



Australia &
New Zealand Dialysis
& Transplant Registry

Chapter 8

Transplantation

ANZDATA gratefully acknowledges the
contributions of the Transplant Working Group
convened by Dr Wai Lim

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New Transplants

Table 8.1 shows the number of transplants performed in each country over the last 20 years. The 882 transplants performed in Australia in 2013 represent the highest number ever performed. This is predominantly driven by large growth in deceased donor numbers (figure 8.1); after a peak in 2008 living donor numbers have returned to pre-2008 levels. In New Zealand total transplant activity is relatively static, with approximately equal numbers of living and deceased donors.

Table 8.1

Number of Grafts Performed by Country 1994-2013

Year	Australia							New Zealand						
	Graft							Graft						
	1	2	3	4	5	Total	Living	1	2	3	4	Total	Living	
1994	384	41	12	2	1	440	103	70	11	1	1	83	20	
1995	371	60	11	0	0	442	94	84	7	3	0	94	24	
1996	416	50	9	0	0	475	115	88	7	1	0	96	26	
1997	447	51	6	1	0	505	147	101	10	1	0	112	31	
1998	443	62	11	2	0	518	161	95	10	1	0	106	31	
1999	403	43	9	0	0	455	169	97	11	4	0	112	42	
2000	476	47	7	1	0	531	181	91	13	2	0	106	31	
2001	488	45	6	2	0	541	213	101	9	0	0	110	43	
2002	537	60	5	2	0	604	230	103	12	2	0	117	48	
2003	472	60	10	1	0	543	218	94	13	4	0	111	44	
2004	583	53	11	3	0	650	244	98	7	0	0	105	48	
2005	539	67	15	2	0	623	246	87	5	0	1	93	46	
2006	549	70	17	5	0	641	273	80	8	2	0	90	49	
2007	527	75	11	0	2	615	271	112	9	2	0	123	58	
2008	708	84	16	5	0	813	354	111	10	1	0	122	69	
2009	674	88	11	0	0	773	327	109	12	0	0	121	67	
2010	744	83	18	1	0	846	296	104	5	1	0	110	60	
2011	744	68	10	3	0	825	255	110	7	1	0	118	57	
2012	747	80	15	1	2	845	238	99	9	0	0	108	54	
2013	788	85	7	2	0	882	252	110	5	0	0	115	58	

The transplant rate of dialysed patients is presented in figure 8.2 (for all dialysis patients) and figure 8.3 (for patients aged 15-64). Note that the denominator for these rates is dialysis-years, enabling a more accurate calculation of rates than that used in previous reports. Differences in rates between states and countries depend on a number of factors including the casemix of the dialysis patients and the local deceased donor rate. These rates are presented by age in figure 8.4, and by racial origin in patients aged 15-64 in figure 8.5. In both countries the transplant rate of indigenous patients is lower than in other racial groups; see also chapter 12.

Figure 8.1.1

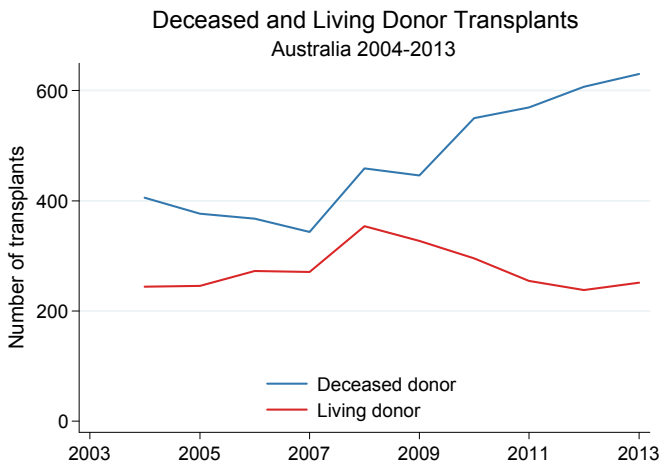


Figure 8.1.2

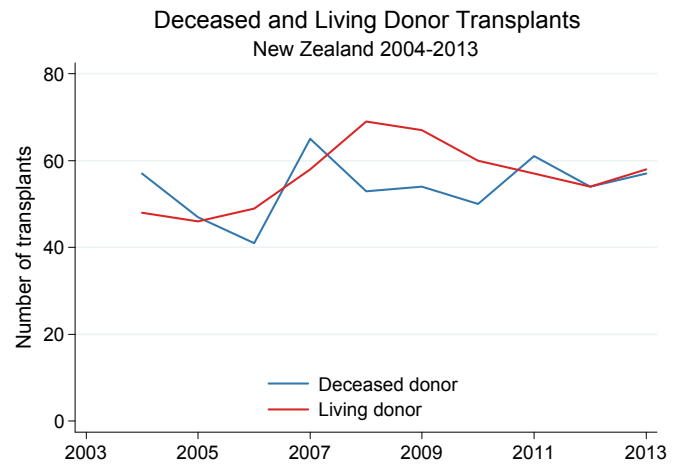


Figure 8.2

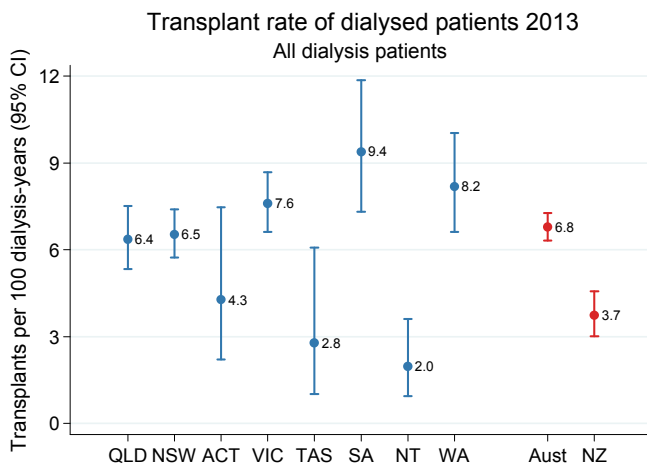


Figure 8.3

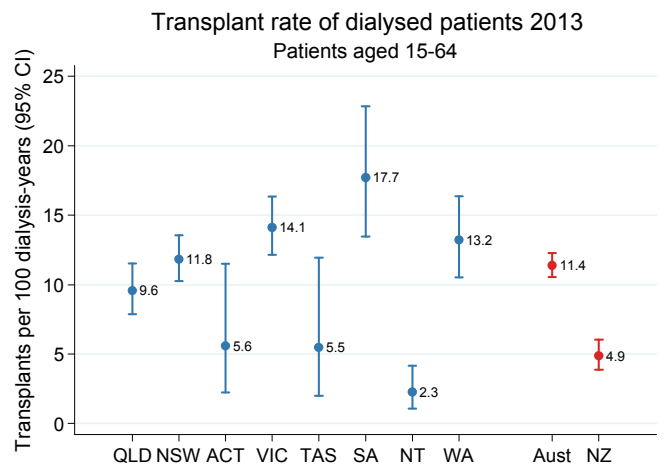


Figure 8.4.1

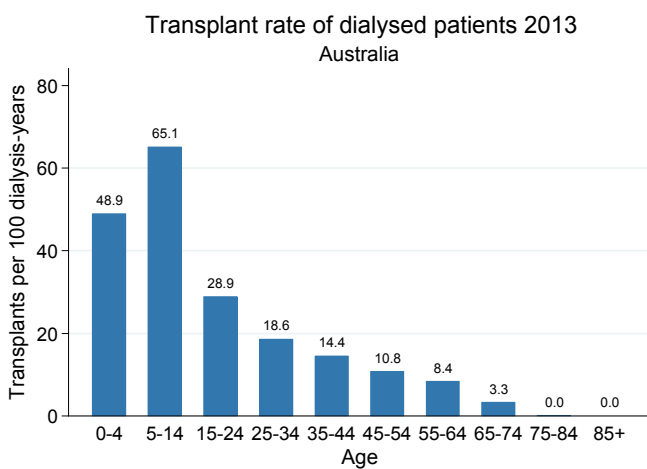


Figure 8.4.2

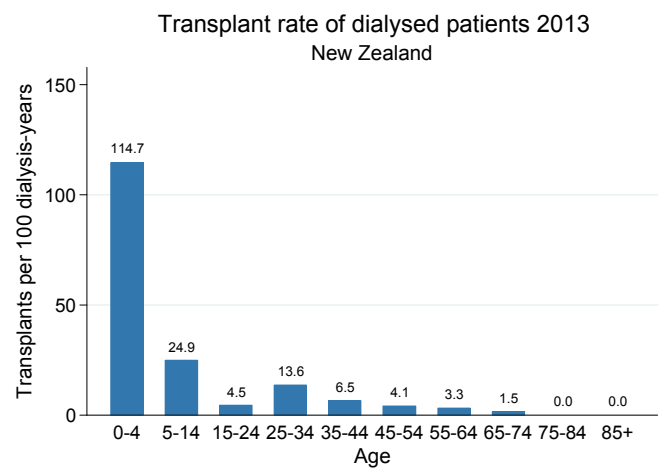


Figure 8.5.1

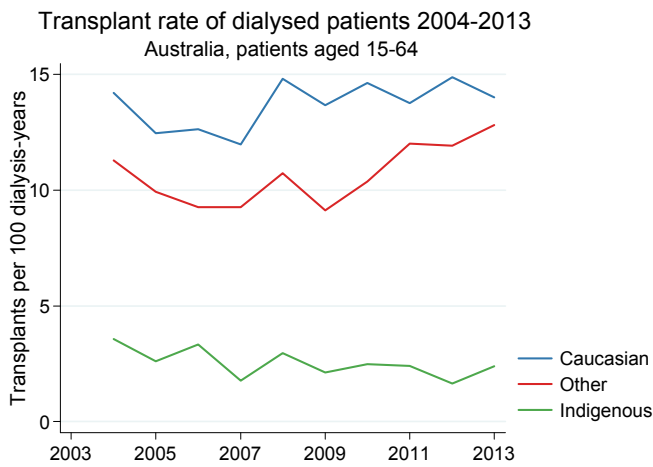


Figure 8.5.2

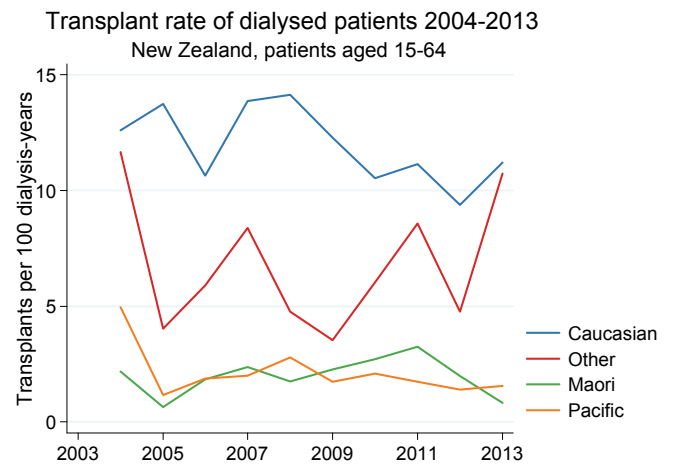


Table 8.2 shows the number of grafts performed according to graft number and recipient age in 2013. Transplant rates by age, per million population, are presented in figure 8.6.

Table 8.2

Age of Recipients Transplanted in 2013

Country	Donor Type	Graft	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84
Australia	Deceased	1	4	7	23	50	96	133	168	82	2
		2	0	2	4	5	11	12	17	8	0
		3	0	0	0	0	2	2	0	0	0
		4	0	0	0	1	1	0	0	0	0
	Living	1	6	11	26	27	32	51	52	18	0
		2	0	0	3	2	6	7	6	2	0
		3	0	0	1	2	0	0	0	0	0
New Zealand	Deceased	1	0	0	0	7	9	11	18	9	0
		2	0	0	0	0	0	3	0	0	0
	Living	1	2	2	4	12	7	13	13	3	0
		2	0	0	0	1	0	1	0	0	0

Figure 8.6.1

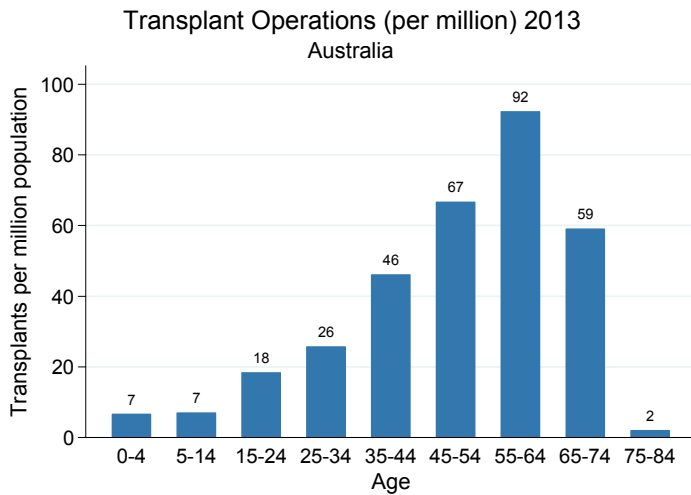


Figure 8.6.2

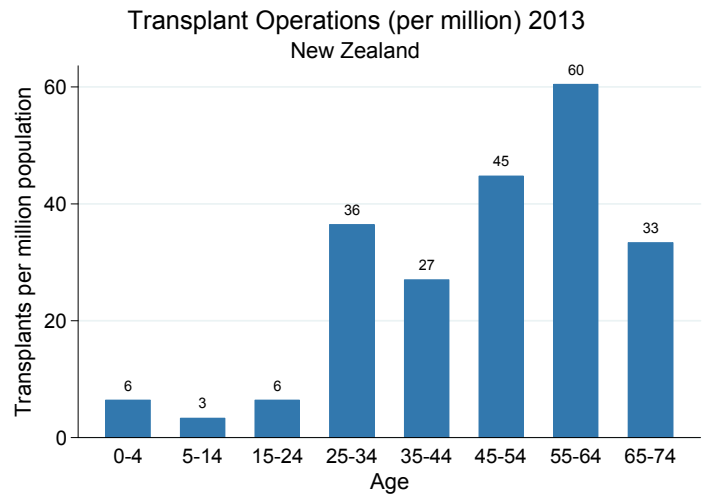


Table 8.3 shows the number of transplants performed by racial origin over 2009-2013. In both countries the majority of recipients are Caucasian.

Table 8.3

**Transplant Operations 2009 - 2013
Related to Ethnicity**

Country	Race	2009	2010	2011	2012	2013
Australia	Total	773 (100.0%)	846 (100.0%)	825 (100.0%)	845 (100.0%)	882 (100.0%)
	Caucasian	651 (84.2%)	706 (83.5%)	657 (79.6%)	671 (79.4%)	675 (76.5%)
	Aboriginal/TSI	24 (3.1%)	28 (3.3%)	28 (3.4%)	20 (2.4%)	31 (3.5%)
	Asian	74 (9.6%)	82 (9.7%)	97 (11.8%)	88 (10.4%)	101 (11.5%)
	Māori	5 (0.6%)	2 (0.2%)	11 (1.3%)	11 (1.3%)	8 (0.9%)
	Pacific	6 (0.8%)	12 (1.4%)	16 (1.9%)	13 (1.5%)	24 (2.7%)
	Other	13 (1.7%)	16 (1.9%)	16 (1.9%)	28 (3.3%)	31 (3.5%)
	Not reported	-	-	-	14 (1.7%)	12 (1.4%)
New Zealand	Total	121 (100.0%)	110 (100.0%)	118 (100.0%)	108 (100.0%)	115 (100.0%)
	Caucasian	91 (75.2%)	71 (64.5%)	77 (65.3%)	74 (68.5%)	79 (68.7%)
	Asian	5 (4.1%)	8 (7.3%)	11 (9.3%)	11 (10.2%)	16 (13.9%)
	Māori	19 (15.7%)	20 (18.2%)	20 (16.9%)	15 (13.9%)	9 (7.8%)
	Pacific	6 (5.0%)	9 (8.2%)	9 (7.6%)	7 (6.5%)	8 (7.0%)
	Other	-	2 (1.8%)	1 (0.8%)	-	1 (0.9%)
	Not reported	-	-	-	1 (0.9%)	2 (1.7%)

Table 8.4 shows the number of transplants (per million population) performed by transplanting region over 2009-2013. Transplants performed for people resident in Tasmania and the Northern Territory patients are included in figures for Victoria and South Australia regions respectively. These regions share common waiting lists and allocation protocols.

Table 8.4

Transplants in Each Region 2009 - 2013
Number of Operations
(Per Million Population Per Year)

State	2009	2010	2011	2012	2013
NSW/ACT	238 (32)	265 (35)	232 (31)	247 (32)	288 (37)
VIC/TAS	233 (40)	285 (48)	278 (46)	268 (44)	266 (43)
QLD	140 (32)	137 (31)	155 (35)	159 (35)	149 (32)
SA/NT	83 (45)	82 (44)	74 (40)	88 (47)	81 (42)
WA	79 (35)	77 (34)	86 (37)	83 (34)	98 (39)
AUSTRALIA	773 (36)	846 (38)	825 (37)	845 (37)	882 (38)

Each year a small number of Australian and New Zealand dialysis patients travel overseas to receive a kidney transplant. The numbers of such procedures over 2004-13 are presented in table 8.5. It is possible that these numbers are an underestimate of the true number, since some patients may not return to Australia/New Zealand and hence be reported to ANZDATA as lost to follow-up.

Table 8.5

Transplant Operations Performed Overseas
On Australian/NZ Patients 2004 - 2013

Year	Australia	New Zealand
2004	10	1
2005	9	2
2006	5	2
2007	11	1
2008	5	0
2009	8	1
2010	4	1
2011	7	2
2012	4	1
2013	4	1

Prevalent Transplant Patients

This section presents the number of prevalent (functioning) transplants according to various categories.

Table 8.6 presents the total number of transplants performed (in Australia and New Zealand, categorised by country of transplant) and functioning at the end of 2013 (categorised by country of residence). The patients with transplants of “unknown” source were transplanted outside Australia/New Zealand.

Table 8.6

Total Number of Transplants Performed and Functioning at end of 2013

Country	Donor type	Graft number	Performed	Functioning
Australia	Living	1	4685	3206
		2	435	274
		3	62	46
		4	10	7
		5	1	0
	Deceased	1	13951	5395
		2	2056	630
		3	330	102
		4	50	15
		5	6	2
Unknown	1	0	17	
	2	0	2	
New Zealand	Living	1	1054	656
		2	84	47
		3	6	4
	Deceased	1	2336	768
		2	403	78
		3	76	16
		4	7	0
Unknown	1	0	3	

Table 8.8 presents the number of functioning transplants at the end of 2004-13 by transplant region. In Australia SA/NT has the highest prevalence of transplant patients per million population (552 pmp) and WA the lowest (375 pmp). These data are shown graphically in figures 8.7 and 8.8.

Table 8.8

Functioning Transplants 2004 - 2013
Transplanting Region, Australia and New Zealand
(Number Per Million Population)

Year	NSW/ACT	VIC/TAS	QLD	SA/NT	WA	AUSTRALIA	NEW ZEALAND
2004	2072 (297)	1673 (309)	1289 (337)	773 (447)	586 (296)	6393 (321)	1219 (298)
2005	2143 (305)	1758 (321)	1330 (339)	783 (449)	641 (319)	6655 (330)	1244 (301)
2006	2226 (315)	1872 (337)	1377 (344)	825 (468)	685 (334)	6985 (342)	1258 (301)
2007	2280 (318)	1964 (348)	1425 (347)	870 (488)	710 (337)	7249 (348)	1302 (308)
2008	2388 (327)	2097 (364)	1507 (357)	912 (504)	749 (345)	7653 (360)	1353 (318)
2009	2487 (336)	2254 (384)	1577 (364)	936 (510)	788 (352)	8042 (371)	1407 (327)
2010	2637 (351)	2419 (405)	1649 (374)	975 (525)	820 (358)	8500 (386)	1444 (332)
2011	2713 (358)	2577 (426)	1715 (383)	988 (528)	862 (366)	8855 (396)	1486 (339)
2012	2828 (368)	2714 (442)	1799 (394)	1030 (544)	893 (366)	9264 (408)	1521 (345)
2013	2948 (378)	2867 (459)	1879 (404)	1056 (552)	946 (375)	9696 (419)	1572 (354)

Figure 8.7

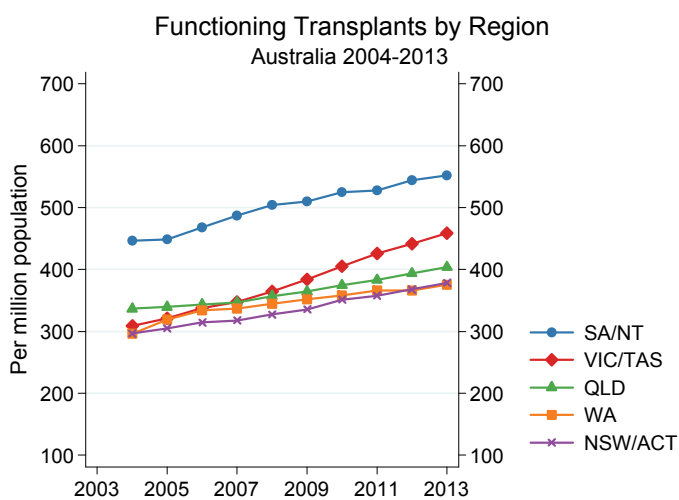
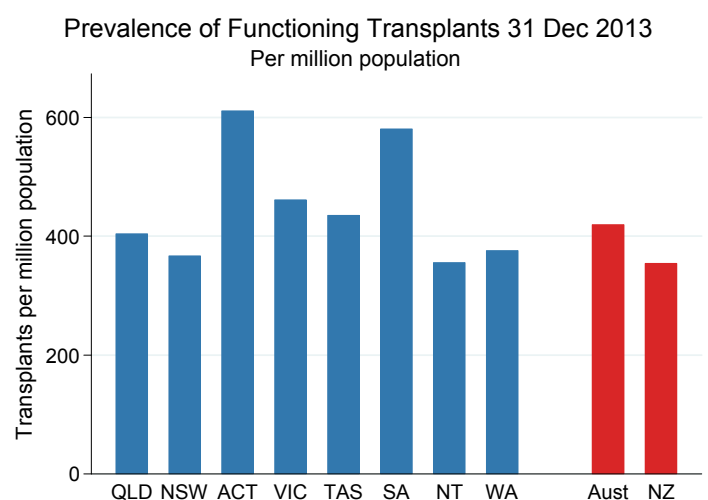


Figure 8.8



The age distribution of prevalent transplant patients as a proportion of patients on renal replacement therapy is shown in figure 8.9. The proportion depending on living donor grafts is greater in the younger age groups. The number of prevalent transplant patients by age and donor source is shown in table 8.9. Finally, the age distribution, and distribution per million population, are shown in figures 8.10 and 8.11 for Australia and New Zealand respectively.

Figure 8.9.1

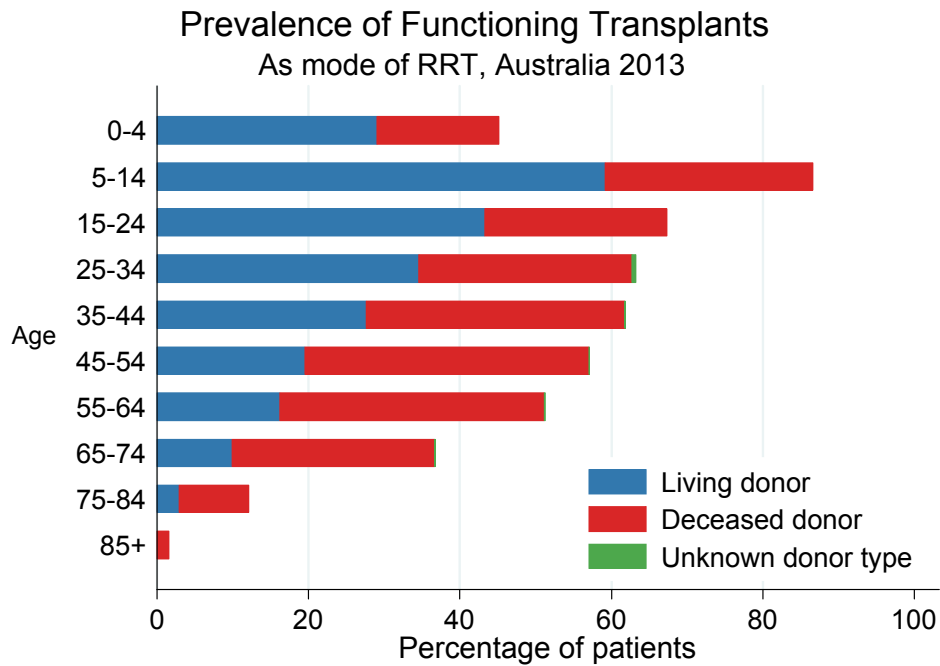


Figure 8.9.2

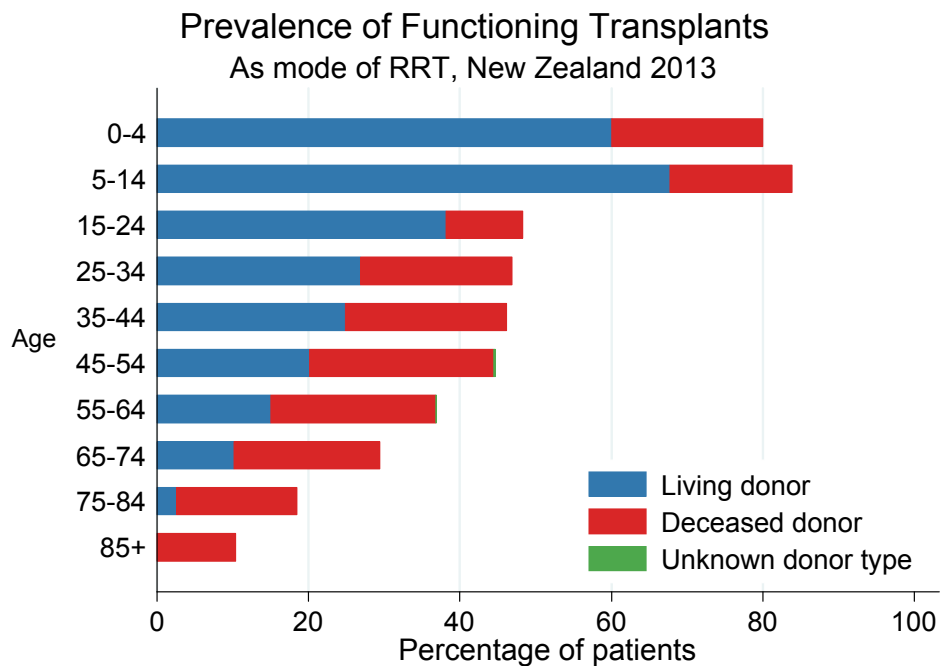


Table 8.9

**Age of All Functioning Transplant Patients
as at 31 Dec 2013**

Country	Donor Source	Graft Number	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	Total	
Australia	All	All	14	142	316	688	1508	2328	2656	1683	353	8	9696	
	Living Donor	1	9	95	187	344	596	706	763	428	78	-	-	3206
		2	-	2	14	29	64	70	66	23	6	-	-	274
		3	-	-	2	3	10	18	10	3	-	-	-	46
		4	-	-	-	-	3	2	1	1	-	-	-	7
		All	9	97	203	376	673	796	840	455	84	-	-	3533
	Deceased Donor	1	5	40	101	263	703	1286	1614	1119	257	7	-	5395
		2	-	5	10	35	104	196	171	96	12	1	-	630
		3	-	-	2	7	22	39	21	11	-	-	-	102
		4	-	-	-	1	4	7	3	-	-	-	-	15
		5	-	-	-	-	-	1	1	-	-	-	-	2
	All	5	45	113	306	833	1529	1810	1226	269	8	-	6144	
	Unknown	1	-	-	-	5	2	2	6	2	-	-	-	17
		2	-	-	-	1	-	1	-	-	-	-	-	2
		All	-	-	-	6	2	3	6	2	-	-	-	19
New Zealand	All	All	4	26	57	122	217	397	433	256	57	3	1572	
	Living Donor	1	3	21	43	65	103	160	165	88	8	-	-	656
		2	-	-	2	5	13	18	9	-	-	-	-	47
		3	-	-	-	-	1	1	2	-	-	-	-	4
		All	3	21	45	70	117	179	176	88	8	-	-	707
	Deceased Donor	1	1	5	11	50	84	176	229	160	49	3	-	768
		2	-	-	1	2	13	34	22	6	-	-	-	78
		3	-	-	-	-	3	6	5	2	-	-	-	16
	All	1	5	12	52	100	216	256	168	49	3	-	862	
	Unknown	1	-	-	-	-	-	2	1	-	-	-	-	3
All		-	-	-	-	-	2	1	-	-	-	-	3	

Figure 8.10.1

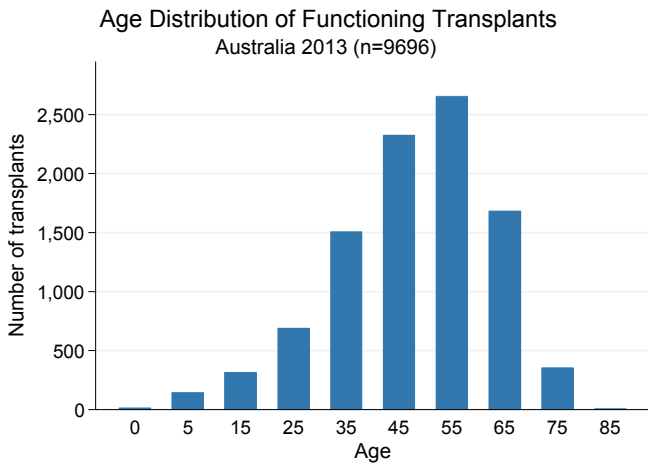


Figure 8.10.2

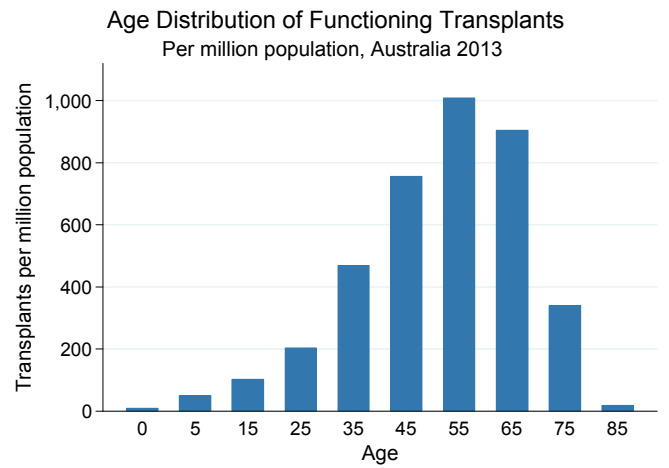


Figure 8.11.1

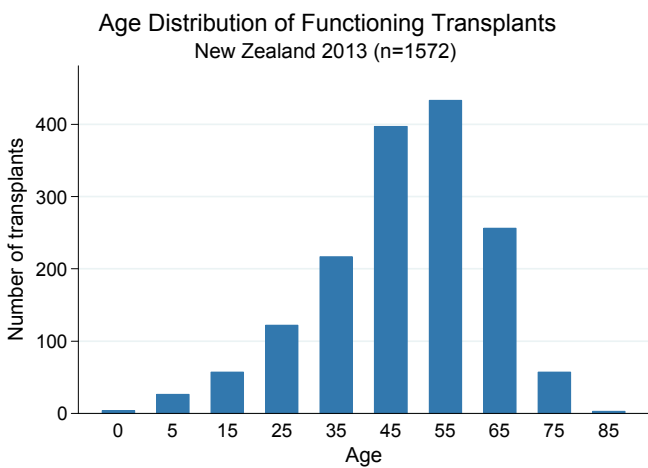


Figure 8.11.2

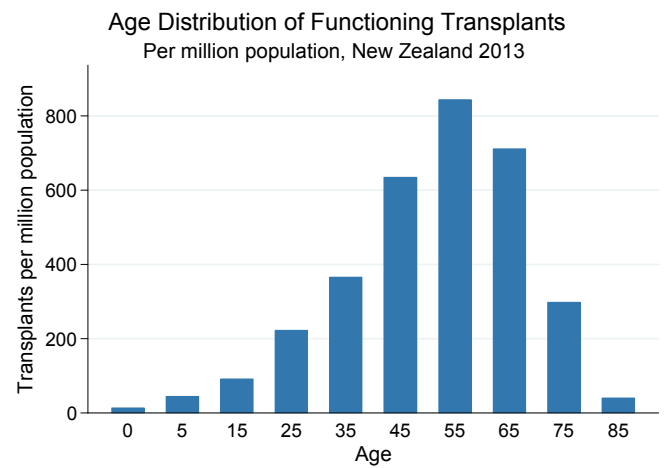


Table 8.10 presents the number of prevalent patients by sex, racial origin and age; the great majority of prevalent transplant patients in both countries are Caucasian.

Table 8.10

**Functioning Transplant Patients
Related to Ethnicity and Age Group 31 Dec 2013**

Country	Sex	Race	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	Total
Australia	F	Total	14	142	316	688	1508	2328	2656	1683	353	8	9696
		Caucasian	1	36	104	232	485	700	811	575	142	4	3090
		Aboriginal/TSI	-	3	3	7	20	31	22	4	-	-	90
		Asian	1	3	7	26	76	109	144	53	10	-	429
		Other	-	8	11	23	24	28	30	9	3	-	136
		Not reported	1	2	1	1	-	2	3	-	-	-	10
	M	Total	3	52	126	289	605	870	1010	641	155	4	3755
		Caucasian	10	71	158	332	769	1248	1402	933	180	4	5107
		Aboriginal/TSI	-	3	4	8	21	27	37	13	1	-	114
		Asian	-	6	14	35	80	141	152	72	13	-	513
Other		1	7	12	23	31	37	52	23	4	-	190	
Not reported		-	3	2	1	2	5	3	1	-	-	17	
New Zealand	F	Total	4	26	57	122	217	397	433	256	57	3	1572
		Caucasian	-	7	22	27	72	117	129	81	23	1	479
		Asian	-	1	4	4	4	15	16	5	1	-	50
		Māori	-	4	2	8	14	9	8	8	3	-	56
		Pacific	-	-	1	6	6	16	8	3	1	-	41
		Total	-	12	29	45	96	157	161	97	28	1	626
	M	Caucasian	4	12	24	51	96	190	195	114	22	1	709
		Asian	-	-	-	12	11	11	29	14	3	-	80
		Māori	-	1	4	10	6	24	23	19	4	1	92
		Pacific	-	1	-	3	6	11	21	9	-	-	51
Other		-	-	-	1	1	3	4	2	-	-	11	
Not reported		-	-	-	-	1	1	-	1	-	-	3	
Total	4	14	28	77	121	240	272	159	29	2	946		

Figure 8.12 shows the duration of function of prevalent transplants at the end of 2013. In Australia there were 3331 grafts that had functioned for ≥ 10 years, 891 ≥ 20 years and 206 ≥ 30 years. In New Zealand there were 631 grafts that had functioned for ≥ 10 years, 170 ≥ 20 years and 37 ≥ 30 years.

Figure 8.12.1

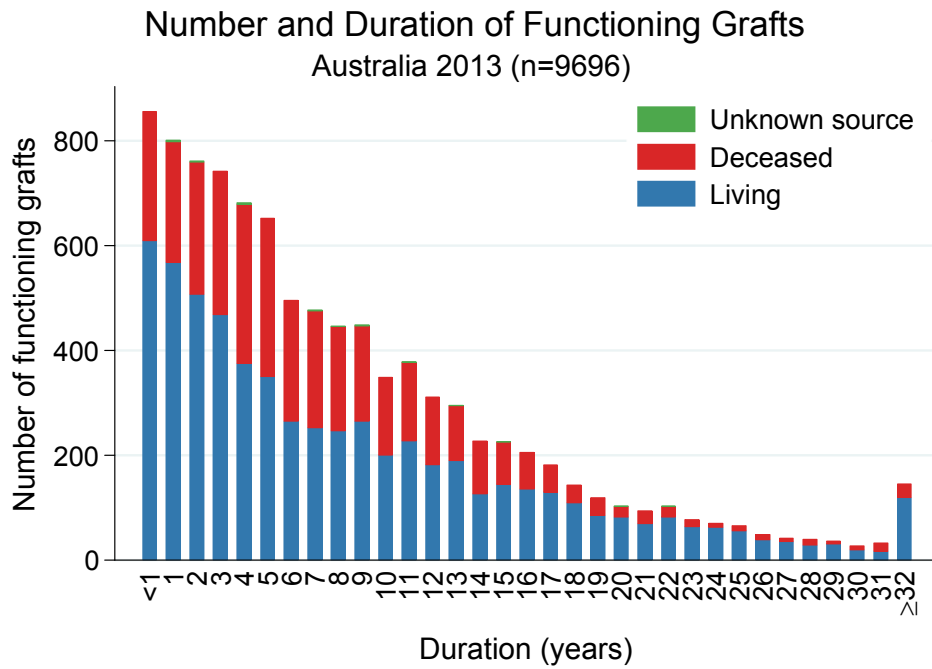
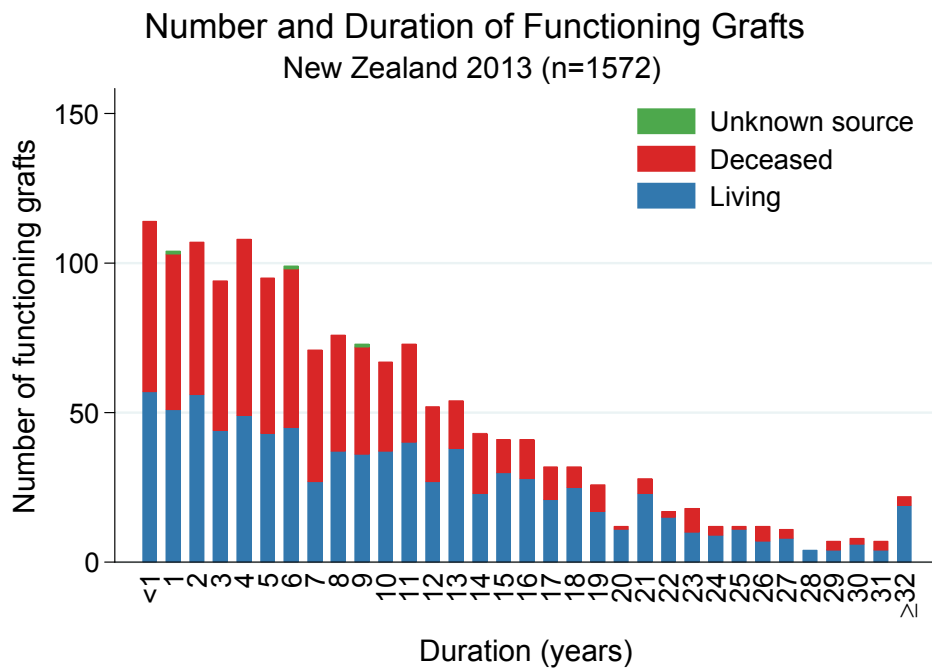


Figure 8.12.2



Graft Loss

Table 8.11 presents the overall graft loss rate in 2004-13 by country, stratified into graft failure and death with a functioning graft. These rates are expressed as graft losses per 100 graft-years, a new methodology compared with previous reports. In general around half of grafts are lost due to graft failure and half due to patient death.

Table 8.11 **Graft Loss Rate 2004 - 2013**

Country	Outcome	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Australia	Graft failure	3.7	3.2	2.9	3.0	3.5	3.3	2.9	2.9	3.2	2.6
	Death with function	2.6	2.8	2.4	2.6	2.6	2.1	2.4	2.9	2.2	2.7
	All losses	6.3	6.0	5.3	5.6	6.1	5.4	5.3	5.8	5.4	5.3
New Zealand	Graft failure	1.9	3.8	4.0	3.5	2.4	2.7	2.4	2.4	2.8	2.4
	Death with function	2.4	2.7	3.0	3.8	2.2	2.7	2.6	3.1	2.2	2.1
	All losses	4.3	6.5	7.0	7.3	4.6	5.5	5.0	5.5	4.9	4.5

The causes of graft loss over 2004-13 are presented in table 8.12. Chronic allograft nephropathy dominates the causes of graft failure, whilst graft failure due to acute rejection is an uncommon event. These data are further categorised by timing post-transplant (first year versus later years) for 2004-13 in table 8.13. Cancer is the most common cause of death with a functioning graft in both Australia and New Zealand.

Table 8.12 **Year of Graft Loss Due to Death or Failure 2004 - 2013**

Country	Cause of Graft Loss	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Australia	Death with function	147	165	146	165	175	149	178	221	171	218	1735
	Acute rejection	5	3	7	11	10	17	8	10	10	14	95
	Chronic allograft nephropathy	145	134	108	132	174	153	149	155	176	148	1474
	Hyperacute rejection	-	-	1	-	2	-	-	-	1	-	4
	Vascular	18	13	14	8	14	17	11	6	10	9	120
	Technical	2	4	5	2	4	3	3	5	2	-	30
	Glomerulonephritis	13	16	23	15	10	15	16	15	18	16	157
	Non-compliance	9	5	3	7	6	12	6	6	8	8	70
	Other	20	15	19	17	16	15	17	27	27	19	192
	Total	359	355	326	357	411	381	388	445	423	432	3877
New Zealand	Death with function	27	31	34	44	26	34	33	41	29	29	328
	Acute rejection	-	2	2	1	1	1	-	3	1	2	13
	Chronic allograft nephropathy	14	23	31	20	20	28	17	15	26	21	215
	Hyperacute rejection	1	-	-	-	-	-	-	-	-	-	1
	Vascular	-	4	-	3	1	2	3	2	1	2	18
	Technical	-	2	3	1	-	-	-	-	-	-	6
	Glomerulonephritis	2	3	6	5	5	-	4	4	5	1	35
	Non-compliance	-	1	1	6	1	1	5	3	-	4	22
	Other	4	8	3	5	1	2	2	4	4	3	36
Total	48	74	80	85	55	68	64	72	66	62	674	

Table 8.13

Graft Losses 2009 - 2013

Country	Outcome	Cause	First year	Beyond first year	Total
	Death with function	Cardiovascular	23 (32%)	208 (24%)	231 (25%)
		Withdrawal	1 (1%)	60 (7%)	61 (7%)
		Cancer	4 (5%)	283 (33%)	287 (31%)
		Infection	28 (38%)	142 (16%)	170 (18%)
		Other	17 (23%)	171 (20%)	188 (20%)
		Total	73 (100%)	864 (100%)	937 (100%)
		Australia	Graft Failure	Acute rejection	27 (22%)
Chronic allograft nephropathy	7 (6%)			778 (77%)	785 (69%)
Hyperacute rejection	1 (1%)			-	1 (<1%)
Vascular	37 (30%)			16 (2%)	53 (5%)
Technical	9 (7%)			4 (<1%)	13 (1%)
Glomerulonephritis	6 (5%)			74 (7%)	80 (7%)
Non-compliance	1 (1%)			40 (4%)	41 (4%)
Other	34 (28%)			71 (7%)	105 (9%)
Total	122 (100%)			1015 (100%)	1137 (100%)
	Death with function	Cardiovascular	5 (42%)	37 (24%)	42 (25%)
		Withdrawal	1 (8%)	9 (6%)	10 (6%)
		Cancer	2 (17%)	54 (35%)	56 (34%)
		Infection	1 (8%)	22 (14%)	23 (14%)
		Other	3 (25%)	32 (21%)	35 (21%)
		Total	12 (100%)	154 (100%)	166 (100%)
		New Zealand	Graft Failure	Acute rejection	1 (8%)
Chronic allograft nephropathy	1 (8%)			106 (69%)	107 (64%)
Vascular	4 (31%)			6 (4%)	10 (6%)
Glomerulonephritis	2 (15%)			12 (8%)	14 (8%)
Non-compliance	1 (8%)			12 (8%)	13 (8%)
Other	4 (31%)			11 (7%)	15 (9%)
Total	13 (100%)			153 (100%)	166 (100%)

Immunosuppression

The use of antibodies for induction immunosuppression is shown in table 8.14. The drop in the number of patients receiving antibody therapy in 2012-13 may represent underreporting rather than a change in practice; the Registry is attempting to clarify this with contributing units. Caution is advised when interpreting these data.

Table 8.14

Antibody Use for Induction Immunosuppression 2009 - 2013

Number of Kidney Transplant Recipients Receiving Each Agent by Year (% Total New Transplants)

Country	Type of agent	2009	2010	2011	2012	2013
Australia	Muromonab-CD3	1 (0.1%)	-	-	-	-
	Intravenous immunoglobulin	28 (3.6%)	39 (4.6%)	42 (5.1%)	30 (3.6%)	38 (4.3%)
	Anti-CD25	715 (92.5%)	801 (94.7%)	767 (93.0%)	666 (78.8%)	714 (81.0%)
	Rituximab	17 (2.2%)	9 (1.1%)	10 (1.2%)	7 (0.8%)	2 (0.2%)
	T cell depleting polyclonal Ab	40 (5.2%)	52 (6.1%)	34 (4.1%)	28 (3.3%)	29 (3.3%)
	Other	4 (0.5%)	2 (0.2%)	-	14 (1.7%)	4 (0.5%)
	Total new transplants	773	846	825	845	882
New Zealand	Intravenous immunoglobulin	-	-	-	1 (0.9%)	-
	Anti-CD25	63 (52.1%)	65 (59.1%)	114 (96.6%)	101 (93.5%)	109 (94.8%)
	Rituximab	2 (1.7%)	1 (0.9%)	3 (2.5%)	4 (3.7%)	6 (5.2%)
	T cell depleting polyclonal Ab	-	1 (0.9%)	1 (0.8%)	-	2 (1.7%)
	Total new transplants	121	110	118	108	115

Immunosuppressive therapy at baseline, 1 and 2 years post-transplant for primary deceased donor grafts over 2006-13 is presented in table 8.16. Tacrolimus is the most commonly prescribed calcineurin inhibitor in Australia, whereas in New Zealand cyclosporin predominates. As with antibody therapy, immunosuppression data appear to be underreported over 2012-13 and caution is advised when interpreting these data for these years.

Table 8.16.1

Immunosuppressive Therapy - Primary Deceased Donor Grafts 2006 - 2013

Country	Time	Year Transplanted	AZA	CYC	TAC	MMF	MPA	SIR	EVE	PRE	Number of Grafts
Australia	Initial Treatment	2006	-	155 (51%)	139 (45%)	260 (85%)	24 (8%)	3 (1%)	19 (6%)	296 (97%)	306
		2007	2 (1%)	138 (48%)	140 (49%)	244 (85%)	36 (13%)	-	5 (2%)	285 (99%)	287
		2008	2 (1%)	137 (35%)	240 (61%)	364 (93%)	22 (6%)	-	-	389 (99%)	391
		2009	4 (1%)	62 (16%)	310 (82%)	356 (95%)	13 (3%)	-	3 (1%)	375 (100%)	376
		2010	-	66 (14%)	409 (86%)	425 (89%)	38 (8%)	1 (<1%)	3 (1%)	477 (100%)	478
		2011	1 (<1%)	54 (11%)	446 (87%)	299 (59%)	205 (40%)	-	-	505 (99%)	511
		2012	1 (<1%)	24 (4%)	461 (86%)	310 (58%)	188 (35%)	2 (<1%)	-	496 (93%)	533
	2013	4 (1%)	11 (2%)	492 (87%)	325 (58%)	183 (32%)	-	-	511 (90%)	565	
	Treatment at 1 Year	2006	12 (4%)	94 (34%)	145 (52%)	216 (78%)	27 (10%)	21 (8%)	20 (7%)	259 (93%)	278
		2007	13 (5%)	86 (32%)	149 (56%)	189 (71%)	51 (19%)	12 (5%)	14 (5%)	252 (95%)	265
		2008	17 (5%)	84 (23%)	251 (70%)	288 (80%)	37 (10%)	12 (3%)	9 (2%)	345 (96%)	361
		2009	18 (5%)	40 (11%)	283 (80%)	281 (79%)	40 (11%)	18 (5%)	9 (3%)	341 (96%)	354
		2010	24 (5%)	53 (12%)	370 (81%)	322 (71%)	84 (18%)	16 (4%)	11 (2%)	441 (97%)	455
2011		24 (5%)	31 (6%)	410 (85%)	229 (48%)	196 (41%)	8 (2%)	14 (3%)	455 (94%)	482	
Treatment at 2 Years	2006	15 (6%)	81 (30%)	144 (53%)	207 (76%)	31 (11%)	23 (8%)	25 (9%)	248 (92%)	271	
	2007	12 (5%)	79 (31%)	152 (59%)	181 (70%)	54 (21%)	14 (5%)	13 (5%)	243 (94%)	259	
	2008	20 (6%)	80 (23%)	238 (68%)	275 (79%)	39 (11%)	12 (3%)	9 (3%)	324 (93%)	350	
	2009	23 (7%)	39 (11%)	272 (79%)	253 (74%)	54 (16%)	20 (6%)	11 (3%)	329 (96%)	344	
	2010	25 (6%)	46 (11%)	339 (78%)	302 (70%)	75 (17%)	21 (5%)	14 (3%)	406 (94%)	434	
	2011	30 (6%)	30 (6%)	378 (80%)	191 (41%)	193 (41%)	8 (2%)	19 (4%)	420 (89%)	470	

Table 8.16.2

Immunosuppressive Therapy - Primary Deceased Donor Grafts 2006 - 2013

Country	Time	Year Transplanted	AZA	CYC	TAC	MMF	MPA	SIR	EVE	PRE	Number of Grafts
New Zealand	Initial Treatment	2006	-	26 (68%)	11 (30%)	34 (92%)	-	-	3 (8%)	37 (100%)	37
		2007	-	43 (74%)	15 (26%)	57 (98%)	-	-	1 (2%)	58 (100%)	58
		2008	-	30 (67%)	15 (33%)	42 (93%)	3 (7%)	-	-	45 (100%)	45
		2009	-	39 (78%)	10 (20%)	49 (98%)	-	-	-	49 (98%)	50
		2010	-	32 (71%)	13 (29%)	45 (100%)	-	-	-	45 (100%)	45
		2011	-	41 (71%)	17 (29%)	58 (100%)	-	-	-	58 (100%)	58
		2012	-	36 (72%)	13 (26%)	49 (98%)	-	-	-	49 (98%)	50
	2013	-	43 (80%)	8 (15%)	50 (93%)	-	-	-	50 (93%)	54	
	Treatment at 1 Year	2006	-	18 (53%)	15 (45%)	29 (88%)	-	-	3 (9%)	32 (97%)	33
		2007	3 (6%)	31 (60%)	20 (38%)	43 (83%)	-	2 (4%)	1 (2%)	48 (92%)	52
		2008	2 (5%)	21 (48%)	23 (52%)	39 (89%)	1 (2%)	-	-	41 (93%)	44
		2009	-	24 (50%)	23 (48%)	48 (100%)	-	1 (2%)	-	45 (94%)	48
		2010	2 (5%)	16 (37%)	27 (63%)	41 (95%)	-	-	-	42 (98%)	43
2011		2 (4%)	25 (46%)	29 (54%)	50 (93%)	-	-	-	52 (96%)	54	
2012		2 (4%)	26 (54%)	21 (44%)	44 (92%)	-	-	-	46 (96%)	48	
Treatment at 2 Years	2006	-	16 (50%)	16 (50%)	28 (88%)	-	-	2 (6%)	30 (94%)	32	
	2007	3 (6%)	29 (58%)	20 (40%)	41 (82%)	-	2 (4%)	1 (2%)	45 (90%)	50	
	2008	2 (5%)	20 (48%)	22 (52%)	37 (88%)	-	1 (2%)	-	40 (95%)	42	
	2009	-	21 (46%)	24 (52%)	45 (98%)	-	1 (2%)	-	42 (91%)	46	
	2010	2 (5%)	17 (40%)	25 (60%)	39 (93%)	-	-	-	39 (93%)	42	
	2011	5 (9%)	25 (46%)	29 (54%)	45 (83%)	-	-	-	50 (93%)	54	

Rejection

The proportion of patients experiencing any rejection episode by 6 months post-transplant, stratified by donor type and graft number, is presented in table 8.17. Antibody-mediated rejection rates are presented in table 8.18; rates are notably higher in re-grafts.

Table 8.17

**Australia and New Zealand
Rejection Rates at Six Months Post Transplant**

Donor Type	Graft Number	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Living Donor	First	27.7%	21.6%	19.6%	19.6%	21.1%	17.0%	16.8%	17.8%	17.5%	13.7%
	Second and Subsequent	33.3%	34.8%	18.5%	33.3%	34.3%	30.0%	24.3%	12.9%	18.5%	10.3%
Deceased Donor	First	26.8%	22.8%	18.6%	16.3%	17.7%	22.0%	21.1%	18.7%	19.9%	16.0%
	Second and Subsequent	25.0%	27.5%	31.7%	36.4%	32.8%	32.9%	36.5%	27.3%	19.4%	21.8%

Table 8.18

**Australia and New Zealand
Antibody-Mediated Rejection Rates at Six Months Post Transplant**

Donor Type	Graft Number	2005	2006	2007	2008	2009	2010	2011	2012
Living Donor	First	1.1%	1.4%	3.4%	3.1%	4.5%	3.7%	4.9%	2.3%
	Second and Subsequent	3.7%	5.6%	20.0%	12.5%	13.5%	3.2%	11.1%	6.9%
Deceased Donor	First	3.0%	2.9%	5.8%	4.8%	5.6%	5.2%	5.4%	3.8%
	Second and Subsequent	4.8%	15.2%	10.9%	15.8%	24.3%	13.0%	11.3%	10.3%

Table 8.19 shows the number of people who received antibody agents for treating acute rejection by calendar year. The number is also reported as a proportion of new transplant recipients in each calendar year, but readers should be aware that although the large majority of people experiencing acute rejection do so within the first six months of transplantation, some experience rejection after this time (when they would not necessarily be counted as a new transplant). For this reason the total number of transplant recipients treated during the year is also reported. Muromonab-CD3 has been withdrawn from sale and was unavailable from 2011.

Table 8.19

**Australia and New Zealand
Antibody Therapy for Acute Rejection**

Country	Type of agent	2009	2010	2011	2012	2013
Australia	Muromonab-CD3	12 (1.6%)	2 (0.2%)	-	-	-
	Intravenous immunoglobulin	105 (13.6%)	92 (10.9%)	106 (12.8%)	65 (7.7%)	101 (11.5%)
	Anti-CD25	1 (0.1%)	-	-	-	1 (0.1%)
	Rituximab	26 (3.4%)	15 (1.8%)	11 (1.3%)	8 (0.9%)	11 (1.2%)
	T cell depleting polyclonal Ab	27 (3.5%)	41 (4.8%)	43 (5.2%)	31 (3.7%)	44 (5.0%)
	Total new transplants	773	846	825	845	882
	Total transplants at risk	8426	8888	9325	9700	10146
New Zealand	Muromonab-CD3	8 (6.6%)	4 (3.6%)	-	-	-
	Intravenous immunoglobulin	7 (5.8%)	4 (3.6%)	3 (2.5%)	3 (2.8%)	2 (1.7%)
	Anti-CD25	-	-	1 (0.8%)	-	1 (0.9%)
	Rituximab	3 (2.5%)	-	-	1 (0.9%)	1 (0.9%)
	T cell depleting polyclonal Ab	2 (1.7%)	12 (10.9%)	11 (9.3%)	4 (3.7%)	4 (3.5%)
	Total new transplants	121	110	118	108	115
	Total transplants at risk	1474	1517	1562	1594	1636

Patient and Graft Survival

The remainder of the chapter presents patient and graft survival by transplant era and within a number of different categories combining country, graft number and donor type. Each page shows the patient and graft survival graphically, and in tabular form (with 95% confidence intervals) at selected time-points post-transplant. In each case the survivor function is calculated using the Kaplan-Meier method. Graft survival is not censored for death. All of these survival statistics are unadjusted. Note that in the survival graphs out to 5 years, the y axis ranges from 0.60 to 1.00 in order to show the differences between the eras more clearly, whereas in the long-term graphs (out to 30 years) the y axis starts at 0.

Figure 8.13.1

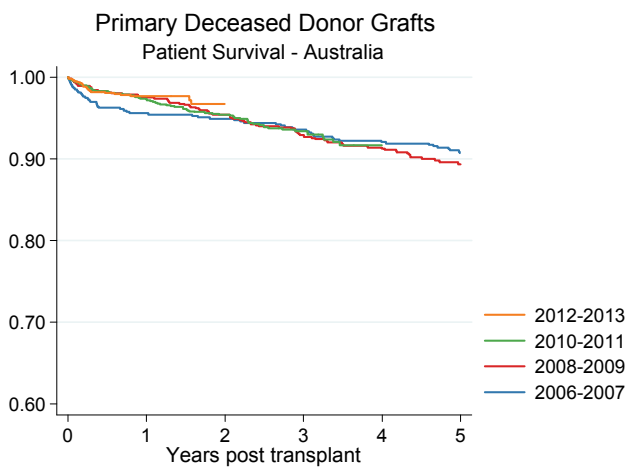


Figure 8.14

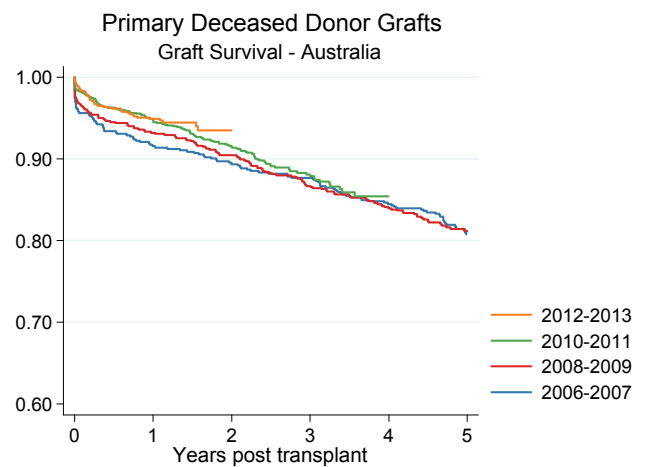


Table 8.20

**Primary Deceased Donor Grafts - Australia
Recipient and Graft Survival 2006 - 2013 % (95% Confidence Interval)**

Outcome	Era	1 month	6 months	1 year	5 years
Patient survival	2006-2007 (n=593)	99 (97, 99)	96 (94, 98)	96 (94, 97)	91 (88, 93)
	2008-2009 (n=767)	99 (99, 100)	98 (97, 99)	98 (96, 98)	89 (87, 91)
	2010-2011 (n=989)	99 (99, 100)	98 (97, 99)	97 (96, 98)	-
	2012-2013 (n=1098)	100 (99, 100)	98 (97, 99)	98 (96, 98)	-
Graft survival	2006-2007 (n=593)	96 (94, 97)	93 (91, 95)	92 (89, 94)	81 (77, 84)
	2008-2009 (n=767)	97 (95, 98)	95 (93, 96)	93 (91, 95)	81 (78, 84)
	2010-2011 (n=989)	98 (97, 99)	96 (95, 97)	95 (93, 96)	-
	2012-2013 (n=1098)	98 (97, 99)	96 (95, 97)	95 (93, 96)	-

Figure 8.15

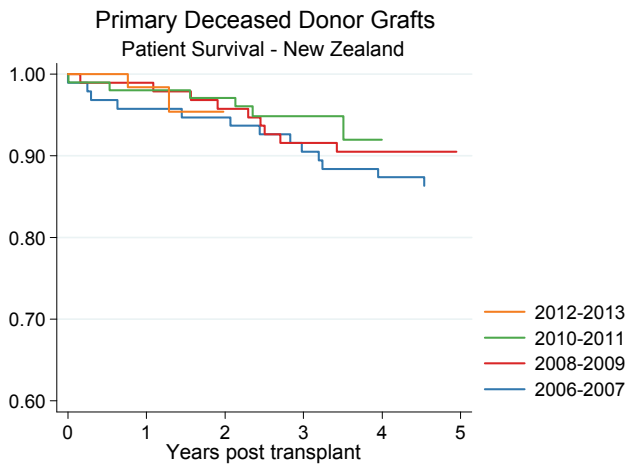


Figure 8.16

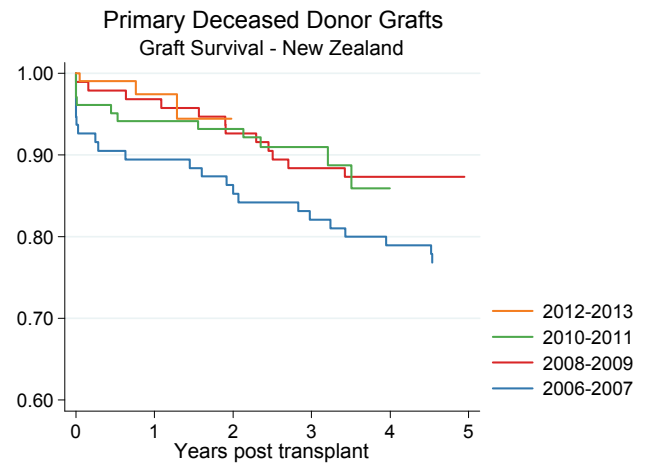


Table 8.21

Primary Deceased Donor Grafts - New Zealand
 Recipient and Graft Survival 2006 - 2013 % (95% Confidence Interval)

Outcome	Era	1 month	6 months	1 year	5 years
Patient survival	2006-2007 (n=95)	99 (93, 100)	97 (91, 99)	96 (89, 98)	86 (78, 92)
	2008-2009 (n=95)	100	99 (93, 100)	99 (93, 100)	91 (83, 95)
	2010-2011 (n=103)	99 (93, 100)	99 (93, 100)	98 (92, 100)	-
	2012-2013 (n=104)	100	100	98 (89, 100)	-
Graft survival	2006-2007 (n=95)	93 (85, 96)	91 (83, 95)	89 (81, 94)	77 (67, 84)
	2008-2009 (n=95)	99 (93, 100)	98 (92, 99)	97 (91, 99)	87 (79, 93)
	2010-2011 (n=103)	96 (90, 99)	95 (89, 98)	94 (87, 97)	-
	2012-2013 (n=104)	99 (93, 100)	99 (93, 100)	97 (90, 99)	-

Figure 8.17

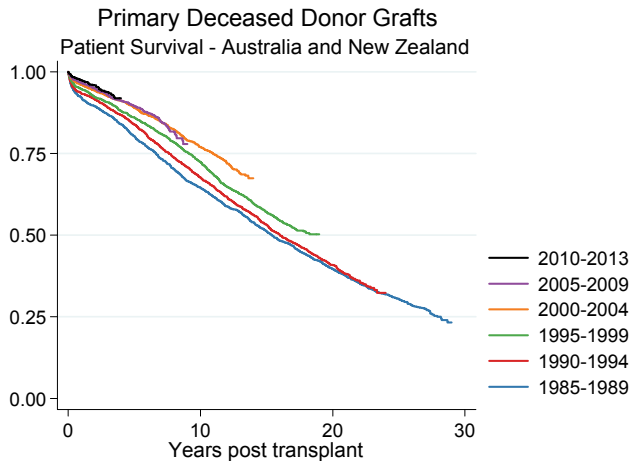


Figure 8.18

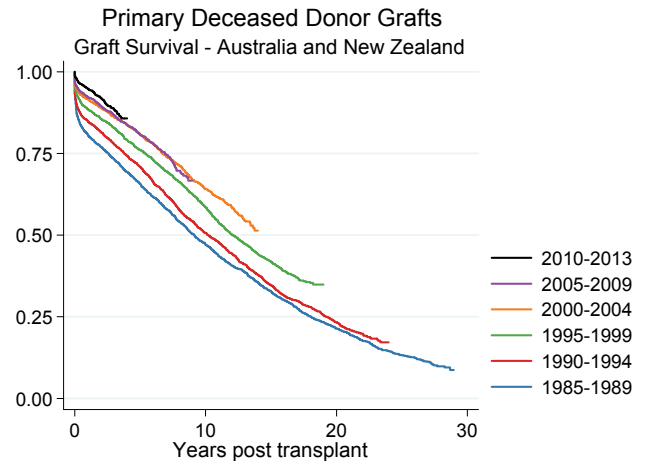


Table 8.22

Primary Deceased Donor Grafts - Australia and New Zealand
Recipient and Graft Survival 1985 - 2013 % (95% Confidence Interval)

Outcome	Era	1 year	5 years	10 years	15 years	20 years
Patient survival	1985-1989 (n=1916)	92 (91, 93)	80 (78, 82)	65 (62, 67)	51 (49, 53)	40 (37, 42)
	1990-1994 (n=1906)	93 (92, 94)	84 (82, 85)	68 (66, 70)	53 (51, 55)	41 (39, 43)
	1995-1999 (n=1779)	95 (94, 96)	86 (84, 88)	72 (70, 74)	57 (55, 59)	-
	2000-2004 (n=1850)	96 (95, 97)	89 (88, 90)	77 (75, 79)	-	-
	2005-2009 (n=1911)	97 (96, 97)	90 (88, 91)	-	-	-
	2010-2013 (n=2294)	98 (97, 98)	-	-	-	-
Graft survival	1985-1989 (n=1916)	81 (79, 83)	66 (64, 68)	47 (45, 49)	33 (31, 35)	21 (20, 23)
	1990-1994 (n=1906)	85 (83, 87)	71 (69, 73)	51 (48, 53)	35 (33, 37)	23 (21, 25)
	1995-1999 (n=1779)	89 (87, 90)	76 (74, 78)	59 (56, 61)	42 (40, 44)	-
	2000-2004 (n=1850)	92 (90, 93)	81 (79, 83)	64 (62, 66)	-	-
	2005-2009 (n=1911)	92 (91, 93)	81 (79, 83)	-	-	-
	2010-2013 (n=2294)	95 (94, 96)	-	-	-	-

Figure 8.19

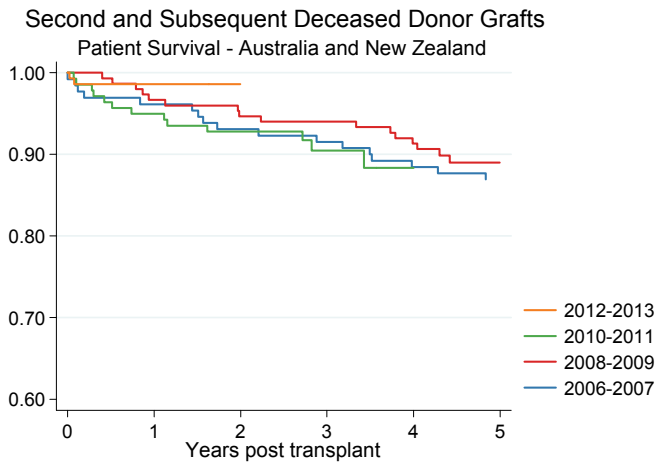


Figure 8.20

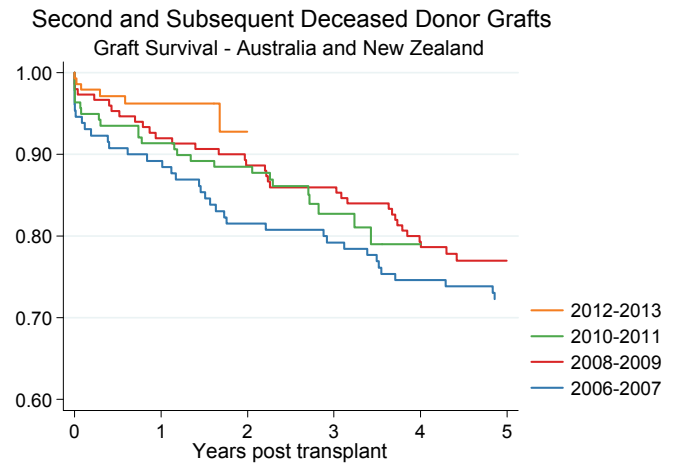


Table 8.23

Second and Subsequent Deceased Donor Grafts - Australia and New Zealand
Recipient and Graft Survival 2006 - 2013 % (95% Confidence Interval)

Outcome	Era	1 month	6 months	1 year	5 years
Patient survival	2006-2007 (n=130)	99 (95, 100)	97 (92, 99)	96 (91, 98)	87 (80, 92)
	2008-2009 (n=150)	100	99 (95, 100)	97 (92, 99)	89 (83, 93)
	2010-2011 (n=139)	99 (95, 100)	96 (92, 98)	95 (90, 98)	-
	2012-2013 (n=146)	99 (95, 100)	99 (95, 100)	99 (95, 100)	-
Graft survival	2006-2007 (n=130)	95 (89, 97)	91 (84, 95)	89 (82, 93)	72 (64, 79)
	2008-2009 (n=150)	97 (93, 99)	95 (90, 98)	92 (86, 95)	77 (69, 83)
	2010-2011 (n=139)	95 (90, 98)	94 (88, 97)	91 (85, 95)	-
	2012-2013 (n=146)	98 (94, 99)	97 (93, 99)	96 (91, 98)	-

Figure 8.21

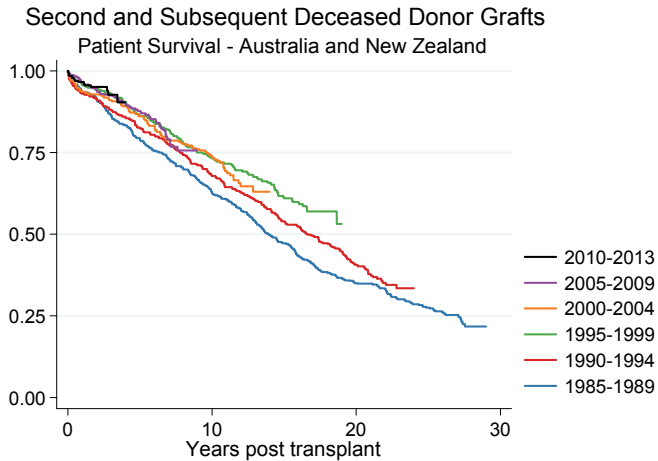


Figure 8.22

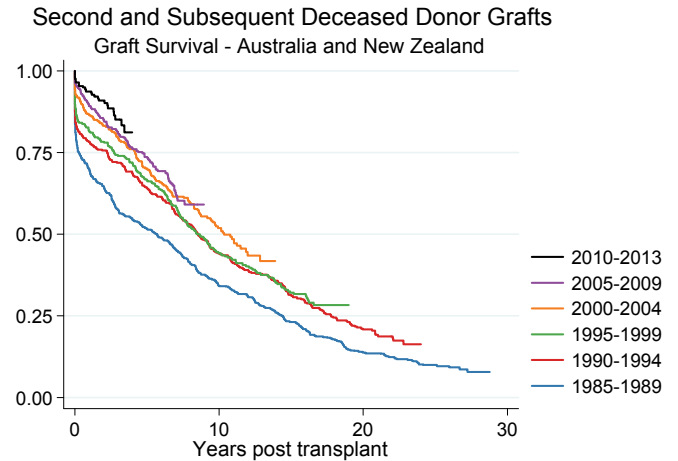


Table 8.24

**Second and Subsequent Deceased Donor Grafts - Australia and New Zealand
Recipient and Graft Survival 1985 - 2013 % (95% Confidence Interval)**

Outcome	Era	1 year	5 years	10 years	15 years	20 years
Patient survival	1985-1989 (n=458)	94 (91, 96)	79 (75, 83)	63 (58, 67)	47 (43, 52)	35 (31, 39)
	1990-1994 (n=374)	93 (90, 95)	83 (78, 86)	68 (63, 72)	54 (49, 59)	41 (36, 46)
	1995-1999 (n=296)	96 (93, 98)	86 (82, 90)	73 (68, 78)	61 (55, 66)	-
	2000-2004 (n=268)	94 (90, 96)	86 (81, 90)	74 (68, 79)	-	-
	2005-2009 (n=343)	96 (94, 98)	88 (84, 91)	-	-	-
	2010-2013 (n=285)	97 (94, 98)	-	-	-	-
Graft survival	1985-1989 (n=458)	70 (66, 74)	52 (47, 56)	34 (30, 39)	23 (19, 27)	14 (11, 17)
	1990-1994 (n=374)	78 (74, 82)	64 (59, 69)	44 (39, 49)	31 (27, 36)	21 (17, 25)
	1995-1999 (n=296)	82 (77, 86)	67 (61, 72)	44 (39, 50)	32 (27, 38)	-
	2000-2004 (n=268)	87 (82, 90)	70 (64, 75)	52 (46, 58)	-	-
	2005-2009 (n=343)	90 (86, 92)	74 (69, 78)	-	-	-
	2010-2013 (n=285)	94 (90, 96)	-	-	-	-

Figure 8.23

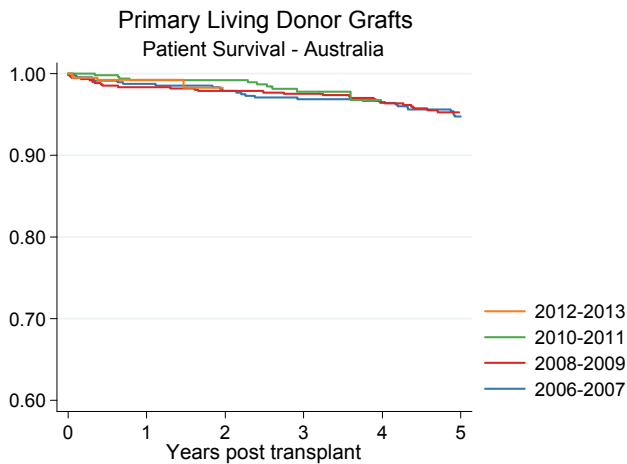


Figure 8.24

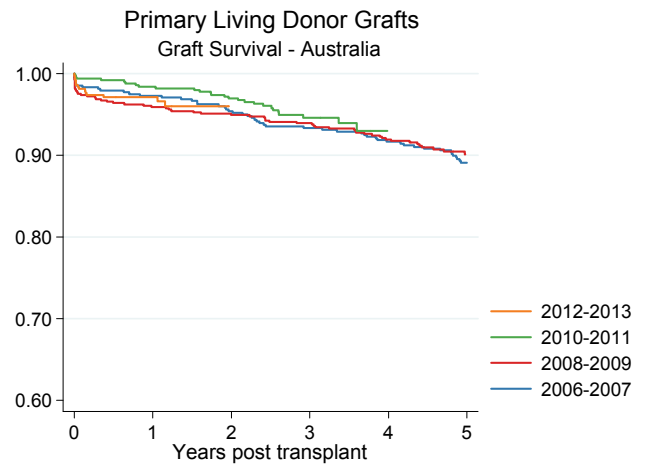


Table 8.25

Primary Living Donor Grafts - Australia
Recipient and Graft Survival 2006 - 2013 % (95% Confidence Interval)

Outcome	Era	1 month	6 months	1 year	5 years
Patient survival	2006-2007 (n=483)	100 (99, 100)	99 (98, 100)	99 (97, 99)	95 (92, 96)
	2008-2009 (n=615)	100 (98, 100)	99 (97, 99)	98 (97, 99)	95 (93, 97)
	2010-2011 (n=499)	100	100 (99, 100)	99 (98, 100)	-
	2012-2013 (n=437)	100 (98, 100)	99 (98, 100)	99 (98, 100)	-
Graft survival	2006-2007 (n=483)	99 (97, 99)	98 (96, 99)	97 (95, 98)	89 (86, 92)
	2008-2009 (n=615)	98 (96, 99)	96 (95, 98)	96 (94, 97)	90 (87, 92)
	2010-2011 (n=499)	99 (98, 100)	99 (98, 100)	98 (97, 99)	-
	2012-2013 (n=437)	98 (96, 99)	97 (95, 98)	97 (95, 98)	-

Figure 8.25

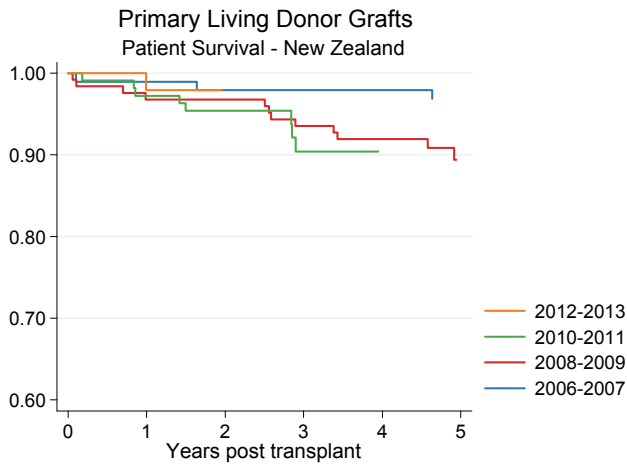


Figure 8.26

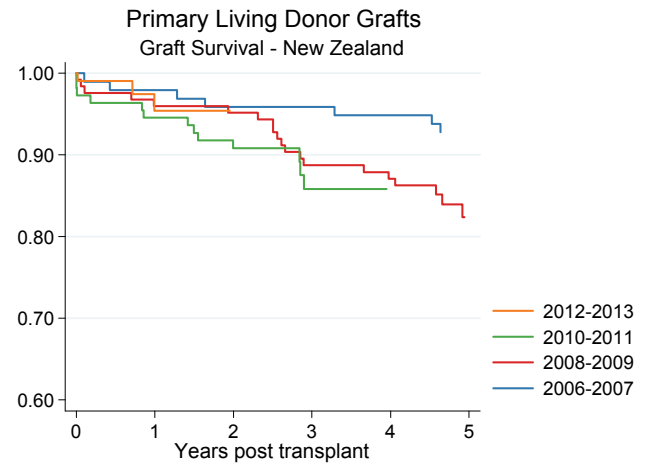


Table 8.26

Primary Living Donor Grafts - New Zealand
Recipient and Graft Survival 2006 - 2013 % (95% Confidence Interval)

Outcome	Era	1 month	6 months	1 year	5 years
Patient Survival	2006-2007 (n=97)	100	99 (93, 100)	99 (93, 100)	97 (91, 99)
	2008-2009 (n=125)	99 (94, 100)	98 (94, 100)	97 (92, 99)	89 (82, 94)
	2010-2011 (n=111)	100	99 (94, 100)	97 (92, 99)	-
	2012-2013 (n=105)	100	100	98 (86, 100)	-
Graft Survival	2006-2007 (n=97)	100	98 (92, 99)	98 (92, 99)	93 (85, 96)
	2008-2009 (n=125)	98 (94, 100)	98 (93, 99)	96 (91, 98)	82 (74, 88)
	2010-2011 (n=111)	97 (92, 99)	96 (91, 99)	95 (88, 98)	-
	2012-2013 (n=105)	99 (93, 100)	99 (93, 100)	95 (86, 99)	-

Figure 8.27

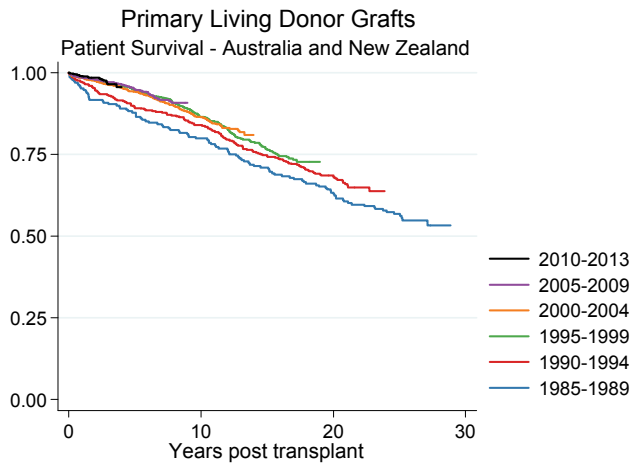


Figure 8.28

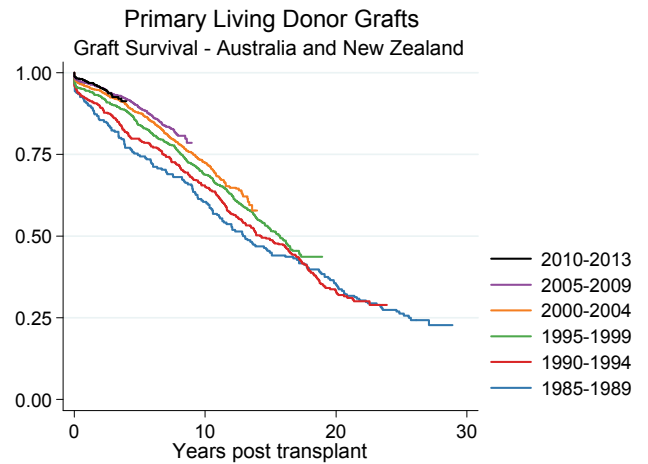


Table 8.27

Primary Living Donor Grafts - Australia and New Zealand
Recipient and Graft Survival 1985 - 2013 % (95% Confidence Interval)

Outcome	Era	1 year	5 years	10 years	15 years	20 years
Patient Survival	1985-1989 (n=230)	95 (92, 97)	88 (83, 91)	80 (74, 85)	71 (65, 76)	63 (56, 69)
	1990-1994 (n=431)	97 (95, 98)	89 (86, 92)	84 (80, 87)	75 (70, 78)	68 (64, 73)
	1995-1999 (n=766)	99 (97, 99)	95 (93, 96)	87 (84, 89)	77 (73, 80)	-
	2000-2004 (n=1193)	98 (98, 99)	94 (93, 95)	86 (84, 88)	-	-
	2005-2009 (n=1585)	99 (98, 99)	95 (94, 96)	-	-	-
	2010-2013 (n=1152)	99 (98, 99)	-	-	-	-
Graft Survival	1985-1989 (n=230)	91 (86, 94)	75 (69, 80)	60 (54, 67)	45 (38, 51)	35 (29, 41)
	1990-1994 (n=431)	92 (89, 94)	80 (75, 83)	65 (61, 70)	49 (44, 54)	33 (29, 38)
	1995-1999 (n=766)	95 (93, 96)	84 (81, 86)	69 (65, 72)	52 (48, 56)	-
	2000-2004 (n=1193)	96 (95, 97)	88 (86, 89)	72 (70, 75)	-	-
	2005-2009 (n=1585)	97 (96, 97)	89 (88, 91)	-	-	-
	2010-2013 (n=1152)	97 (96, 98)	-	-	-	-

Figure 8.29

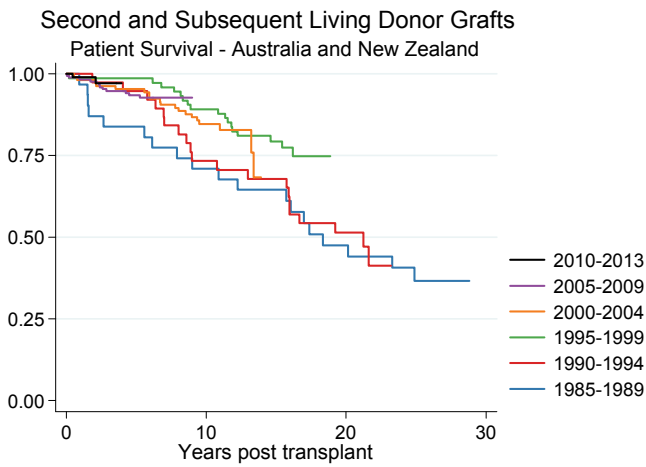


Figure 8.30

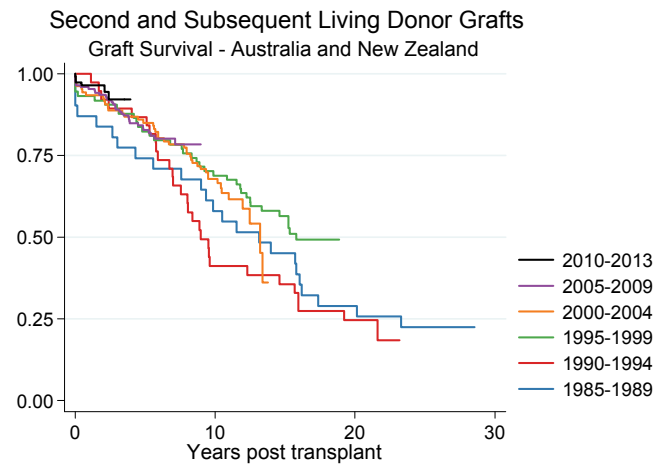


Table 8.28

**Second and Subsequent Living Donor Grafts - Australia and New Zealand
Recipient and Graft Survival 1985 - 2013 % (95% Confidence Interval)**

Outcome	Era	1 year	5 years	10 years	15 years	20 years
Patient Survival	1985-1989 (n=31)	97 (79, 100)	84 (66, 93)	71 (52, 84)	65 (45, 79)	48 (29, 64)
	1990-1994 (n=38)	100	95 (81, 99)	73 (56, 85)	68 (50, 80)	51 (34, 66)
	1995-1999 (n=74)	99 (91, 100)	99 (91, 100)	89 (80, 94)	79 (68, 87)	-
	2000-2004 (n=107)	98 (93, 100)	95 (89, 98)	85 (76, 90)	-	-
	2005-2009 (n=175)	98 (95, 99)	94 (89, 96)	-	-	-
	2010-2013 (n=118)	99 (93, 100)	-	-	-	-
Graft Survival	1985-1989 (n=31)	87 (69, 95)	74 (55, 86)	58 (39, 73)	45 (27, 61)	29 (15, 45)
	1990-1994 (n=38)	100	87 (71, 94)	41 (25, 56)	36 (21, 51)	25 (12, 39)
	1995-1999 (n=74)	93 (85, 97)	82 (72, 89)	69 (57, 78)	57 (44, 67)	-
	2000-2004 (n=107)	93 (87, 97)	85 (77, 91)	68 (58, 76)	-	-
	2005-2009 (n=175)	95 (91, 98)	83 (76, 88)	-	-	-
	2010-2013 (n=118)	96 (91, 99)	-	-	-	-

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Notes:

This is a corrected version of chapter 8 and was released on August 19,2015. This version corrects errors in tables 8.11-8.13.



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