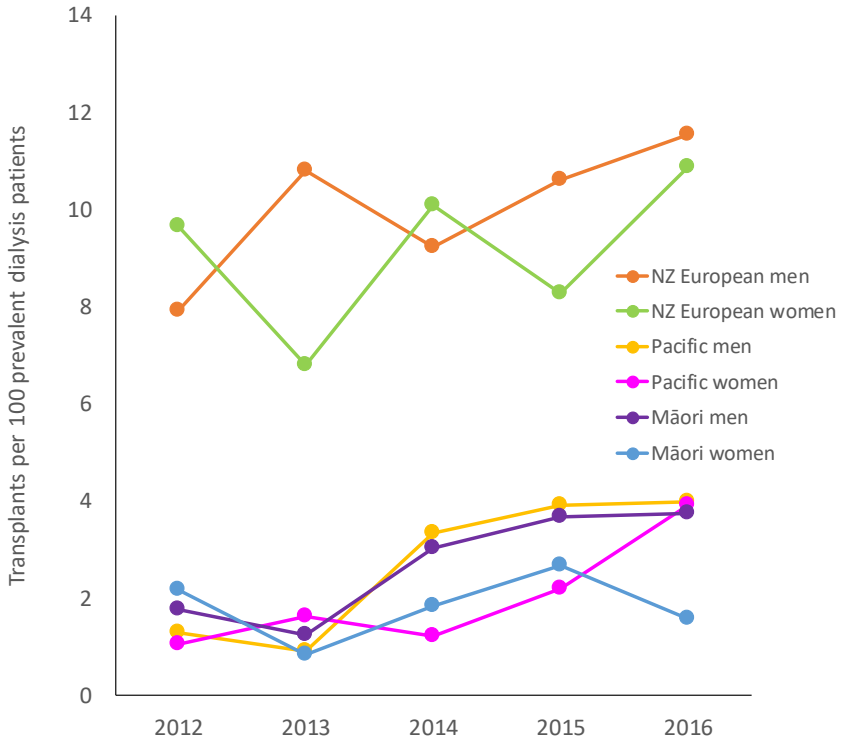


Transplantation

Number of kidney transplants per year 2012-2016 by gender and ethnicity

The rate of kidney transplantation is markedly higher for patients identifying as New Zealand European than other ethnicities. Approximately 10-11 New Zealand European patients receive a kidney transplant each year for every 100 sex-and ethnicity-specific dialysis patients.

The rate of kidney transplantation appears to have increased for Māori and Pacific men since 2013 from a low baseline of 1 transplant for every 100 prevalent dialysis patients to approximately 4 per 100. A similar increase has occurred for Pacific women since 2014. The transplantation rate for Māori women appears to be variable and may not be increasing over time.

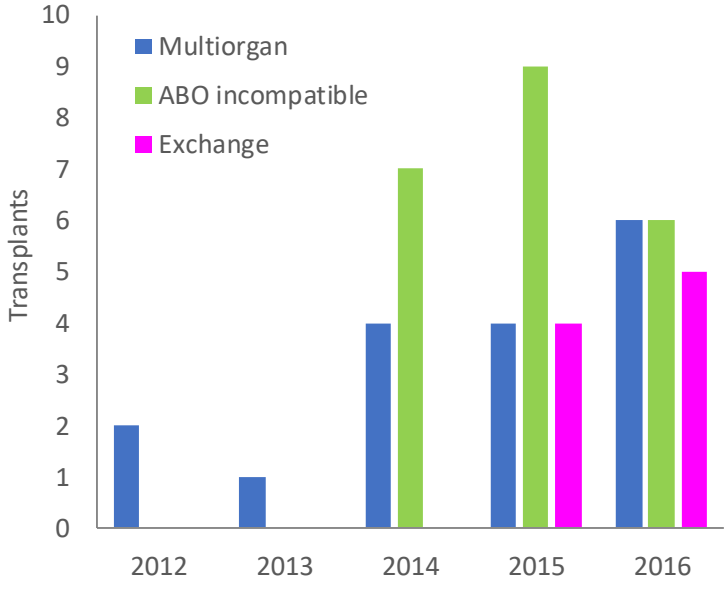


Multiorgan, ABO incompatible, and kidney exchange transplant activity 2012-2016

ABO incompatible transplantation and the kidney exchange program are increasing access to transplantation across ABO blood groups and for patients who have a positive cross-match with their donor.

The NZ kidney exchange program provided 5 kidney transplants in 2016. Six ABO incompatible kidney transplants were completed.

Six NZ patients received a multiorgan transplant that included a kidney transplant. Reporting on these treatments will have an increased focus in future annual reports.



Transplantation

Kidney transplants occurring in 2016 by District Health Board, expressed per 100 dialysis patients

There is evidence of transplantation growth at many District Health Boards including Waitemata, Auckland, and Southern DHBs. Smaller incremental increases are seen at Waikato, while MidCentral has regained the substantial increase first observed there in 2014.

Auckland has experienced a marked increase in kidney transplantation in 2016, with the primary contribution from deceased kidney donation. Similarly, the substantial increase at Southern DHB in 2016 was principally due to increased deceased kidney donation.

Canterbury DHB continues to have the highest transplantation rate per dialysis population.

Waikato and Counties Manukau, the two District Health Boards with the highest dialysis populations, have relatively lower transplantation rates.

Transplantation

Immunosuppression

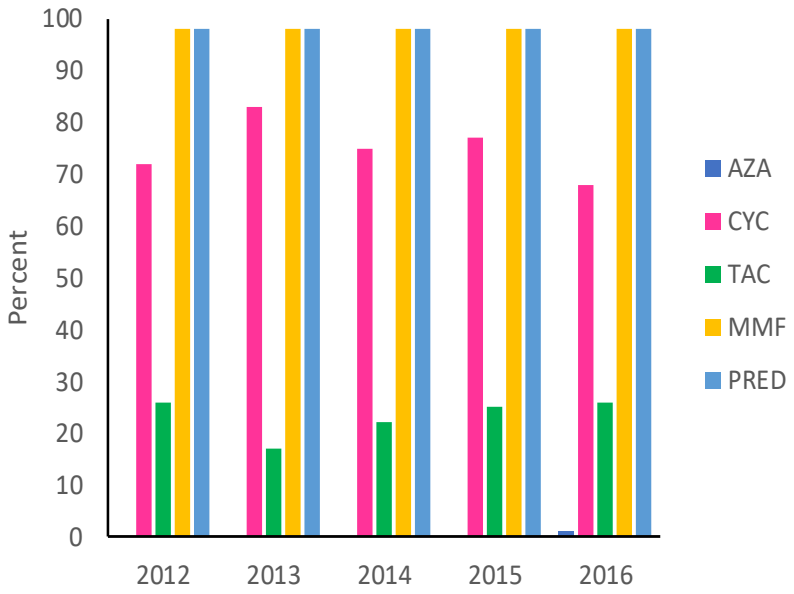
The use of antibodies for induction immunosuppression at transplantation in New Zealand 2012-2016

There appears to be a rise in the use of rituximab and T-cell depleting polyclonal antibodies, although the absolute numbers remain low.

Type of agent	2012	2013	2014	2015	2016
Intravenous immunoglobulin	1 (0.9%)	-	-	1 (0.7%)	-
Anti-CD25	101 (93.5%)	115 (99.1%)	133 (96.4%)	142 (96.6%)	166 (96.5%)
Rituximab	4 (3.7%)	6 (5.2%)	9 (6.5%)	9 (6.1%)	5 (2.9%)
T cell depleting polyclonal ab	-	2 (1.7%)	2 (1.4%)	1 (0.7%)	6 (3.5%)
Other	-	-	-	1 (0.7%)	2 (1.2%)
Total new transplants	108	116	138	147	172

Initial immunosuppression at time of primary deceased donor kidney transplantation in New Zealand 2012 -2016

The combination of prednisone (PRED), mycophenolate mofetil (MMF), and a calcineurin inhibitor are nearly universally used as the initial immunosuppression at the time of a primary deceased donor kidney transplant in New Zealand. Cyclosporin (CYC) is more commonly used than tacrolimus (TAC) (68% of patients versus 26% in 2016), which is in contrast with practice in Australia where 80% of patients received tacrolimus in 2016 as initial immunosuppression compared to 1% receiving cyclosporin.



Transplantation

Rejection

Rejection rate at 6 months after transplant 2011-2015

Donor type	Graft number	2011	2012	2013	2014	2015
Living	**First**	17.5%	14.1%	19.2%	22.4%	17.1%
	Second/subsequent	19.2%	10.0%	16.1%	28.6%	11.1%
Deceased	**First**	20.0%	16.8%	18.4%	19.8%	17.7%
	Second/subsequent	19.4%	24.4%	25.0%	25.9%	24.7%

Antibody-mediated rejection rate at 6 months after transplant 2011-2015

Donor type	Graft number	2011	2012	2013	2014	2015
Living	**First**	4.9%	2.3%	5.0%	4.6%	3.9%
	Second/subsequent	11.5%	6.7%	3.2%	5.7%	5.6%
Deceased	**First**	5.6%	3.9%	5.0%	5.1%	6.0%
	Second/subsequent	11.3%	10.3%	10.3%	12.9%	17.6%

The proportion of patients in Australia and New Zealand experiencing any rejection episode by 6 months after transplantation stratified by donor type and graft number. Rates of antibody mediated rejection are notably higher in deceased donor transplants and specifically second and subsequent grafts.

In 2016, 6 patients received intravenous immunoglobulin , 2 received rituximab, and 15 receiving T cell depleting polyclonal antibody as antibody therapy for acute rejection.

Peritoneal dialysis

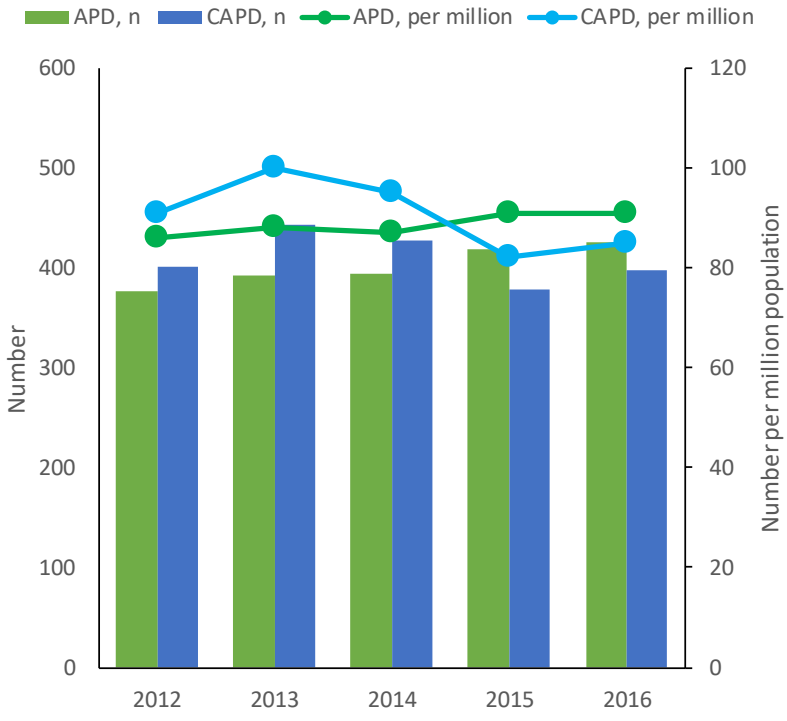
Patterns of peritoneal dialysis use in 2016

Overall, 326 patients commenced peritoneal dialysis in 2016 in New Zealand and 302 patients stopped peritoneal dialysis, resulting in 823 patients on peritoneal dialysis at year end.

All patients who commenced peritoneal dialysis		
First dialysis	209	(64%)
Transfer from haemodialysis	105	(32%)
Failed transplant	12	(4%)
Total	**326**	
All patients who stopped peritoneal dialysis		
Received kidney transplant	47	(16%)
Transferred to haemodialysis	138	(46%)
Recovery of kidney function	6	(2%)
Death	111	(37%)
Total	**302**	
Total patients on peritoneal dialysis at 31 December 2016	**823**	

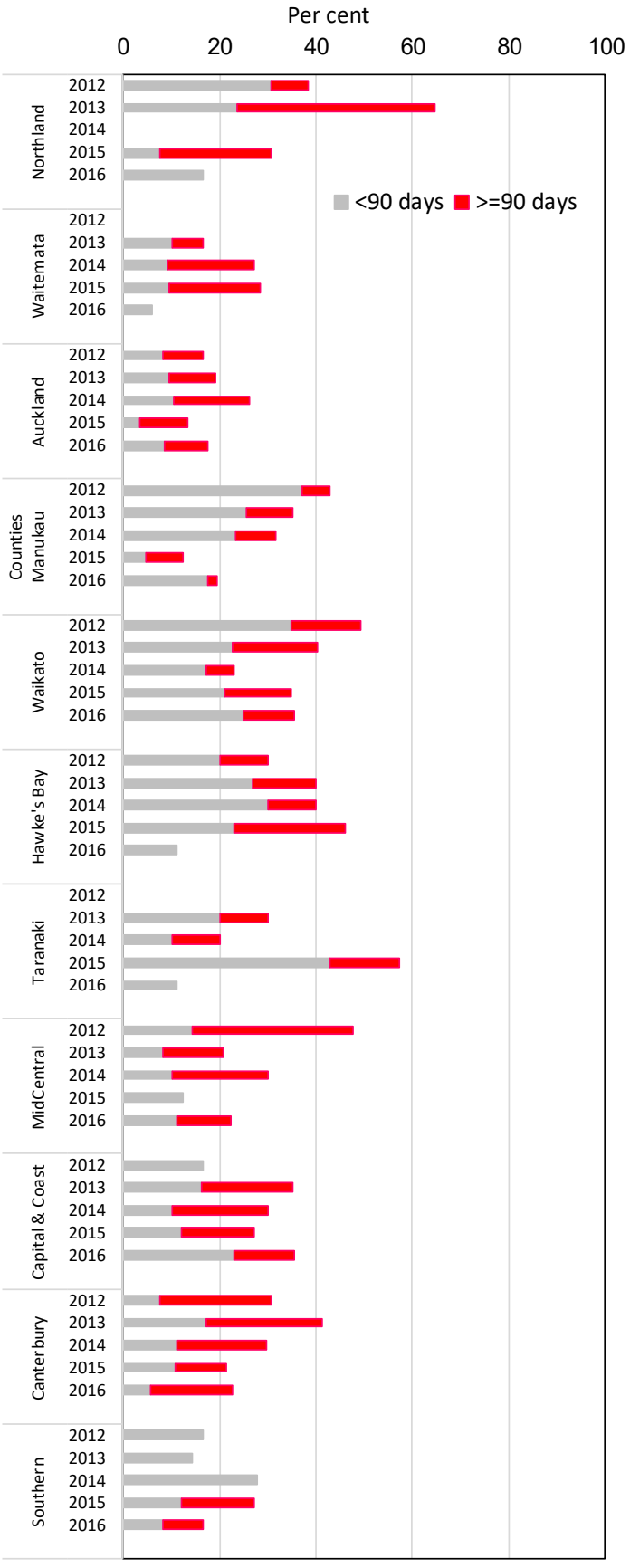
Peritoneal dialysis 2012-2016 expressed as number and per million

Of the 823 patients treated with peritoneal dialysis, 426 (52%) were treated with automated peritoneal dialysis and 397 (48%) were treated with continuous ambulatory peritoneal dialysis.



Peritoneal dialysis

Delay starting peritoneal dialysis



Delay in starting peritoneal dialysis by District Health Board

A percentage of people who choose peritoneal dialysis as their preferred dialysis modality may not commence dialysis treatment with peritoneal dialysis. This can be for a number of reasons including late specialist referral, urgent start to dialysis, or delayed insertion of peritoneal dialysis catheter.

Delay in starting peritoneal dialysis is highly variable between DHBs and within DHBs from year to year.

Notably, in 2016, many DHBs have not reported any incidence of delay >90 days (Northland, Waitemata, Hawke's Bay, and Taranaki). Longer delay has emerged at Southern DHB in 2015 and 2016, while the percentage with longer delay is relatively higher at Auckland and Canterbury DHBs.

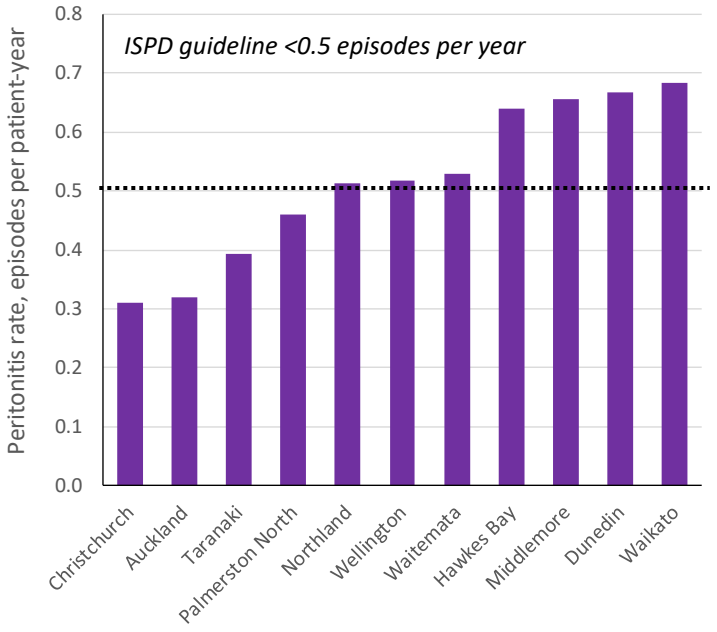
The delay >90 days has decreased at Counties Manukau District Health Board in 2016, which may reflect processes and activity developed in the acute start peritoneal dialysis program.

Peritoneal dialysis

Peritonitis & exit-site infection

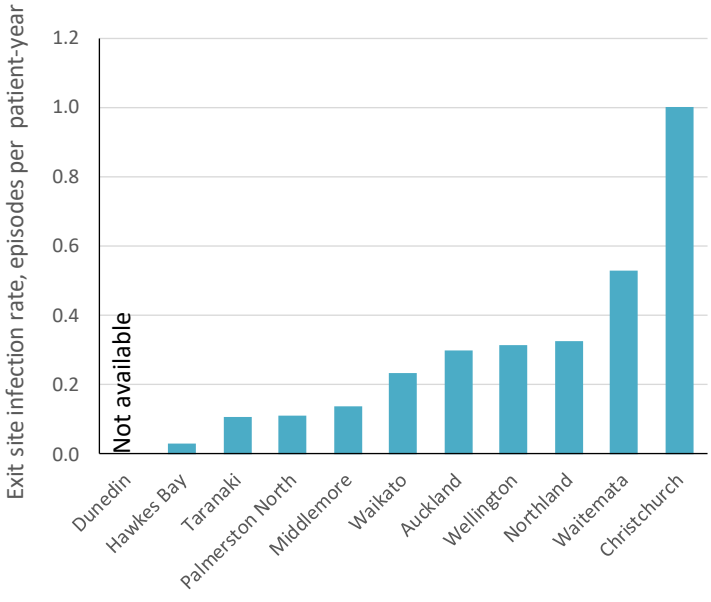
Peritoneal dialysis peritonitis rates by DHB, 2016

The peritoneal dialysis peritonitis rate in 2016 by DHB ranged from 0.31 to 0.68 episodes per year of peritoneal dialysis treatment. The current International Society of Peritoneal Dialysis (ISPD) guideline recommends that the rate should be no more than 0.5 episodes per year at risk.[1] Four of the eleven New Zealand units achieved this guideline rate. The guidelines recommend that dialysis teams examine each infection episode and identify the root cause of the infection.



Peritoneal dialysis exit-site infection rate by DHB, 2016

The rate of PD exit-site infection for every year of treatment ranged between 0.0 and 1.0 episodes. The data quality for this analysis was likely to be poor and may have underestimated the infection rates.



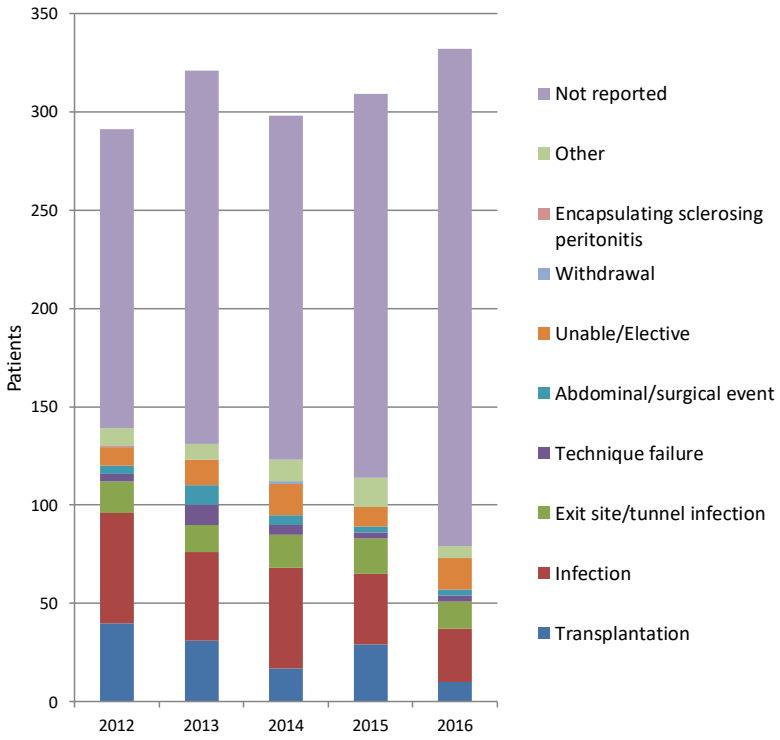
[1]Kam-Tao, P et al. ISPD Peritonitis Recommendations: 2016 Update on Prevention and treatment. PDI March-April 2018; 38(2)

Peritoneal dialysis

Dialysis catheter removal

Reasons for removal of peritoneal dialysis catheter, 2012-2016

The graphic shows the primary reasons for PD catheter removal in the years 2012 to 2016. The reason for catheter removal is most commonly not reported. Exit site and tunnel infection rates as a cause for removal appear unchanged. These data highlight the need to support more complete data collection for peritoneal dialysis catheter removal through the NZ Peritoneal Dialysis Registry.



Haemodialysis

Patterns of haemodialysis use in 2016

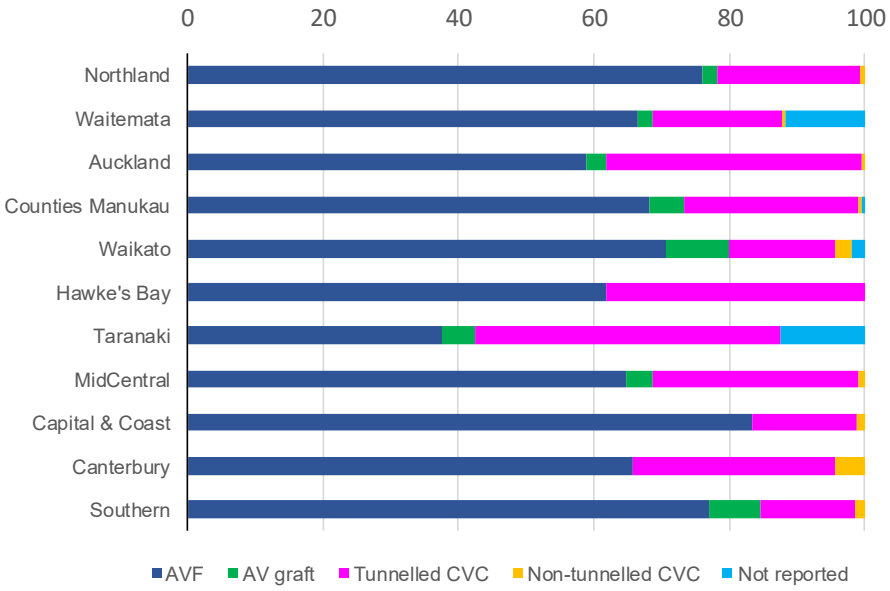
Overall, 514 patients commenced haemodialysis in 2016 in New Zealand and 494 patients stopped haemodialysis, resulting in 1927 patients on haemodialysis at year end. 468 patients (24%) were on home haemodialysis.

All patients who commenced haemodialysis		
First dialysis	332	(65%)
Transfer from peritoneal dialysis	156	(30%)
Failed transplant	24	(5%)
Total	**514**	
All patients who stopped haemodialysis		
Received kidney transplant	93	(20%)
Transferred to peritoneal dialysis	120	(24%)
Recovery of kidney function	7	(1.4%)
Death	274	(55%)
Total	**494**	
Total patients on haemodialysis at 31 December 2016	**1927**	
Patients on home haemodialysis at 31 December 2016 (% of all haemodialysis patients)	**468**	**(24%)**

Dialysis vascular access in prevalent haemodialysis patients in 2016.

The majority of prevalent haemodialysis patients had dialysis via an arteriovenous fistula or graft, with the exception of Taranaki DHB, at which 43% of patients had permanent vascular access. Many District Health Boards did not reach the national standard of 70% of prevalent patients with permanent vascular access.

Notably, although still a small proportion of patients, there is increasing use of arteriovenous grafts with the highest prevalence at Waikato and Southern District Health Boards. Capital & Coast and Southern DHBs had the highest prevalence of permanent access.



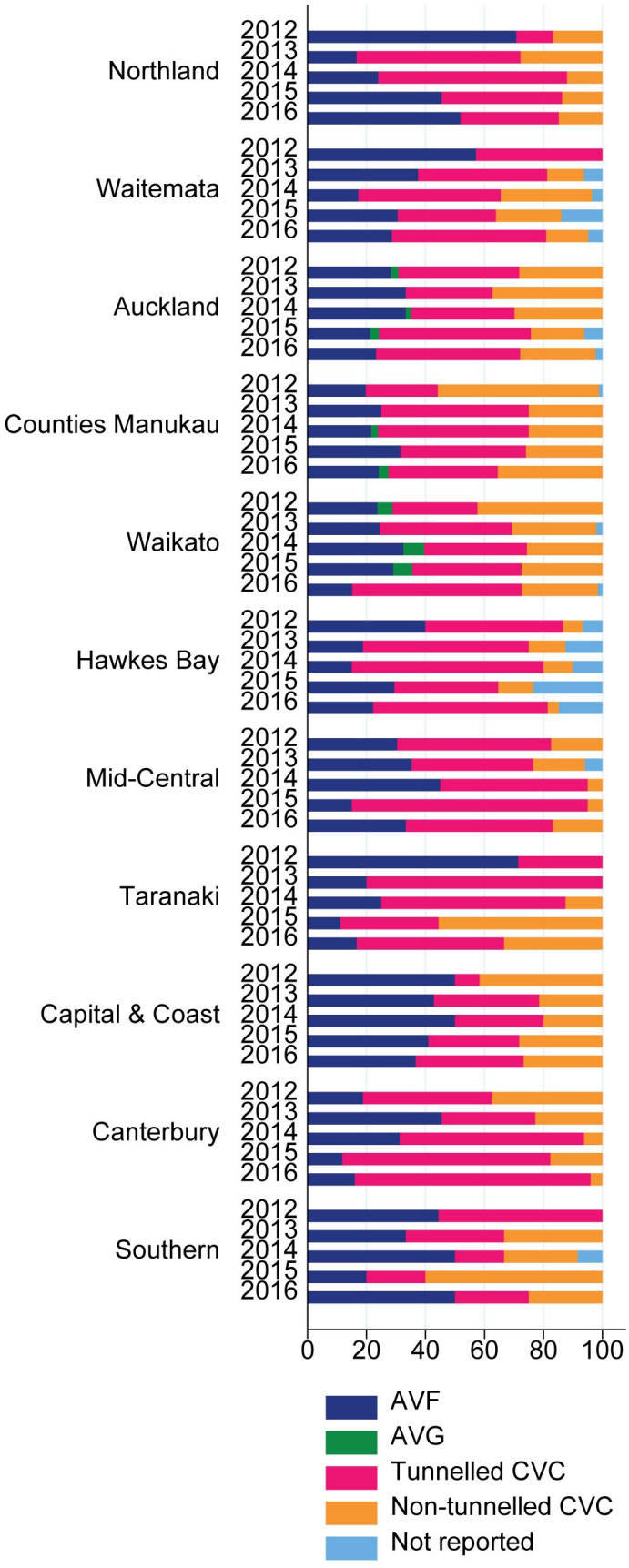
Haemodialysis

Incident vascular access

Incident vascular access in all patients starting haemodialysis, by District Health Board

No District Health Board except Northland achieved the national standard of 50% of patients starting haemodialysis with permanent vascular access (either an arteriovenous fistula (AVF) or AV graft (AVG)).

The Northland District Health Board is showing marked year-on-year increases and has reached the national standard in 2016. Capital & Coast and Canterbury District Health Boards are showing progressive decreases in attainment of permanent vascular access at dialysis start. Currently, Waikato, Taranaki, and Canterbury DHBs have an incidence of permanent access below 20%.



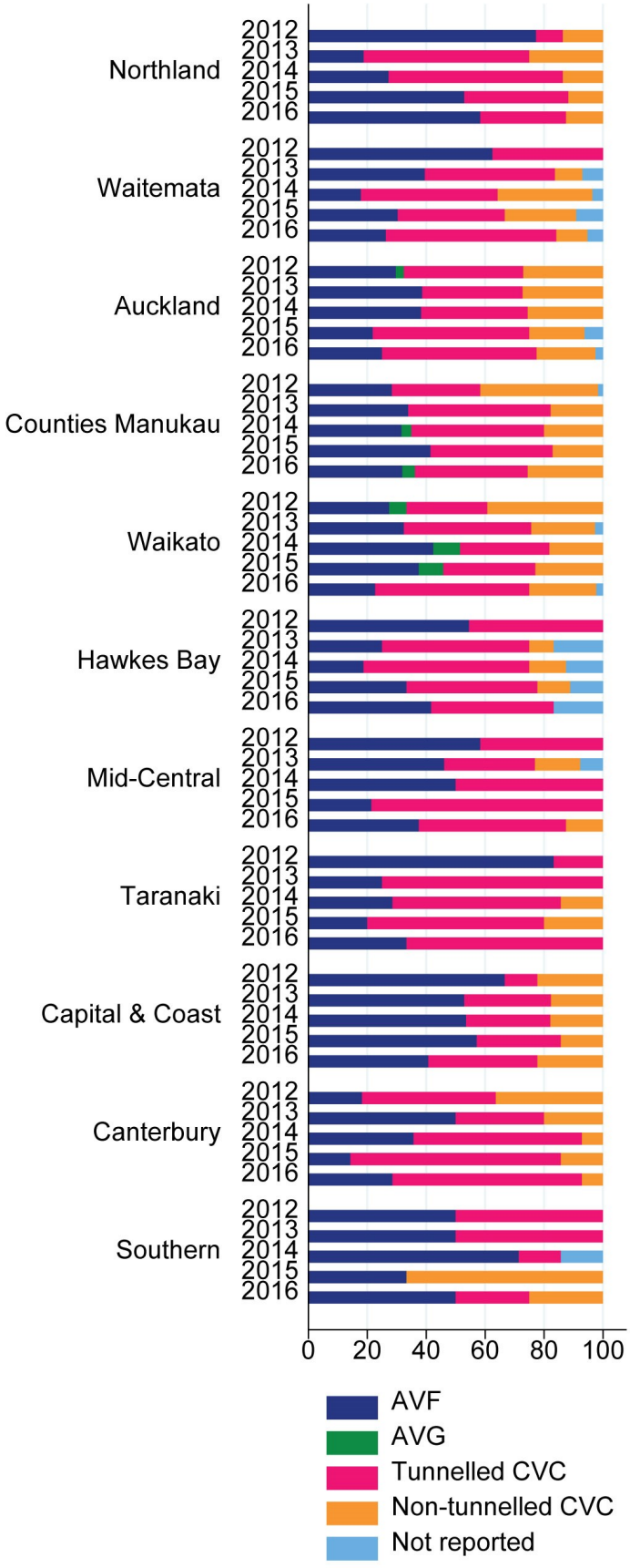
Haemodialysis

Incident vascular access

Incident vascular access in patients starting haemodialysis (excluding late referrals), by District Health Board.

National practice patterns for vascular access among patients who started haemodialysis >3 months of their first specialist assessment) is shown. The national standard is >80% patients starting dialysis with an arteriovenous fistula or graft.

Although most patients started haemodialysis with either a fistula or tunnelled dialysis catheter, no District Health Board achieved the national standard, and all were well below the standard. Progressive increase in permanent access is seen at Northland and Hawke's Bay District Health Boards, while there is a progressive decrease at Waitemata, MidCentral, Capital & Coast, and Canterbury District Health Boards. Incomplete reporting is evident at some DHB.



Haemodialysis

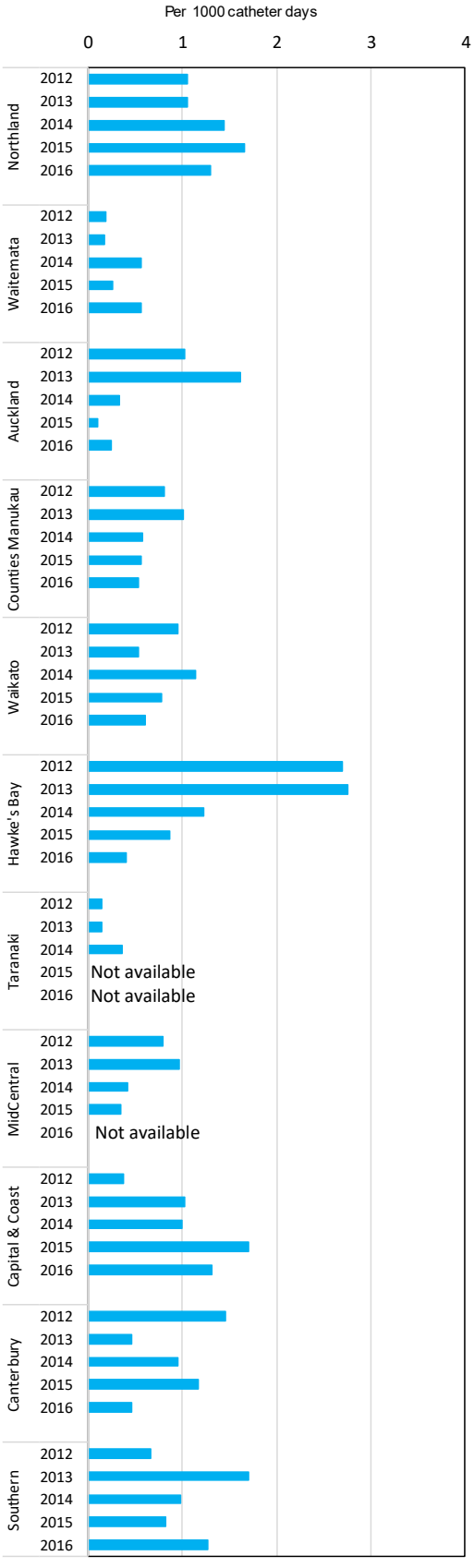
Catheter-associated blood stream infections

Dialysis central-line-associated blood stream infections (CLABSI) expressed as number of infections per 1000 catheter-days

The rate of central-line associated bloodstream infections (CLABSI) is highly variable across the country. The CLABSI is an important quality measure as it reflects several intersecting dialysis unit practices including handwashing, dressing policies and adherence to protocols, patient education, and wider dialysis unit quality and safety practices. CLABSI is also associated with patient mortality.

Two District Health Boards have not returned results for CLABSI in 2016.

It is notable that Auckland DHB has sustained the reduction they achieved in 2014, the rate appears to be increasing at Capital & Coast DHB, although there was some improvement on 2015. The rate appears to be increasing at Waitemata DHB. Hawke's Bay DHB has achieved marked year-on-year reductions in the CLABSI rate.



Haemodialysis

Duration

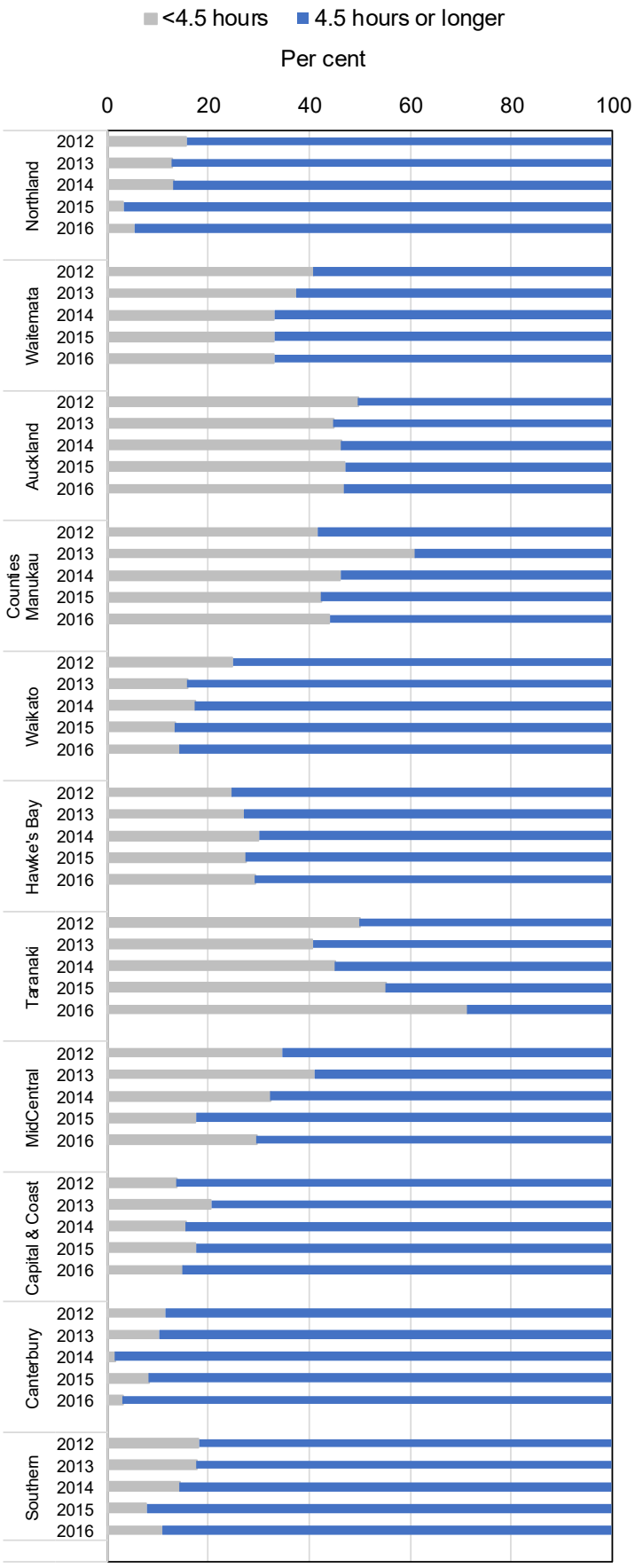
Duration of haemodialysis sessions, 2012-2016

The proportion of haemodialysis patients receiving 4.5 hours or longer with each dialysis session varies widely across the country.

The proportion receiving dialysis for 4.5 hours or less is high and increasing in Taranaki DHB, high and decreasing in Counties Manukau DHB, and high and stable in Auckland DHB.

The duration of haemodialysis is predominantly >4.5 hours in Northland and Canterbury DHBs.

The proportion of patients receiving shorter hours is decreasing across many units year on year including Waitemata, Counties Manukau, Waikato, MidCentral, Capital & Coast, Canterbury, and Southern DHBs.



Haemodialysis

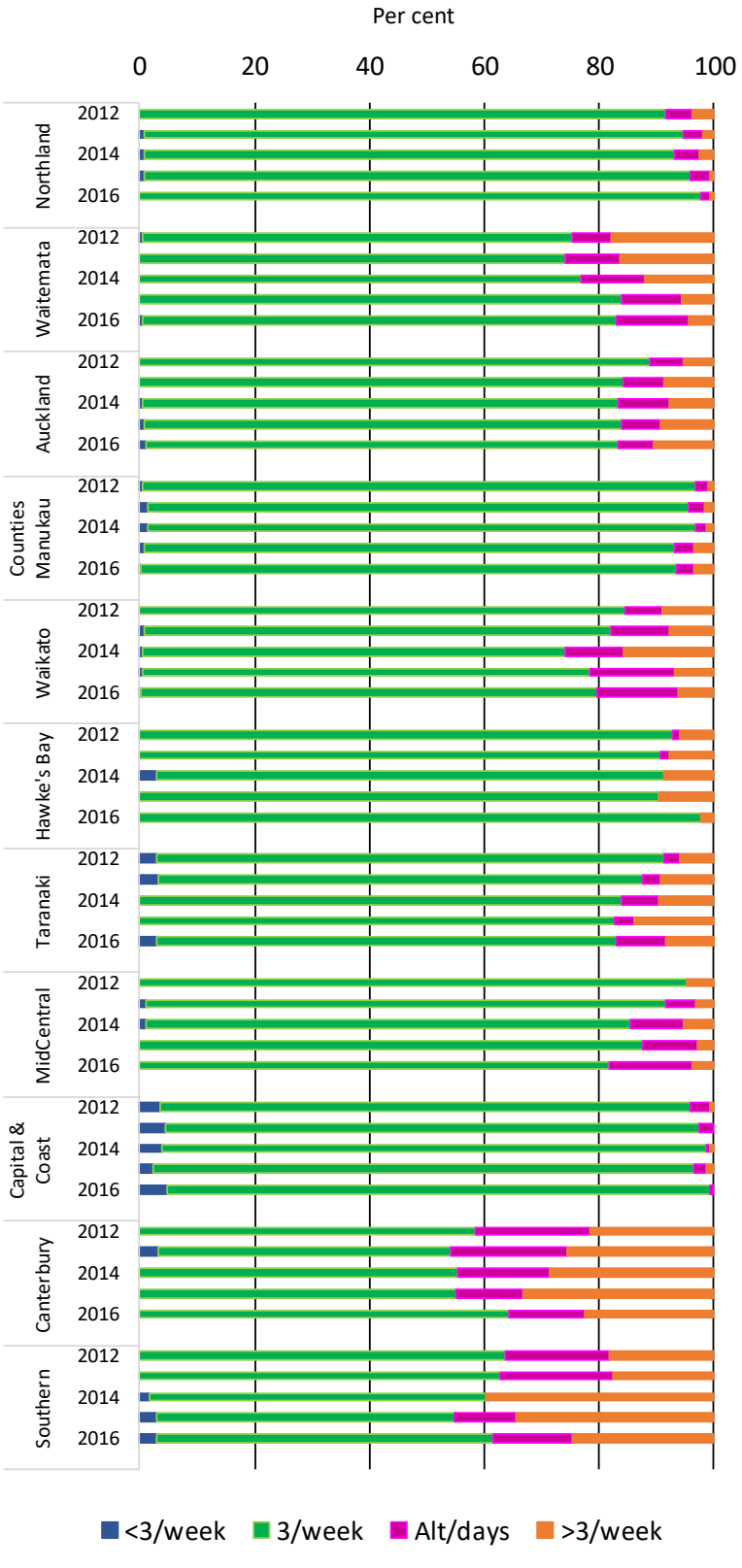
Frequency

Frequency of haemodialysis

As in previous years, few patients received haemodialysis fewer than three times a week. For much of the country, the core practice is to receive haemodialysis three times weekly.

In the two southern-most District Health Boards with a high rate of home haemodialysis (Canterbury and Southern), approximately 40% of patients are receiving more frequent dialysis (at least alternate daily).

The proportion of patients receiving >3 times weekly is increasing year on year at Counties Manukau, Taranaki, and MidCentral DHBs. The proportion of patients receiving dialysis >3 times weekly at Northland and Capital & Coast DHBs remains very low.

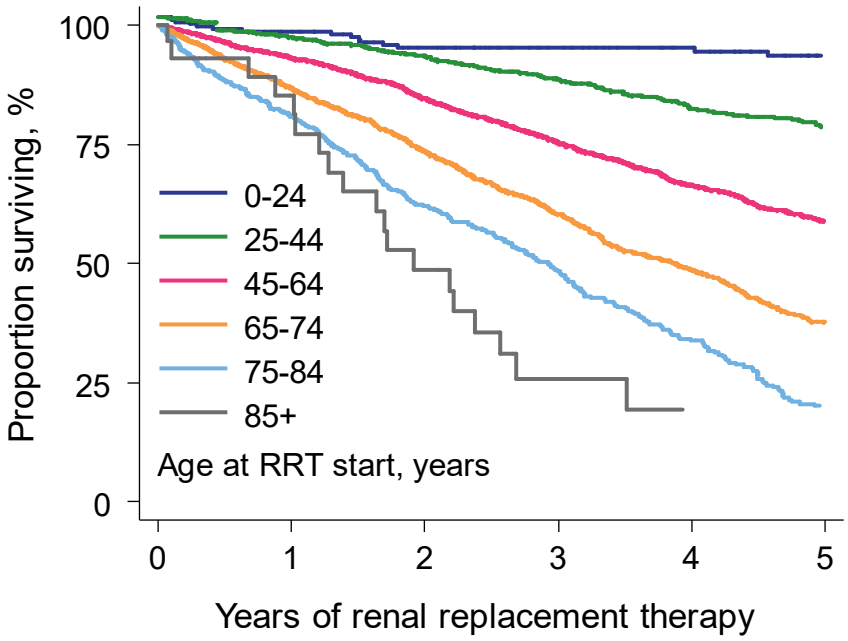


Mortality

Overall and dialysis

Survival after starting renal replacement therapy in New Zealand 2007-2016

Overall survival for patients who started renal replacement therapy in New Zealand during the period 2007-2016 is shown. The 5-year survival for the age group 0-24 years was 92%, 25-44 years was 79%, 45-64 years was 59%,, 65-74 years was 38%, 75-84 years was 20% and 85+ years was 19%. The overall death rate was 13.9 per 100 patient years on therapy (comparing with 13.9 per 100 patient-years in Australia).



Median survival on dialysis by age

The median survival on dialysis (the time to which 50% of people can expect to survive) for those who started dialysis between 2007-2016 is shown. Some values were not observed* (for example, half of the cohort aged 0-24 years had not died in the observation period). The younger age groups are likely to be affected by selection bias. That is, those patients who are fitter receive a transplant and are not included in the analysis after transplantation.

Age at start	Median survival, years (25th and 75th centiles)
0-24	* (7.4,*)
25-44	7.9 (4.8, *)
45-64	5.4 (2.8, 8.5)
65-74	3.7 (1.9, 6.1)
75-84	2.9 (1.3, 4.5)
85+	1.9 (1.2, 3.5)

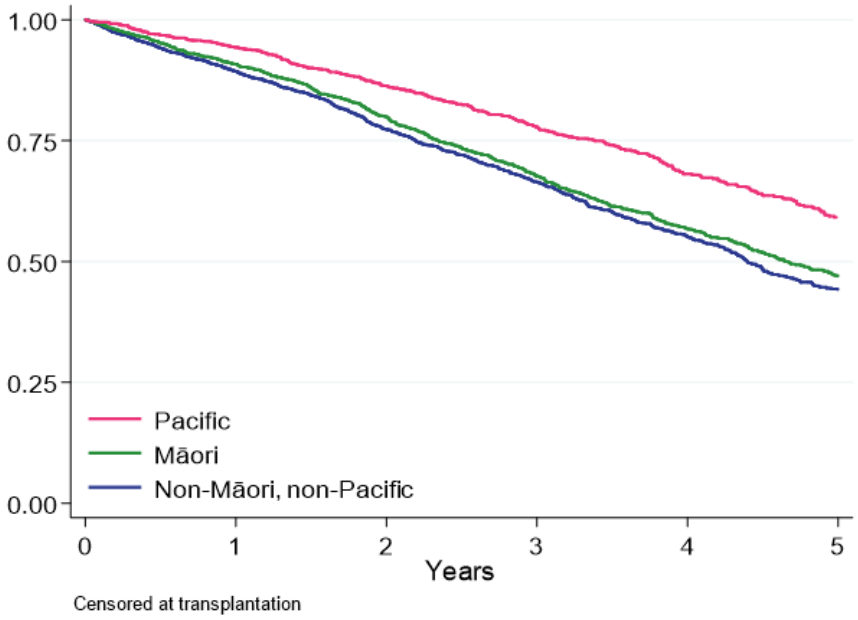
*Not observable

Mortality

Dialysis (by ethnicity)

Patient survival after commencing dialysis in New Zealand by ethnicity

The survival of incident dialysis patients in New Zealand by ethnicity is shown. The median overall survival (unadjusted) is below 5 years, although is higher among Pacific patients. Unadjusted survival does not account for competing risks of transplantation or adjust for age and sex characteristics of the populations. These survival data warrant more detailed exploration including competing risk analysis, separate analyses for haemodialysis and peritoneal dialysis, and adjustment for case-mix.

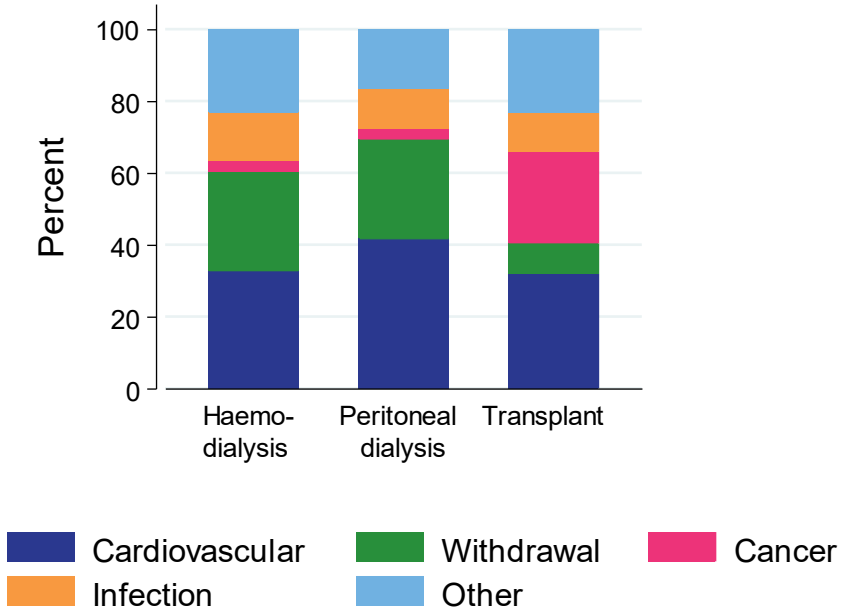


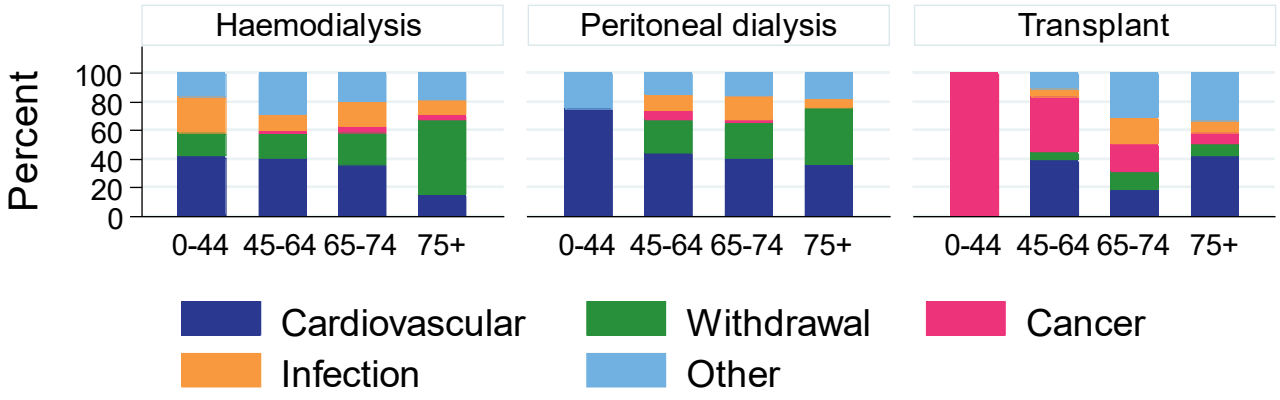
Mortality

Causes of death by treatment modality

Causes of death on renal replacement therapy occurring during 2016

The causes of death (modality at time of death) are shown. For transplant recipients, cancer is a dominant cause of death in addition to cardiovascular disease. For dialysis patients, withdrawal from dialysis care is dominant, together with cardiovascular causes, particularly among those treated with peritoneal dialysis.





Causes of death on renal replacement therapy occurring during 2016, by age group and modality

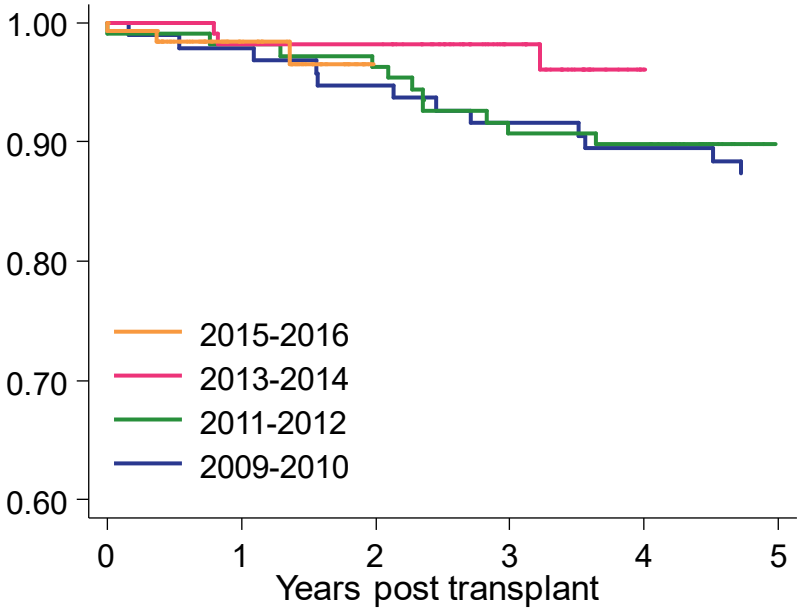
The causes of death (modality at time of death) are shown for each modality and each age group. Notably, cancer dominates cause of death for young transplant recipients, while cardiovascular disease dominates cause of death for young patients treated with peritoneal dialysis. Withdrawal from treatment is progressively more frequent with increasing age for dialysis patients (particularly haemodialysis). Infection is a more frequent cause of death for patients aged 65-74 years with a kidney transplant.

Patient and graft survival

Primary deceased donor transplant

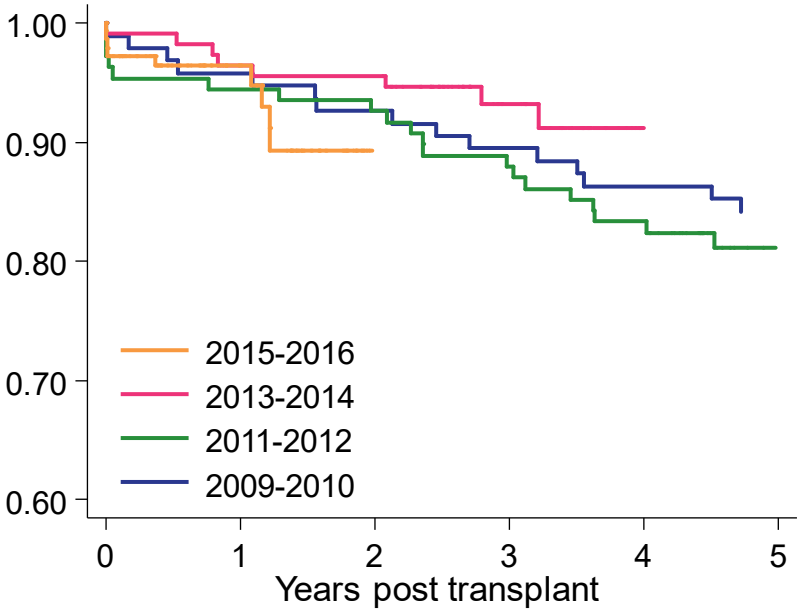
Patient survival after primary deceased donor kidney transplant 2009-2016

The graphic shows the patient survival after a primary deceased donor kidney transplant in New Zealand. At 1 year after primary deceased donor kidney transplantation, patient survival overall in New Zealand is 98% and at 5 years is 90%.



Graft survival after primary deceased donor kidney transplant 2009-2016

The graphic shows the graft survival after a primary deceased donor kidney transplant in New Zealand. At 1 year after primary deceased donor kidney transplantation, graft survival overall in New Zealand is 96% and 81% at 5 years.

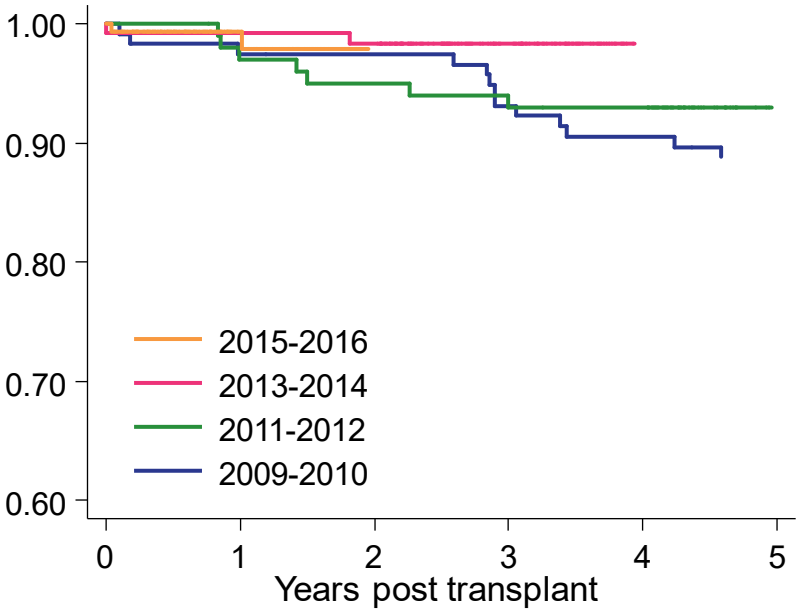


Patient and graft survival

Primary living donor transplant

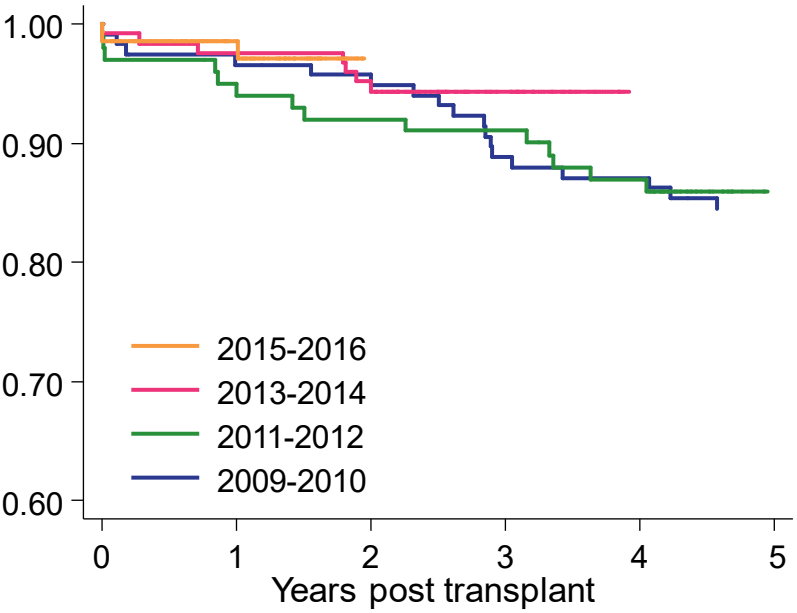
Patient survival after primary living donor kidney transplant 2009-2016

The graphic shows the patient survival after a primary living donor kidney transplant in New Zealand. At 1 year after primary living donor kidney transplantation, patient survival overall in New Zealand is 99% and at 5 years is 93%.



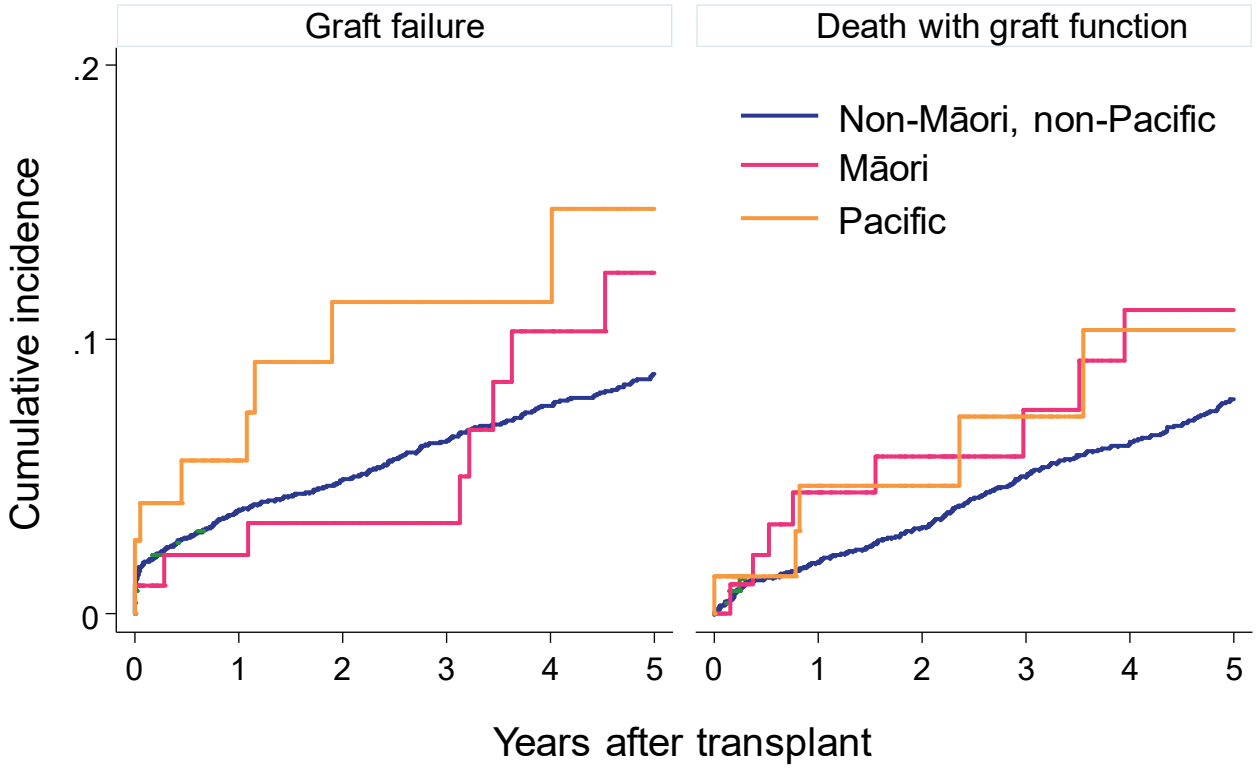
Graft survival after primary living donor kidney transplant 2009-2016

The graphic shows the graft survival after a primary living donor kidney transplant in New Zealand. At 1 year after primary living donor kidney transplantation, graft survival overall in New Zealand is 99% and 86% at 5 years.



Patient and graft survival

Transplantation survival by ethnicity

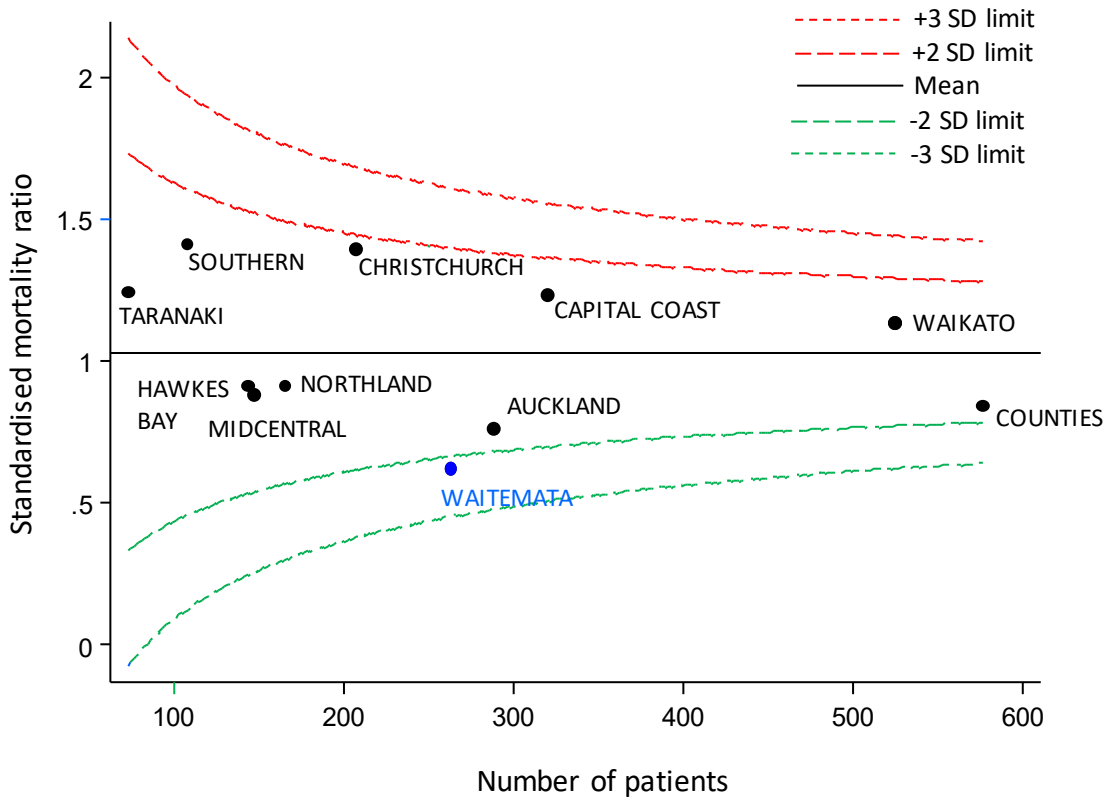


Overall graft failure and death with transplant function after kidney transplantation in New Zealand

The cumulative incidence of kidney transplant failure and death after kidney transplantation in the first 5 years after transplantation. The analysis utilises competing risk techniques to account for the effects of both components of graft failure (graft loss or death). For Māori and Pacific patients, mortality is increased immediately after transplantation. For Māori patients, graft function appears to be comparable to non-Māori patients in the first 3 years. Pacific patients experience higher graft loss at all time points after kidney transplantation.

Survival

By District Health Board



All District Health Boards fall within 3 standard deviations of the mean national mortality rate for patients starting dialysis between 2011 and 2016.

Survival for dialysis patients by District Health Board treating District Health Board

The standardised mortality ratio (SMR) is the number of deaths in each District Health Board renal unit divided by the number of expected deaths. The expected number of deaths is obtained by multivariate modelling adjusting for the characteristics of patients at each treating DHB. All patients aged ≥18 years who commenced dialysis during 2011-2016 and who remained on dialysis >90 days were included.

An SMR close to 1 means that the observed number of deaths is close to the expected number. An SMR higher than 1 means that the observed number of deaths is higher than the expected number. The control limits are shown as the potential for an SMR to fall outside the 95% prediction limit (2 SD) and the 99.8% (3 SD) prediction limit. All District Health Boards fell within 3 standard deviations of the mean national SMR.

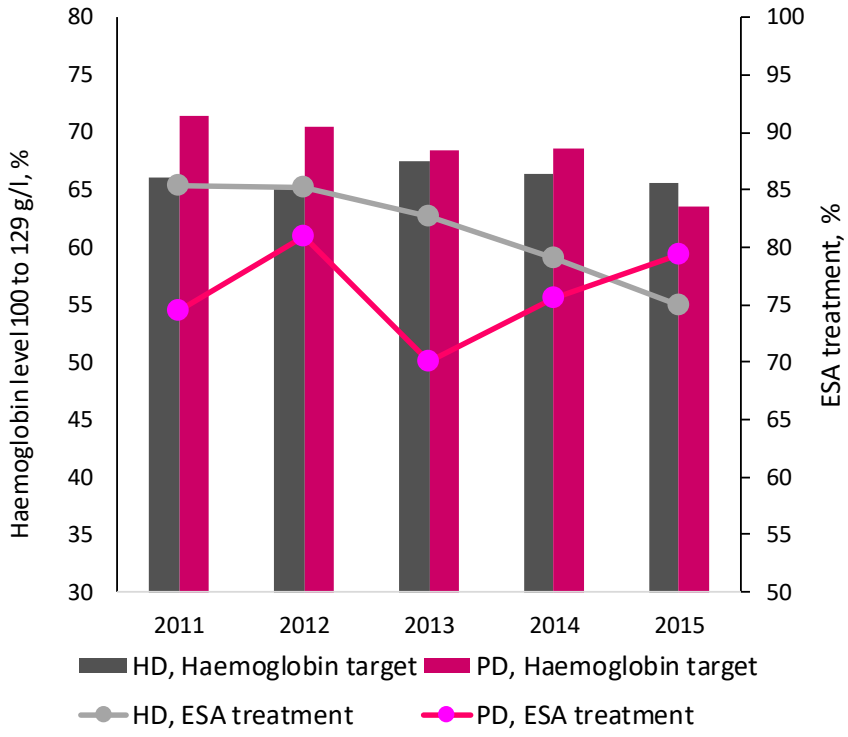
Anaemia

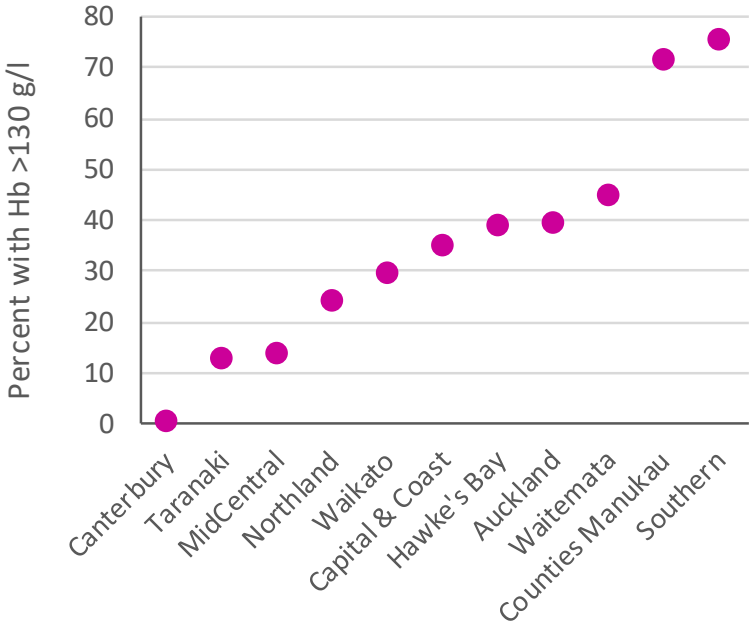
Treatment of anaemia

Treatment of anaemia with erythropoietin is associated with worse patient outcomes when the haemoglobin is above 130 g/l. International guidelines suggest haemoglobin is maintained between 110 and 120 g/l during erythropoietin treatment. Patients and clinicians may choose to aim for a lower haemoglobin target than the guideline range.

Approximately two-thirds of dialysis patients have a haemoglobin level between 110-120 g/l. Approximately 75% of haemodialysis patients are treated with erythropoietin. This prevalence has decreased by about 10% over the last 10 years. Approximately 80% of peritoneal dialysis patients are treated with erythropoietin. This percentage is somewhat variable over time.

The proportion of patients with a haemoglobin above 130 g/l while treated with erythropoietin varied across District Health Boards, ranging from 0% at Canterbury to 75% at Southern. DHB





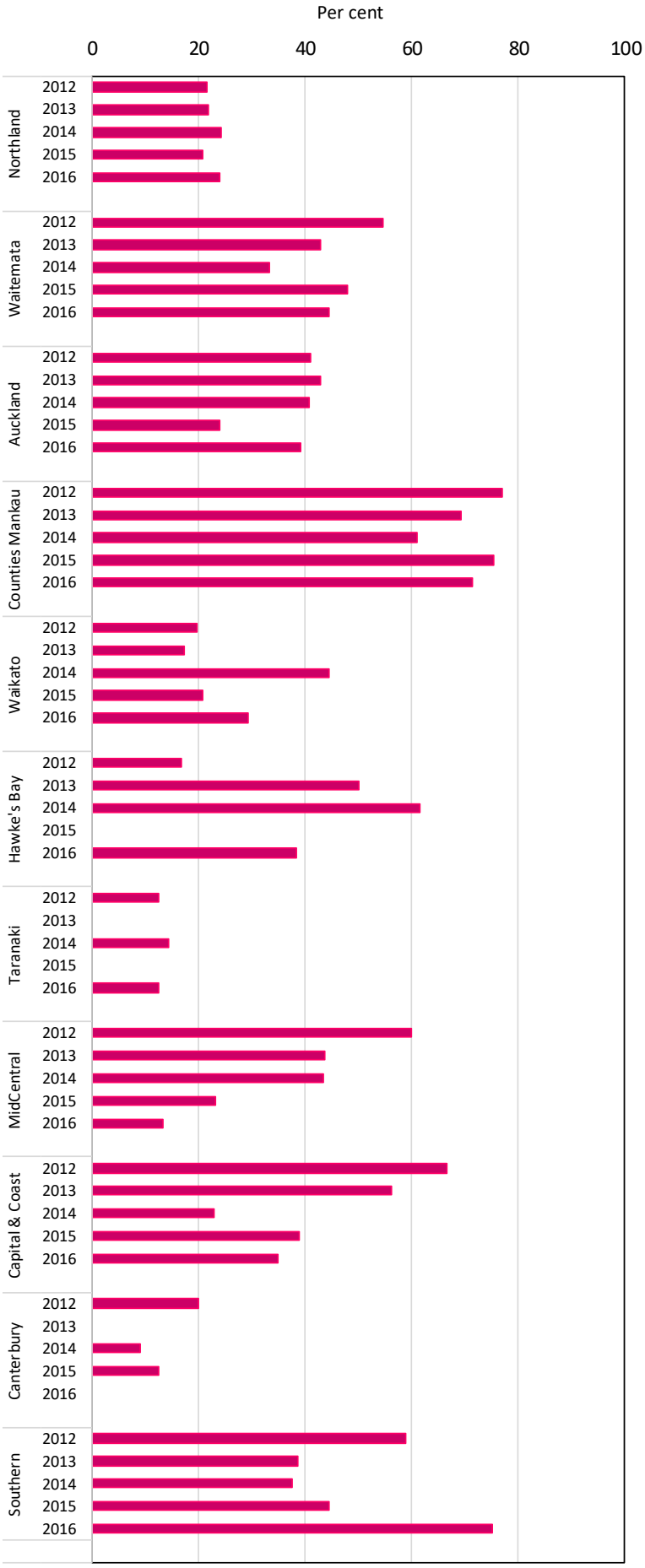
Anaemia

Prevalence of haemoglobin >130 g/l with erythropoietin therapy by District Health Board

The percentage of patients who have a haemoglobin >130 g/l while treated with erythropoietin varies across District Health Boards.

The percentage has decreased markedly at Capital & Coast Health and MidCentral over the last 5 years. The prevalence at Taranaki and Canterbury is low.

At most District Health Boards, the rate has remained largely unchanged between 2012 and 2016.



National Renal
Advisory Board