

Chapter - 13

RENAL TRANSPLANTATION

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SECTION 13.1: STOCK AND FLOW

The number of new transplant patients peaked at 192 in 2004 and continued to decrease over the last 10 years with only 94 transplant surgeries performed in 2013. This substantial reduction in the number of new transplant was predominantly due to reduction in the number of transplantation performed oversea. This drop was due to the implementation of restriction of commercial organ transplantation by the Chinese Ministry of Health.

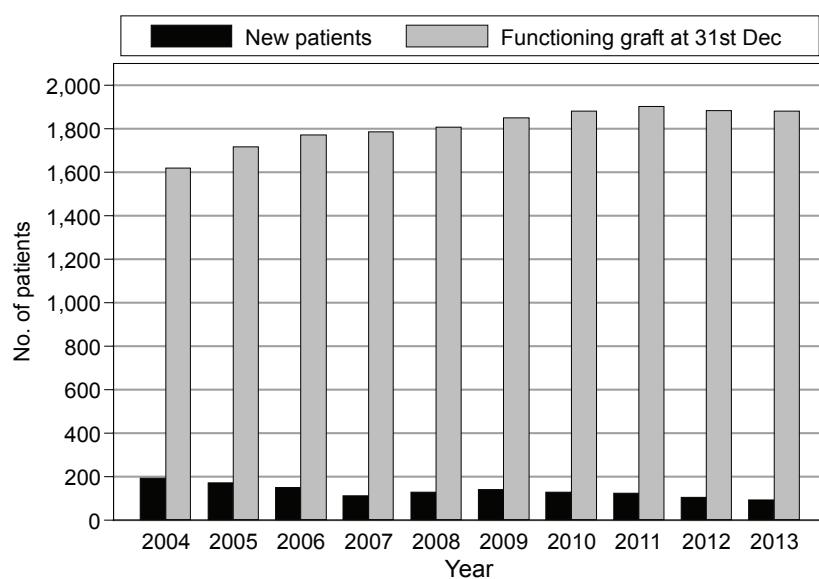
The number of functioning renal transplants had increased by 11.6% from 1619 in 2004 to 1807 in 2008 and had been static over the last 5 years (Table 13.1.1).

Despite advances in immunosuppression, the rate of allograft failure remained the same with 2-3% of allograft loss every year.

Table 13.1.1: Stock and flow of renal transplantation, 2004-2013

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
New transplant patients	194	172	151	112	130	141	128	124	105	94
Died	44	48	58	47	59	49	47	55	62	41
Graft failure	43	20	36	38	38	37	45	40	47	51
Lost to Follow up	5	6	3	11	13	11	6	8	14	11
Functioning graft at 31 st December	1619	1717	1771	1787	1807	1851	1881	1902	1884	1882

Figure 13.1.1: Stock and flow of renal transplantation, 2004-2013



The incidence rate of renal transplant continued to decline, from 6 to 7 per million population in 2004 to 3 per million population in 2013 (Table & Figure 13.1.2). This is extremely low in comparison to Australia and New Zealand, which reported 37 and 27 per million population in 2011.

Table 13.1.2: New transplant rate per million population (pmp), 2004-2013

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
New transplant patients	194	172	151	112	130	141	128	124	105	94
New transplant rate, pmp	7	6	6	4	5	5	5	4	4	3

Table 13.1.3: Transplant prevalence rate per million population (pmp), 2004-2013

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Functioning graft at 31 st December	1619	1717	1771	1787	1807	1851	1881	1902	1884	1882
Transplant prevalence rate, pmp	62	65	66	66	66	66	67	67	64	63

The transplant prevalence rate remained static over the last 10 years at 62 to 63 per million population (Table & Figure 13.1.3). The transplant prevalence rate had not kept up with the growth in the prevalence rate of dialysis patients (which had increased from 71pmp in 1993 to 975pmp in 2012).

Figure 13.1.2(a): New transplant rate, 2004-2013

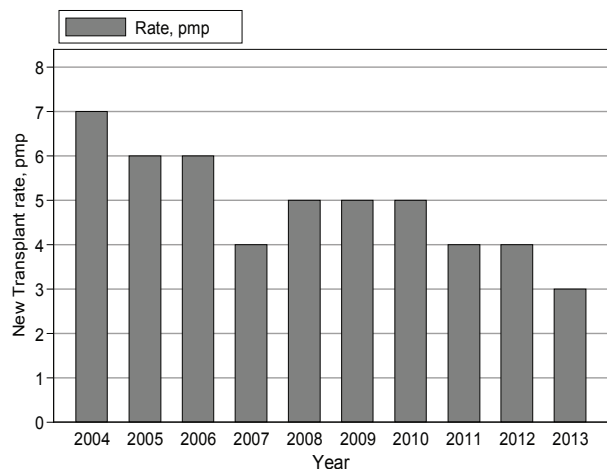
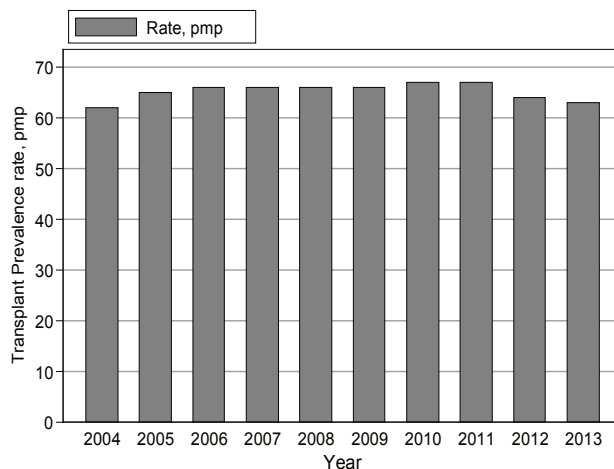


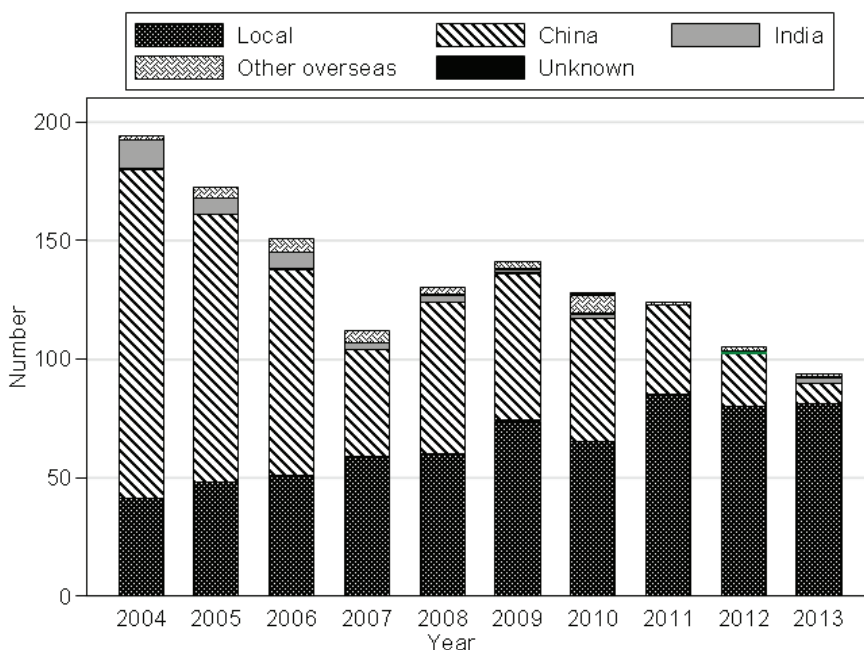
Figure 13.1.3: Transplant prevalence rate, 2004-2013



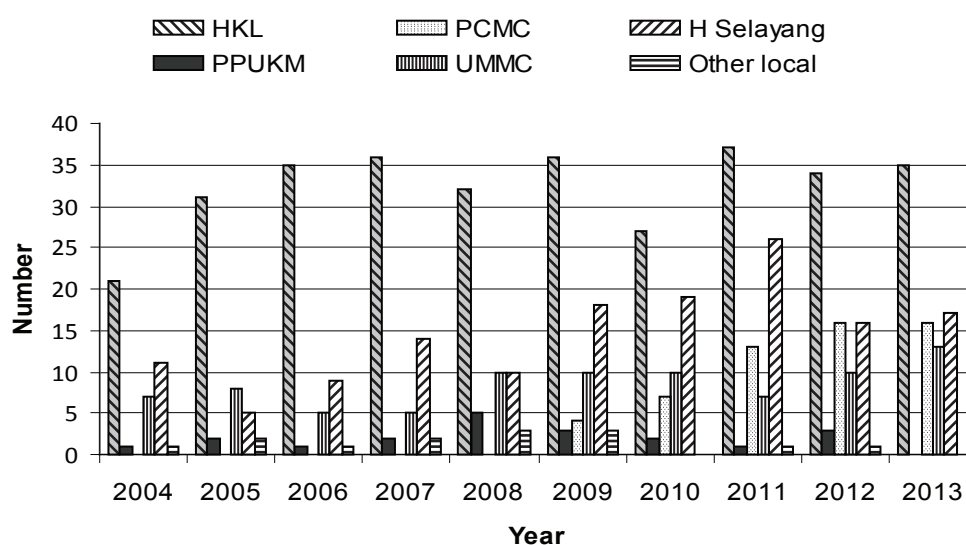
Transplantation in local centers had doubled over the last 10 years with 41 transplants performed in 2004 and 85 transplants in 2011. Unfortunately, this increase was not sustained and the number of renal transplant performed in local centers has remained static in 2012 and 2013. This is disturbing data as it underscores our failure to improve rate of transplantation within the country, which is mainly due to the lack of both living as well as cadaveric donors.

It is encouraging to see that the number of transplants performed in China continued to drop from 139 cases (71.6%) in 2004 down to 9 cases (9%) in 2013 (Table 13.1.4 and Figure 13.1.4 a).

Figure 13.1.4(a): Places of transplantation, 2004-2013



The number of transplants performed in Hospital Kuala Lumpur, which was the main transplant centre in Malaysia showed an initial rise from 21 in 2004 to more than 30 in 2005. Unfortunately this initial growth plateaued and remained the same since 2005. Similar trend is seen in Hospital Selayang. Prince Court Hospital initiated their transplant program in 2009 and had contributed a significant number of transplants performed in 2012 and 2013 with 16 transplants performed in the last 2 years.

Figure 13.1.4(b): Place of transplantation within Malaysia**Table 13.1.4:** Place of transplantation, 2004-2013

Year	2004		2005		2006		2007		2008	
	n	%	n	%	n	%	n	%	n	%
HKL	21	10.8	31	18	35	23.2	36	32.1	32	24.6
PPUKM	1	0.5	2	1.2	1	0.7	2	1.8	5	3.8
Prince Court Medical Centre	0	0	0	0	0	0	0	0	0	0
UMMC	7	3.6	8	4.7	5	3.3	5	4.5	10	7.7
Selayang Hospital	11	5.7	5	2.9	9	6	14	12.5	10	7.7
Other local	1	0.5	2	1.2	1	0.7	2	1.8	3	2.3
China	139	71.6	113	65.7	87	57.6	45	40.2	64	49.2
India	12	6.2	7	4.1	7	4.6	3	2.7	3	2.3
Other overseas	2	1	4	2.3	6	4	5	4.5	3	2.3
Unknown	0	0	0	0	0	0	0	0	0	0
Total	194	100	172	100	151	100	112	100	130	100

Year	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
HKL	36	25.5	27	21.1	37	29.8	34	32.4	35	37.2
PPUKM	3	2.1	2	1.6	1	0.8	3	2.9	0	0
Prince Court Medical Centre	4	2.8	7	5.5	13	10.5	16	15.2	16	17
UMMC	10	7.1	10	7.8	7	5.6	10	9.5	13	13.8
Selayang Hospital	18	12.8	19	14.8	26	21	16	15.2	17	18.1
Other local	3	2.1	0	0	1	0.8	1	1	0	0
China	62	44	52	40.6	38	30.6	22	21	9	9.6
India	2	1.4	2	1.6	0	0	1	1	2	2.1
Other overseas	3	2.1	8	6.3	1	0.8	2	1.9	2	2.1
Unknown	0	0	1	0.8	0	0	0	0	0	0
Total	141	100	128	100	124	100	105	100	94	100

SECTION 13.2: RECIPIENTS' CHARACTERISTICS

Over the last 10 years, the age of transplant recipients had remained unchanged, with a mean between 36 to 42 years old. Male patients continued to predominate with 59 to 69% of the recipients. Over the last ten years, the proportion of diabetic patients underwent renal transplantation decreased slowly over the last 10 years with 21% in 2004 and only 13% in 2013. This coincided with the drop in China transplants where the majority of the diabetic patients underwent their transplantation. Patients with hepatitis B had decreased from 8 to 9% earlier to only 3% in the last 4 years. Similar patterns were seen in patients with Hepatitis C infections.

In terms of underlying cause of end stage renal failure (Table 13.2.2), the commonest cause was glomerulonephritis (GN), followed by hypertension and diabetes. Forty to 50% of transplant recipients had end stage renal disease due to unknown causes, belying the fact that majority of these patients presented late.

Table 13.2.1: Renal transplant recipients' characteristics, 2004-2013

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
New Transplant Patients	194	172	151	112	130	141	128	124	105	94
Age at transplant (years), Mean	42	38	37	37	37	38	40	38	37	36
Age at transplant (years), SD	13	14	15	16	14	14	14	15	13	13
% Male	62	68	66	64	59	64	66	69	59	62
% Diabetic (co-morbid/ primary renal disease)	21	22	18	14	18	18	19	14	16	13
% HBsAg positive	5	4	7	7	3	2	4	2	3	0
% Anti-HCV positive	8	2	8	9	3	7	3	3	1	3

Table 13.2.2: Primary causes of end stage renal failure, 2004-2013

Year	2004		2005		2006		2007		2008	
	n	%	n	%	n	%	n	%	n	%
New transplant patients	194		172		151		112		130	
Glomerulonephritis	66	34	60	35	62	41	38	34	41	32
Diabetes Mellitus	34	18	33	19	22	15	12	11	19	15
Hypertension	52	27	54	31	38	25	36	32	28	22
Obstructive uropathy	5	3	3	2	6	4	7	6	6	5
ADPKD	5	3	3	2	1	1	3	3	0	0
Drugs/ toxic nephropathy	2	1	3	2	1	1	0	0	1	1
Hereditary nephritis	1	1	0	0	0	0	0	0	0	0
Unknown	90	46	68	40	69	46	46	41	64	49
Others	9	5	4	2	4	3	1	1	6	5

Year	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
New transplant patients	141		128		124		105		94	
Glomerulonephritis	53	38	49	38	34	27	35	33	38	40
Diabetes Mellitus	26	18	20	16	18	15	15	14	12	13
Hypertension	39	28	43	34	45	36	27	26	16	17
Obstructive uropathy	5	4	7	5	8	6	12	11	5	5
ADPKD	8	6	5	4	3	2	2	2	4	4
Drugs/ toxic nephropathy	0	0	0	0	0	0	0	0	2	2
Hereditary nephritis	0	0	1	1	0	0	0	0	0	0
Unknown	47	33	39	30	52	42	32	30	26	28
Others	1	1	5	4	6	5	3	3	2	2

SECTION 13.3: TRANSPLANT PRACTICES

13.3.1: Type of renal transplantation

The proportion of commercial transplantation had gradually reduced from 79% at its peak in 2004 to 8% in 2013. This was predominantly due to the marked decline in commercial cadaveric transplantation (76% in 2004 to none in 2013). There was an increasing number of commercial living transplantation in 2010 which contributed to 26% of all transplant performed. However, this number had dropped to 16% in 2012 and 8% in 2013.

Local live donor transplantation made up 66% of transplants (59 recipients) in 2013, which was an increase from 52 cases (38%) in 2012. However, the number of life donor remained low.

Local cadaveric transplantation had shown a promising rise over the last 10 years with 17 transplants performed in 2004 and slowly rising to 35 (31%) recipients in 2010 and 40 (33%) recipients in 2011. Unfortunately, this rise was not sustained and the number of local cadaveric transplant dropped to 28 recipients (28 %) in 2012 and 23 (26%) recipients in 2013.

The year 2007 marked the first time where there were more local transplant (55%) compared to overseas commercial transplant (45%). Since then, the proportion of local transplant continued to rise over the last five years with 79% of the total transplantation performed locally in 2012 and 92% in 2013.

Table 13.3.1: Type of renal transplantation, 2004-2013

Year	2004		2005		2006		2007		2008	
	n	%	n	%	n	%	n	%	n	%
Commercial cadaver	145	76	107	63	85	57	45	41	61	47
Commercial live donor	6	3	11	7	10	7	4	4	2	2
Live donor (genetically related)	21	11	37	22	25	17	21	19	36	28
Live donor (emotionally related)	2	1	4	2	4	3	14	13	6	5
Cadaver	17	9	10	6	26	17	27	24	24	19
Total	191	100	169	100	150	100	111	100	129	100
Year	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
Commercial cadaver	37	27	14	12	5	4	5	5	0	0
Commercial live donor	25	18	31	26	31	26	16	16	7	8
Live donor (genetically related)	27	19	25	21	28	23	36	36	44	49
Live donor (emotionally related)	15	11	13	11	16	13	16	16	15	17
Cadaver	35	25	35	30	40	33	28	28	23	26
Total	139	100	118	100	120	100	101	100	89	100

*Commercial Cadaver (China, India, other oversea) *Commercial live donor (living unrelated) *Cadaver (local)

13.3.2: Biochemical data**Table 13.3.2:** Summarized the biochemical data for all the transplant recipients from 2009 to 2013.

Biochemical parameter		2009	2010	2011	2012	2013
Creatinine, umol/L	n	1695	1831	1873	1883	1931
	Mean	128.1	129.7	126.7	128.9	128.2
	SD	62.8	79.7	74.4	82.6	74.2
	Median	115	112	110	110	110
	Minimum	10.7	10.3	10.1	12	38
	Maximum	657	882	970	1000	920
Hb, g/dL	n	1695	1831	1873	1883	1931
	Mean	12.6	12.6	12.6	12.7	12.8
	SD	1.8	1.9	1.8	1.8	1.8
	Median	12.7	12.7	12.7	12.7	12.8
	Minimum	5.3	1.8	4.5	1.8	4.8
	Maximum	18.5	18.5	18.9	18.8	19.3
Albumin, g/L	n	1695	1831	1873	1883	1931
	Mean	40.1	40.1	40.1	40.2	40.2
	SD	1.3	1.4	1.2	1.1	1
	Median	40.2	40.2	40.2	40.2	40.2
	Minimum	21	24	19	26	30
	Maximum	50	75	49.8	53	49.8
Calcium, mmol/L	n	1695	1831	1873	1883	1931
	Mean	2.3	2.3	2.3	2.3	2.3
	SD	0.2	0.2	0.2	0.1	0.1
	Median	2.3	2.3	2.3	2.3	2.3
	Minimum	1.1	1.1	1	1.3	1.5
	Maximum	3.3	3.2	4	3.8	3
Phosphate, mmol/L	n	1695	1831	1873	1883	1931
	Mean	1.1	1.1	1.1	1.1	1.1
	SD	0.2	0.3	0.2	0.2	0.2
	Median	1.1	1.1	1.1	1.1	1.1
	Minimum	0.5	0.5	0.5	0.5	0.5
	Maximum	2.8	3.1	3	3.9	2.8
Alkaline phosphate (ALP), U/L	n	1695	1831	1873	1883	1931
	Mean	80	82.6	81.4	82.3	82.8
	SD	45.3	58.6	42.9	42.7	44
	Median	73	73	73	74.8	75.8
	Minimum	21	20	21	21	22.5
	Maximum	732	964	650	716.8	835
ALT, U/L	n	1695	1831	1873	1883	1931
	Mean	29.8	27	26.5	26.4	25.4
	SD	32.5	25.1	22.1	18.7	18
	Median	24	21	21	23	21
	Minimum	4	4	4	4	4
	Maximum	881	410	371	205	166.3
Total cholesterol, mmol/L	n	1695	1831	1873	1883	1931
	Mean	5.2	5.2	5.1	5.3	5.1
	SD	1.5	1.5	1.1	2.5	1.3
	Median	5.3	5.3	5.2	5.2	5.1
	Minimum	0.7	1.3	1	0.9	1.7
	Maximum	46	49	14.9	63	43

Biochemical parameter		2009	2010	2011	2012	2013
LDL cholesterol, mmol/L	n	1695	1831	1873	1883	1931
	Mean	2.8	2.9	2.9	2.9	2.8
	SD	1	0.9	0.8	0.8	0.8
	Median	2.9	2.9	2.9	2.9	2.8
	Minimum	0.9	0.9	1	0.9	0.9
	Maximum	10.8	10.4	12.2	9.9	8
HDL cholesterol, mmol/L	n	1695	1831	1873	1883	1931
	Mean	1.5	1.5	1.5	1.5	1.5
	SD	0.5	0.5	0.5	0.4	0.5
	Median	1.5	1.5	1.5	1.5	1.5
	Minimum	0.4	0.4	0.5	0.5	0.5
	Maximum	6.9	6.8	9	5.7	5.4
Systolic blood pressure, mmHg	n	1695	1831	1873	1883	1931
	Mean	130.1	129.7	130.1	130.5	131.2
	SD	14.7	14.8	15.3	13.4	13.2
	Median	130	130	130	130	130.8
	Minimum	65	70	71	91.3	79
	Maximum	210	192	200	203.8	249.7
Diastolic blood pressure, mmHg	n	1695	1831	1873	1883	1931
	Mean	78.2	77.4	77.7	78	78
	SD	8.7	9.4	9.2	8	8.2
	Median	79	78.5	80	78.5	78.5
	Minimum	40	10	30	46	41.3
	Maximum	120	124	114	118.5	111

13.3.3: Immunosuppression medications

Majority of patients were on combination immunosuppressions.

Calcineurin-inhibitor based therapy remained the mainstay of immunosuppressive therapy with 88% of patients receiving it in 2013. Cyclosporin remained the most widely used calcineurin inhibitors. However, there was a gradual decline in cyclosporine usage with 63% in 2009 to 54% in 2011 and 46% in 2013, which coincided with increasing use of tacrolimus, with 29% in 2009 to 37% in 2011 and 42% in 2013.

The usage of anti-proliferative agents have shown similar trend over the last 5 years. The used of azathioprine continue to decline from 21% in 2009 to 16% in 2013, and this coincided with gradual increase in the use of mycophenolic acid; 57% in 2009 to 67% in 2013 (Figure 13.3.3).

The use of proliferation signal inhibitor (PSI) has doubled from 3% in 2009 to 6% in 2013.

Table 13.3.3: Immunosuppressive Medications, 2009-2013

Medication data	Single drug treatment									
	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
All	1701	100	1863	100	1890	100	1887	100	1952	100
Immunosuppressive drug(s) treatment										
Prednisolone	8	0	20	1	5	0	18	1	12	1
Cyclosporin A	15	1	7	0	5	0	8	0	7	0
Tacrolimus (FK506)	15	1	2	0	7	0	3	0	2	0
Azathioprine	1	0	0	0	2	0	0	0	1	0
MPA	0	0	1	0	4	0	4	0	4	0
PSI	1	0	0	0	0	0	0	0	4	0
Others	0	0	0	0	0	0	0	0	0	0
Medication data	Combined drug treatment									
	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
All	1701	100	1863	100	1890	100	1887	100	1952	100
Immunosuppressive drug(s) treatment										
Prednisolone	1569	92	1754	94	1791	95	1792	95	1843	94
Cyclosporin A	1057	62	1094	59	1028	54	950	50	899	46
Tacrolimus (FK506)	469	28	592	32	696	37	731	39	826	42
Azathioprine	365	21	440	24	321	17	284	15	322	16
MPA	972	57	1088	58	1245	66	1218	65	1311	67
PSI	48	3	73	4	79	4	107	6	115	6
Others	1	0	0	0	1	0	0	0	2	0

13.3.4: Non immunosuppression medications

In terms of non-immunosuppressive medications, the use of ACE inhibitors or angiotensin receptor blocker or both showed a slight increase over the last 5 years; 34% of patients were on ACE inhibitors or angiotensin II receptor blockers (ARBs) or both in 2009 and this increased to 42 % in 2013. The use of calcium channel blockers was static with 60 % of patients were on it either alone or in combination with other medications. Beta blockers usage was reported in 44% of patients in 2013.

Table 13.3.4: Non-immunosuppressive medications, 2009-2013

Medication data	Single Drug Treatment									
	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
All	1701	100	1863	100	1890	100	1887	100	1952	100
Non-Immunosuppressive drug(s) treatment										
Alpha blocker	10	1	7	0	10	1	14	1	18	1
Beta blocker	204	12	260	14	438	23	201	11	195	10
Calcium channel blocker	269	16	335	18	266	14	341	18	305	16
ACE inhibitor	88	5	74	4	68	4	90	5	105	5
ARBs	34	2	60	3	54	3	65	3	91	5
Anti-lipid	0	0	0	0	0	0	1	0	3	0
Other anti-hypertensive	26	2	32	2	15	1	9	0	6	0
Medication data	Combined Drug Treatment									
	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
All	1701	100	1863	100	1890	100	1887	100	1952	100
Non-Immunosuppressive drug(s) treatment										
Alpha blocker	94	6	60	3	93	5	121	6	150	8
Beta blocker	678	40	717	38	868	46	620	33	663	34
Calcium channel blocker	751	44	794	43	760	40	838	44	858	44
ACE inhibitor	302	18	297	16	272	14	278	15	344	18
ARBs	146	9	207	11	187	10	231	12	281	14
Anti-lipid	0	0	0	0	0	0	3	0	5	0
Other anti-hypertensive	83	5	129	7	75	4	32	2	26	1

SECTION 13.4: TRANSPLANT OUTCOMES

13.4.1: Post-transplant complications

In the year 2013, 62% of patients were hypertensive prior to transplantation whereas 24% developed hypertension post transplantation. In terms of cardiovascular and cerebrovascular disease 4 % had either or both prior to transplant and another 4% developed these complications post transplantation. Cancer remains uncommon both before and after transplantation.

Table 13.4.1: Post-transplant complications

	Pre Transplant									
	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
All patients	1507	100	1585	100	1552	100	1661	100	1683	100
Diabetes (either as primary renal disease or co-morbid)	189	13	216	14	220	14	233	14	234	14
Cancer	3	0	2	0	2	0	3	0	2	0
Cardiovascular disease + cerebrovascular disorder	80	5	75	5	70	5	70	4	67	4
Hypertension	978	65	1016	64	1003	65	1045	63	1045	62

	Pre Transplant									
	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
All patients	1507	100	1585	100	1552	100	1661	100	1683	100
Diabetes (either as primary renal disease or co-morbid)	117	8	118	7	122	8	112	7	117	7
Cancer	17	1	19	1	20	1	21	1	24	1
Cardiovascular disease + cerebrovascular disorder	83	6	45	3	45	3	54	3	72	4
Hypertension	383	25	425	27	351	23	445	27	407	24

*Hypertension: BP systolic >140 and BP diastolic >90
or have either Beta blocker/ Calcium channel blocker / ACE inhibitor / ARBs / Other anti-hypertensive

13.4.2: Deaths and graft loss

In 2013, 36 transplant recipients died and 51 lost their grafts. The rates of transplant death and grafts lost remained static. However, the transplant death rate appeared to be lower at 1.9% in 2013 (Table 13.4.2).

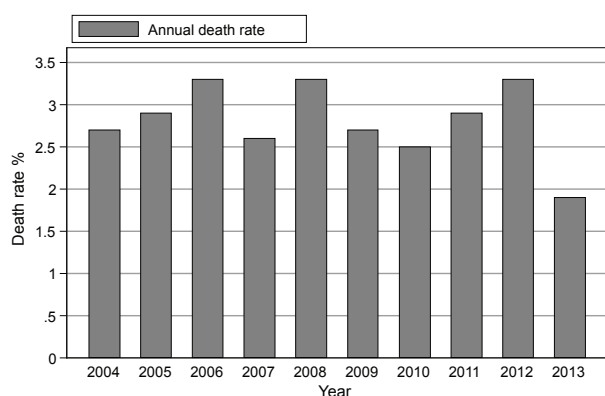
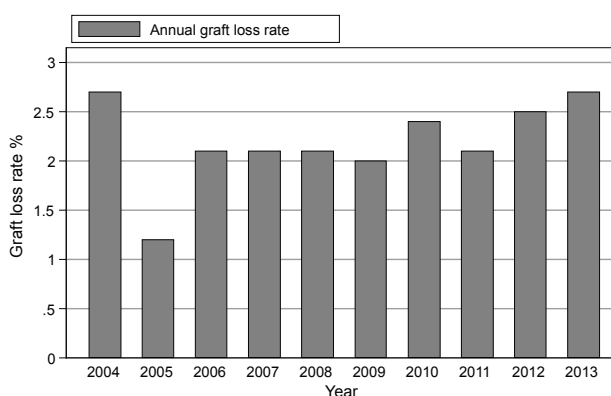
The main causes of death had consistently been infection and cardiovascular disease with 53% and 13% respectively in 2013. It was important to note that proportion of patients died from infection continue to increase from 35% in 2010, 41% in 2012 and 53% in 2013. This may be a reflection that the patients were heavily immunosuppressed. The proportion of patient who died at home, which was usually presumed to be cardiovascular death remained relatively static.

Cancer death rates remained high during the 10 year period contributing between 7 to 19% of all deaths. Death due to liver disease slowly declined from 8% in 2004 to around 3% in 2013.

Rejection remained the major cause of graft loss (Table 13.4.4).

Table 13.4.2: Transplant patient death rate and graft loss, 2004-2013

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Number at risk	1619	1668	1744	1779	1797	1829	1866	1892	1893	1883
Transplant death	44	48	58	47	59	49	47	55	62	36
Transplant death rate %	2.7	2.9	3.3	2.6	3.3	2.7	2.5	2.9	3.3	1.9
Graft loss	43	20	36	38	38	37	45	40	47	51
Graft loss rate %	2.7	1.2	2.1	2.1	2.1	2	2.4	2.1	2.5	2.7
Acute rejection	19	14	19	14	24	32	81	53	20	0
Acute rejection rate %	1.2	0.8	1.1	0.8	1.3	1.7	4.3	2.8	1.1	0
All losses	87	68	94	85	97	86	92	95	109	87
All losses rate %	5.4	4.1	5.4	4.8	5.4	4.7	4.9	5	5.8	4.6

Figure 13.4.2(a): Transplant recipient death rate, 2004-2013**Figure 13.4.2(b):** Transplant recipient graft loss rate, 2004-2013**Table 13.4.3:** Causes of death in transplant recipients, 2004-2013

Year	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
Cardiovascular	7	15	5	10	16	24	13	24	14	21
Died at home	5	10	6	12	7	10	5	9	12	18
Infection	17	35	29	56	27	40	21	39	21	31
Graft failure	0	0	0	0	0	0	0	0	0	0
Cancer	9	19	5	10	5	7	7	13	11	16
Liver disease	4	8	3	6	6	9	0	0	0	0
Accidental death	0	0	1	2	1	1	0	0	0	0
Others	3	6	2	4	2	3	1	2	6	9
Unknown	3	6	1	2	4	6	7	13	4	6
Total	48	100	52	100	68	100	54	100	68	100

Year	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
Cardiovascular	13	23	14	25	12	18	12	17	5	13
Died at home	9	16	7	12	5	8	8	11	4	10
Infection	20	36	20	35	24	37	29	41	21	53
Graft failure	0	0	0	0	0	0	0	0	3	8
Cancer	7	13	6	11	5	8	8	11	6	15
Liver disease	2	4	2	4	2	3	4	6	1	3
Accidental death	0	0	0	0	0	0	0	0	0	0
Others	1	2	4	7	8	12	4	6	0	0
Unknown	4	7	4	7	9	14	5	7	0	0
Total	56	100	57	100	65	100	70	100	40	100

Table 13.4.4: Causes of graft failure, 2004-2013

Year	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
Rejection	30	70	15	71	24	65	25	66	26	62
Calcineurin toxicity	0	0	0	0	1	3	1	3	0	0
Other drug toxicity	0	0	0	0	0	0	0	0	0	0
Ureteric obstruction	0	0	0	0	0	0	1	3	0	0
Infection	1	2	1	5	3	8	1	3	3	7
Vascular causes	3	7	1	5	4	11	1	3	4	10
Recurrent/ de novo renal disease	1	2	0	0	1	3	0	0	1	2
Others	0	0	1	5	1	3	2	5	2	5
Unknown	8	19	3	14	3	8	7	18	6	14
Total	43	100	21	100	37	100	38	100	42	100

Year	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
Rejection	24	62	27	57	18	43	31	60	31	58
Calcineurin toxicity	1	3	1	2	1	2	4	8	3	6
Other drug toxicity	1	3	1	2	0	0	0	0	0	0
Ureteric obstruction	0	0	0	0	0	0	1	2	1	2
Infection	1	3	0	0	0	0	1	2	0	0
Vascular causes	1	3	3	6	1	2	2	4	1	2
Recurrent/ de novo renal disease	0	0	1	2	0	0	1	2	3	6
Others	1	3	4	9	4	10	1	2	3	6
Unknown	10	26	10	21	18	43	11	21	11	21
Total	39	100	47	100	42	100	52	100	53	100

SECTION 13.5: PATIENT AND GRAFT SURVIVAL

13.5.1: Patient survival

Overall patient survival rates from 2004 to 2013 were 96%, 93%, 90% and 84% at year 1, 3, 5 and 10 respectively.

Factors affecting patient survival were years of transplantation, age at transplantation, primary disease and type of transplantation. Patients who underwent renal transplantation in later years (between 2009 to 2013) have higher risk of mortality in comparison to those who were transplanted between 2004-2008. This may be due to the acceptance of patients with more co-morbidity in later years. Older age patients were also at higher risk of mortality. Diabetes as primary renal disease had a tendency of higher mortality but this was not statistically significant. However, patient with glomerulonephritis and systemic lupus nephritis had better survival in comparison to those with an unknown primary (Table 13.5.1b).

Table 13.5.1(a): Patient survival, 2004-2013

Interval (years)	n	% Survival	SE
0	1352	100	
1	1163	96	1
2	1029	94	1
3	893	93	1
4	756	91	1
5	623	90	1
6	501	88	1
7	389	86	1
8	273	85	1
9	137	84	1
10	6	84	1

*n=Number at risk SE=standard error

Figure 13.5.1(a): Patient survival, 2004-2013

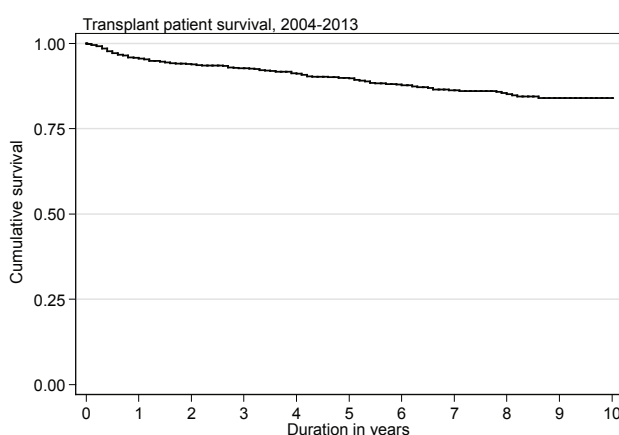


Table 13.5.1(b): Risk factors for transplant patient survival 2004-2013

Factors	n	Hazard Ratio	95% CI	P value
Year of transplant				
2004-2008 (ref*)	759	1.000		
2009-2013	592	1.716	(1.061 ;2.775)	0.028
Age at transplant				
<20	161	0.900	(0.411 ;1.968)	0.791
20-39(ref*)	520	1.000		
40-54	583	1.776	(1.152 ;2.739)	0.009
>=55	87	2.610	(1.366 ;4.987)	0.004
Gender				
Male (ref*)	867			
Female	484	1.206	(0.809 ;1.799)	0.357
Primary diagnosis				
Unknown primary (ref*)	302	1.000		
Diabetes mellitus	109	1.095	(0.586 ;2.046)	0.775
GN/SLE	386	0.642	(0.368 ;1.118)	0.117
Polycystic kidney	30	1.039	(0.236 ;4.585)	0.959
Obstructive nephropathy	53	1.014	(0.371 ;2.771)	0.978
Others	421	1.030	(0.643 ;1.648)	0.903
Type of transplant				
Commercial cadaver (ref*)	504	1.000		
Commercial live donor	140	0.377	(0.15 ;0.947)	0.038
Living donor	409	1.380	(0.83 ;2.295)	0.214
Cadaver	263	2.490	(1.493 ;4.154)	<0.001
HBsAg				
Negative (ref*)	1350	1.000		
Positive	1	4.450	(0.574 ;34.518)	0.153
Anti-HCV				
Negative (ref*)	1349	1.000		
Positive	2	0.000	na	na

13.5.2: Graft survival

Overall graft survival rates were 93%, 88%, 83% and 67% at year 1, 3, 5 and 10 respectively. (Table and Figure 13.5.1a & 13.5.2a)

Factors affecting allograft survival were years of transplantation and type of transplantation. Patients who underwent renal transplantation in later years (between 2009-2013) are more likely to lose their allograft in comparison to those who underwent renal transplantation between 2004-2008. This may be due to the acceptance of marginal organs and transplanting patients with marked vascular calcifications, which posed difficult surgical anastomosis. This was supported by the fact that local cadaveric transplant recipients were at higher risk of losing their allograft in comparison to other types of transplantation (Table 13.5.2b).

Table 13.5.2(a): Graft survival, 2004-2013

Interval (years)	n	% Survival	SE
0	1352	100	
1	1163	93	1
2	1029	90	1
3	893	88	1
4	756	86	1
5	623	83	1
6	501	80	1
7	389	77	1
8	273	76	2
9	137	74	2
10	6	67	3

*n=Number at risk SE=standard error

Figure 13.5.2(a): Graft survival, 2004-2013



Table 13.5.2(b): Transplant patient death rate and graft loss, 2004-2013

Factors	n	Hazard Ratio	95% CI	P value
Year of transplant				
2004-2008 (ref*)	759	1.000		
2009-2013	592	2.203	(1.541 ;3.151)	<0.001
Age at transplant				
<20	161	1.131	(0.699 ;1.83)	0.616
20-39 (ref*)	520	1.000		
40-54	583	1.063	(0.78 ;1.448)	0.700
>=55	87	1.104	(0.629 ;1.94)	0.730
Gender				
Male (ref*)	867			
Female	484	1.229	(0.917 ;1.648)	0.167
Primary diagnosis				
Unknown primary (ref*)	302	1.000		
Diabetes mellitus	109	1.056	(0.627 ;1.781)	0.837
GN/SLE	386	0.709	(0.472 ;1.064)	0.097
Polycystic kidney	30	0.683	(0.161 ;2.898)	0.605
Obstructive nephropathy	53	0.821	(0.384 ;1.757)	0.612
Others	421	1.003	(0.698 ;1.442)	0.986
Type of transplant				
Commercial cadaver (ref*)	504	1.000		
Commercial live donor	140	0.532	(0.283 ;1.001)	0.050
Living donor	409	1.403	(0.968 ;2.034)	0.073
Cadaver	263	2.503	(1.688 ;3.712)	<0.001
HBsAg				
Negative (ref*)	1350	1.000		
Positive	1	3.390	(0.454 ;25.328)	0.234
Anti-HCV				
Negative (ref*)	1349	1.000		
Positive	2	0.554	(0.074 ;4.147)	0.565

13.5.3: Patient survival according to type of transplant

Outcomes of renal transplantation over the last 10 years in the 4 different donor groups were shown in Table and Figures 13.5.3. For local living renal transplantation, the 1, 3, 5 and 10 years patient survival was 98%, 97%, 95% and 92% respectively.

The patient survival of commercial cadaveric transplantation were 96%, 92%, 89% and 84% at year 1, 3, 5 and 10 years respectively. The patient survival of local cadaveric allograft recipients was worse in comparison to all other groups. This may be due to older age group and more co-morbidity in this group.

The patient survival of commercial living transplant are comparable to those local living transplant.

Table 13.5.3: Unadjusted patient survival by type of transplant, 2004-2013

Type of Transplant Interval (years)	Commercial Cadaver			Commercial Live Donor			Live Donor			Cadaver		
	n	% Survival	SE	n	% Survival	SE	n	% Survival	SE	n	% Survival	SE
0	505	100		143	100		407	100		265	100	
1	473	96	1	133	99	1	327	98	1	204	90	2
2	450	94	1	117	98	1	272	97	1	167	88	2
3	433	92	1	88	98	1	228	97	1	126	87	2
4	407	90	1	53	96	2	191	95	1	95	85	2
5	364	89	1	31	96	2	152	95	1	69	84	3
6	304	87	2	28	92	4	116	93	2	51	84	3
7	257	85	2	22	89	5	79	92	2	32	84	3
8	187	85	2	13	89	5	55	92	2	14	84	3
9	100	84	2	8	89	5	21	92	2	8	84	3
10	1	84	2	2			2	92	2	3	84	3

*n=Number at risk SE=standard error

Figure 13.5.3: Patient survival by type of transplant, 2004-2013

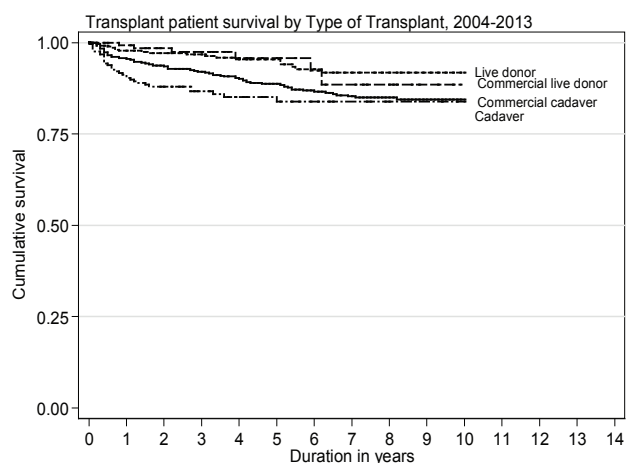
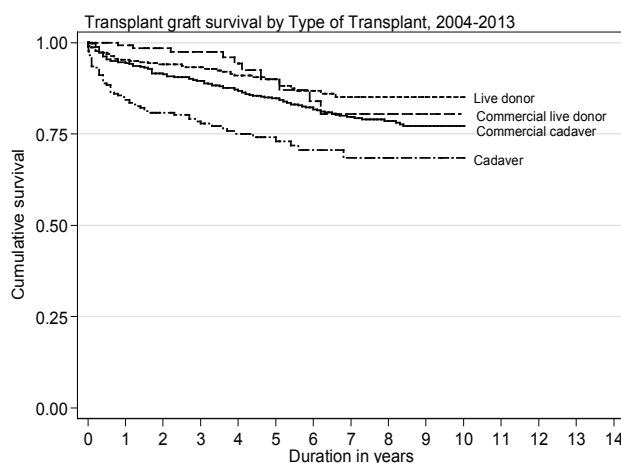


Figure 13.5.4: Graft survival by type of transplants, 2004-2013



13.5.4: Graft survival according to type of transplant

For local living renal transplantation, the graft survival was 95%, 93%, 90% and 85 % at year 1, 3, 5 and 10 respectively.

The graft survival for commercial cadaveric transplant was 94%, 90% 85% and 77% at year 1,3, 5 and 10 years respectively. This is comparable to graft survival of local living transplantation.

The graft survival of local cadaveric allograft recipients was worse in comparison to all other groups with only 73% and 68% graft surviving at 5 and 10 years respectively.

Table 13.5.4: Graft survival by type of transplant, 2004-2013

Type of Transplant Interval (years)	Commercial Cadaver			Commercial Live Donor			Live Donor			Cadaver		
	n	% Survival	SE	n	% Survival	SE	n	% Survival	SE	n	% Survival	SE
0	505	100		143	100		407	100		265	100	
1	473	94	1	133	99	1	327	95	1	204	84	2
2	450	91	1	117	98	1	272	94	1	167	81	2
3	433	90	1	88	98	1	228	93	1	126	78	3
4	407	87	2	53	94	3	191	91	2	95	75	3
5	364	85	2	31	90	4	152	90	2	69	73	3
6	304	82	2	28	84	6	116	87	2	51	71	4
7	257	80	2	22	80	6	79	85	2	32	68	4
8	187	79	2	13	80	6	55	85	2	14	68	4
9	100	77	2	8	80	6	21	85	2	8	68	4
10	1	77	2	2			2	85	2	3	68	4

*n=Number at risk SE=standard error

13.5.5: Outcome of living related renal transplantation

Patient and graft survival for living related transplants were compared between two cohorts, those transplanted between 2004-2008 and 2009-2013. In living related transplants, both patient and graft survival between these 2 cohorts was similar. (Table and Figure 13.5.5a & b)

Table 13.5.5(a): Patient Survival By Year Of Transplant (Living Related Transplant, 2004-2013)

Type of Transplant Interval (years)	2004-2008			2009-2013		
	n	% Survival	SE	n	% Survival	SE
0	140	100		160	100	
1	133	97	1	108	98	1
2	130	96	2	75	98	1
3	129	96	2	48	96	2
4	125	95	2	26	94	3
5	123	95	2	4		
6	91	92	2			
7	73	90	3			
8	48	89	3			
9	20	89	3			
10	2	89	3			

*n=Number at risk SE=standard error

Figure 13.5.5(a): Patient survival by year of transplant (Living related transplant, 2004-2013)

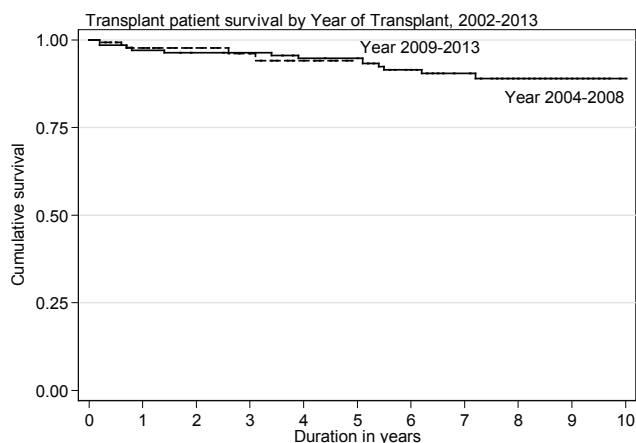


Figure 13.5.5(b): Graft survival by year of transplant (Living related transplant, 2004-2013)

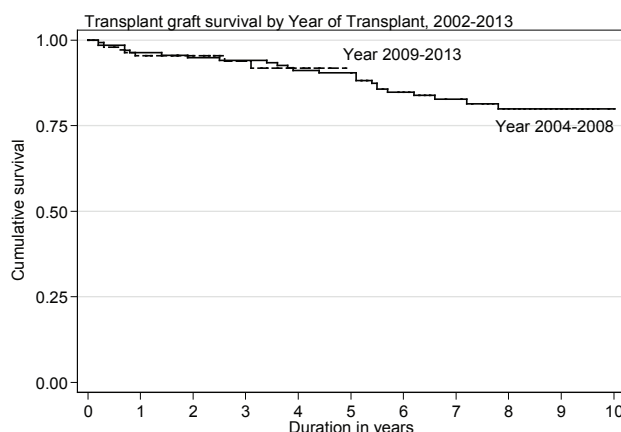


Table 13.5.5(b): Patient Survival By Year Of Transplant (Living Related Transplant, 2004-2013)

Type of Transplant Interval (years)	2004-2008			2009-2013		
	n	% Survival	SE	n	% Survival	SE
0	140	100		160	100	
1	133	96	2	108	95	2
2	130	95	2	75	95	2
3	129	94	2	48	94	2
4	125	91	2	26	92	3
5	123	90	3	4		
6	91	85	3			
7	73	83	3			
8	48	80	4			
9	20	80	4			
10	2	80	4			

*n=Number at risk SE=standard error

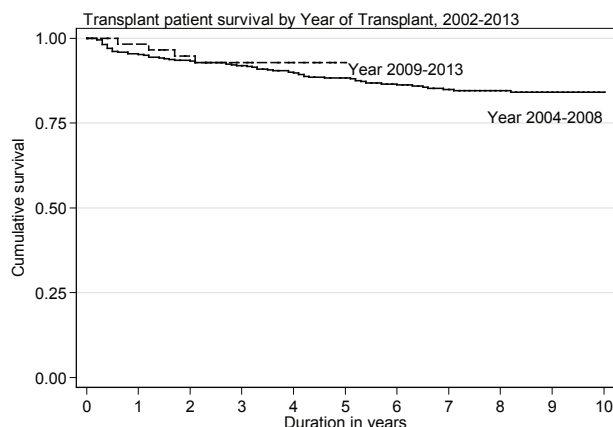
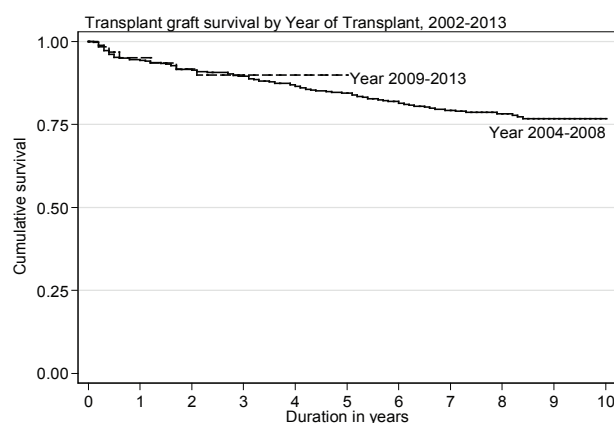
13.5.6: Outcome of commercial cadaveric transplantation

Patient and graft survival for commercial cadaveric transplants were compared between two cohorts, those transplanted between 2004-2008 and 2009-2013. Both patient and allograft survival for commercial cadaveric transplant appeared to be better for the later cohort (Table & Figure 13.5.6a & b).

Table 13.5.6(a): Patient survival by year of transplant (Commercial cadaver transplant, 2004-2013)

Type of Transplant Interval (years)	2004-2008			2009-2013		
	n	% Survival	SE	n	% Survival	SE
0	140	100		160	100	
1	415	95	1	59	98	3
2	400	93	1	52	95	4
3	389	92	1	44	93	4
4	374	90	1	33	93	4
5	362	88	2	2	93	4
6	304	86	2	2		
7	257	85	2			
8	187	85	2			
9	100	84	2			
10	1	84	2			

*n=Number at risk SE=standard error

Figure 13.5.6(a): Patient survival by year of transplant
(Commercial cadaver transplant, 2004-2013)**Figure 13.5.6(b):** Graft survival by year of transplant
(Commercial cadaver transplant, 2004-2013)**Table 13.5.6(b):** Graft survival by year of transplant (Commercial cadaver transplant, 2004-2013)

Type of Transplant Interval (years)	2004-2008			2009-2013		
	n	% Survival	SE	n	% Survival	SE
0	140	100		160	100	
1	415	94	1	59	95	3
2	400	91	1	52	92	4
3	389	90	1	44	90	4
4	374	87	2	33	90	4
5	362	84	2	2	90	4
6	304	81	2	2		
7	257	79	2			
8	187	78	2			
9	100	77	2			
10	1	77	2			

*n=Number at risk SE=standard error

SECTION 13.6: CARDIOVASCULAR RISK IN RENAL TRANSPLANT RECIPIENTS

13.6.1: Risk factors for Ischaemic Heart Disease (IHD)

In 2013, 83.5% of patients were hypertensive, 20.9% were diabetic and 49.9% had renal insufficiency fulfilling CKD III and above. Forty-one percent of patients had 2 cardiovascular risk factors while 6.2 % had all 3 major risk factors. The proportion of patients with hypertension appeared to be decreasing over the years. However the proportion of patients with diabetes remained the same.

Table 13.6.1: Risk factors for IHD in renal transplant recipients at year 2009-2013

	2009	2010	2011	2012	2013
Diabetes	29 (1.8)	37 (2.2)	37 (2.2)	34 (2.1)	44 (2.6)
Hypertension**	642 (40.9)	632 (37.7)	671 (39.3)	601 (36.5)	633 (37.0)
CKD	163 (10.4)	169 (10.1)	149 (8.7)	216 (13.1)	210 (12.3)
Diabetes + Hypertension**	164 (10.5)	196 (11.7)	213 (12.5)	204 (12.4)	180 (10.5)
Diabetes + CKD	19 (1.2)	23 (1.4)	30 (1.8)	31 (1.9)	27 (1.6)
CKD + Hypertension**	464 (29.6)	511 (30.5)	505 (29.5)	462 (28.0)	510 (29.8)
Diabetes + CKD + Hypertension**	88 (5.6)	109 (6.5)	104 (6.1)	100 (6.1)	106 (6.2)

**Hypertension: BP systolic > 140 and BP diastolic > 90

OR have either Beta blocker / Calcium channel blocker / ACE inhibitor / ARBs / Other anti-hypertensive drugs

GFR (mL/min/1.73m²) = 1.2*(140-age(year))*weight(kg) / creatinine (μmol/L) if maleGFR (mL/min/1.73m²) = 0.85*(1.2*(140-age(year))*weight(kg) / creatinine (μmol/L) if female

CKD stage III-GFR, 30-60

CKD stage IV-GFR, 15-30

CKD stage V-GFR, <15

Figure 13.6.1(a): Venn diagram for pre and post transplant complications (in %) at year 2009

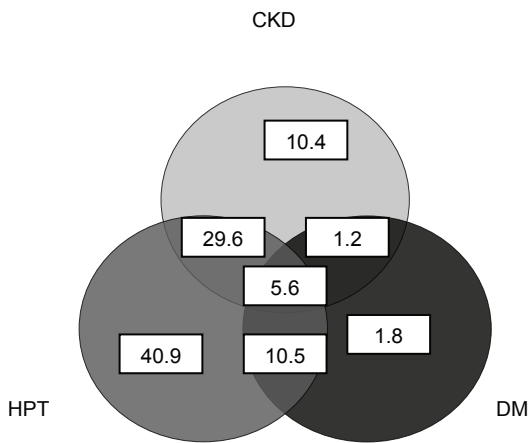


Figure 13.6.1(b): Venn diagram for pre and post transplant complications (in %) at year 2010

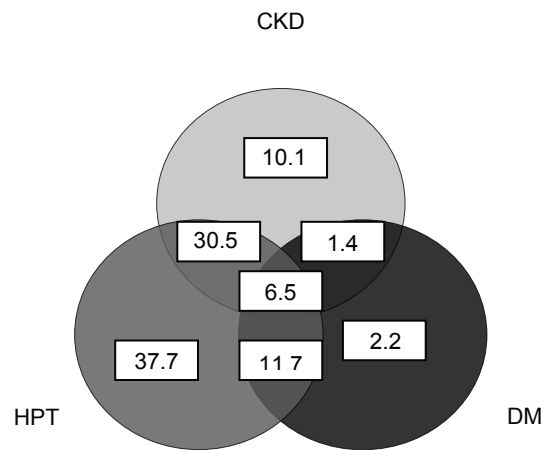


Figure 13.6.1(c): Venn diagram for pre and post transplant complications (in %) at year 2011

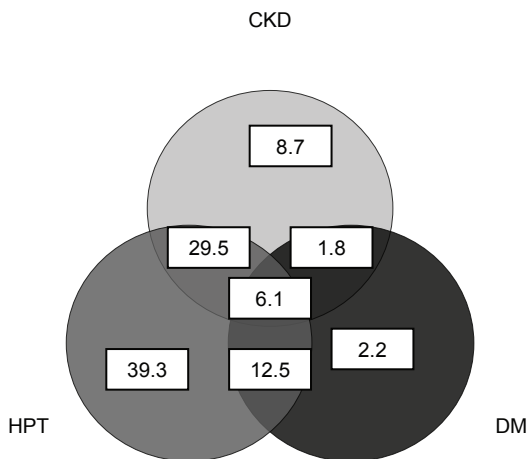


Figure 13.6.1(d): Venn diagram for pre and post transplant complications (in %) at year 2012

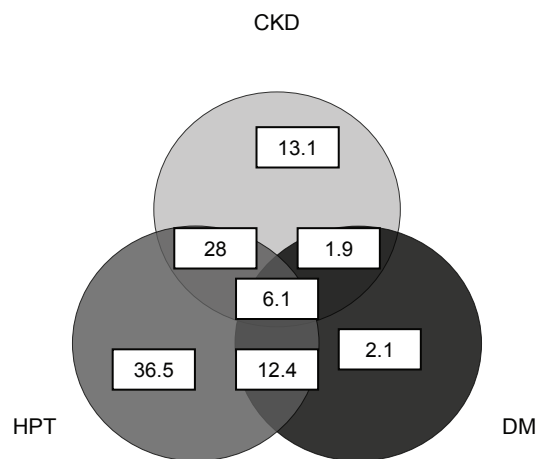
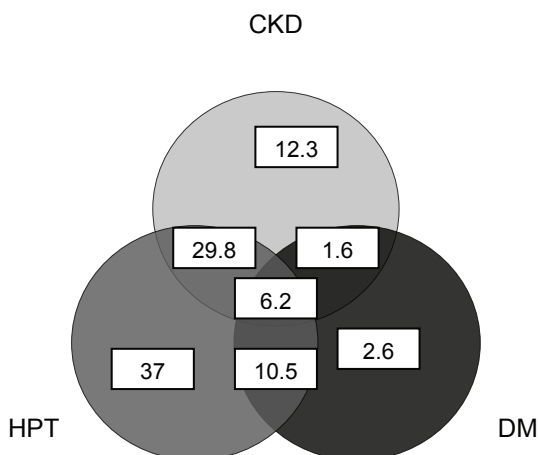


Figure 13.6.1(e): Venn diagram for pre and post transplant complications (in %) at year 2013

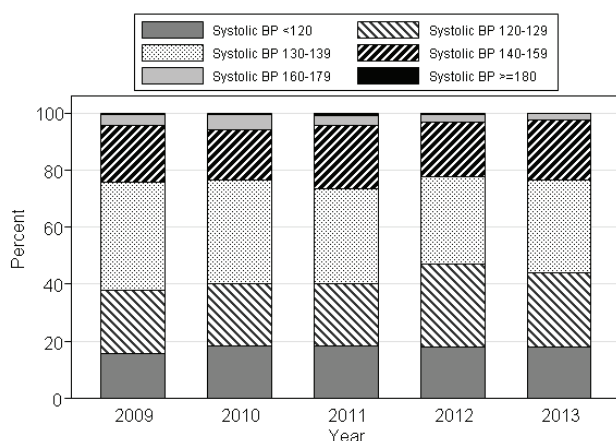
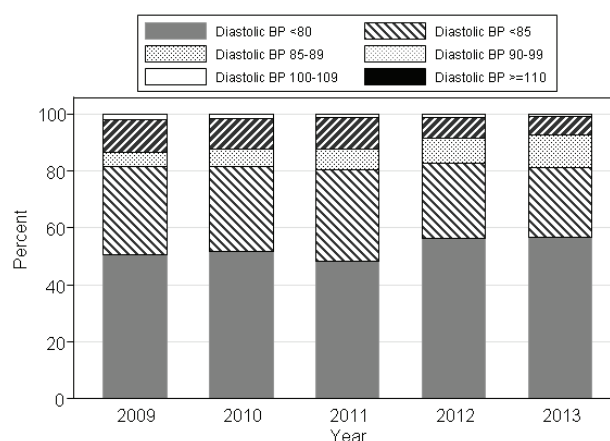


13.6.2: Blood pressure classification according to JNC VI criteria, 2009-2013

In 2013, twenty-one percent of renal transplant recipients had stage I systolic hypertension and 2% had stage II hypertension despite being on treatment (Table 13.6.2 a). Seven percent of patients had stage I diastolic hypertension.

Table 13.6.2(a): Systolic BP, 2009-2013

Year	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
<120	270	16	349	19	347	18	338	18	353	18
120-129	379	22	400	21	414	22	548	29	497	26
130-139	642	38	681	37	627	33	570	30	631	33
140-159	342	20	323	17	416	22	364	19	408	21
160-179	62	4	101	5	65	3	45	2	39	2
>=180	10	1	10	1	20	1	13	1	6	0

Figure 13.6.2(a): Systolic BP, 2009-2013**Figure 13.6.2(b):** Systolic BP, 2009-2013**Table 13.6.2(b):** Diastolic BP, 2009-2013

Year	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
<80	861	50	963	52	910	48	1064	56	1106	57
80-84	532	31	554	30	606	32	497	26	477	24
85-89	84	5	113	6	136	7	169	9	219	11
90-99	196	11	204	11	215	11	135	7	130	7
100-109	27	2	26	1	19	1	20	1	9	0
>=110	5	0	4	0	3	0	3	0	7	0

13.6.3: Level of allograft function

Table and Figure 13.6.3 summarized the CKD Stage classification. In 2013, 40% of renal transplant recipients had CKD Stage III, whilst another 8% had CKD Stage IV. CKD Stage V (impending renal replacement therapy) was found in 2% of renal transplant recipients.

Table 13.6.3: CKD stages, 2009-2013

Year	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
Stage 1	170	10	237	13	221	12	224	12	216	11
Stage 2	605	36	647	35	733	39	740	40	753	39
Stage 3	770	46	769	42	748	40	732	39	779	40
Stage 4	108	6	131	7	131	7	134	7	153	8
Stage 5	21	1	51	3	25	1	33	2	34	2

Figure 13.6.3: CKD stages by year

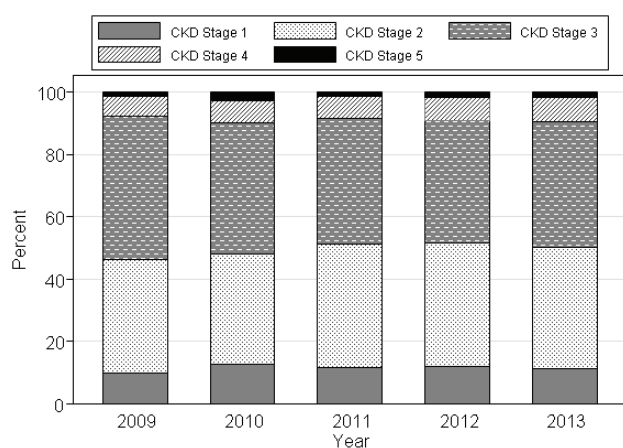
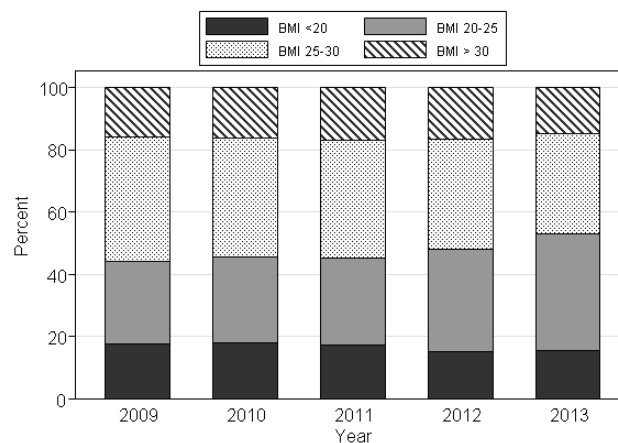


Figure 13.6.4: BMI, 2009-2013



13.6.4: Body mass index

In 2013, fifty-two percent of renal transplant recipients had BMI of 25 or below. However 32% were overweight and another 15% were obese. It was encouraging to see that the proportion of overweight transplant recipient appeared to be decreasing over the 5 years observation period. However, the proportion of obese transplant recipient remained the same over the last 5 years.

Table 13.6.4: BMI, 2009-2013

Year	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
<20	299	18	334	18	327	17	289	15	302	15
20-25	451	26	517	28	530	28	624	33	732	37
25-30	684	40	709	38	715	38	669	35	633	32
>30	269	16	304	16	323	17	313	17	288	15

13.6.5: LDL cholesterol

LDL cholesterol had been identified as the primary lipid target for prevention of coronary heart disease by National Cholesterol Education Program (NCEP) with a log linear relationship between risk of coronary heart disease and level of LDL cholesterol. In 2013, 41% of our renal transplant recipients had LDL levels below 2.6 mmol/L. The LDL level in transplant patients had improved slightly in comparison to the year before. Whether or not this translated into less cardiovascular mortality in the transplant population is still questionable. Proportion of patients with serum LDL >3.4 mmol/L remained relatively static throughout the last five-year period. In terms of other cholesterol parameters, 49% had total cholesterol levels < 5.1 mmol/L and 8 % had HDL cholesterol levels < 1.0 mmol/L.

Table 13.6.5(a): LDL, 2009-2013

Year	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
< 2.6	653	38	630	34	604	32	635	34	801	41
2.6-3.4	720	42	887	48	945	50	904	48	801	41
>= 3.4	332	19	347	19	340	18	353	19	358	18

Figure 13.6.5(a): LDL, 2009-2013

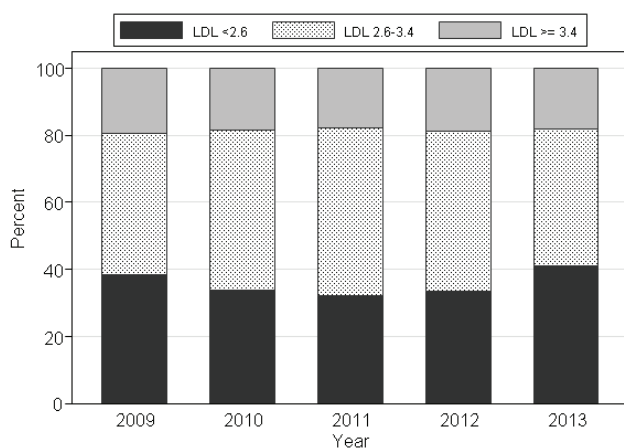


Figure 13.6.5(b): Total cholesterol, 2009-2013

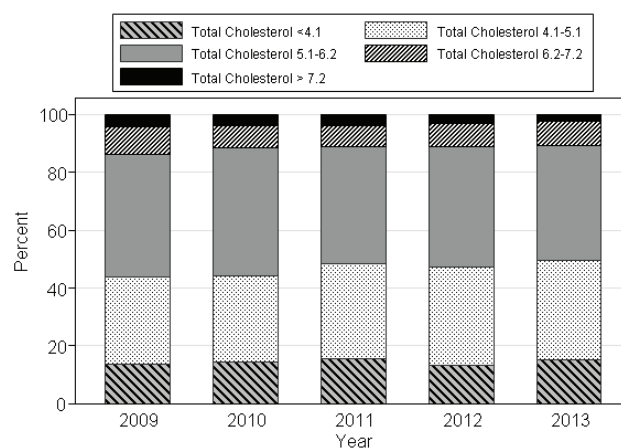
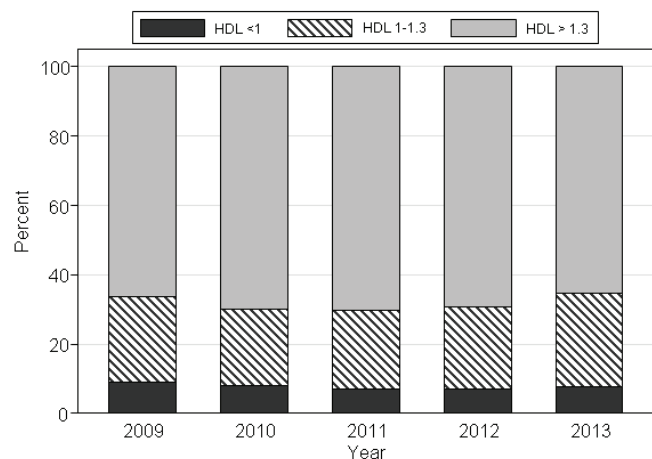


Table 13.6.5(b): Total cholesterol, 2009-2013

Year	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
<4.1	235	14	270	14	296	16	249	13	300	15
4.1-5.1	512	30	552	30	614	33	647	34	666	34
5.1-6.2	724	42	821	44	769	41	785	41	779	40
6.2- 7.2	159	9	152	8	136	7	148	8	169	9
> 7.2	75	4	69	4	74	4	63	3	46	2

Figure 13.6.5(c): HDL, 2009-2013**Table 13.6.5(c): HDL, 2009-2013**

Year	2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%
<1	153	9	149	8	134	7	132	7	147	8
1-1.3	422	25	410	22	427	23	449	24	537	27
>1.3	1130	66	1305	70	1328	70	1311	69	1276	65

13.6.6: Blood pressure control

There was no change in the percentage of patients who were on antihypertensive over the last five-year period with 70 to 76 % were on antihypertensive medications. Furthermore, the percentage of patients taking multiple antihypertensive medications had not changed much with 40% taking one antihypertensive, 25% taking two anti-hypertensives and 6 to 7% taking 3 anti-hypertensives.

The blood pressure control, both systolic and diastolic had remained relatively the same for the five years.

In 2013, only 1% of patients still had systolic BP of >160 mmHg and 7% had diastolic BP of > 90 mmHg despite being given antihypertensive(s).

Table 13.6.6(a): Treatment for hypertension, 2009-2013

Year	n	% on anti-hypertensives	% on 1 anti-hypertensive drug	% on 2 anti-hypertensives	% on 3 anti-hypertensives
2009	1704	73	39	28	6
2010	1856	74	42	24	7
2011	1888	76	46	23	6
2012	1891	70	40	24	6
2013	1953	72	39	26	7

Table 13.6.6(b): Distribution of systolic BP without anti-hypertensives, 2009-2013

Year	n	Mean	SD	Median	LQ	UQ	% Patients \geq 160mmHg
2009	347	124.6	15	121	112	131	2
2010	406	128.7	36.4	124.5	119	137	5
2011	388	125.3	15.3	124	115	132.5	3
2012	532	127.4	25.7	125.5	117.5	133.5	2
2013	523	126.5	13.5	126.5	118	135	1

Table 13.6.6(c): Distribution of diastolic BP without anti-hypertensives, 2009-2013

Year	n	Mean	SD	Median	LQ	UQ	% Patients \geq 90 mmHg
2009	347	77.6	9.1	80	70	80	14
2010	405	77.5	10.1	80	70	83	15
2011	388	77.3	9.4	80	70	81	12
2012	532	77.3	10.6	77.5	72	82.3	8
2013	523	80.6	77.2	77.5	71.3	82	6

Table 13.6.6(d): Distribution of systolic BP on anti-hypertensives, 2009-2013

Year	n	Mean	SD	Median	LQ	UQ	% Patients \geq 160mmHg
2009	1113	131.5	15.9	130	120	140	6
2010	1243	130.6	16.2	130	120	140	7
2011	1326	131.6	16.1	130	120	140	6
2012	1250	132.8	18.3	130.3	123	140	4
2013	1360	133.2	15.6	132.5	124.7	140	3

Table 13.6.6(e): Distribution of diastolic BP on anti-hypertensives, 2009-2013

Year	n	Mean	SD	Median	LQ	UQ	% Patients \geq 90 mmHg
2009	1111	78.3	9.5	80	70	82	16
2010	1238	78	22.1	80	70	82	14
2011	1326	77.7	9.8	80	70	83	14
2012	1250	78.4	8.6	79	73	82.5	9
2013	1360	78.8	11.7	78.8	73	83.8	8

SECTION 13.7: QoL INDEX SCORE IN RENAL TRANSPLANT RECIPIENTS

One thousand one hundred and seventy six patients who were transplanted from 2004-2013 were analyzed for QoL index score. They reported median QoL index score of 10 (Table & Figure 13.7.1). There was no difference in the median QoL index score between diabetics and non-diabetics who underwent renal transplantation during this period (Table & Figure 13.7.2). There was also no difference seen between gender (Table & Figure 13.7.3) and age (Table & Figure 13.7.4). It is worthwhile to note that those above 60 year-old also enjoyed the same QoL index score (10) as their younger counterpart (Table & Figure 13.7.4). This trend of high QoL index score remained the same for the last ten years.

Table 13.7.1: Cumulative distribution of QoL-Index score in relation to dialysis modality, transplant recipient patients 2004-2013

Dialysis modality	QoL score
Number of patients	1176
Centile	
0	0
0.05	9
0.1	10
0.25 (LQ)	10
0.5 (median)	10
0.75 (UQ)	10
0.9	10
0.95	10
1	10

Figure 13.7.1: Cumulative distribution of QoL-Index score in relation to dialysis modality, transplant recipient patients 2004-2013

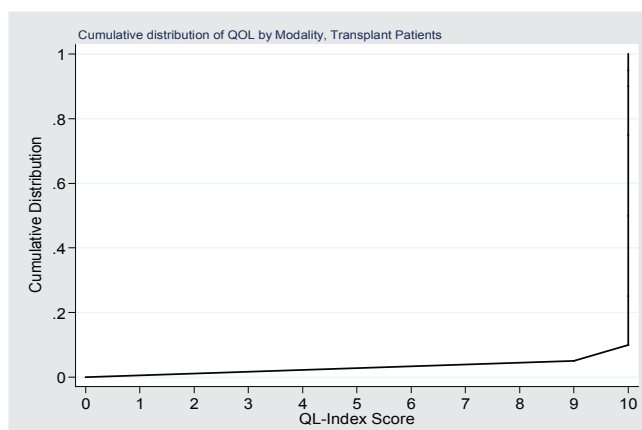


Table 13.7.2: Cumulative distribution of QoL-Index score in relation to diabetes mellitus, transplant recipient patients 2004-2013

Dialysis mellitus	No	Yes
Number of patients	1031	145
Centile		
0	0	0
0.05	9	8
0.1	10	9
0.25 (LQ)	10	10
0.5 (median)	10	10
0.75 (UQ)	10	10
0.9	10	10
0.95	10	10
1	10	10

Figure 13.7.2: Cumulative distribution of QoL-Index score in relation to diabetes mellitus, transplant recipient patients 2004-2013

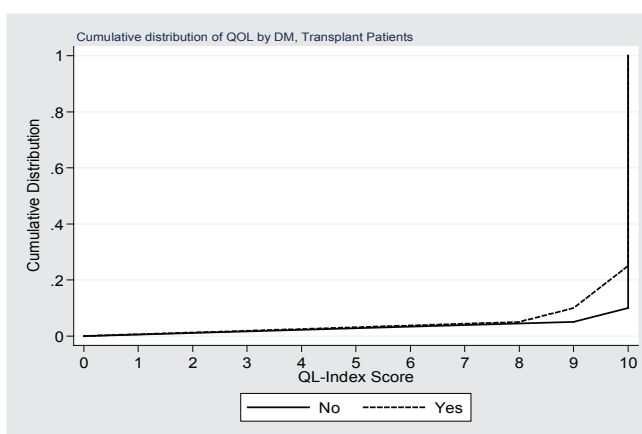


Table 13.7.3: Cumulative distribution of QoL-Index score in relation to gender, transplant recipient patients 2004-2013

Gender	Male	Female
Number of patients	758	418
Centile		
0	0	0
0.05	9	9
0.1	10	10
0.25 (LQ)	10	10
0.5 (median)	10	10
0.75 (UQ)	10	10
0.9	10	10
0.95	10	10
1	10	10

Figure 13.7.3: Cumulative distribution of QoL-Index score in relation to gender, transplant recipient patients 2004-2013

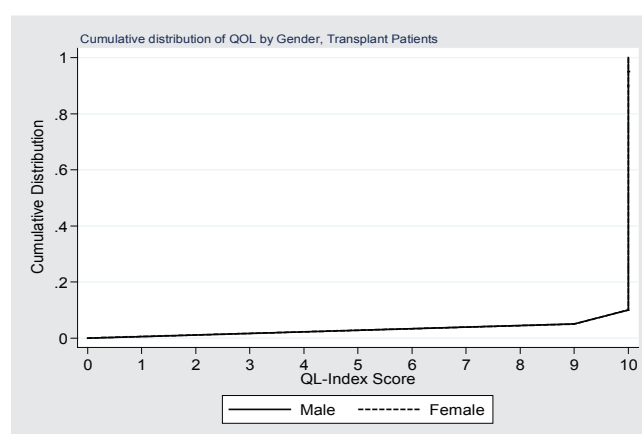
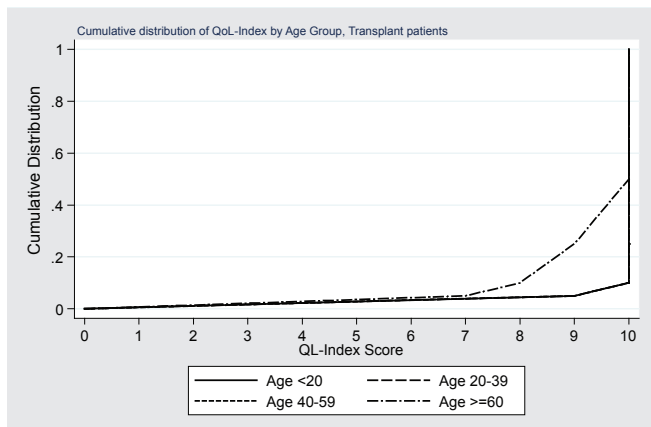
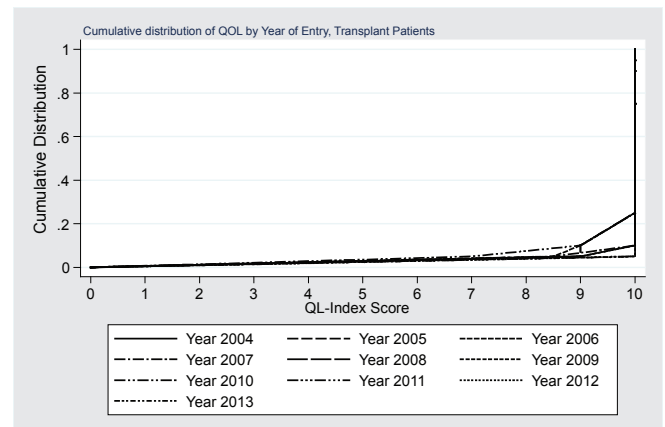


Table 13.7.4: Cumulative distribution of QoL-Index score in relation to age, transplant recipient patients 2004-2013

Age group (years)	<20	20-39	40-59	>=60
Number of patients	141	453	508	74
Centile				
0	0	0	0	0
0.05	9	9	9	7
0.1	10	10	10	8
0.25 (LQ)	10	10	10	9
0.5 (median)	10	10	10	10
0.75 (UQ)	10	10	10	10
0.9	10	10	10	10
0.95	10	10	10	10
1	10	10	10	10

Figure 13.7.4: Cumulative distribution of QoL-Index score in relation to age, transplant recipient patients 2004-2013**Figure 13.7.5:** Cumulative distribution of QoL-Index score in relation to age, transplant recipient patients 2004-2013**Table 13.7.5:** Cumulative distribution of QoL-Index score in relation to year of entry, transplant recipient patients 2004-2013

Age group (years)	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Number of patients	170	154	140	100	114	129	118	112	92	47
Centile										
0	0	0	0	0	0	0	0	0	0	0
0.05	9	9	8.5	8.5	9	9	7	10	10	10
0.1	10	9	9	10	9	10	9	10	10	10
0.25 (LQ)	10	10	10	10	10	10	10	10	10	10
0.5 (median)	10	10	10	10	10	10	10	10	10	10
0.75 (UQ)	10	10	10	10	10	10	10	10	10	10
0.9	10	10	10	10	10	10	10	10	10	10
0.95	10	10	10	10	10	10	10	10	10	10
1	10	10	10	10	10	10	10	10	10	10

