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.

Contents

Suggested Citation

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Incidence and Prevalence of Renal Replacement Therapy

Tables 1.1 and 1.2 show the incidence and prevalence 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 2019 there were 3229 new RRT patients, with an overall incidence rate of 127 per million population. In New Zealand there were 656 new patients (133 pmp). Although the absolute number of incident RRT patients in Australia continued to increase in 2019, the rate pmp has remained stable over the last 3 years in the setting of ongoing population growth. 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 2019 there were 26746 (1054 pmp) patients receiving RRT, and in New Zealand there were 4966 (1009 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 (2019)[1] and Stats NZ (2019)[2], respectively State/territory is based on the location of the treating hospital unless otherwise indicated. NSW population estimates exclude residents of the NSW South Eastern region which includes the local government areas of Bega Valley, Eurobodalla, Goulburn Mulwaree, Hilltops, Queanbeyan-Palerang Regional, Snowy Monaro Regional, Upper Lachlan Shire and Yass Valley. ACT population includes residents of the NSW South Eastern region. The population base for the NSW South Eastern region is based on the estimated resident population by local government area from the Australian Bureau of Statistics (2020)[3].

Table 1.1 Incidence and Prevalence of RRT in Australia and New Zealand 2015-2019 (pmp)

Country	Event	2015	2016	2017	2018	2019
Australia	**Total New Patients**	2764 (116)	2918 (121)	3113 (127)	3150 (126)	3229 (127)
	Total Transplants	949 (40)	1091 (45)	1109 (45)	1149 (46)	1104 (44)
	Living Donor Transplants	242	264	271	238	238
	Subsequent Transplants	107	159	158	122	117
	Total Deaths	1949	2073	2174	2087	2109
	Dialysis Patients	1701	1818	1925	1833	1869
	Transplant Patients	248	255	249	254	240
	Total Prevalent	23111 (970)	23852 (986)	24705 (1004)	25702 (1029)	26746 (1054)
	Dialysis Patients	12632 (530)	12799 (529)	13086 (532)	13487 (540)	13931 (549)
	Transplant Patients	10479 (440)	11053 (457)	11619 (472)	12215 (489)	12815 (505)
New Zealand	**Total New Patients**	565 (123)	582 (124)	623 (131)	625 (129)	656 (133)
	Total Transplants	147 (32)	172 (37)	187 (39)	182 (38)	221 (45)
	Living Donor Transplants	74	82	69	84	91
	Subsequent Transplants	14	17	13	12	25
	Total Deaths	450	448	481	465	506
	Dialysis Patients	408	397	429	413	446
	Transplant Patients	42	51	52	52	60
	Total Prevalent	4423 (965)	4552 (973)	4679 (982)	4826 (997)	4966 (1009)
	Dialysis Patients	2716 (592)	2766 (591)	2787 (585)	2853 (589)	2868 (583)
	Transplant Patients	1707 (372)	1786 (382)	1892 (397)	1973 (408)	2098 (426)

Table 1.2 Incidence and Prevalence of RRT by State/Territory and Country (pmp) 2019

State	New Patients	Transplant Operations	Deaths Dialysis	Deaths Transplant	Dialysis Dependent	Functioning Transplants	Total Prevalent
QLD	669 (131)	207 (41)	408	45	2771 (544)	2407 (472)	5178 (1016)
NSW*	945 (120)	350 (45)	544	74	4173 (531)	3634 (462)	7807 (993)
ACT*	80 (122)	0 (0)	40	9	293 (446)	304 (463)	597 (909)
VIC	746 (113)	351 (53)	441	59	3269 (496)	3711 (563)	6980 (1058)
TAS	65 (122)	0 (0)	37	11	226 (423)	301 (563)	527 (986)
SA	213 (122)	93 (53)	135	26	924 (527)	1100 (628)	2024 (1155)
NT	132 (537)	0 (0)	70	1	779 (3168)	127 (517)	906 (3685)
WA	379 (145)	103 (39)	194	15	1496 (571)	1231 (470)	2727 (1040)
Australia	**3229 (127)**	**1104 (44)**	**1869**	**240**	**13931 (549)**	**12815 (505)**	**26746 (1054)**
New Zealand	**656 (133)**	**221 (45)**	**446**	**60**	**2868 (583)**	**2098 (426)**	**4966 (1009)**

**ACT and NSW population estimates adjusted for SE NSW Region.*

Incident Patients

The total numbers of incident RRT patients per year in Australia and New Zealand are shown over time in figure 1.1.

Figure 1.1 - New Patients - Australia and New Zealand

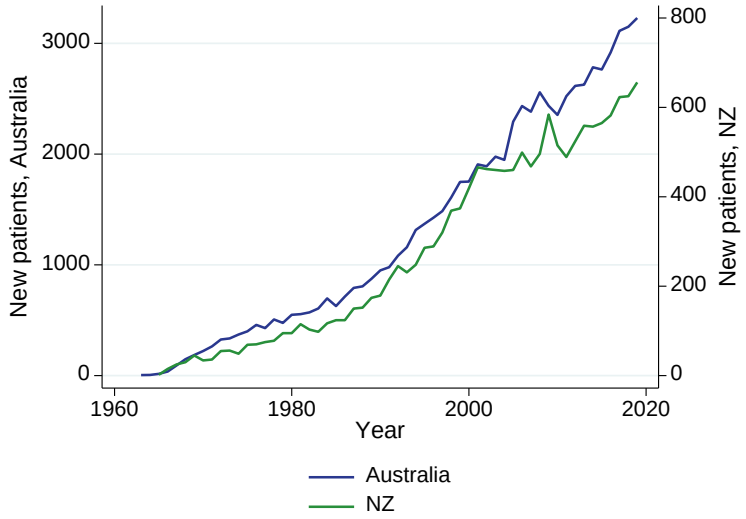


Figure 1.2 presents these data another way, showing the numbers of new patients per year and change in each country compared to the previous year over the last 30 years.

Figure 1.2.1 - New Patients and Change - Australia

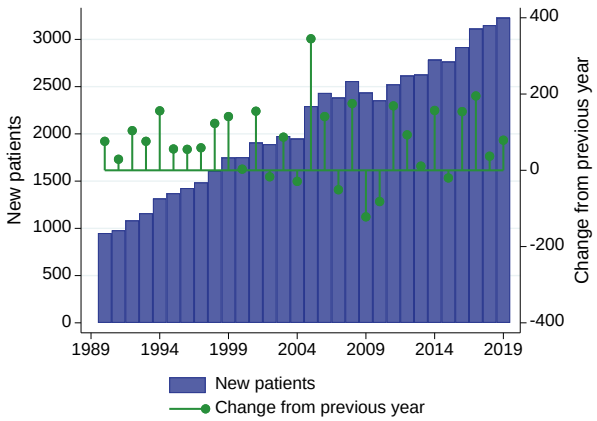


Figure 1.2.2 - New Patients and Change - New Zealand

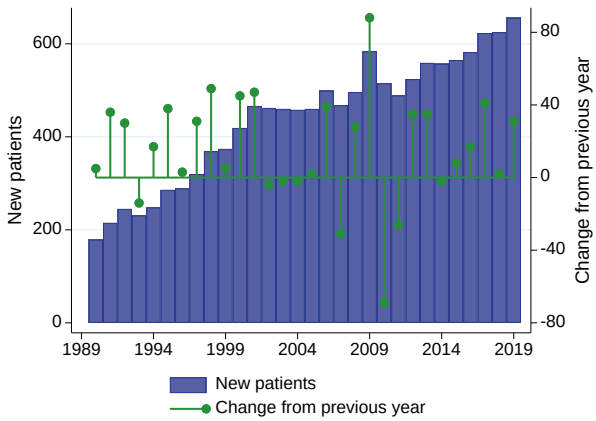


Table 1.3 shows the number of new patients (pmp) by state/territory and country over 2015-2019. There is substantial variation in incidence rates between states/territories, in 2019 the lowest rate was in Victoria (113 pmp) and the highest in the Northern Territory (537 pmp).

Table 1.3 RRT Incidence (pmp) 2015-2019

State	2015	2016	2017	2018	2019
QLD	517 (108)	526 (109)	627 (127)	665 (133)	669 (131)
NSW*	840 (114)	882 (117)	913 (119)	915 (118)	945 (120)
ACT*	48 (78)	70 (112)	54 (85)	53 (82)	80 (122)
VIC	676 (112)	732 (119)	776 (123)	799 (124)	746 (113)
TAS	55 (107)	57 (110)	56 (107)	46 (87)	65 (122)
SA	189 (111)	226 (132)	204 (118)	203 (117)	213 (122)
NT	131 (535)	82 (334)	119 (481)	131 (530)	132 (537)
WA	308 (121)	343 (134)	364 (141)	338 (130)	379 (145)
Australia	**2764 (116)**	**2918 (121)**	**3113 (127)**	**3150 (126)**	**3229 (127)**
New Zealand	**565 (123)**	**582 (124)**	**623 (131)**	**625 (129)**	**656 (133)**

*ACT and NSW population estimates adjusted for SE NSW Region.

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

Figure 1.3.1 - New Patients - Age Specific Rates - Australia

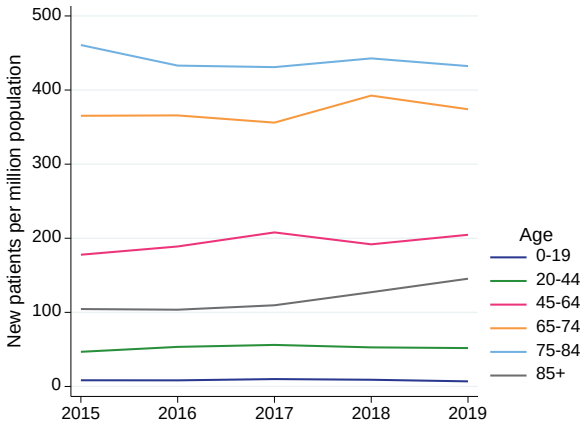


Figure 1.3.2 - New Patients - Age Specific Rates - New Zealand

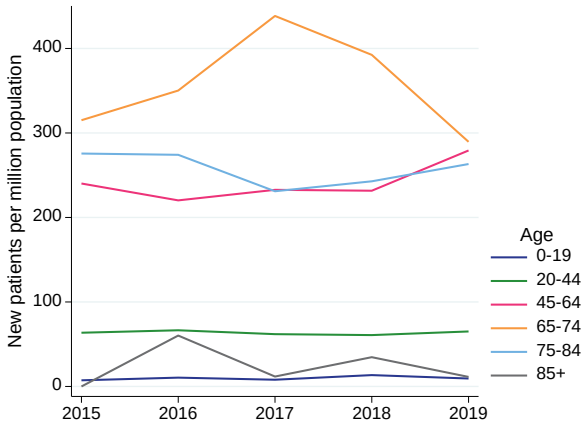


Figure 1.4.1 - New Patients by Age Group - NT

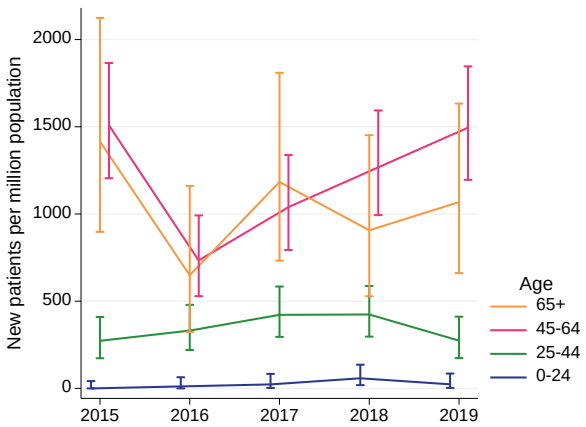


Figure 1.4.2 - New Patients by Age Group - NSW

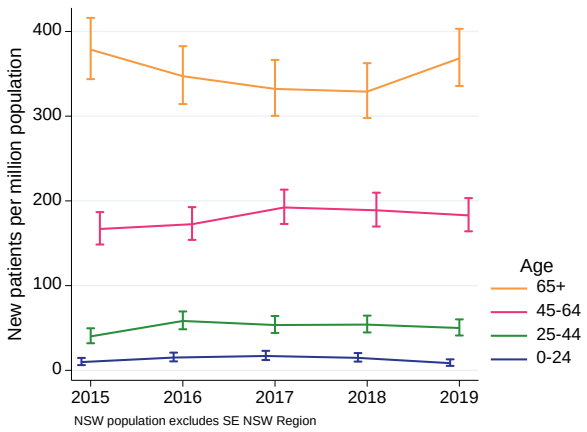


Figure 1.4.3 - New Patients by Age Group - VIC

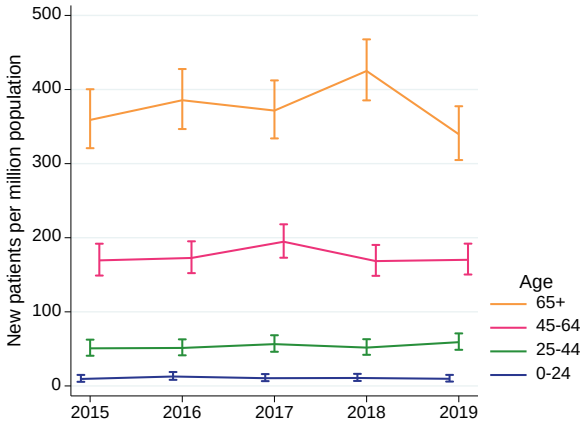


Figure 1.4.4 - New Patients by Age Group - QLD

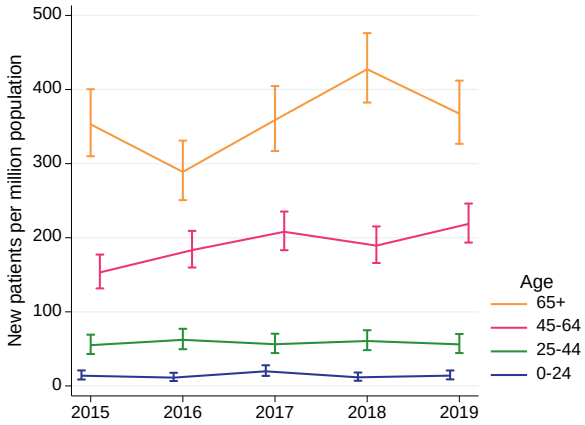


Figure 1.4.5 - New Patients by Age Group - SA

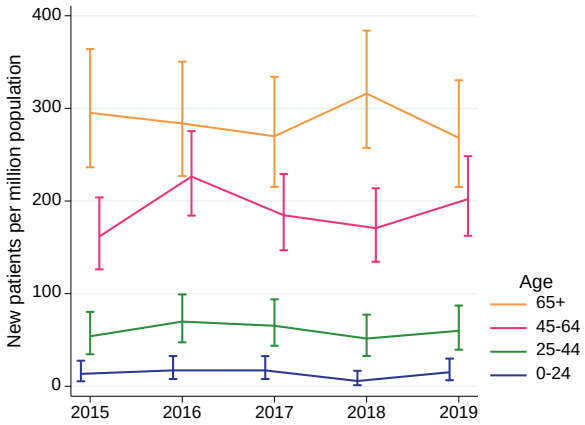


Figure 1.4.6 - New Patients by Age Group - WA

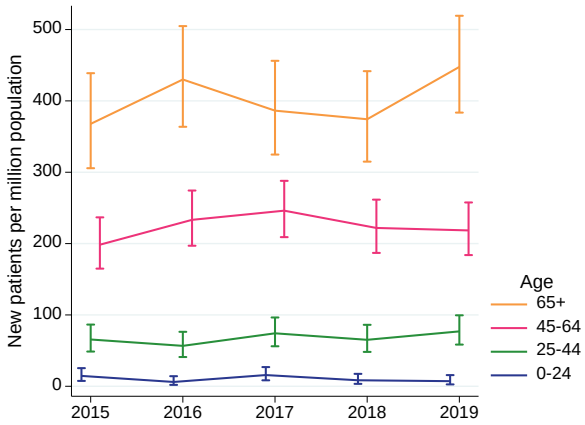


Figure 1.4.7 - New Patients by Age Group - TAS

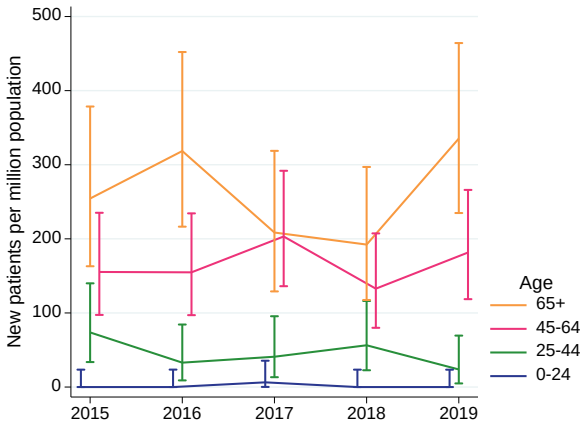
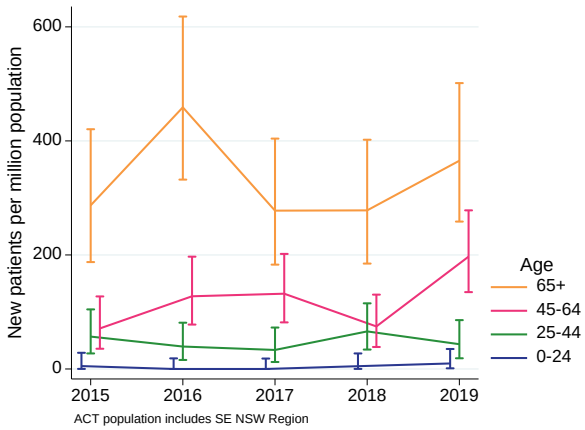


Figure 1.4.8 - New Patients by Age Group - ACT



The rates in older patients are shown in table 1.4.

Table 1.4 Incidence (pmp) of ESKD in Older Patients 2015-2019

Country	Age	2015	2016	2017	2018	2019
Australia	60-64	329 (257)	345 (264)	377 (283)	375 (276)	390 (281)
	65-69	398 (344)	405 (339)	384 (322)	429 (355)	406 (331)
	70-74	335 (394)	357 (401)	382 (399)	444 (437)	448 (423)
	75-79	314 (498)	299 (459)	335 (495)	332 (474)	338 (460)
	80-84	183 (408)	180 (396)	159 (339)	193 (397)	198 (392)
	85+	49 (104)	50 (104)	54 (110)	64 (127)	75 (145)
New Zealand	60-64	84 (336)	84 (327)	71 (268)	69 (254)	97 (347)
	65-69	67 (297)	84 (360)	110 (469)	87 (368)	70 (290)
	70-74	56 (340)	57 (336)	72 (399)	82 (422)	59 (289)
	75-79	43 (358)	42 (329)	44 (327)	42 (305)	49 (342)
	80-84	13 (156)	16 (191)	7 (81)	13 (146)	13 (141)
	85+	0 (0)	5 (60)	1 (12)	3 (35)	1 (11)

Table 1.5 shows the breakdown of incident RRT patients by age group according to gender.

Table 1.5 Age and Gender of New Patients 2019

Country	Gender	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	Total	Mean Age	Median Age
Australia	F	2	5	20	72	110	224	280	296	183	25	1217	59.2	61
	M	9	8	38	93	149	337	417	558	353	50	2012	60.8	63
New Zealand	F	1	3	2	25	21	69	79	54	22	0	276	55.3	56.5
	M	2	1	8	21	35	89	108	75	40	1	380	56.6	58

Late Referral

The following figures and tables examine late referral, defined as <3 months between initial 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 a downward trend in both countries. In 2019, among those with referral timing reported, 18% of Australian and 14% of New Zealand new patients were late referrals. Figure 1.6 shows the variation in late referral rates across Australian states/territories 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 2015-2019 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 reported to have been referred late, compared with 15% of patients with diabetic nephropathy and 27% of patients with “other” diseases.

Figure 1.5 - Late Referral Rates - All Incident Patients 2010 - 2019

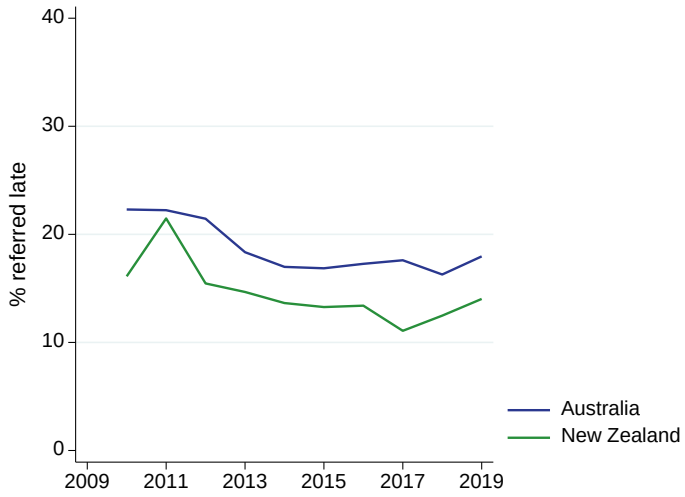


Figure 1.6 - Late Referral Rates by State/Territory - Australia 2010 - 2019

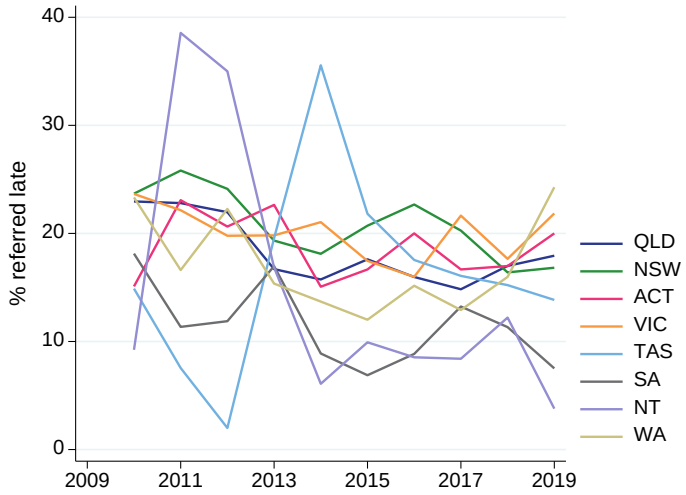


Figure 1.7.1 - Late Referral Rates by Age -Australia 2010 - 2019

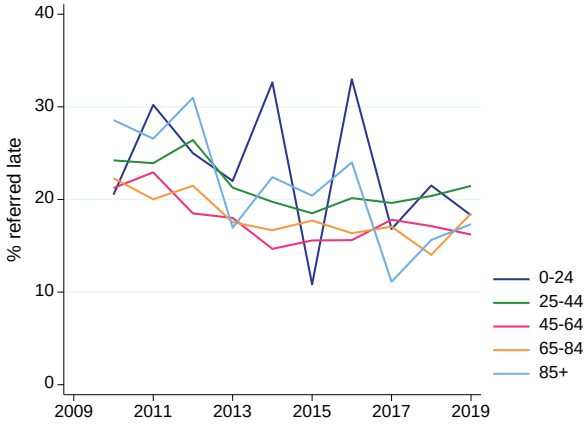


Figure 1.7.2 - Late Referral Rates by Age -New Zealand 2010 - 2019

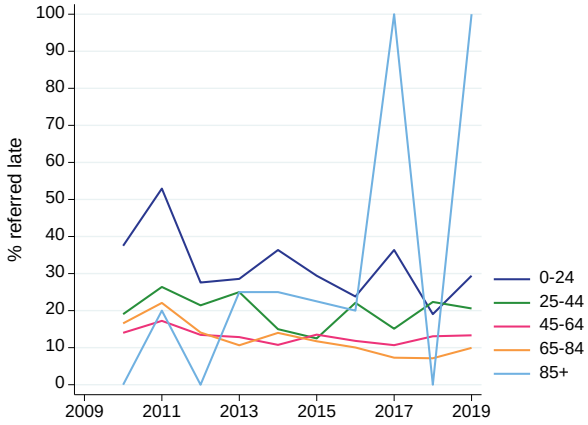


Table 1.6 Late Referral by Country and Ethnicity 2015-2019*

Country	Ethnicity	Late	Not Late	Not Reported	Total
Australia	**Caucasian**	1682 (17%)	7911 (81%)	147 (2%)	9740
	Aboriginal/Torres Strait Islander	260 (16%)	1359 (81%)	50 (3%)	1669
	Asian	300 (18%)	1381 (81%)	23 (1%)	1704
	Māori	51 (33%)	104 (67%)	0 (0%)	155
	Pacific	99 (21%)	371 (78%)	4 (1%)	474
	Other	132 (19%)	563 (79%)	14 (2%)	709
	Not reported	87 (12%)	478 (66%)	158 (22%)	723
	Total	**2611 (17%)**	**12167 (80%)**	**396 (3%)**	**15174**
New Zealand	**Caucasian**	131 (12%)	914 (86%)	17 (2%)	1062
	Aboriginal/Torres Strait Islander	0 (0%)	3 (100%)	0 (0%)	3
	Asian	33 (12%)	238 (87%)	2 (1%)	273
	Māori	128 (14%)	781 (84%)	25 (3%)	934
	Pacific	92 (13%)	594 (86%)	6 (1%)	692
	Other	5 (8%)	58 (91%)	1 (2%)	64
	Not reported	3 (13%)	10 (43%)	10 (43%)	23
	Total	**392 (13%)**	**2598 (85%)**	**61 (2%)**	**3051**

**Collection of ethnicity data in ANZDATA has evolved to align with Australian Bureau of Statistics Australian Standard Classification of Cultural and Ethnic Groups[4] and data collection now allows for a patient to nominate more than one ethnicity group, however, consultation regarding reporting of ethnicity data is currently ongoing and reporting guidelines have not been finalised at the time of publication. As a result, ethnicity data thorough this report includes only the first ethnicity category entered for each patient and uses the legacy term 'Caucasian' which includes data recorded as 'Caucasoid', 'Oceanian – Australian', 'Oceanian – New Zealand European', 'North American' and a number of European ethnicities.*

Table 1.7 Late Referral by Country and Primary Renal Disease 2015-2019

Country	Primary renal disease	Late	Not Late	Not Reported	Total
Australia	Diabetic Nephropathy	843 (15%)	4840 (84%)	88 (2%)	5771
	Glomerulonephritis	428 (16%)	2156 (82%)	46 (2%)	2630
	Hypertension	336 (17%)	1614 (81%)	31 (2%)	1981
	Polycystic Disease	62 (7%)	848 (91%)	20 (2%)	930
	Reflux Nephropathy	22 (7%)	269 (91%)	5 (2%)	296
	Other	639 (27%)	1669 (71%)	31 (1%)	2339
	Uncertain	220 (27%)	574 (71%)	11 (1%)	805
	Not reported	61 (14%)	197 (47%)	164 (39%)	422
	Total	**2611 (17%)**	**12167 (80%)**	**396 (3%)**	**15174**
New Zealand	Diabetic Nephropathy	142 (10%)	1308 (88%)	33 (2%)	1483
	Glomerulonephritis	96 (17%)	469 (81%)	11 (2%)	576
	Hypertension	34 (13%)	223 (85%)	6 (2%)	263
	Polycystic Disease	3 (2%)	139 (97%)	2 (1%)	144
	Reflux Nephropathy	5 (9%)	52 (91%)	0 (0%)	57
	Other	87 (22%)	310 (77%)	6 (1%)	403
	Uncertain	23 (20%)	88 (78%)	2 (2%)	113
	Not reported	2 (17%)	9 (75%)	1 (8%)	12
	Total	**392 (13%)**	**2598 (85%)**	**61 (2%)**	**3051**

Co-morbidities

Tables 1.8-1.10 show the co-morbidities at RRT entry for new patients in 2019. Notably, in 2019 the majority of patient starting RRT in both Australia and New Zealand are documented as having diabetes. 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 2019

Country	Status at RRT Entry	Coronary Artery Disease	Peripheral Vascular Disease	Cerebrovascular Disease	Chronic Lung Disease
Australia	No	2096 (65%)	2499 (77%)	2794 (87%)	2662 (82%)
	Suspected	176 (5%)	197 (6%)	86 (3%)	115 (4%)
	Yes	851 (26%)	428 (13%)	242 (7%)	346 (11%)
	Not reported	106 (3%)	105 (3%)	107 (3%)	106 (3%)
New Zealand	No	450 (69%)	556 (85%)	586 (89%)	545 (83%)
	Suspected	65 (10%)	42 (6%)	11 (2%)	16 (2%)
	Yes	138 (21%)	55 (8%)	56 (9%)	92 (14%)
	Not reported	3 (0%)	3 (0%)	3 (0%)	3 (0%)

Table 1.9 Smoking Status of New Patients 2019

Country	Status at RRT Entry	Smoking
Australia	Current	352 (11%)
	Former	1174 (36%)
	Never	1633 (51%)
	Not reported	70 (2%)
New Zealand	Current	95 (14%)
	Former	212 (32%)
	Never	287 (44%)
	Not reported	62 (9%)

Table 1.10 Diabetic Status of New Patients 2019

Country	Status at RRT Entry	Diabetes
Australia	**No**	1453 (45%)
	Type 1	176 (5%)
	Type 2	1516 (47%)
	Not reported	84 (3%)
New Zealand	**No**	242 (37%)
	Type 1	35 (5%)
	Type 2	354 (54%)
	Not reported	25 (4%)

Figure 1.8.1 - Comorbid Conditions at RRT Entry - Australia

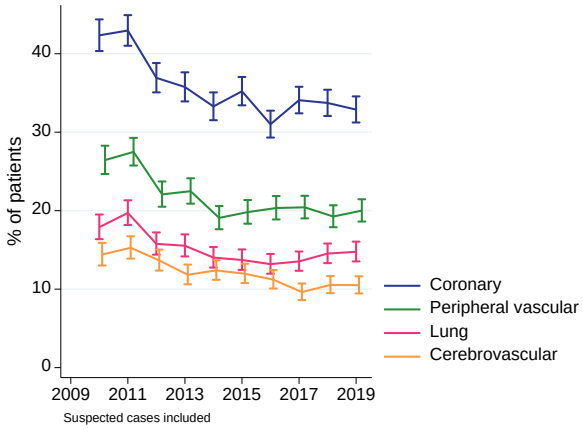


Figure 1.8.2 - Comorbid Conditions at RRT Entry - New Zealand

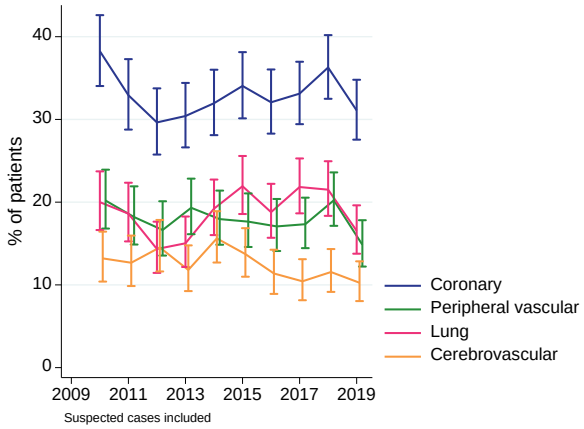
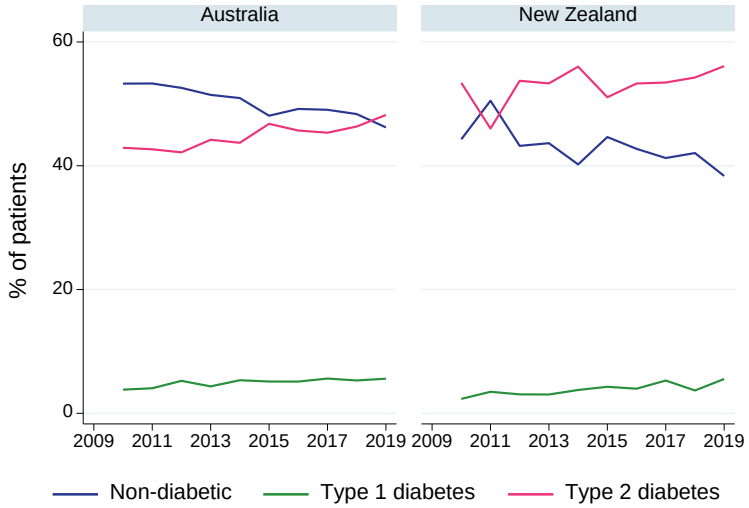


Figure 1.9 - Diabetes Status at RRT Entry



Primary Renal Disease

The primary renal disease of new patients over 2016-2019 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. Primary renal disease coding in ANZDATA is currently based on a legacy classification system derived from historical European Renal Association/European Dialysis and Transplantation Association classifications. The Registry recognises that in some cases, these diagnoses have failed to keep up to date with an evolving understanding of renal pathology, particularly in the

categorisation of glomerulonephritis and inherited conditions. Work is currently underway to review and revise this classification system.

Table 1.11 Primary Renal Disease of New Patients 2016 - 2019

Country	Primary renal disease	2016	2017	2018	2019
Australia	Diabetic Nephropathy	1070 (37%)	1197 (38%)	1191 (38%)	1254 (39%)
	Glomerulonephritis	537 (18%)	536 (17%)	510 (16%)	550 (17%)
	Hypertension	407 (14%)	396 (13%)	397 (13%)	393 (12%)
	Polycystic Disease	174 (6%)	209 (7%)	207 (7%)	174 (5%)
	Reflux Nephropathy	64 (2%)	69 (2%)	55 (2%)	59 (2%)
	Other	426 (15%)	434 (14%)	537 (17%)	554 (17%)
	Uncertain	142 (5%)	191 (6%)	160 (5%)	182 (6%)
	Not reported	98 (3%)	81 (3%)	93 (3%)	63 (2%)
	Total	**2918**	**3113**	**3150**	**3229**
New Zealand	Diabetic Nephropathy	283 (49%)	325 (52%)	294 (47%)	308 (47%)
	Glomerulonephritis	117 (20%)	131 (21%)	111 (18%)	103 (16%)
	Hypertension	55 (9%)	52 (8%)	44 (7%)	61 (9%)
	Polycystic Disease	26 (4%)	29 (5%)	34 (5%)	29 (4%)
	Reflux Nephropathy	9 (2%)	6 (1%)	12 (2%)	14 (2%)
	Other	73 (13%)	59 (9%)	98 (16%)	107 (16%)
	Uncertain	17 (3%)	18 (3%)	26 (4%)	33 (5%)
	Not reported	2 (<1%)	3 (<1%)	6 (1%)	1 (<1%)
	Total	**582**	**623**	**625**	**656**

Table 1.12 Glomerulonephritis as Primary Renal Disease 2019

Primary renal disease	Australia	New Zealand
Advanced GN (unclassified=end stage)	10	0
Extra and intra capillary GN (rapidly progressive)	3	2
Familial GN (including Alports)	11	5
Focal and segmental proliferative GN	18	3
Focal sclerosing GN (including hyalinosis)	29	4
GN other (specify)	38	3
GN with systemic disease (specify)	9	2
Goodpastures with linear IgG and lung haemorrhage	8	2
Henoch-Schonlein purpura	1	0
Membranous GN	42	7
Mesangial proliferative (IgA+)	163	23
Mesangial proliferative (IgA-)	14	0
Mesangial proliferative (no if studies)	6	0
Mesangiocapillary GN (dense deposit disease)	10	0
Mesangiocapillary GN (double contour)	9	6
Microscopic polyarteritis	9	0
Presumed GN (no biopsy)	40	17
Primary focal sclerosing GN or focal glomerular sclerosis	79	17
Proliferative GN with linear IgG and no lung haemorrhage	3	0
S.L.E.	23	5
Scleroderma	10	3
Secondary focal sclerosing GN	4	2
Wegeners granulomatosis	11	2
Total	550	103

Table 1.13 Miscellaneous Primary Renal Diseases 2019

Primary renal disease	Australia	New Zealand
Analgesic Nephropathy	10	0
Calcineurin Inhibitor Toxicity	6	0
Cystinosis	2	0
Interstitial Nephritis	49	6
Lead Nephropathy	1	3
Lithium Toxicity	20	6
Loss of Single Kidney (Trauma-Surgery)	8	1
Oxalosis	3	0
Post partum Nephropathy	2	0
Pyelonephritis	7	1
Renal Tuberculosis	3	1
Sarcoidosis	1	0
Bladder Neck Obstruction (Incl. Prostatiomegaly)	3	1
Congenital Renal Hypoplasia and Dysplasia	15	2
Neuropathic Bladder	3	0
Obstructive Nephropathy	28	5
Other Lower Urinary Tract Abnormalities (With Secondary Reflux)	4	0
Pelvi-Ureteric Junction Obstruction	1	1
Posterior Urethral Valves	6	2
Spina Bifida or Myelomeningocoele	5	0
Ureteric Obstructive Nephropathy	6	1
Calculi	6	4
Medullary Cystic Disease	11	1
Cortical Necrosis	5	1
Haemolytic Uraemic Syndrome	10	0
Amyloid Disease	19	1
Light Chain Nephropathy (Not Malignant)	6	1
Paraproteinaemia (Including Multiple Myeloma)	35	5
Renal Cell Carcinoma (Grawitz)	21	0
Transitional Cell Carcinoma Urinary Tract	3	0
Other (Specify)	255	64

Figure 1.10.1 - Biopsy Rates - Australia

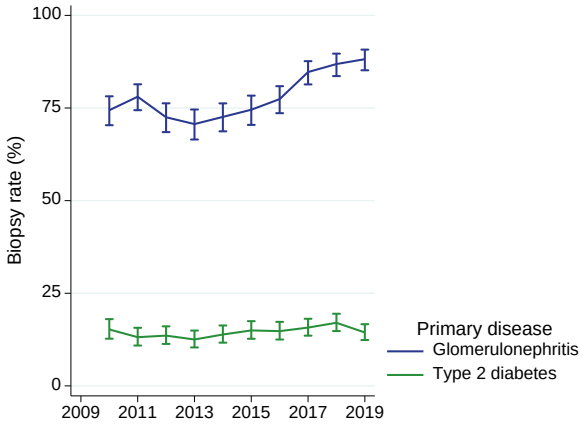
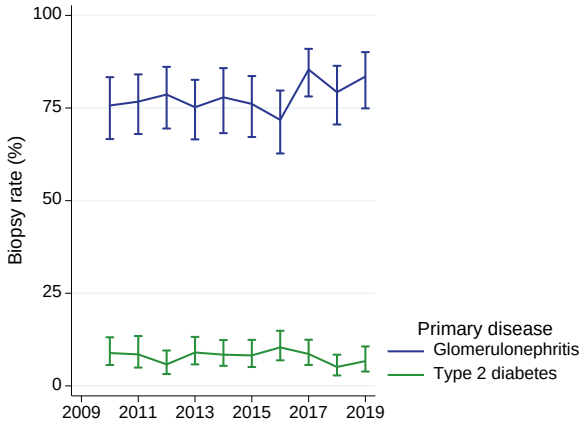


Figure 1.10.2 - Biopsy Rates - New Zealand



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 Australia. Recent years have seen a slight reduction in this figure for New Zealand which remains lower than in Australia; in 2019 this was 7.4mL/min/1.73m^2 in Australia and 5.6min/1.73m^2 in New Zealand.

Figure 1.11.1 - eGFR at RRT Start - Australia

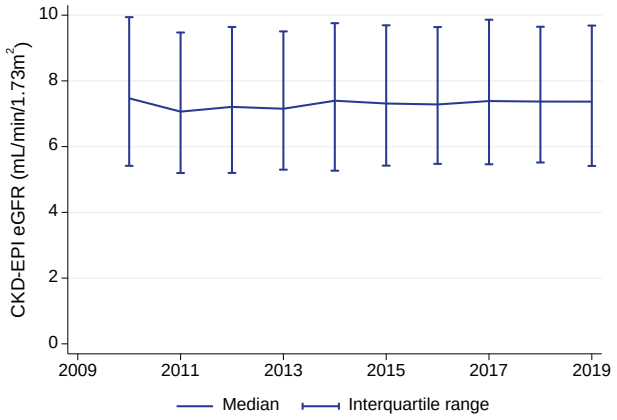
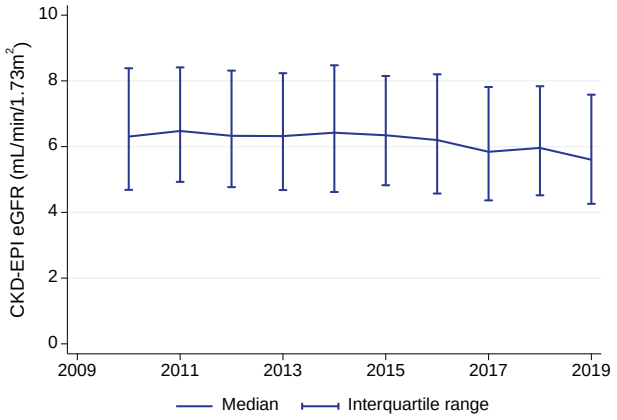


Figure 1.11.2 - eGFR at RRT Start - New Zealand



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[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, 2019, Estimated Resident Population by Age and Sex (1991+) (Annual-Jun), NZ Infoshare, viewed 19 Dec 2019, http://archive.stats.govt.nz/infoshare/SelectVariables.aspx?pxID=782e8afc-96ab-49e7-bb65-994c51b2e715*

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