



Australia &  
New Zealand Dialysis  
& Transplant Registry

# Chapter 1

## Incidence of End Stage Kidney Disease

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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. In Australia in 2013 there were 2,544 new RRT patients, with an overall incidence rate of 110 per million population (pmp). This rate has now been stable for several years. In New Zealand there were 546 new patients (123 pmp). The rate in New Zealand is subject

to more annual variation due to lower numbers.

In contrast to incident patients, the number of prevalent patients in each country continues to climb; in Australia at the end of 2013 there were 21,470 (928 pmp) patients receiving RRT, and in New Zealand there were 4,156 (936 pmp).

**Table 1.1**

### Stock and Flow 2009 - 2013

Country	Event	2009	2010	2011	2012	2013
AUSTRALIA	Total New Patients	2431 (112)	2335 (106)	2511 (112)	2573 (113)	2544 (110)
	Total Transplants	773 (36)	846 (38)	825 (37)	845 (37)	882 (38)
	- Living Donor Transplants	327	296	255	238	252
	- Subsequent Transplants	99	102	81	98	94
	Total Deaths	1693	1599	1733	1658	1743
	- Dialysis Patients	1538	1414	1507	1485	1518
	- Transplant Patients	155	185	226	173	225
	Total Prevalent	18510 (853)	19212 (872)	19909 (891)	20742 (913)	21470 (928)
	- Dialysis Patients	10468 (483)	10712 (486)	11054 (495)	11478 (505)	11774 (509)
	- Transplant Patients	8042 (371)	8500 (386)	8855 (396)	9264 (408)	9696 (419)
NEW ZEALAND	Total New Patients	584 (136)	515 (118)	487 (111)	517 (117)	546 (123)
	Total Transplants	121 (28)	110 (25)	118 (27)	108 (25)	115 (26)
	- Living Donor Transplants	67	60	57	54	58
	- Subsequent Transplants	12	6	8	9	5
	Total Deaths	365	354	413	392	373
	- Dialysis Patients	331	319	369	361	342
	- Transplant Patients	34	35	44	31	31
	Total Prevalent	3688 (857)	3832 (881)	3878 (885)	3988 (905)	4156 (936)
	- Dialysis Patients	2281 (530)	2388 (549)	2392 (546)	2467 (560)	2584 (582)
	- Transplant Patients	1407 (327)	1444 (332)	1486 (339)	1521 (345)	1572 (354)

Table 1.2

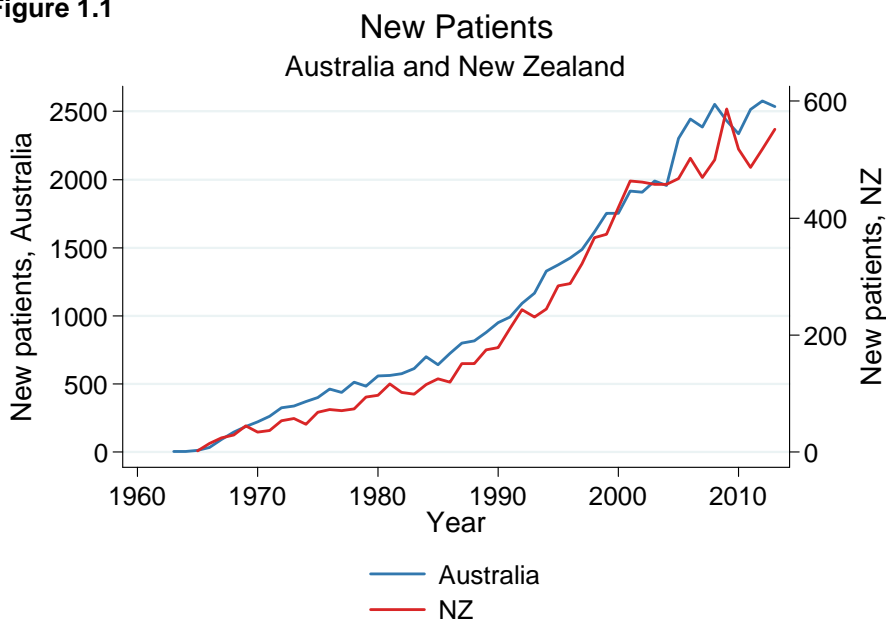
## Stock and Flow by State and Country 2013

State	New patients (pmp)	Transplant operations (pmp)	Deaths - dialysis	Deaths - transplant	Dialysis dependent (pmp)	Functioning transplants (pmp)	Total prevalent (pmp)
QLD	492 (106)	149 (32)	271	40	2200 (473)	1879 (404)	4079 (877)
NSW	783 (106)	288 (39)	501	66	3764 (508)	2715 (366)	6479 (874)
ACT	53 (139)	0 (0)	31	7	288 (755)	233 (611)	521 (1366)
VIC	651 (113)	266 (46)	338	48	2892 (504)	2644 (461)	5536 (965)
TAS	44 (86)	0 (0)	43	10	216 (421)	223 (435)	439 (856)
SA	165 (99)	81 (48)	109	27	753 (451)	970 (581)	1723 (1031)
NT	85 (351)	0 (0)	48	2	521 (2153)	86 (355)	607 (2509)
WA	271 (108)	98 (39)	177	25	1140 (452)	946 (375)	2086 (828)
<b>Aust</b>	<b>2544 (110)</b>	<b>882 (38)</b>	<b>1518</b>	<b>225</b>	<b>11774 (509)</b>	<b>9696 (419)</b>	<b>21470 (928)</b>
<b>NZ</b>	<b>546 (123)</b>	<b>115 (26)</b>	<b>342</b>	<b>31</b>	<b>2584 (582)</b>	<b>1572 (354)</b>	<b>4156 (936)</b>

## Incident Patients

## Incident Rates

Figure 1.1



The total numbers of incident patients in Australia and New Zealand since the beginning of RRT are shown in figure 1.1. The flattening off of incidence in the last decade is apparent compared with the strong growth in the preceding decades.

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

Table 1.3 shows the number of new patients (pmp) by state and country over 2009-2013. There is substantial variation in incidence rates between states, with the lowest rates in Tasmania (86 pmp in 2013) and the highest in the Northern Territory (351 pmp in 2013).

Figure 1.2.1

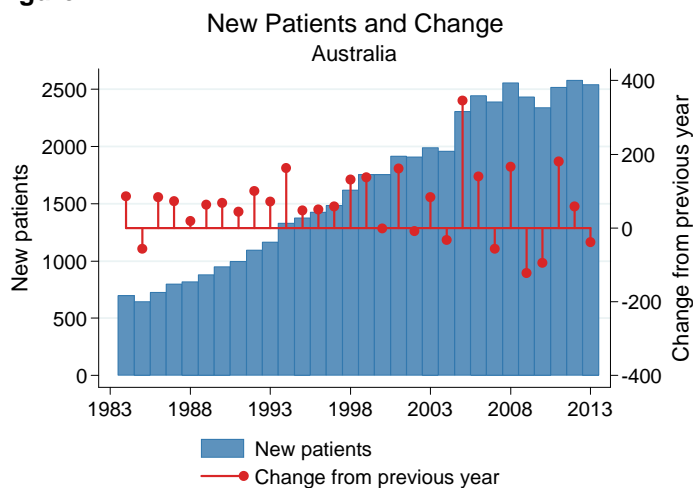


Figure 1.2.2

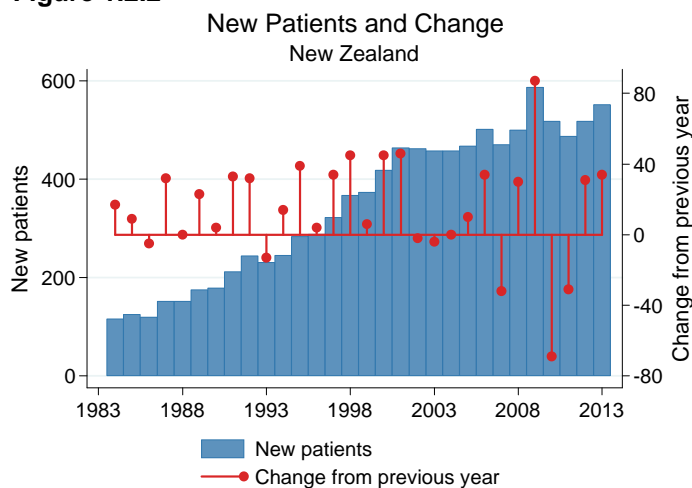


Table 1.3

RRT Incidence (pmp) 2009 - 2013

State	2009	2010	2011	2012	2013
QLD	490 (113)	450 (102)	454 (101)	473 (104)	492 (106)
NSW	766 (109)	726 (102)	790 (109)	811 (111)	783 (106)
ACT	41 (116)	53 (147)	53 (144)	63 (168)	53 (139)
Vic	549 (102)	575 (105)	603 (109)	634 (113)	651 (113)
Tas	58 (115)	47 (92)	53 (104)	49 (96)	44 (86)
SA	207 (129)	182 (112)	184 (112)	203 (123)	165 (99)
NT	72 (319)	65 (283)	82 (355)	98 (415)	85 (351)
WA	248 (111)	237 (103)	292 (124)	242 (99)	271 (108)
<b>Aust</b>	<b>2431 (112)</b>	<b>2335 (106)</b>	<b>2511 (112)</b>	<b>2573 (113)</b>	<b>2544 (110)</b>
<b>NZ</b>	<b>584 (136)</b>	<b>515 (118)</b>	<b>487 (111)</b>	<b>517 (117)</b>	<b>546 (123)</b>

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

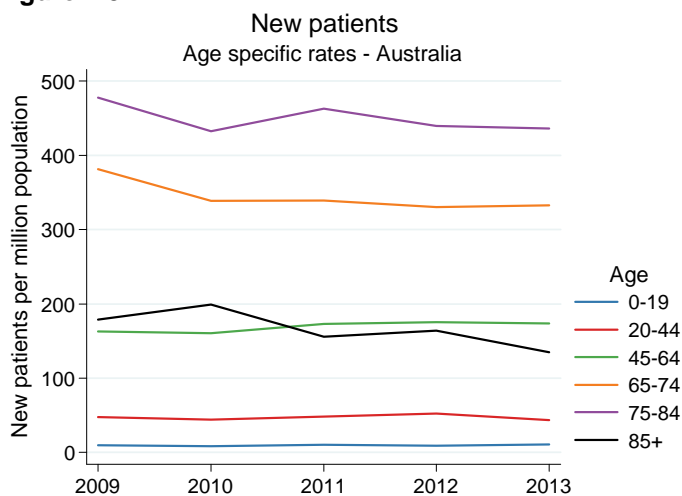


Figure 1.3.2

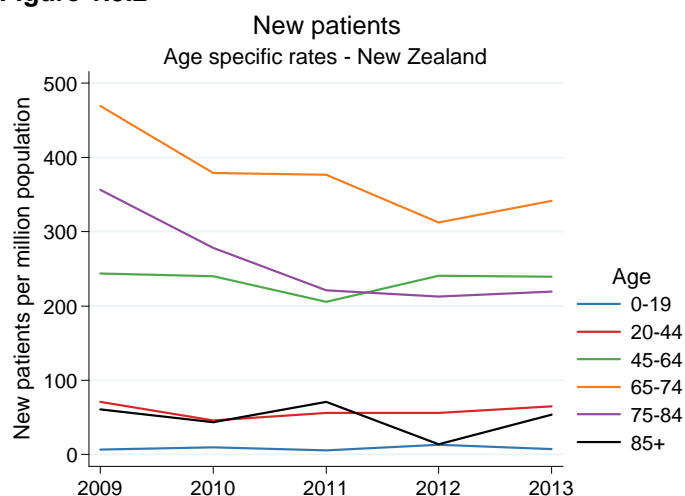


Figure 1.4.1

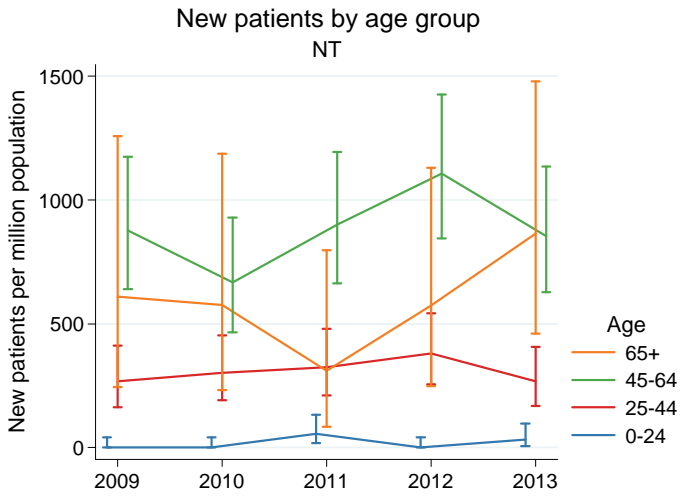


Figure 1.4.2

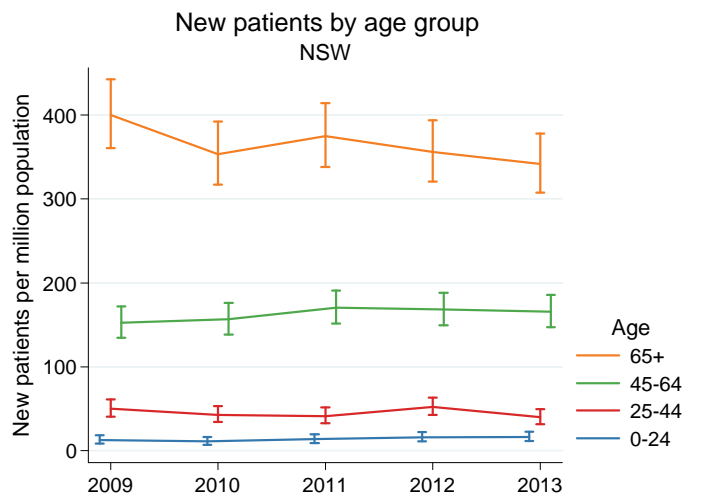


Figure 1.4.3

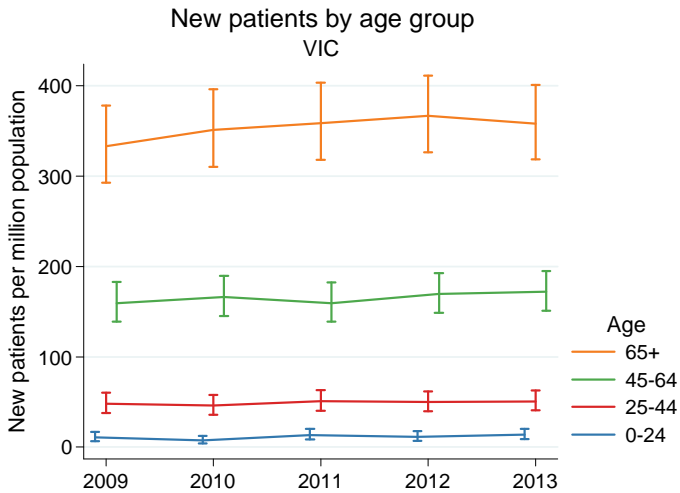


Figure 1.4.4

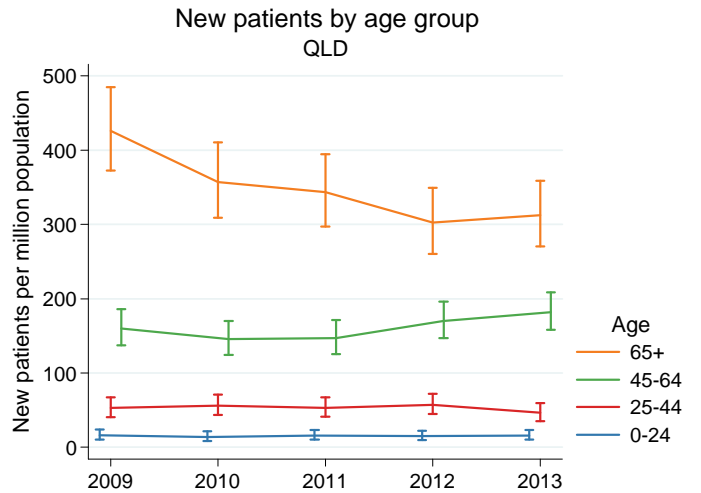


Figure 1.4.5

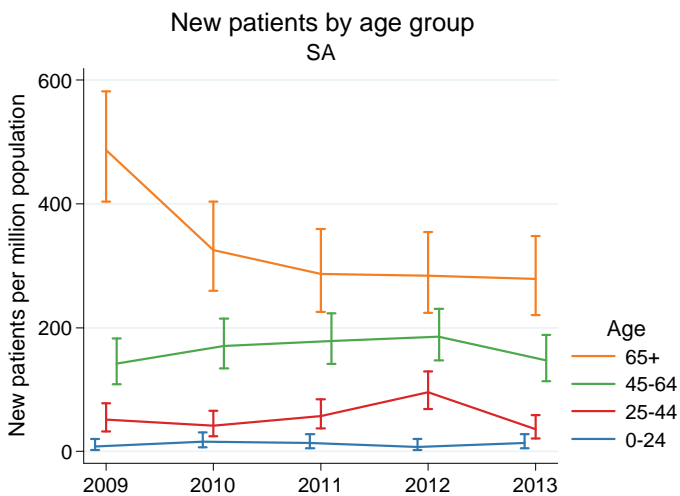


Figure 1.4.6

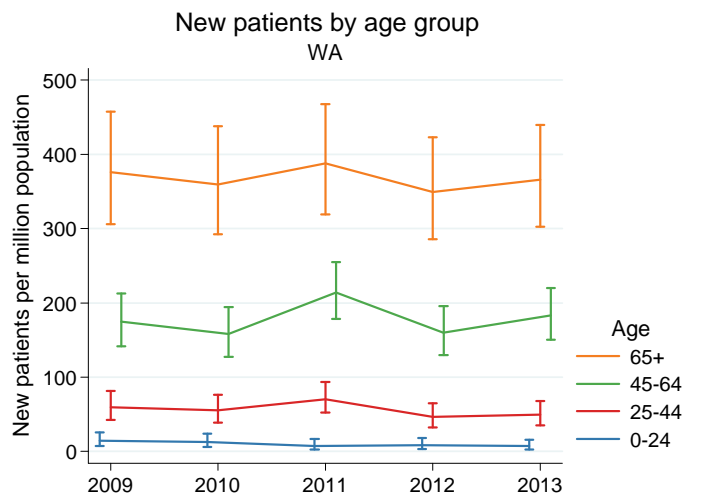


Figure 1.4.7

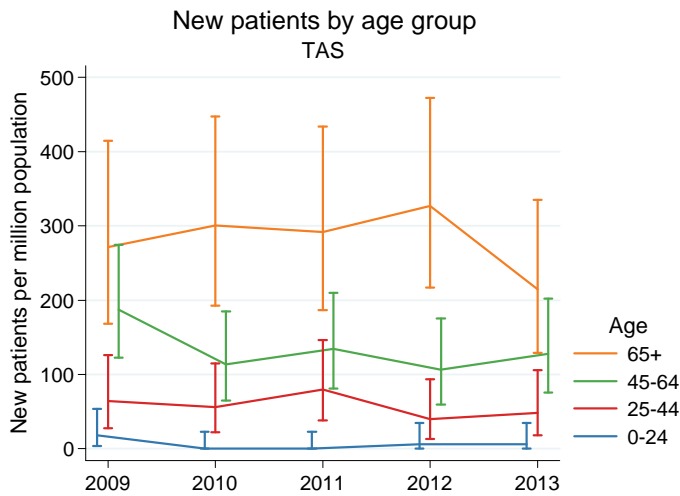
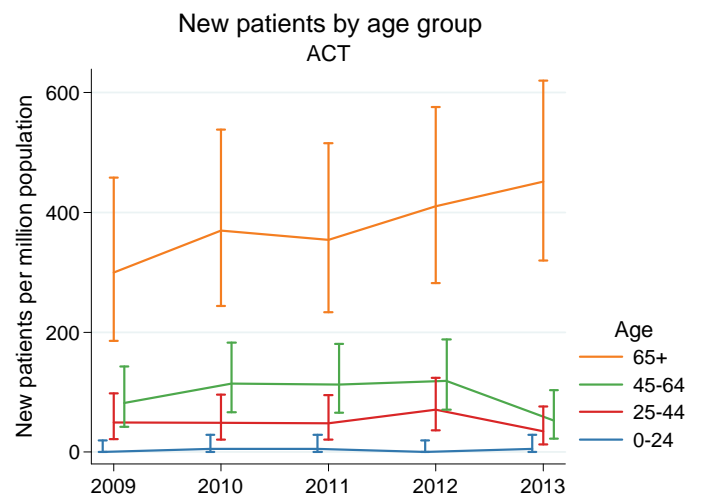


Figure 1.4.8



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 2013 data by sex.

Table 1.4

## Incidence (pmp) of ESKD in Older Patients 2009 - 2013

Country	Age	2009	2010	2011	2012	2013
Australia	60-64	271 (234)	280 (234)	294 (240)	317 (259)	320 (258)
	65-69	288 (333)	255 (281)	293 (307)	294 (287)	316 (292)
	70-74	302 (444)	291 (413)	278 (382)	294 (389)	304 (389)
	75-79	297 (542)	271 (493)	301 (539)	259 (452)	262 (444)
	80-84	169 (394)	156 (357)	163 (367)	189 (424)	190 (425)
	85+	66 (179)	77 (199)	63 (156)	69 (164)	59 (135)
New Zealand	60-64	72 (325)	93 (402)	62 (260)	84 (351)	77 (319)
	65-69	75 (438)	70 (398)	75 (416)	62 (324)	78 (379)
	70-74	66 (511)	48 (354)	47 (327)	45 (298)	45 (292)
	75-79	49 (472)	33 (317)	22 (211)	27 (254)	34 (311)
	80-84	16 (204)	18 (227)	19 (234)	13 (159)	8 (97)
	85+	4 (61)	3 (44)	5 (71)	1 (14)	4 (54)

Table 1.5

## Age and Sex New Patients 2013

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	5	9	31	44	80	175	245	227	157	25	998	59.2	61
	M	11	13	37	77	114	229	343	393	295	34	1,546	60.4	63
New Zealand	F	1	2	4	10	28	44	61	58	18	1	227	56.6	58
	M	0	1	6	22	30	75	93	65	24	3	319	56.3	57

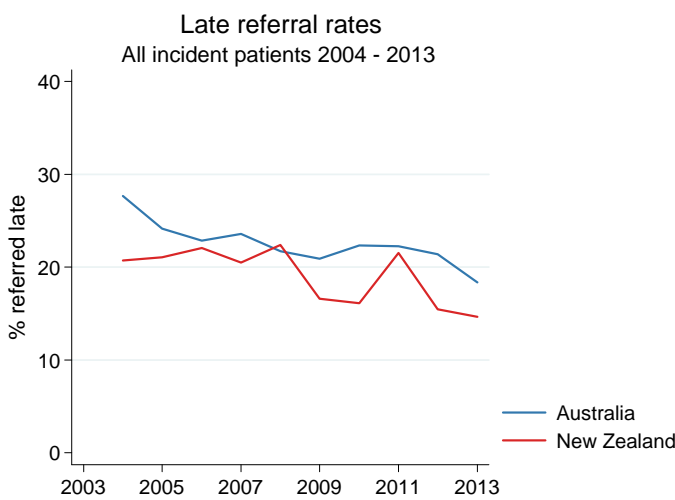
## Late Referral

The following figures and tables examine late referral, defined as <3 months between referral 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 steady decline in both countries. In 2013 18% of Australian and 15% of New Zealand new patients were referred late. Rates have fallen in each Australian state (figure 1.5.2) and in all age groups (figure 1.6), although the New Zealand data

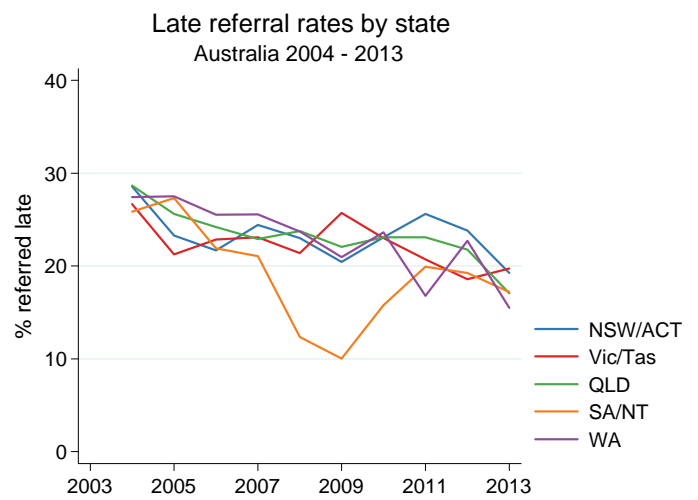
are subject to more variation due to low numbers.

Tables 1.6 and 1.7 show late referral rates for new patients over 2009-2013 by race and primary renal disease. Rates are similar amongst racial groups but vary substantially between primary renal disease categories; for example in Australia 9% of patients with polycystic kidney disease were referred late, compared with 34% of patients with "other" diseases.

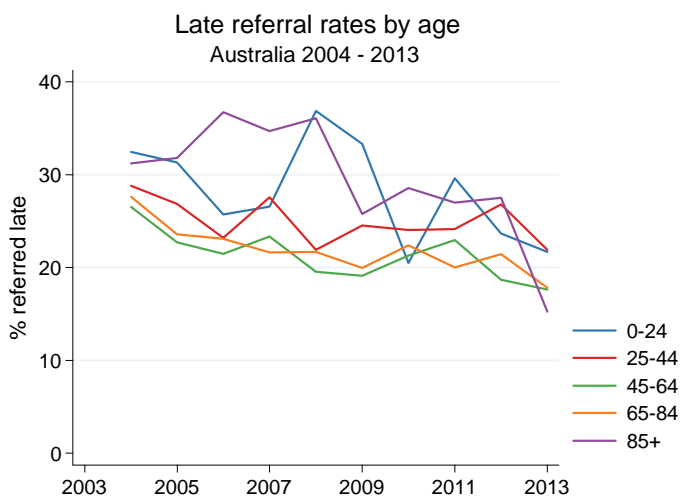
**Figure 1.5.1**



**Figure 1.5.2**



**Figure 1.6.1**



**Figure 1.6.2**

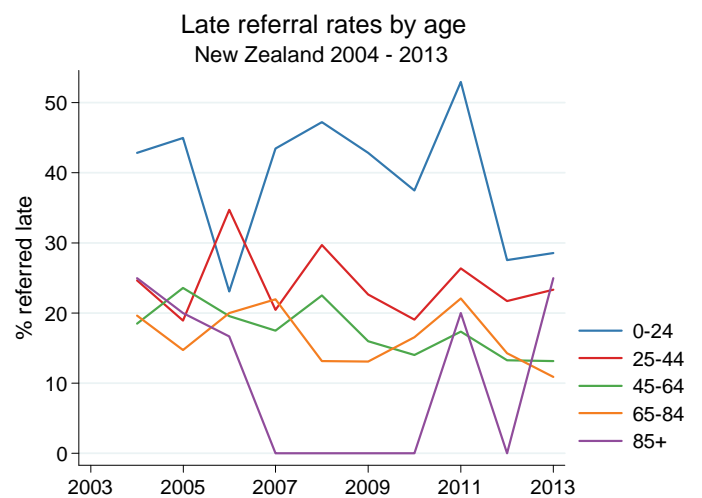


Table 1.6

## Late Referral by Country and Race 2009 - 2013

Country	Race	Late	Not late	Not reported	Total
Australia	Caucasian	1899 (20%)	7309 (79%)	82 (1%)	9290
	Aboriginal/TSI	276 (24%)	866 (74%)	30 (3%)	1172
	Asian	244 (22%)	871 (78%)	8 (1%)	1123
	Māori	35 (27%)	95 (73%)	0 (0%)	130
	Pacific	69 (27%)	182 (72%)	2 (1%)	253
	Other	79 (22%)	272 (75%)	13 (4%)	364
	Not reported	6 (10%)	35 (56%)	21 (34%)	62
	<b>Total</b>	<b>2608 (21%)</b>	<b>9630 (78%)</b>	<b>156 (1%)</b>	<b>12394</b>
New Zealand	Caucasian	169 (16%)	885 (84%)	4 (0%)	1058
	Asian	29 (13%)	190 (87%)	0 (0%)	219
	Māori	147 (18%)	663 (81%)	8 (1%)	818
	Pacific	94 (18%)	415 (81%)	3 (1%)	512
	Other	6 (18%)	28 (82%)	0 (0%)	34
	Not reported	0 (0%)	6 (75%)	2 (25%)	8
<b>Total</b>	<b>445 (17%)</b>	<b>2187 (83%)</b>	<b>17 (1%)</b>	<b>2649</b>	

Table 1.7

## Late Referral by Country and Disease 2009 - 2013

Country	Primary Renal Disease	Late	Not late	Not reported	Total
Australia	GN	590 (22%)	2065 (77%)	24 (1%)	2679
	Analgesic	32 (18%)	144 (81%)	2 (1%)	178
	Polycystic	69 (9%)	705 (90%)	11 (1%)	785
	Reflux	43 (14%)	265 (86%)	1 (0%)	309
	Hypertension	351 (21%)	1351 (79%)	8 (0%)	1710
	Diabetes	792 (18%)	3522 (81%)	33 (1%)	4347
	Other	540 (34%)	1049 (65%)	20 (1%)	1609
	Uncertain	180 (27%)	485 (72%)	5 (1%)	670
	Not reported	11 (10%)	44 (41%)	52 (49%)	107
	<b>Total</b>	<b>2608 (21%)</b>	<b>9630 (78%)</b>	<b>156 (1%)</b>	<b>12394</b>
New Zealand	GN	113 (20%)	459 (80%)	3 (1%)	575
	Analgesic	4 (27%)	11 (73%)	0 (0%)	15
	Polycystic	6 (4%)	130 (94%)	3 (2%)	139
	Reflux	7 (15%)	40 (85%)	0 (0%)	47
	Hypertension	38 (14%)	231 (86%)	1 (0%)	270
	Diabetes	175 (14%)	1081 (86%)	7 (1%)	1263
	Other	78 (31%)	169 (68%)	1 (0%)	248
	Uncertain	22 (26%)	62 (74%)	0 (0%)	84
	Not reported	2 (25%)	4 (50%)	2 (25%)	8
	<b>Total</b>	<b>445 (17%)</b>	<b>2187 (83%)</b>	<b>17 (1%)</b>	<b>2649</b>



## Co-morbidities

Tables 1.8-1.10 show the co-morbidities at RRT entry of new patients in 2013. Notably, patients who have never smoked are in the minority in both countries, and non-diabetics are in the minority in New Zealand. Trends in the prevalence of these co-morbidities at RRT entry are

shown in figures 1.7-1.8, with the bars representing 95% confidence intervals. The last two years have seen a substantial fall in the number of patients reported as having coronary artery disease in both countries, and in Australia, peripheral vascular disease.

**Table 1.8**

**Co-morbidities of New Patients with ESKD 2013**

Country	Status at RRT entry	Coronary artery disease	Peripheral vascular disease	Cerebrovascular disease	Chronic lung disease
Australia	No	1646 (65%)	1991 (78%)	2258 (89%)	2149 (84%)
	Suspected	141 (6%)	147 (6%)	42 (2%)	78 (3%)
	Yes	757 (30%)	406 (16%)	244 (10%)	317 (12%)
New Zealand	No	381 (70%)	438 (80%)	481 (88%)	465 (85%)
	Suspected	32 (6%)	23 (4%)	15 (3%)	22 (4%)
	Yes	133 (24%)	85 (16%)	50 (9%)	59 (11%)

**Table 1.9**

**Smoking Status of New Patients with ESKD 2013**

Country	Status at RRT entry	N (%)
Australia	Current	288 (11%)
	Former	1007 (40%)
	Never	1195 (47%)
	Not reported	54 (2%)
New Zealand	Current	75 (14%)
	Former	218 (40%)
	Never	243 (45%)
	Not reported	10 (2%)

**Table 1.10**

**Diabetes Status of New Patients with ESKD 2013**

Country	Diabetes at RRT entry	N (%)
Australia	No	1338 (53%)
	Type 1	107 (4%)
	Type 2	1099 (43%)
New Zealand	No	236 (43%)
	Type 1	20 (4%)
	Type 2	290 (53%)

Figure 1.7.1

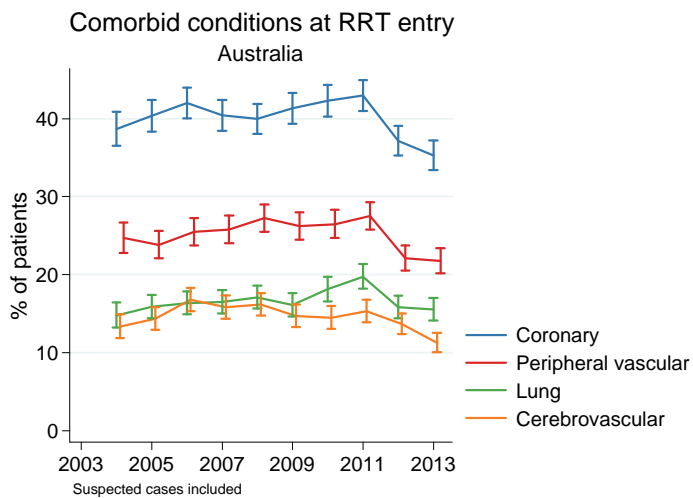


Figure 1.7.2

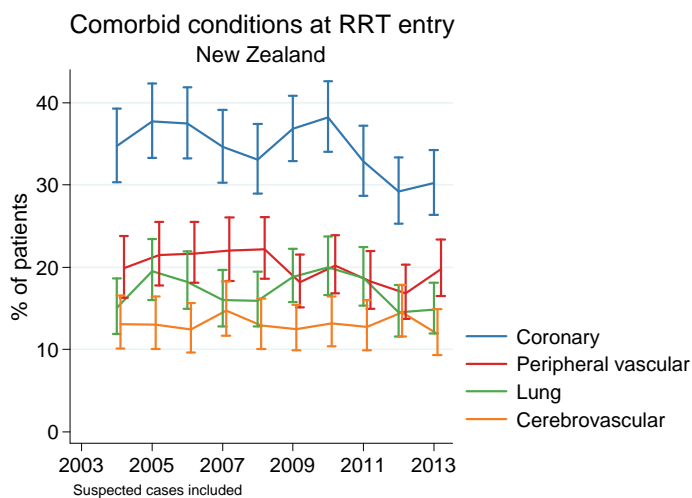
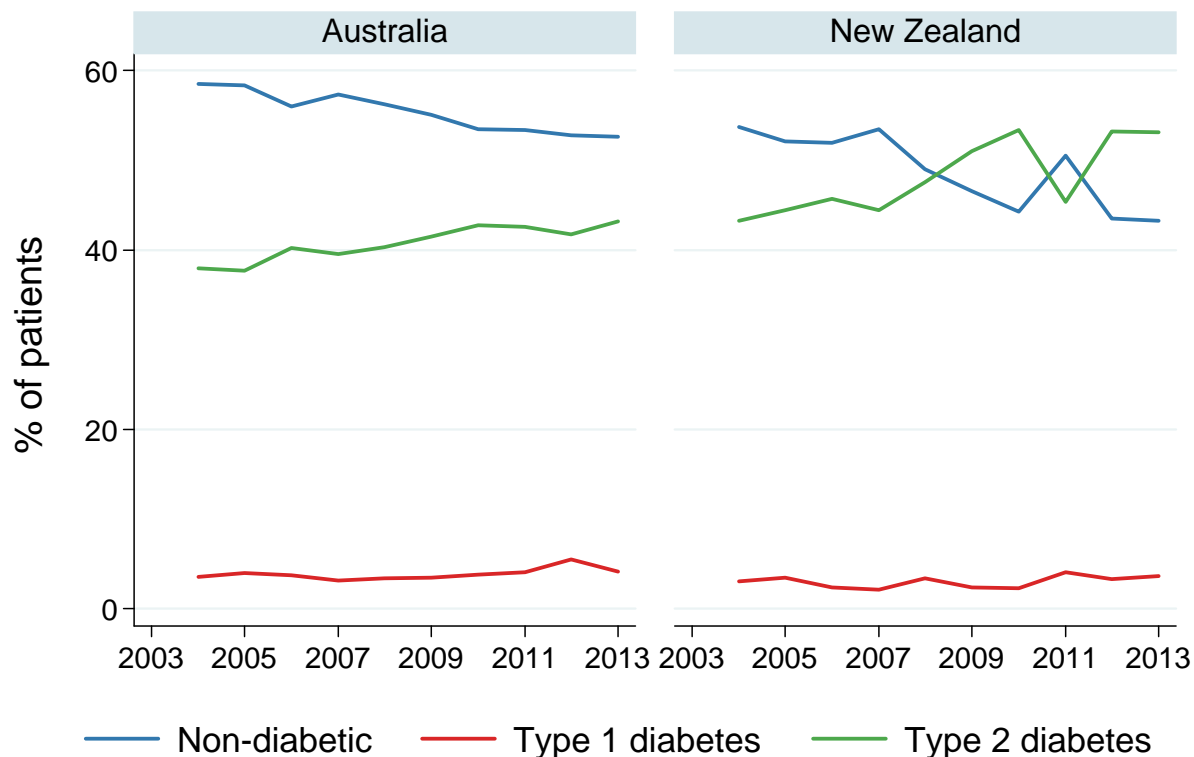


Figure 1.8

### Diabetes status at RRT entry



## Primary Renal Disease

The primary renal diseases of new patients over 2010-13 are shown in table 1.11. Diabetes continues to be the leading cause of ESKD in both countries, followed by glomerulonephritis (table 1.12). Analgesic nephropathy is now a rare cause of ESKD. 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 seeking to address this problem.

**Table 1.11**

**Primary Renal Disease of New Patients 2010 - 2013**

Country	Primary Renal Disease	2010	2011	2012	2013
Australia	GN	501 (21%)	572 (23%)	522 (20%)	493 (19%)
	Analgesic	37 (2%)	33 (1%)	40 (2%)	26 (1%)
	Polycystic	166 (7%)	144 (6%)	137 (5%)	161 (6%)
	Reflux	60 (3%)	56 (2%)	65 (3%)	48 (2%)
	Hypertension	321 (14%)	363 (14%)	321 (12%)	359 (14%)
	Diabetes	830 (36%)	891 (35%)	956 (37%)	887 (35%)
	Other	289 (12%)	313 (12%)	375 (15%)	364 (14%)
	Uncertain	131 (6%)	134 (5%)	129 (5%)	132 (5%)
	Not reported	0 (0%)	5 (0%)	28 (1%)	74 (3%)
	<b>Total</b>		<b>2335</b>	<b>2511</b>	<b>2573</b>
New Zealand	GN	111 (22%)	115 (24%)	106 (21%)	118 (22%)
	Analgesic	2 (0%)	5 (1%)	5 (1%)	1 (0%)
	Polycystic	18 (3%)	29 (6%)	28 (5%)	30 (5%)
	Reflux	8 (2%)	9 (2%)	8 (2%)	13 (2%)
	Hypertension	58 (11%)	51 (10%)	48 (9%)	51 (9%)
	Diabetes	260 (50%)	205 (42%)	252 (49%)	267 (49%)
	Other	41 (8%)	52 (11%)	48 (9%)	53 (10%)
	Uncertain	17 (3%)	21 (4%)	15 (3%)	12 (2%)
	Not reported	0 (0%)	0 (0%)	7 (1%)	1 (0%)
	<b>Total</b>		<b>515</b>	<b>487</b>	<b>517</b>

**Table 1.12****Glomerulonephritis as Cause of Primary Renal Disease in 2013**

<b>Primary renal disease</b>	<b>Australia</b>	<b>New Zealand</b>
Advanced GN (unclassified)	3	4
Extra and intra capillary GN (rapidly progressive)	6	0
Familial GN (including Alports)	10	2
Focal and segmental proliferative GN	16	13
Focal sclerosing GN (including hyalinosis)	23	5
GN other (specify)	12	0
GN with systemic disease	2	1
Goodpasture's with linear IgG and lung haemorrhage	12	4
Henoch-Schonlein purpura	1	1
Membranous GN	22	3
Mesangial proliferative (IgA+)	131	23
Mesangial proliferative (IgA-)	10	2
Mesangial proliferative (no IF studies)	0	1
Mesangiocapillary GN (double contour)	10	2
Microscopic polyarteritis	9	1
Presumed GN (no biopsy)	129	28
Primary focal sclerosing GN/focal glomerular sclerosis	47	13
Proliferative GN with linear IgG and no lung haemorrhage	6	3
S.L.E.	17	5
Scleroderma	5	0
Secondary focal sclerosing GN	3	3
Wegener's granulomatosis	19	4
<b>Total</b>	<b>493</b>	<b>118</b>

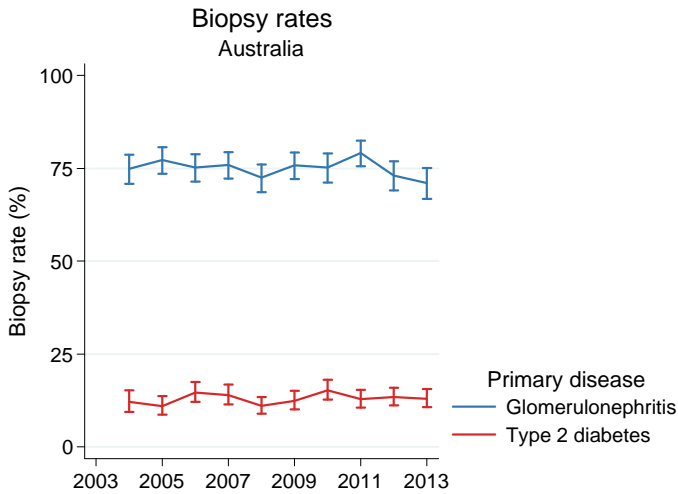
Table 1.13

## Miscellaneous Primary Renal Diseases in 2013

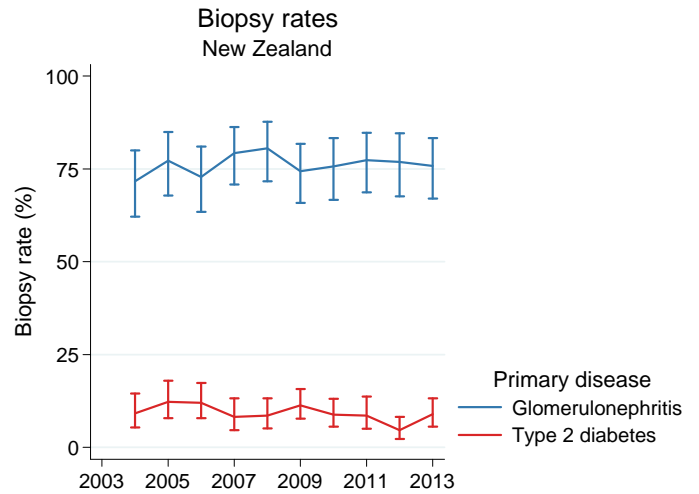
Primary renal disease	Australia	New Zealand
Calcineurin inhibitor toxicity	12	0
Cystinosis	2	0
Gout	1	0
Interstitial nephritis	42	4
Lead nephropathy	2	0
Lithium toxicity	15	2
Loss of single kidney (trauma/surgery)	14	4
Oxalosis	2	0
Post partum nephropathy	0	1
Pyelonephritis	5	0
Renal tuberculosis	1	2
Sarcoidosis	2	0
Bladder neck obstruction (incl. prostatomegaly)	3	0
Congenital renal hypoplasia and dysplasia	28	2
Neuropathic bladder	1	1
Obstructed megaureter	3	0
Obstructive nephropathy	24	3
Other lower urinary tract abnormalities (with secondary reflux)	6	0
Pelvi-ureteric junction obstruction	1	0
Posterior urethral valves	7	0
Spina bifida or myelomeningocele	1	0
Ureteric obstructive nephropathy	12	3
Calculi	15	5
Medullary cystic disease	5	1
Cortical necrosis	4	3
Haemolytic uraemic syndrome	9	2
Amyloid disease	25	6
Light chain nephropathy (not malignant)	4	3
Paraproteinaemia (Including Multiple Myeloma)	38	3
Renal cell carcinoma (Grawitz)	16	2
Transitional cell carcinoma urinary tract	4	1
Other (Specify)	60	5
<b>Total</b>	<b>364</b>	<b>53</b>

Biopsy rates for primary renal disease are essentially stable in both countries (figure 1.9); the bars show 95% confidence intervals.

**Figure 1.9.1**



**Figure 1.9.2**

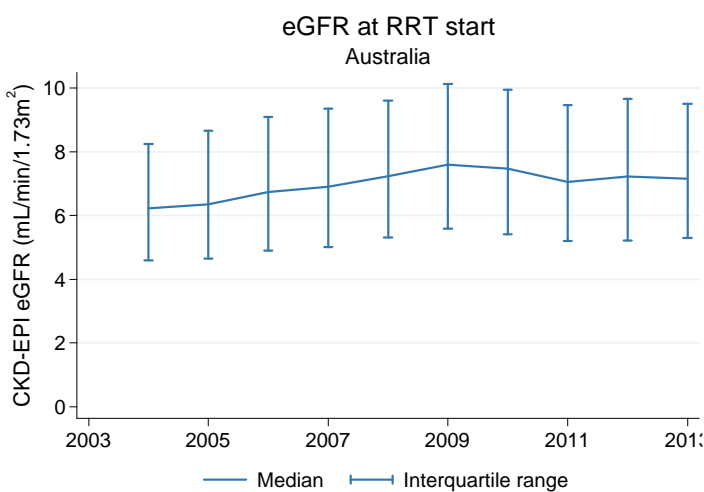


### Timing of RRT Start

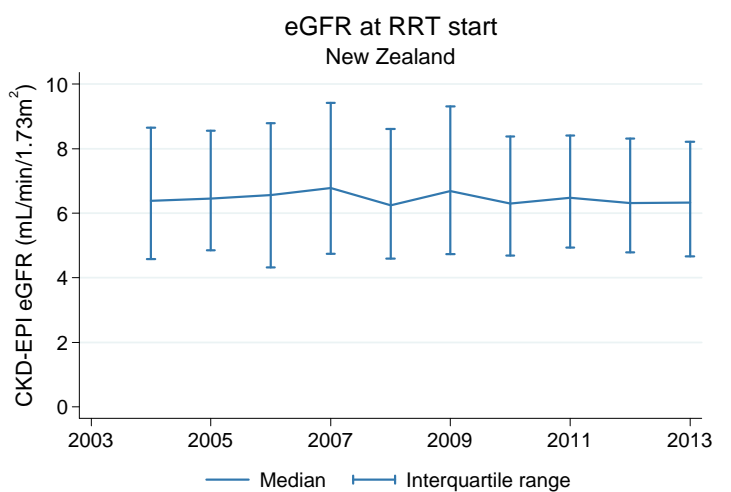
The median eGFR at RRT start over time is shown in figure 1.10. In Australia there was a slight trend towards earlier initiation of RRT until 2009; since then the median eGFR has stabilised, and was 7.2mL/

min/1.73m<sup>2</sup> in 2013. In New Zealand timing of RRT hasn't changed in the last 10 years, with a median eGFR at RRT start of 6.3mL/min/1.73m<sup>2</sup> in 2013.

**Figure 1.10.1**



**Figure 1.10.2**



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## ANZDATA Registry

C-\ Royal Adelaide Hospital  
East Wing 9th Floor  
North Terrace, Adelaide  
South Australia  
Australia

[www.anzdata.org.au](http://www.anzdata.org.au)

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