



CHAPTER 1

Incidence of Renal Replacement Therapy for End Stage Kidney Disease

Summarising the number of incident renal replacement therapy patients in Australia and New Zealand, the rate per million population and the demographic and clinical characteristics of incident patients.

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Suggested citation

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Stock and Flow

Tables 1.1 and 1.2 show the stock and flow of renal replacement therapy (RRT) patients by country and by state as well as the incidence and prevalence rates per million population (pmp). In Australia in 2018 there were 3093 new RRT patients, with an overall incidence rate of 124 per million population. In New Zealand there were 619 new patients (127 pmp). The rate in New Zealand is subject to more annual variation due to lower numbers.

The number of prevalent patients in each country continues to climb; in Australia at the end of 2018 there were 25652 (1026 pmp) patients receiving RRT, and in New Zealand there were 4812 (985 pmp).

Population estimates for Australia and New Zealand used throughout this chapter for the calculation of incidence per million population were sourced from the Australian Bureau of Statistics (2018)¹ and Stats NZ (2018)².

Table 1.1 Stock and Flow 2014-2018 (pmp)

Country	Event	2014	2015	2016	2017	2018
Australia	Total New Patients	2778 (118)	2756 (116)	2911 (120)	3085 (125)	3093 (124)
	Total Transplants	913 (39)	949 (40)	1091 (45)	1109 (45)	1149 (46)
	Living Donor Transplants	267	242	264	271	238
	Subsequent Transplants	108	107	159	158	121
	Total Deaths	1850	1948	2072	2167	2045
	Dialysis Patients	1625	1701	1817	1919	1810
	Transplant Patients	225	247	255	248	235
	Total Prevalent	22380 (953)	23092 (970)	23828 (985)	24653 (1002)	25652 (1026)
	Dialysis Patients	12302 (524)	12611 (530)	12772 (528)	13032 (530)	13399 (536)
	Transplant Patients	10078 (429)	10481 (440)	11056 (457)	11621 (472)	12253 (490)
New Zealand	Total New Patients	557 (124)	565 (123)	579 (123)	618 (129)	619 (127)
	Total Transplants	138 (31)	147 (32)	172 (37)	187 (39)	182 (37)
	Living Donor Transplants	72	74	82	69	84
	Subsequent Transplants	12	14	17	13	12
	Total Deaths	416	450	448	480	458
	Dialysis Patients	371	408	397	428	407
	Transplant Patients	45	42	51	52	51
	Total Prevalent	4321 (958)	4420 (962)	4545 (968)	4667 (974)	4812 (985)
	Dialysis Patients	2692 (597)	2716 (591)	2763 (589)	2779 (580)	2846 (583)
	Transplant Patients	1629 (361)	1704 (371)	1782 (380)	1888 (394)	1966 (402)

Table 1.2 Stock and Flow by State and Country 2018

State	New Patients	Transplant Operations	Deaths Dialysis	Deaths Transplant	Dialysis Dependent	Functioning Transplants	Total Prevalent
QLD	653 (130)	177 (35)	380	47	2670 (533)	2287 (456)	4957 (989)
NSW	896 (112)	393 (49)	530	69	4004 (501)	3506 (439)	7510 (940)
ACT	54 (128)	0 (0)	53	10	269 (639)	299 (710)	568 (1349)
VIC	783 (121)	418 (65)	414	58	3210 (497)	3529 (546)	6739 (1043)
TAS	46 (87)	0 (0)	27	8	211 (400)	285 (540)	496 (939)
SA	203 (117)	69 (40)	112	22	909 (524)	1066 (614)	1975 (1137)
NT	127 (514)	0 (0)	69	3	731 (2956)	114 (461)	845 (3417)
WA	331 (128)	92 (35)	225	18	1395 (537)	1167 (450)	2562 (987)
Australia	3093 (124)	1149 (46)	1810	235	13399 (536)	12253 (490)	25652 (1026)
New Zealand	619 (127)	182 (37)	407	51	2846 (583)	1966 (402)	4812 (985)

Incident Patients

The total numbers of incident patients in Australia and New Zealand since the beginning of RRT are shown in figure 1.1.

Figure 1.1 - New Patients - Australia and New Zealand

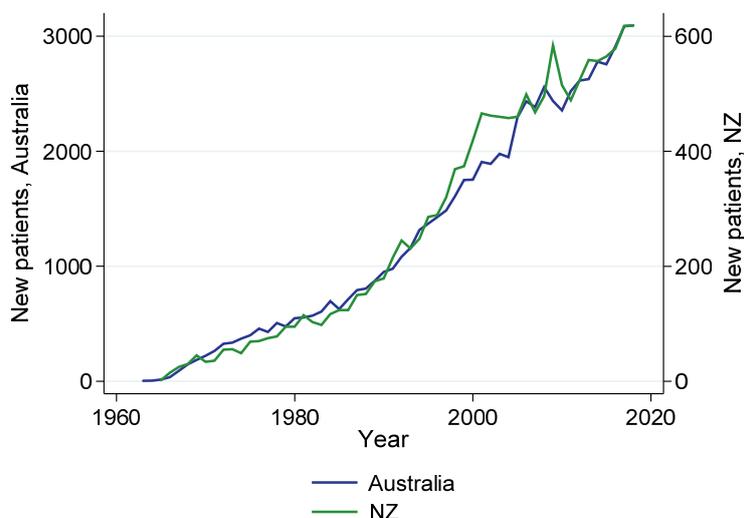


Figure 1.2 presents these data another way, showing the numbers of new patients and change in each country over the last 30 years.

Figure 1.2.1 - New Patients and Change - Australia

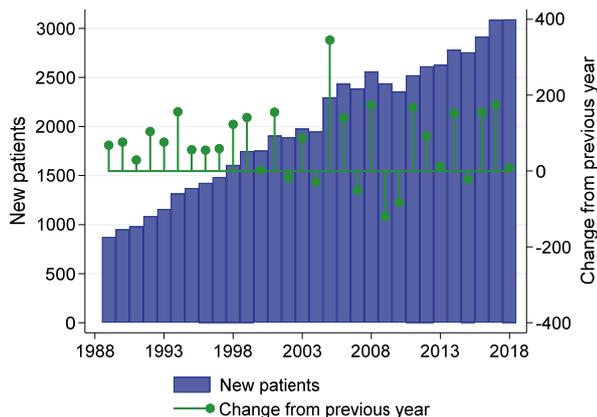


Figure 1.2.2 - New Patients and Change - New Zealand

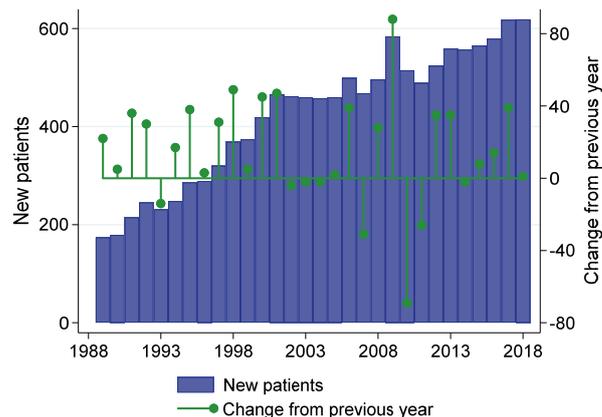


Table 1.3 shows the number of new patients (pmp) by state and country over 2014-2018. There is substantial variation in incidence rates between states, with the lowest rates in Tasmania (87 pmp in 2018) and the highest in the Northern Territory (514 pmp in 2018).

Table 1.3 RRT Incidence (pmp) 2014-2018

State	2014	2015	2016	2017	2018
QLD	540 (114)	517 (108)	527 (109)	626 (127)	653 (130)
NSW	824 (110)	837 (110)	879 (114)	895 (114)	896 (112)
ACT	73 (188)	48 (121)	70 (174)	53 (129)	54 (128)
VIC	688 (117)	675 (112)	731 (118)	771 (122)	783 (121)
TAS	45 (88)	55 (107)	57 (110)	56 (107)	46 (87)
SA	180 (107)	188 (111)	225 (131)	204 (118)	203 (117)
NT	115 (473)	130 (531)	82 (334)	118 (477)	127 (514)
WA	313 (124)	306 (120)	340 (133)	362 (141)	331 (128)
Australia	2778 (118)	2756 (116)	2911 (120)	3085 (125)	3093 (124)
New Zealand	557 (124)	565 (123)	579 (123)	618 (129)	619 (127)

Figure 1.3 shows incidence rates by age group, and figure 1.4 shows them by age group and state; the bars represent 95% confidence intervals. Note the different y axes for each state.

Figure 1.3.1 - New Patients - Age Specific Rates - Australia

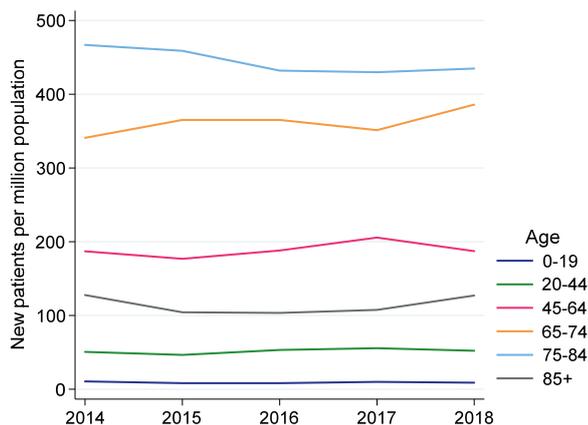


Figure 1.3.2 - New Patients - Age Specific Rates - New Zealand

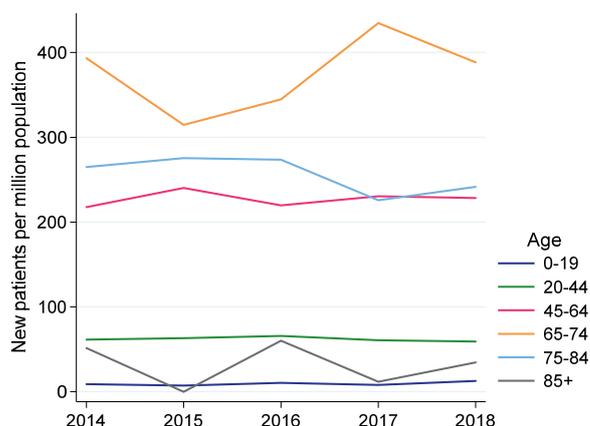


Figure 1.4.1 - New Patients by Age Group - NT

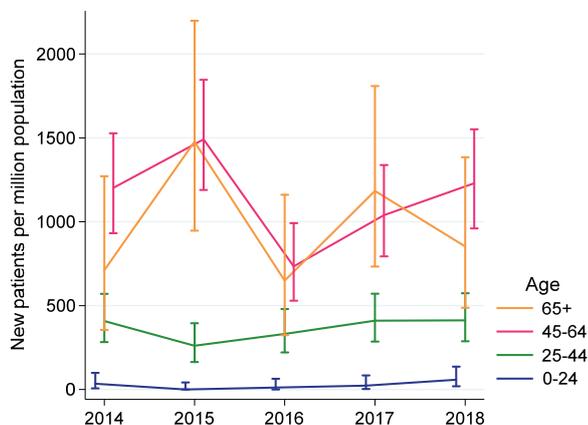


Figure 1.4.2 - New Patients by Age Group - NSW

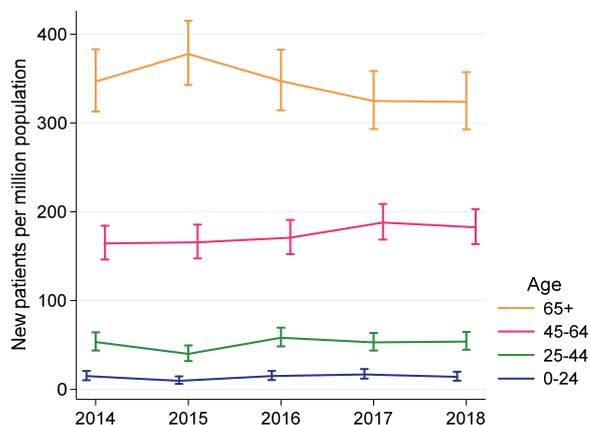


Figure 1.4.3 - New Patients by Age Group - VIC

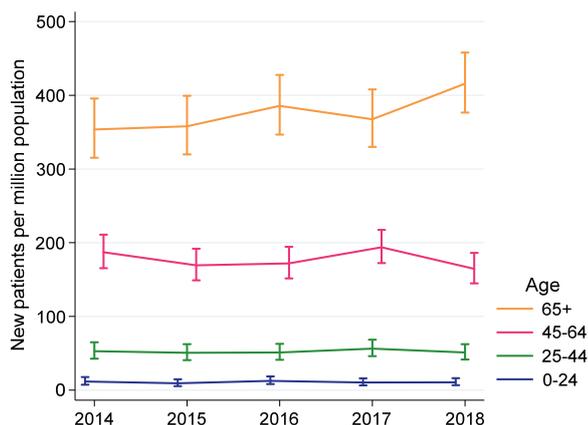


Figure 1.4.4 - New Patients by Age Group - QLD

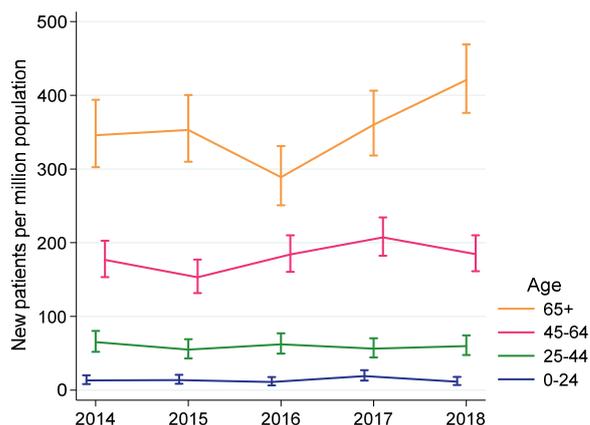


Figure 1.4.5 - New Patients by Age Group - SA

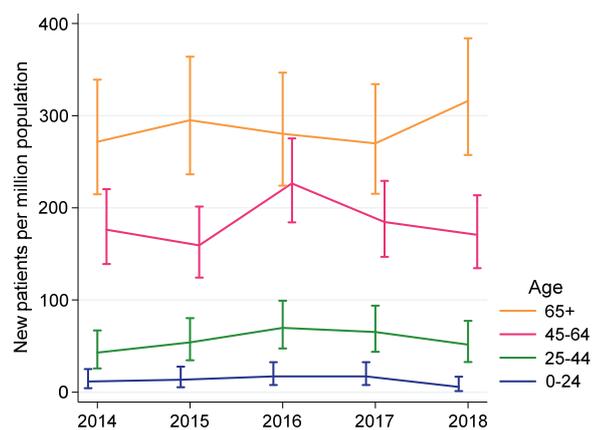


Figure 1.4.6 - New Patients by Age Group - WA

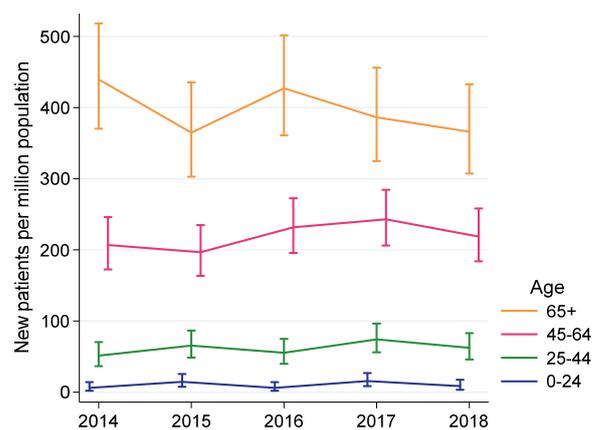


Figure 1.4.7 - New Patients by Age Group - TAS

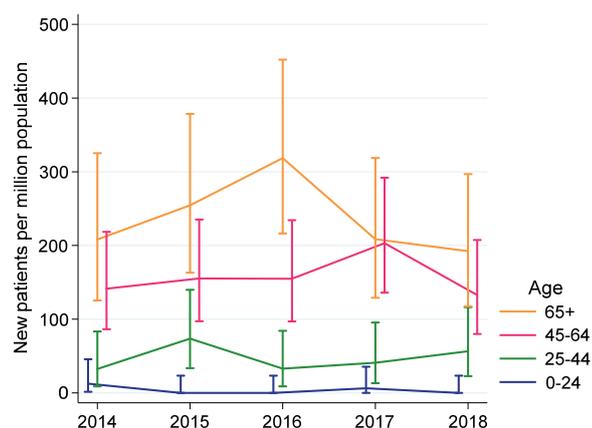
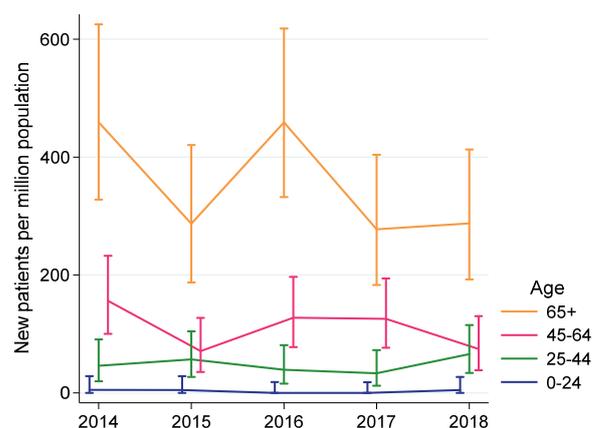


Figure 1.4.8 - New Patients by Age Group - ACT



The rates in older patients are shown in table 1.4. Incidence rates for older patients tend to be lower in New Zealand than in Australia. Finally, table 1.5 further categorises the 2018 data by gender.

Table 1.4 Incidence (pmp) of ESKD in Older Patients 2014-2018

Country	Age	2014	2015	2016	2017	2018
Australia	60-64	340 (269)	327 (255)	346 (265)	377 (283)	370 (272)
	65-69	348 (311)	397 (343)	406 (340)	381 (319)	422 (350)
	70-74	311 (382)	336 (395)	355 (399)	375 (391)	437 (429)
	75-79	306 (503)	312 (495)	298 (458)	336 (496)	327 (467)
	80-84	187 (418)	183 (408)	180 (396)	157 (335)	189 (389)
	85+	58 (128)	49 (104)	50 (104)	53 (108)	64 (127)
New Zealand	60-64	78 (318)	84 (336)	84 (327)	71 (268)	69 (254)
	65-69	89 (412)	67 (297)	82 (351)	110 (468)	87 (367)
	70-74	59 (368)	56 (339)	57 (335)	71 (392)	81 (415)
	75-79	39 (343)	43 (358)	42 (328)	44 (325)	42 (304)
	80-84	13 (157)	13 (156)	16 (190)	6 (70)	13 (145)
	85+	4 (51)	0 (0)	5 (60)	1 (12)	3 (35)

Table 1.5 Age and Sex of New Patients 2018

Country	Sex	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	Total	Mean	Median
Australia	F	6	4	25	66	106	191	258	281	160	17	1114	58.6	61
	M	6	15	36	81	169	290	401	578	356	47	1979	61.1	64
New Zealand	F	3	1	3	25	22	60	58	60	14	1	247	54.5	56
	M	2	5	6	18	29	64	97	108	41	2	372	58.3	60

Late Referral

The following figures and tables examine late referral, defined as <3 months between referral to and review by a nephrologist and RRT start. Figure 1.5 shows the overall proportion of new patients referred late in Australia and New Zealand over the last 10 years. There has been downward trend in both countries. In 2018, among those with referral timing reported, 16% of Australian and 13% of New Zealand new patients were referred late. Figure 1.6 shows the variation in late referral rates across Australian states and figure 1.7 shows late referral rates by age for Australia and New Zealand.

Tables 1.6 and 1.7 show late referral rates for new patients over 2014-2018 by ethnicity and primary renal disease. Rates vary substantially between primary renal disease categories; for example, in Australia, 7% of patients with polycystic kidney disease were referred late, compared with 15% of patients with diabetic nephropathy and 28% of patients with “other” diseases.

Figure 1.5 - Late Referral Rates - All Incident Patients 2009 – 2018

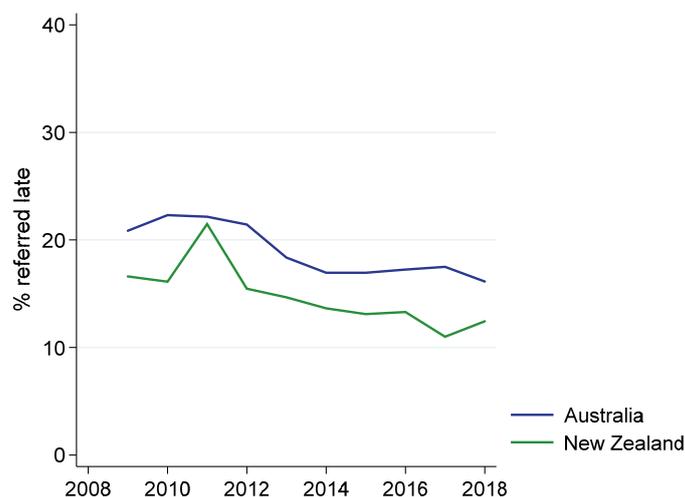


Figure 1.6 - Late Referral Rates by State - Australia 2009 – 2018

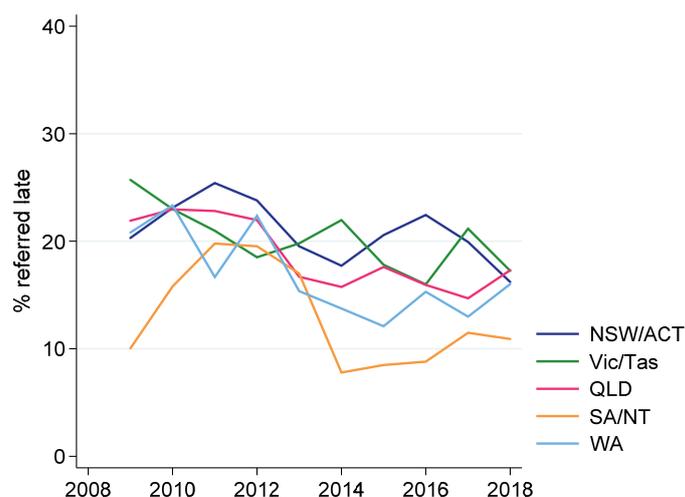


Figure 1.7.1 - Late Referral Rates by Age - Australia 2009 - 2018

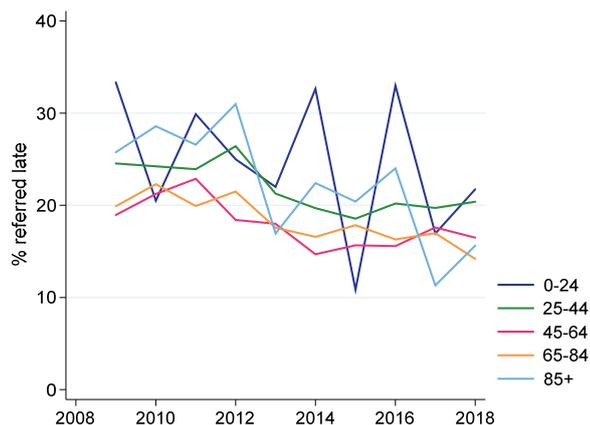


Figure 1.7.2 - Late Referral Rates by Age - New Zealand 2009 - 2018

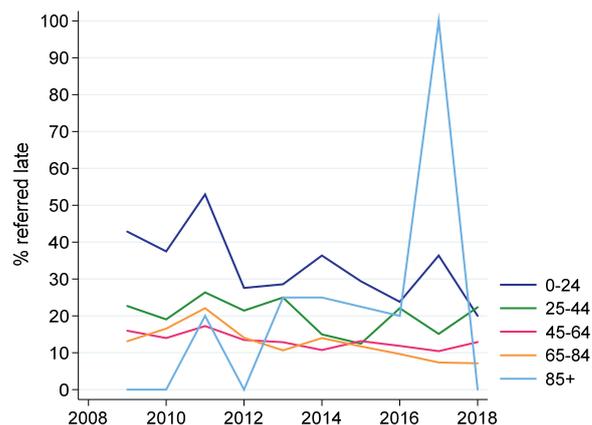


Table 1.6 Late Referral by Country and Ethnicity 2014-2018

Country	Ethnicity	Late	Not Late	Not Reported	Total
Australia	Caucasian	1582 (17%)	7737 (82%)	154 (2%)	9473
	Aboriginal/Torres Strait Islander	241 (15%)	1277 (81%)	62 (4%)	1580
	Asian	264 (18%)	1220 (81%)	23 (2%)	1507
	Māori	45 (31%)	97 (67%)	3 (2%)	145
	Pacific	100 (23%)	330 (76%)	6 (1%)	436
	Other	173 (20%)	695 (79%)	16 (2%)	884
	Not reported	74 (12%)	363 (61%)	161 (27%)	598
	Total	2479 (17%)	11719 (80%)	425 (3%)	14623
New Zealand	Caucasian	133 (13%)	905 (86%)	11 (1%)	1049
	Aboriginal/Torres Strait Islander	0 (0%)	3 (100%)	0 (0%)	3
	Asian	23 (10%)	215 (90%)	2 (1%)	240
	Māori	110 (13%)	747 (85%)	23 (3%)	880
	Pacific	93 (14%)	568 (85%)	5 (1%)	666
	Other	11 (15%)	62 (84%)	1 (1%)	74
	Not reported	2 (8%)	12 (46%)	12 (46%)	26
	Total	372 (13%)	2512 (86%)	54 (2%)	2938

Table 1.7 Late Referral by Country and Primary Renal Disease 2014-2018

Country	Primary renal disease	Late	Not Late	Not Reported	Total
Australia	Diabetic Nephropathy	781 (14%)	4605 (84%)	94 (2%)	5480
	Glomerulonephritis	430 (16%)	2153 (82%)	41 (2%)	2624
	Hypertension	320 (16%)	1591 (82%)	33 (2%)	1944
	Polycystic Disease	63 (7%)	847 (91%)	23 (2%)	933
	Reflux Nephropathy	21 (7%)	269 (90%)	8 (3%)	298
	Other	579 (27%)	1511 (71%)	35 (2%)	2125
	Uncertain	202 (27%)	530 (71%)	11 (1%)	743
	Not reported	83 (17%)	213 (45%)	180 (38%)	476
	Total	2479 (17%)	11719 (80%)	425 (3%)	14623
New Zealand	Diabetic Nephropathy	138 (9%)	1300 (89%)	26 (2%)	1464
	Glomerulonephritis	93 (17%)	460 (82%)	10 (2%)	563
	Hypertension	34 (13%)	213 (85%)	5 (2%)	252
	Polycystic Disease	2 (2%)	129 (97%)	2 (2%)	133
	Reflux Nephropathy	5 (8%)	57 (92%)	0 (0%)	62
	Other	76 (22%)	271 (77%)	5 (1%)	352
	Uncertain	22 (23%)	72 (75%)	2 (2%)	96
	Not reported	2 (13%)	10 (63%)	4 (25%)	16
	Total	372 (13%)	2512 (86%)	54 (2%)	2938

Co-morbidities

Tables 1.8-1.10 show the co-morbidities at RRT entry of new patients in 2018. Notably, patients who have never smoked are in the minority in both countries, and non-diabetics are now also in the minority in both countries. Trends in the prevalence of these co-morbidities at RRT entry are shown in figures 1.8-1.9, with the bars representing 95% confidence intervals. In Australia, the beginning of the decade saw a steady fall in most co-morbidities which now appears to have plateaued.

Table 1.8 Co-morbidities of New Patients 2018

Country	Status at RRT Entry	Coronary Artery Disease	Peripheral Vascular Disease	Cerebrovascular Disease	Chronic Lung Disease
Australia	No	2051 (66%)	2492 (81%)	2767 (89%)	2649 (86%)
	Suspected	158 (5%)	181 (6%)	63 (2%)	86 (3%)
	Yes	884 (29%)	420 (14%)	263 (9%)	358 (12%)
	Not reported	0 (0%)	0 (0%)	0 (0%)	0 (0%)
New Zealand	No	393 (63%)	493 (80%)	548 (89%)	486 (79%)
	Suspected	75 (12%)	61 (10%)	20 (3%)	39 (6%)
	Yes	151 (24%)	65 (11%)	51 (8%)	94 (15%)
	Not reported	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 1.9 Smoking Status of New Patients 2018

Country	Status at RRT Entry	Smoking
Australia	Current	343 (11%)
	Former	1107 (36%)
	Never	1556 (50%)
	Not reported	87 (3%)
New Zealand	Current	88 (14%)
	Former	233 (38%)
	Never	291 (47%)
	Not reported	7 (1%)

Table 1.10 Diabetic Status of New Patients 2018

Country	Status at RRT Entry	Diabetes
Australia	No	1497 (48%)
	Type 1	166 (5%)
	Type 2	1430 (46%)
New Zealand	No	260 (42%)
	Type 1	25 (4%)
	Type 2	334 (54%)

Figure 1.8

.1 - Comorbid Conditions at RRT Entry - Australia

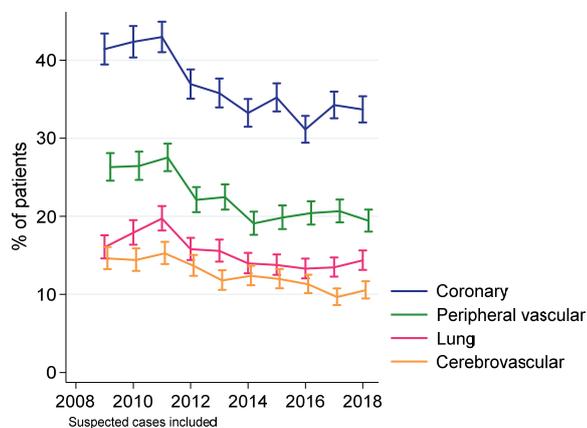


Figure 1.8.2 - Comorbid Conditions at RRT Entry - New Zealand

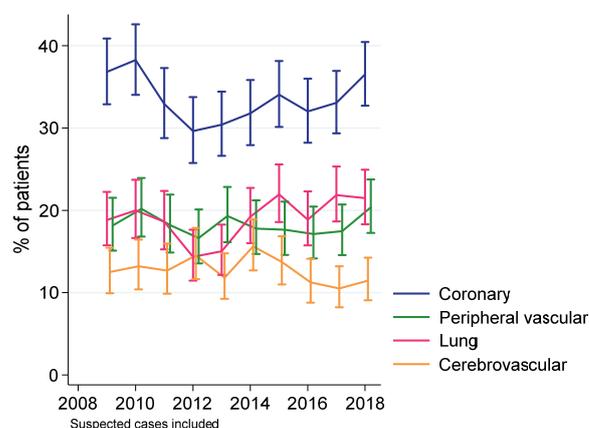
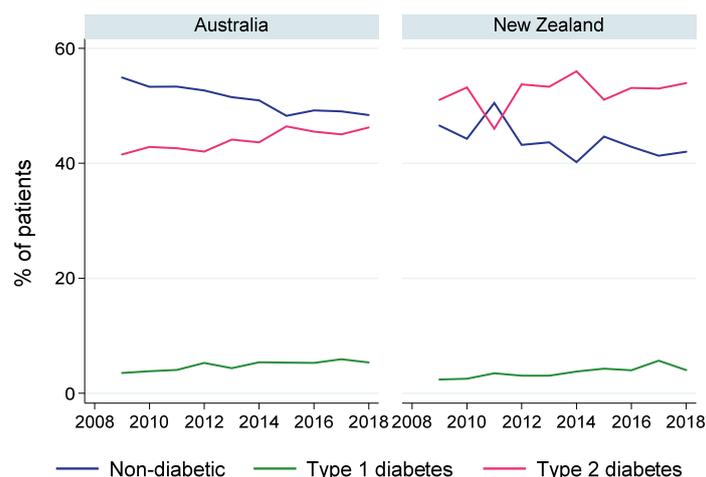


Figure 1.9 - Diabetes Status at RRT Entry



Primary Renal Disease

The primary renal disease of new patients over 2015-2018 are shown in table 1.11. Diabetes continues to be the leading cause of ESKD in both countries, followed by glomerulonephritis. Details of the type of glomerulonephritis reported are shown in table 1.12. Rates of biopsy confirmation of glomerulonephritis and diabetic nephropathy are shown in figure 1.11; biopsy confirmation of glomerulonephritis is increasingly common in Australia.

The “other” causes from table 1.11 are shown in detail in table 1.13. There has been a trend towards missing data for primary disease in Australia; the Registry is actively addressing this problem with some success in 2017-18 (see also Appendix D of this Report).

Table 1.11 Primary Renal Disease of New Patients 2015 - 2018

Country	Primary renal disease	2015	2016	2017	2018
Australia	Diabetic Nephropathy	1044 (38%)	1049 (36%)	1176 (38%)	1176 (38%)
	Glomerulonephritis	495 (18%)	535 (18%)	534 (17%)	492 (16%)
	Hypertension	384 (14%)	403 (14%)	390 (13%)	391 (13%)
	Polycystic Disease	166 (6%)	173 (6%)	208 (7%)	203 (7%)
	Reflux Nephropathy	49 (2%)	63 (2%)	71 (2%)	51 (2%)
	Other	387 (14%)	412 (14%)	426 (14%)	535 (17%)
	Uncertain	127 (5%)	140 (5%)	193 (6%)	159 (5%)
	Not reported	104 (4%)	136 (5%)	87 (3%)	86 (3%)
	Total	2756	2911	3085	3093
New Zealand	Diabetic Nephropathy	273 (48%)	281 (49%)	323 (52%)	293 (47%)
	Glomerulonephritis	113 (20%)	116 (20%)	130 (21%)	109 (18%)
	Hypertension	51 (9%)	54 (9%)	51 (8%)	44 (7%)
	Polycystic Disease	25 (4%)	26 (4%)	29 (5%)	33 (5%)
	Reflux Nephropathy	16 (3%)	9 (2%)	6 (1%)	12 (2%)
	Other	66 (12%)	73 (13%)	58 (9%)	98 (16%)
	Uncertain	19 (3%)	17 (3%)	18 (3%)	26 (4%)
	Not reported	2 (<1%)	3 (1%)	3 (<1%)	4 (1%)
	Total	565	579	618	619

Table 1.12 Glomerulonephritis as Primary Renal Disease 2018

Primary renal disease	Australia	New Zealand
Advanced GN (unclassified=end stage)	12	4
Extra and intra capillary GN (rapidly progressive)	5	0
Familial GN (including Alports)	5	3
Focal and segmental proliferative GN	19	1
Focal sclerosing GN (including hyalinosis)	34	0
GN other (specify)	36	4
GN with systemic disease (specify)	6	2
Goodpastures with linear IgG and lung haemorrhage	5	1
Henoch-Schonlein purpura	1	0
Membranous GN	24	3
Mesangial proliferative (IgA+)	131	16
Mesangial proliferative (IgA-)	16	0
Mesangial proliferative (no if studies)	3	0
Mesangiocapillary GN (double contour)	9	3
Microscopic polyarteritis	6	3
Presumed GN (no biopsy)	55	24
Primary focal sclerosing GN or focal glomerular sclerosis	75	21
Proliferative GN with linear IgG and no lung haemorrhage	2	3
S.L.E.	17	7
Scleroderma	5	1
Secondary focal sclerosing GN	16	13
Wegeners granulomatosis	10	0
Total	492	109

Table 1.13 Miscellaneous Primary Renal Diseases 2018

Primary renal disease	Australia	New Zealand
Analgesic Nephropathy	16	0
Balkan Nephropathy	1	0
Cadmium Toxicity	1	0
Calcineurin Inhibitor Toxicity	6	2
Gout	3	0
Interstitial Nephritis	34	7
Lead Nephropathy	2	0
Lithium Toxicity	18	3
Loss Of Single Kidney (Trauma-Surgery)	8	0
Oxalosis	3	0
Post Partum Nephropathy	2	0
Pyelonephritis	5	1
Renal Tuberculosis	3	0
Congenital Renal Hypoplasia And Dysplasia	9	1
Neuropathic Bladder	3	1
Obstructed Megaureter	1	0
Obstructive Nephropathy	26	7
Other Lower Urinary Tract Abnormalities (With Secondary Reflux)	3	0
Pelvi-Ureteric Junction Obstruction	6	0
Posterior Urethral Valves	4	1
Spina Bifida Or Myelomeningocele	1	0
Ureteric Obstructive Nephropathy	17	1
Calculi	7	4
Medullary Cystic Disease	6	1
Cortical Necrosis	6	0
Haemolytic Uraemic Syndrome	6	1
Amyloid Disease	21	5
Light Chain Nephropathy (Not Malignant)	7	1
Paraproteinaemia (Including Multiple Myeloma)	33	2
Renal Cell Carcinoma (Grawitz)	32	1
Transitional Cell Carcinoma Urinary Tract	5	0
Other (Specify)	240	59

Figure 1.10.1 - Biopsy Rates - Australia

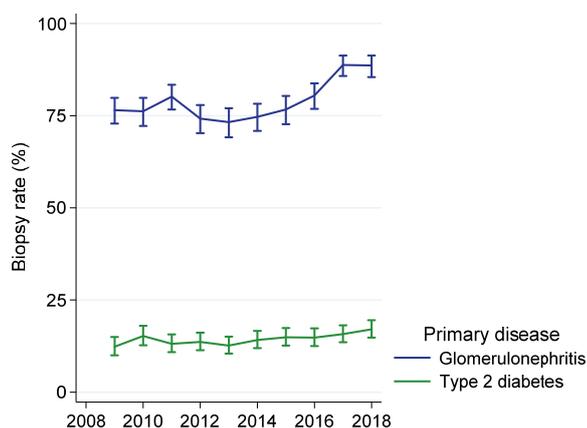
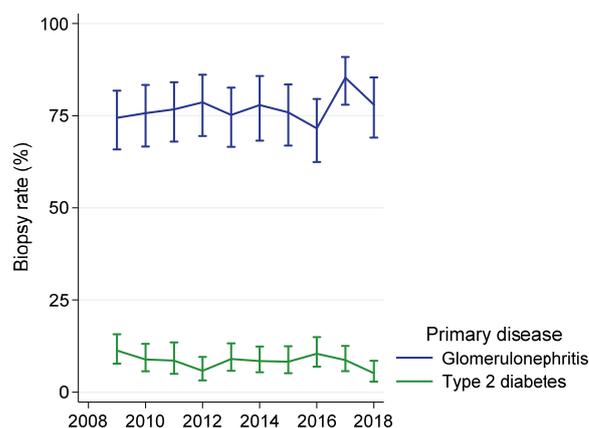


Figure 1.10.2 - Biopsy Rates - New Zealand



Timing of RRT Start

The median eGFR for adult patients (calculated using the CKD-EPI formula) at RRT start over time is shown in figure 1.11. The median eGFR has remained stable for several years in both Australia and New Zealand; in 2018 this was 7.4mL/min/1.73m² in Australia and 6.0mL/min/1.73m² in New Zealand.

Figure 1.11.1 - eGFR at RRT Start - Australia

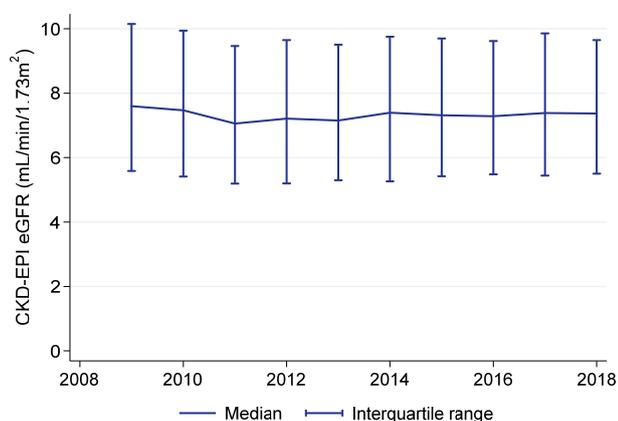
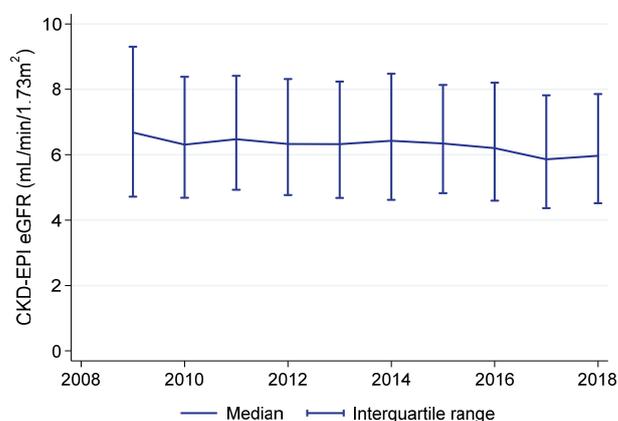


Figure 1.11.2 - eGFR at RRT Start - New Zealand



References

¹ Australian Bureau of Statistics, 2018, Australian Demographic Statistics, Jun 2018, time series spreadsheets, cat. no. 3101.0, viewed 27 Dec 2018, <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3101.0Jun%202018?OpenDocument>

² This work is based on/includes Stats NZ's data which are licensed by Stats NZ for re-use under the Creative Commons Attribution 4.0 International licence. Stats NZ, 2018, Estimated Resident Population by Age and Sex (1991+) (Annual-Jun), NZ Infoshare, viewed 27 Dec 2018, <http://archive.stats.govt.nz/infoshare/>