

## **CHAPTER 5**

### **RENAL TRANSPLANTATION**

Goh Bak Leong  
Fan Kin Sing  
Rohan Malek Bin Dato' Dr. Johan  
Rosnawati Yahya  
S. Prasad Menon  
Tan Si Yen  
Wong Hin Seng

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**SECTION 5.1: STOCK AND FLOW**

The number of new renal transplant patients shows an initial rise from 172 transplants per year in 2002 to a peak of 192 transplants in 2004. From 2004 onwards, the number of new transplants continue to decline to 112 in 2011 (Table 5.1.1). This is predominantly due to reduction in the number of transplantation performed overseas. This coincided with the drop in the number of patients who underwent renal transplantation in China due to the implementation of restriction of commercial organ transplantation by the Chinese Ministry of Health. The number of functioning renal transplants had increased from 1438 in 2001 to 1884 in 2011 (Table 5.1.1).

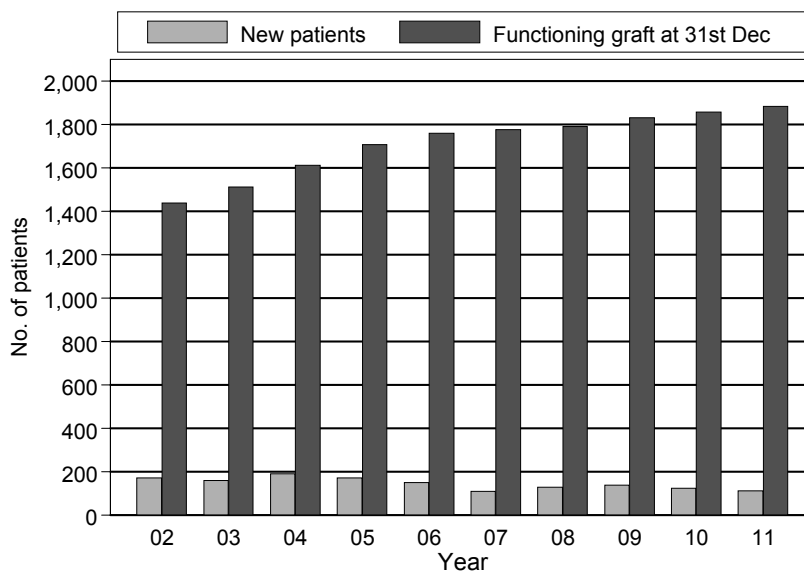
**Table 5.1.1:** Stock and flow of renal transplantation, 2002-2011

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
New transplant patients	172	161	192	171	150	111	128	139	124	112
Died	38	41	44	48	58	47	60	49	45	42
Graft failure	33	41	43	21	36	36	39	37	46	41
Lost to Follow up	3	4	6	6	3	13	13	13	6	10
Functioning graft at 31st December	1438	1513	1612	1708	1761	1776	1792	1832	1859	1884

The incidence of renal transplantation shows a modest decline of 6 to 7 per million population in the early 2000’s to 4-5 per million population in the last 3 years (Table 5.1.2) while transplant prevalence rate has grown slowly from 58 per million in 2002 to 66 per million population in 2006 (Table 5.1.3), an increase of 13.8% over the four-year period, and subsequently has remained static over the last six years.

However, compared to growth in the prevalence rate of dialysis patients (which has increased from 368 per million population in 2001 to 900 in 2011) our transplant prevalence rate has not kept up. The incidence rate has reduced over the last ten years and the prevalence rate has remained static over the last 5 years (4 and 66 per million population respectively) (Table 5.1.2 and 5.1.3).

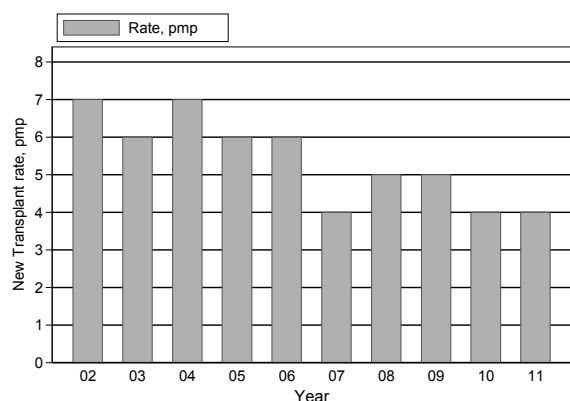
**Figure 5.1.1:** Stock and flow of renal transplantation, 2002-2011



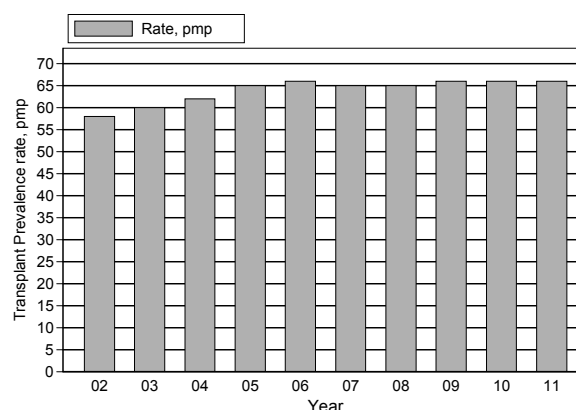
**Table 5.1.2:** New transplant rate per million population (pmp), 2002-2011

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
New transplant patients	172	161	192	171	150	111	128	139	124	112
New transplant rate, pmp	7	6	7	6	6	4	5	5	4	4

**Figure 5.1.2:** New transplant rate, 2002-2011



**Figure 5.1.3:** Transplant prevalence rate, 2002-2011



**Table 5.1.3:** Transplant prevalence rate per million population (pmp), 2002-2011

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Functioning graft at 31st December	1438	1513	1612	1708	1761	1776	1792	1832	1859	1884
Transplant prevalence rate, pmp	58	60	62	65	66	65	65	66	66	66

Transplantation within local centres has fluctuated over the last ten years with 57 cases in 2002, gradually decreasing and was at its lowest in 2004 with only 40 cases and slowly increasing again in the last 5 years with highest peak seen in 2011 with 81 cases. Transplantation in China continues to drop from 139 cases (72.4%) at its peak in 2004 down to 31 cases (27.2%) in 2011 (Table 5.1.4).

**Table 5.1.4:** Place of transplantation, 2002-2011

Year	2002		2003		2004		2005		2006			
	n	%	n	%	n	%	n	%	n	%	n	%
HKL	30	17.4	26	16.1	20	10.4	31	18.1	35	23.3		
UMMC	15	8.7	6	3.7	7	3.6	8	4.7	5	3.3		
Selayang Hospital	11	6.4	11	6.8	11	5.7	5	2.9	9	6		
Other local	1	0.6	1	0.6	2	1	4	2.3	2	1.3		
China	103	59.9	111	68.9	139	72.4	111	64.9	87	58		
India	12	7	4	2.5	11	5.7	7	4.1	7	4.7		
Other overseas	0	0	1	0.6	2	1	4	2.3	5	3.3		
Unknown	0	0	1	0.6	0	0	1	0.6	0	0		
Total	172	100	161	100	192	100	171	100	150	100		
Year	2007		2008		2009		2010		2011		TOTAL	
	n	%	n	%	n	%	n	%	n	%	n	%
HKL	36	32.4	32	25	36	25.9	26	21	34	30.4	306	21
UMMC	4	3.6	10	7.8	10	7.2	10	8.1	7	6.3	82	5.6
Selayang Hospital	14	12.6	10	7.8	18	12.9	19	15.3	25	22.3	133	9.1
Other local	4	3.6	8	6.3	10	7.2	10	8.1	15	13.4	57	3.9
China	45	40.5	63	49.2	62	44.6	49	39.5	31	27.7	801	54.9
India	3	2.7	3	2.3	1	0.7	2	1.6	0	0	50	3.4
Other overseas	5	4.5	2	1.6	2	1.4	5	4	0	0	26	1.8
Unknown	0	0	0	0	0	0	3	2.4	0	0	5	0.3
TOTAL	111	100	128	100	139	100	124	100	112	100	1460	100

**SECTION 5.2: RECIPIENTS' CHARACTERISTICS**

Age of the recipients at transplant has remained unchanged, with a mean between 37 to 42 years old. Between 58% and 70% of recipients were males.

The proportion of diabetic patients undergoing renal transplantation increased from 9% in 2002 peaked at 18% in 2005 and dropped again to 11% in 2011 (Table 5.2.2). This drop coincides with the drop in China transplants where the majority of the diabetic patients underwent their transplantation.

In terms of cause of end stage renal failure (Table 5.2.2), the primary cause was hypertension, followed by glomerulonephritis and diabetes as the third cause. Thirty-eight percent of transplant recipients had end stage renal disease due to unknown causes, belying the fact that majority of these patients presented

**Table 5.2.1:** Renal transplant recipients' characteristics, 2002-2011

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
New Transplant Patients	172	161	192	171	150	111	128	139	124	112
Age at transplant (years), Mean	40	42	42	38	37	37	37	38	40	38
Age at transplant (years), SD	12	13	13	14	15	16	15	14	14	14
% Male	58	66	63	68	66	64	59	63	65	70
% Diabetic (co-morbid/ primary renal disease)	15	22	21	21	20	14	19	19	16	11
% HBsAg positive	7	8	5	5	7	9	3	2	4	5
% Anti-HCV positive	9	10	8	3	8	9	3	7	3	5

**Table 5.2.2:** Primary causes of end stage renal failure, 2002-2011

Year	2002		2003		2004		2005		2006	
	n	%	n	%	n	%	n	%	n	%
New transplant patients	172	100	161	100	192	100	171	100	150	100
Glomerulonephritis	54	31	55	34	64	33	48	28	54	36
Diabetes Mellitus	16	9	27	17	32	17	31	18	23	15
Hypertension	24	14	26	16	52	27	42	25	32	21
Obstructive uropathy	2	1	3	2	4	2	3	2	6	4
ADPKD	3	2	5	3	5	3	3	2	1	1
Drugs/ toxic nephropathy	0	0	2	1	2	1	1	1	1	1
Hereditary nephritis	0	0	0	0	1	1	0	0	0	0
Unknown	71	41	58	36	82	43	56	33	47	31
Others	15	9	12	7	29	15	14	8	16	11

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
New transplant patients	111	100	128	100	139	100	124	100	112	100
Glomerulonephritis	31	28	33	26	43	31	46	37	27	24
Diabetes Mellitus	10	9	19	15	24	17	17	14	12	11
Hypertension	27	24	22	17	30	22	32	26	29	26
Obstructive uropathy	1	1	2	2	5	4	3	2	6	5
ADPKD	2	2	0	0	7	5	4	3	3	3
Drugs/ toxic nephropathy	0	0	1	1	0	0	0	0	0	0
Hereditary nephritis	0	0	0	0	0	0	1	1	0	0
Unknown	42	38	56	44	48	35	38	31	42	38
Others	14	13	12	9	4	3	7	6	4	4

### SECTION 5.3: TRANSPLANT PRACTICES

The proportion of commercial transplantation has gradually reduced from 79% at its peak in 2004 to 23% in 2011. This is predominantly due to the marked decline in commercial cadaveric transplantation (76% in 2004 to 2% in 2011), which is in keeping with the implementation of restriction of cadaveric organ transplantation by the Chinese Ministry of Health. However, the number of commercial live donation has increased to its peak at 25% in 2010 decreasing to 21% in 2011.

Local live donor transplantation made up 40% of transplants (41 recipients) in 2011, which was an increase from 36 cases (33%) in 2010. The number of live donor transplants remain low.

Local cadaveric transplantation made up 17% of transplants (26 recipients) in 2006 and it had shown a promising rise to 34 recipients (31%) in 2010 and 38 recipients (37%) in 2011. 2010 also marked the first time in 10 years where there were more local transplantations (64%) compared to commercial transplantations done overseas (36%). In 2011, this figure improved further to 77% local transplantation and 23% commercial transplantation.

**Table 5.3.1:** Type of renal transplantation, 2002-2011

Year	2002		2003		2004		2005		2006	
	n	%	n	%	n	%	n	%	n	%
Commercial cadaver	103	60	112	70	145	76	107	64	85	57
Commercial live donor	11	6	3	2	6	3	9	5	9	6
Live donor (genetically related)	32	19	24	15	21	11	37	22	25	17
Live donor (emotionally related)	4	2	6	4	2	1	4	2	4	3
Cadaver	22	13	15	9	17	9	10	6	26	17
Total	172	100	160	100	191	100	167	100	149	100

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
Commercial cadaver	45	41	60	48	35	26	12	11	2	2
Commercial live donor	4	4	2	2	23	17	27	25	22	21
Live donor (genetically related)	21	19	34	27	26	20	24	22	26	25
Live donor (emotionally related)	13	12	6	5	15	11	12	11	15	15
Cadaver	27	25	23	18	34	26	34	31	38	37
Total	110	100	125	100	133	100	109	100	103	100

\*Commercial Cadaver (China, India, other oversea)

\*Commercial live donor (living unrelated)

\*Cadaver (local)

**Table 5.3.2:** Biochemical data, 2007-2011

Biochemical parameter	Summary	2007	2008	2009	2010	2011
Creatinine, umol/L	n	1688	1698	1695	1831	1905
	Mean	131.7	131.9	128.1	131.3	126.9
	SD	77.6	80.8	62.8	88.8	74.1
	Median	116	115	115	112	111
	Minimum	36	29	10.7	10.3	10.1
	Maximum	1186	1181	657	1145	970
Hb, g/dL	n	1688	1698	1695	1831	1905
	Mean	12.8	12.8	12.6	12.6	12.6
	SD	1.9	1.9	1.8	1.9	1.8
	Median	12.8	12.7	12.7	12.7	12.7
	Minimum	4.4	6.2	5.3	1.8	4.5
	Maximum	18.7	18.6	18.5	18.5	18.9
Albumin, g/L	n	1688	1698	1695	1831	1905
	Mean	39.7	39.7	39.6	39.6	39.6
	SD	0.8	0.8	1.2	1.4	1.2
	Median	39.6	39.6	39.6	39.6	39.6
	Minimum	29	30	21	24	19
	Maximum	48	50	50	75	49.8
Calcium, mmol/L	n	1688	1698	1695	1831	1905
	Mean	2.3	2.3	2.3	2.3	2.3
	SD	0.2	0.2	0.2	0.2	0.2
	Median	2.3	2.3	2.3	2.3	2.3
	Minimum	1.4	1	1.1	1.1	1
	Maximum	3.2	3.5	3.3	3.2	4
Phosphate, mmol/L	n	1688	1698	1695	1831	1905
	Mean	1.1	1.1	1.1	1.1	1.1
	SD	0.3	0.3	0.2	0.3	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	3.9	3.2	2.8	3.1	3
Alkaline phosphate (ALP), U/L	n	1688	1698	1695	1831	1905
	Mean	79.5	79	80	82.6	81.3
	SD	39.8	46.4	45.3	58.6	42.6
	Median	72.5	72	73	73	73
	Minimum	22	20	21	20	21
	Maximum	508	985	732	964	650
ALT, U/L	n	1688	1698	1695	1831	1905
	Mean	29.8	30.1	29.8	27.1	26.6
	SD	25.6	37.8	32.5	25.1	22
	Median	23	23	24	21	21.2
	Minimum	4	4	4	4	4
	Maximum	356	881	881	410	371
Total cholesterol, mmol/L	n	1688	1698	1695	1831	1905
	Mean	5.2	5.2	5.2	5.2	5.1
	SD	1	1	1.1	1.1	1.1
	Median	5.2	5.2	5.2	5.2	5.2
	Minimum	1.7	2	1.9	2	1.5
	Maximum	11.4	11.2	10.6	11.5	11.6



**Table 5.3.2:** Biochemical data, 2007-2011 (*cont*)

Biochemical parameter	Summary	2007	2008	2009	2010	2011
LDL cholesterol, mmol/L	n	1688	1698	1695	1831	1905
	Mean	2.9	2.9	2.8	2.9	2.9
	SD	0.8	0.8	1	0.9	0.8
	Median	2.9	2.9	2.9	2.9	2.9
	Minimum	1	0.9	0.9	0.9	1
	Maximum	8.9	7.7	10.8	10.4	12.2
HDL cholesterol, mmol/L	n	1688	1698	1695	1831	1905
	Mean	1.5	1.6	1.5	1.5	1.5
	SD	0.4	0.5	0.5	0.5	0.5
	Median	1.6	1.6	1.6	1.6	1.6
	Minimum	0.4	0.5	0.4	0.4	0.5
	Maximum	7.5	7.5	6.9	6.8	9
Systolic blood pressure, mmHg	n	1688	1698	1695	1831	1905
	Mean	131.6	129.4	130.1	129.7	130.1
	SD	15.7	15.3	14.7	14.8	15.3
	Median	130	130	130	130	130
	Minimum	80	80	65	70	71
	Maximum	210	245	210	192	200
Diastolic blood pressure, mmHg	n	1688	1698	1695	1831	1905
	Mean	78.8	77.5	78.2	77.4	77.7
	SD	9.4	9.2	8.7	9.4	9.2
	Median	80	78.6	79	78.6	80
	Minimum	20	20	40	10	30
	Maximum	116	133	120	124	114

Majority of patients were on combinations of immunosuppressive drugs. In 2011, monotherapy is only seen in 0.86% of the patients: 0.2% on steroid alone, 0.5% on calcineurin inhibitor alone and 0.3% of patients are taking anti-proliferatives alone.

Calcineurin-inhibitor based therapy remained the mainstay of immunosuppressive therapy with 93% of patients receiving it. Cyclosporin remained the most widely used calcineurin inhibitor. However, there was a gradual decline in cyclosporine usage from 71% in 2007 to 55% in 2011, which coincided with increasing use of Tacrolimus, with 21% in 2007 to 37% in 2011.

The usage of antiproliferative agents have also shown a similar trend over the last five years. The use of Azathioprine continue to decline from 29% in 2007 to 18% in 2011. This coincided with gradual increase in the use of Mycophenolate Mofetil from 55% in 2007 to 66% in 2011.

The use of PSI (proliferation signal inhibitors) such as rapamycin remained low at 1% of all transplant recipients in 2011.

For non-immunosuppressive medications, in year 2011, only 28% of patients were on ACE inhibitors or Angiotensin II receptor blockers (AIIRB) or both and this trend has been relatively static since 2007. The use of Calcium Channel blockers has gradually decline from 65% in 2007 to 48% in 2011. Beta blocker usage was reported in 56% of patients.

**Table 5.3.3:** Medication data, 2007-2011

Medication data	Single drug treatment									
	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
All	1666	100	1429	100	1747	100	1475	100	1849	100
<b>(i) Immunosuppressive drug(s) treatment</b>										
Prednisolone	9	1	6	0	6	0	11	1	4	0
Cyclosporin A	8	0	2	0	15	1	5	0	3	0
Tacrolimus (FK506)	4	0	3	0	14	1	2	0	7	0
Azathioprine	0	0	0	0	1	0	0	0	2	0
Mycophenolate Mofetil (MMF)	1	0	2	0	0	0	1	0	4	0
Rapamycin	0	0	1	0	0	0	0	0	0	0
Others	0	0	0	0	1	0	0	0	0	0
<b>(ii) Non-Immunosuppressive drug(s) treatment</b>										
Beta blocker	90	5	88	6	118	7	134	9	211	11
Calcium channel blocker	184	11	138	10	161	9	192	13	148	8
ACE inhibitor	38	2	29	2	41	2	35	2	32	2
AIIRB	19	1	17	1	21	1	31	2	28	2
Anti-lipid	95	6	89	6	117	7	111	8	142	8
Other anti-hypertensive	6	0	25	2	26	1	22	1	18	1

Medication data	Combined drug treatment									
	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
All	1666	100	1429	100	1747	100	1475	100	1849	100
<b>(i) Immunosuppressive drug(s) treatment</b>										
Prednisolone	1612	97	1385	97	1645	94	1397	95	1757	95
Cyclosporin A	1191	71	983	69	1122	64	896	61	1019	55
Tacrolimus (FK506)	349	21	345	24	475	27	450	31	687	37
Azathioprine	479	29	382	27	385	22	396	27	330	18
Mycophenolate Mofetil (MMF)	908	55	776	54	1048	60	877	59	1213	66
Rapamycin	33	2	30	2	32	2	20	1	22	1
Others	4	0	1	0	26	1	41	3	68	4
<b>(ii) Non-Immunosuppressive drug(s) treatment</b>										
Beta blocker	735	44	615	43	681	39	559	38	833	45
Calcium channel blocker	905	54	687	48	736	42	595	40	733	40
ACE inhibitor	384	23	287	20	311	18	221	15	266	14
AIIRB	211	13	141	10	146	8	159	11	183	10
Anti-lipid	732	44	627	44	710	41	532	36	815	44
Other anti-hypertensive	140	8	191	13	167	10	147	10	158	9

## SECTION 5.4: TRANSPLANT OUTCOMES

### 5.4.1 Post-transplant complications

In the year 2011, 57% of patients were hypertensive prior to transplantation whereas 29% developed hypertension post transplantation. Thirteen percent of patients had diabetes mellitus prior to transplant whereas only 7% of patients developed new onset diabetes after transplantation (NODAT). These trends have been quite the same since 2007. In terms of cardiovascular and cerebrovascular disease 3% had either or both prior to transplant and another 3% developed these post transplantation.

**Table 5.4.1:** Post-transplant complications, 2007-2011

Medication data	Pre Transplant									
	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
All patients	1688	100	1705	100	1710	100	1862	100	1912	100
Diabetes (either as primary renal disease or co-morbid)	232	14	233	14	211	12	246	13	257	13
Cancer	3	0	2	0	1	0	3	0	2	0
Cardiovascular disease + cerebrovascular disorder	72	4	67	4	51	3	63	3	60	3
Hypertension	1064	63	1055	62	1028	60	1095	59	1093	57
	Post transplant									
All patients	1688	100	1705	100	1710	100	1862	100	1912	100
Diabetes (either as primary renal disease or co-morbid)	113	7	119	7	88	5	120	6	127	7
Cancer	21	1	24	1	16	1	19	1	18	1
Cardiovascular disease + cerebrovascular disorder	54	3	72	4	56	3	48	3	54	3
Hypertension	451	27	413	24	448	26	502	27	562	29

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

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

### 5.4.2 Deaths and Graft loss

In 2011, 38 transplant recipients died and 41 lost their grafts. The rates of transplant death and graft loss have remained static for the past 10 years (Table 5.4.2).

The main known causes of death have been infection and cardiovascular disease with 41% and 18% respectively. Another 11% of patients died at home, which is usually presumed to be cardiovascular death as well.

Cancer death rates have been significantly high from 2002 to 2011 contributing between 7 to 18% of all deaths. Death due to liver disease has slowly declined from 13% in 2002 to around 2 - 4% in the last 3 years.

Rejection remains the major cause of graft loss.

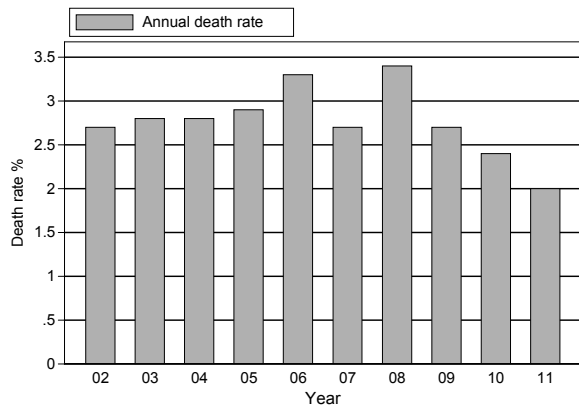
**Table 5.4.2:** Transplant patients death rate and graft loss, 2002-2011

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number at risk	1389	1476	1563	1660	1735	1769	1784	1812	1846	1872
Transplant death	38	41	44	48	58	47	60	49	45	38
Transplant death rate %	2.7	2.8	2.8	2.9	3.3	2.7	3.4	2.7	2.4	2
Graft loss	33	41	43	21	36	36	39	37	46	41
Graft loss rate %	2.4	2.8	2.8	1.3	2.1	2	2.2	2	2.5	2.2
Acute rejection	0	4	19	14	19	14	24	32	80	49
Acute rejection rate %	0	0.3	1.2	0.8	1.1	0.8	1.3	1.8	4.3	2.6
All losses	71	82	87	69	94	83	99	86	91	79
All losses rate %	5.1	5.6	5.6	4.2	5.4	4.7	5.5	4.7	4.9	4.2

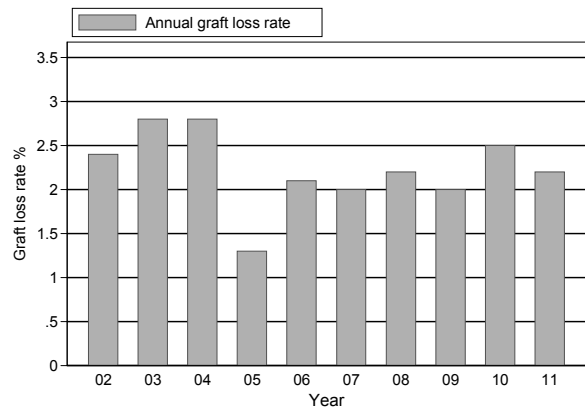
\*Graft loss=graft failure

\*All losses=death / graft loss (acute rejection happens concurrently with graft failure / death)

**Figure 5.4.2(a):** Transplant recipient death rate, 2002-2011



**Figure 5.4.2(b):** Transplant recipient graft loss rate, 2002-2011



**Table 5.4.3:** Causes of death in transplant recipients, 2002-2011

Year	2002		2003		2004		2005		2006	
	n	%	n	%	n	%	n	%	n	%
Cardiovascular	6	15	14	30	6	13	5	10	13	21
Died at home	5	13	5	11	5	11	6	12	7	11
Infection	14	35	13	28	17	36	29	58	25	40
Graft failure	0	0	0	0	3	6	0	0	0	0
Cancer	5	13	7	15	8	17	5	10	5	8
Liver disease	5	13	3	7	4	9	3	6	5	8
Accidental death	1	3	1	2	0	0	1	2	1	2
Others	2	5	1	2	3	6	0	0	2	3
Unknown	2	5	2	4	1	2	1	2	5	8
TOTAL	40	100	46	100	47	100	50	100	63	100

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
Cardiovascular	10	19	11	17	12	22	12	24	8	18
Died at home	5	10	12	18	9	17	7	14	5	11
Infection	19	37	20	30	19	35	16	31	18	41
Graft failure	4	8	0	0	1	2	2	4	1	2
Cancer	6	12	12	18	7	13	6	12	3	7
Liver disease	0	0	0	0	2	4	2	4	1	2
Accidental death	0	0	0	0	0	0	0	0	0	0
Others	1	2	6	9	1	2	5	10	6	14
Unknown	7	13	5	8	3	6	1	2	2	5
TOTAL	52	100	66	100	54	100	51	100	44	100

**Table 5.4.4:** Causes of graft failure, 2002-2011

Year	2002		2003		2004		2005		2006	
	n	%	n	%	n	%	n	%	n	%
Rejection	19	56	20	47	29	67	15	68	25	68
Calcineurin toxicity	1	3	1	2	0	0	0	0	0	0
Other drug toxicity	0	0	0	0	0	0	0	0	0	0
Ureteric obstruction	0	0	0	0	0	0	0	0	0	0
Infection	0	0	2	5	1	2	1	5	2	5
Vascular causes	0	0	3	7	4	9	2	9	4	11
Recurrent/ de novo renal disease	2	6	2	5	1	2	0	0	1	3
Others	2	6	1	2	0	0	1	5	2	5
Unknown	10	29	14	33	8	19	3	14	3	8
TOTAL	34	100	43	100	43	100	22	100	37	100

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
Rejection	24	67	27	63	24	62	29	60	19	46
Calcineurin toxicity	0	0	0	0	1	3	1	2	1	2
Other drug toxicity	0	0	0	0	1	3	1	2	0	0
Ureteric obstruction	1	3	0	0	0	0	0	0	0	0
Infection	1	3	3	7	1	3	0	0	0	0
Vascular causes	1	3	3	7	1	3	3	6	1	2
Recurrent/ de novo renal disease	0	0	1	2	0	0	0	0	0	0
Others	3	8	3	7	1	3	4	8	3	7
Unknown	6	17	6	14	10	26	10	21	17	41
TOTAL	36	100	43	100	39	100	48	100	41	100

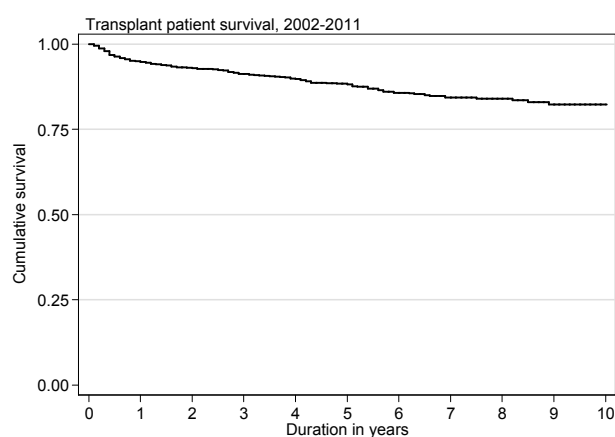
### 5.5: PATIENT AND GRAFT SURVIVAL

Overall patient survival rates from 2002 to 2011 is 95%, 91%, 88% and 82% at year 1, 3, 5 and 10 respectively. Overall graft survival rate is 93%, 88%, 83% and 68% at year 1, 3, 5 and 10 respectively.

**Table 5.5.1(a):** Patient survival, 2002-2011

Interval (years)	n	% Survival	SE
0	1460	100	
1	1235	95	1
2	1080	93	1
3	930	91	1
4	794	90	1
5	673	88	1
6	524	86	1
7	370	84	1
8	223	84	1
9	107	82	2
10	2	82	2

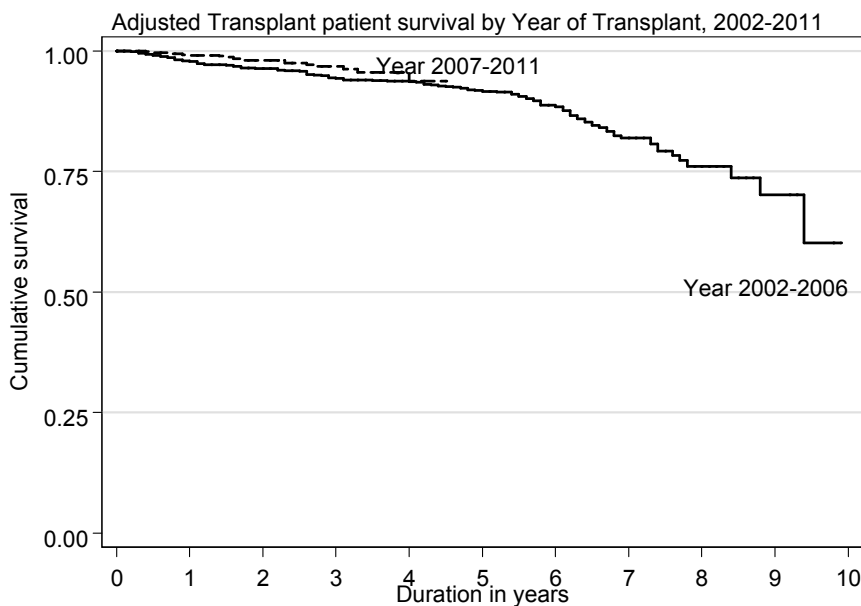
**Figure 5.5.1(a):** Patient survival, 2002-2011



**Table 5.5.1(b): Risk factors for transplant patient survival 2002-2011**

Factors	n	Hazard Ratio	95% CI	P value
<b>Year of transplant</b>				
2002-2006 (ref*)	846	1.00		
2007-2011	614	1.28	(0.27; 0.83)	0.266
<b>Age at transplant</b>				
<20	159	0.42	(0.03; 0.2)	0.027
20-39 (ref*)	538	1.00		
40-54	657	1.90	(0; 1.27)	0.002
≥55	106	2.69	(0; 1.52)	0.001
<b>Gender:</b>				
Male (ref*)	935	1.00		
Female	525	0.96	(0.81; 0.68)	0.806
<b>Primary diagnosis:</b>				
Unknown primary (ref*)	794	1.00		
Diabetes mellitus	107	1.35	(0.22; 0.84)	0.219
GN/SLE	332	0.80	(0.31; 0.52)	0.309
Polycystic kidney	24	0.56	(0.43; 0.13)	0.427
Obstructive nephropathy	41	1.67	(0.28; 0.66)	0.281
Others	162	0.72	(0.23; 0.41)	0.230
<b>Type of transplant</b>				
Commercial cadaver (ref*)	706	1.00		
Commercial live donor	113	0.71	(0.38; 0.32)	0.382
Living donor	355	1.17	(0.52; 0.73)	0.520
Cadaver	246	4.03	(0; 2.63)	<0.001
<b>HbsAg</b>				
Negative (ref*)	1436	1.00		
Positive	24	1.64	(0.2; 0.77)	0.201
<b>Anti-HCV</b>				
Negative (ref*)	1345	1.00		
Positive	25	1.78	(0.15; 0.81)	0.150

**Figure 5.5.1(b):** Adjusted transplant patient survival related to year of transplant, 2002-2011 (adjusted for age, gender, primary diagnosis, type of transplant, HBsAg and Anti-HCV status)



**Table 5.5.2 (a):** Graft survival, 2002-2011

Interval (years)	n	% Survival	SE
0	1460	100	
1	1235	93	1
2	1080	90	1
3	930	88	1
4	794	85	1
5	673	83	1
6	524	79	1
7	370	77	1
8	223	74	2
9	107	71	2
10	2	68	3

\*n=Number at risk SE=standard error

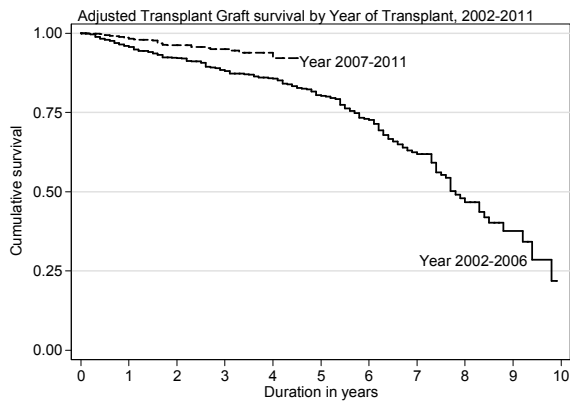
**Figure 5.5.2 (a):** Graft survival, 2002-2011



**Table 5.5.2(b):** Risk factors for transplant graft survival 2002-2011

Factors	n	Hazard Ratio	95% CI	P value
<b>Year of transplant</b>				
2002-2006 <sup>(ref*)</sup>	846	1.00		
2007-2011	614	1.42	(0.04; 1.01)	0.041
<b>Age at transplant</b>				
<20	159	0.59	(0.02; 0.38)	0.020
20-39 <sup>(ref*)</sup>	538	1.00		
40-54	657	1.00	(0.99; 0.75)	0.994
>=55	106	1.20	(0.45; 0.75)	0.448
<b>Gender:</b>				
Male <sup>(ref*)</sup>	935	1.00		
Female	525	0.99	(0.92; 0.76)	0.915
<b>Primary diagnosis:</b>				
Unknown primary <sup>(ref*)</sup>	794	1.00		
Diabetes mellitus	107	1.52	(0.04; 1.01)	0.043
GN/SLE	332	0.93	(0.67; 0.68)	0.668
Polycystic kidney	24	0.72	(0.52; 0.26)	0.518
Obstructive nephropathy	41	0.95	(0.9; 0.41)	0.895
Others	162	1.46	(0.04; 1.02)	0.036
<b>Type of transplant</b>				
Commercial cadaver <sup>(ref*)</sup>	706	1.00		
Commercial live donor	113	0.93	(0.79; 0.54)	0.791
Living donor	355	1.00	(1; 0.7)	0.997
Cadaver	246	3.77	(0; 2.71)	<0.001
<b>HbsAg</b>				
Negative <sup>(ref*)</sup>	1436	1.00		
Positive	24	1.36	(0.34; 0.72)	0.339
<b>Anti-HCV</b>				
Negative <sup>(ref*)</sup>	1345	1.00		
Positive	25	1.53	(0.18; 0.82)	0.178

**Figure 5.5.2(b):** Adjusted transplant graft survival related to year of transplant, 2002-2011 (adjusted for age, gender, primary diagnosis, type of transplant, HBsAg and Anti-HCV status)



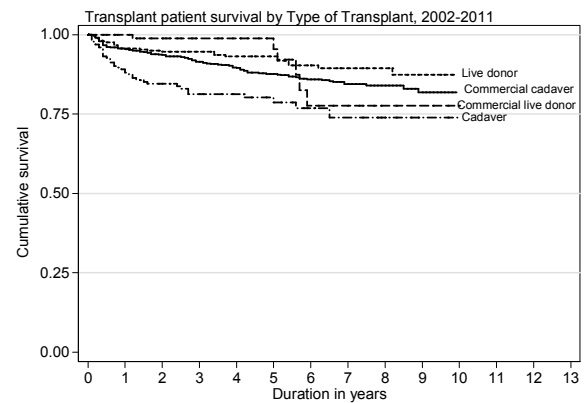
Outcomes of renal transplantation from the 4 different donor groups are shown in Figures 5.5.3 and 5.5.4.

The patient and graft survival for local living renal transplantation was 96%, 95%, 93% and 94%, 92% and 89% at year 1, 3 and 5 respectively.

The outcome of commercial cadaveric allograft was similar to local living transplantation with patients and graft survival of 95%, 91%, 88% and 94%, 89% and 83% at year 1,3 and 5 respectively

The outcome of local cadaveric renal transplantation was poorer with patient and graft survival of 88%, 81%, 79% and 84%, 75% and 69% at year 1, 3 and 5 respectively.

**Figure 5.5.3:** Patient survival by type of transplant, 2002-2011



**Table 5.5.3:** Unadjusted patient survival by type of transplant, 2002-2011

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	706	100		113	100		355	100		246	100	
1	658	95	1	95	100		289	96	1	164	88	2
2	624	94	1	62	99	1	253	95	1	125	85	3
3	571	91	1	40	99	1	213	95	1	96	81	3
4	499	90	1	37	99	1	176	93	2	77	81	3
5	443	88	1	30	96	3	140	93	2	53	79	3
6	360	86	1	17	78	9	107	90	2	35	77	4
7	262	84	2	14	78	9	67	89	2	26	74	5
8	147	84	2	9	78	9	48	89	2	20	74	5
9	68	82	2	6	78	9	24	87	3	10	74	5
10	4	-	-	1	78	9	1	-	-	1	74	5

\*n=Number at risk SE=standard error



**Table 5.5.4:** Graft survival by type of transplant, 2002-2011

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	706	100		113	100		355	100		246	100	
1	658	94	1	95	100		289	94	1	164	84	3
2	624	91	1	62	98	2	253	92	2	125	79	3
3	571	89	1	40	94	3	213	92	2	96	75	3
4	499	86	1	37	91	4	176	90	2	77	73	3
5	443	83	1	30	83	6	140	89	2	53	69	4
6	360	80	2	17	62	9	107	85	2	35	65	4
7	262	78	2	14	62	9	67	82	3	26	60	5
8	147	75	2	9	62	9	48	81	3	20	57	6
9	68	73	2	6	52	12	24	75	4	10	57	6
10	4			1	52	12	1			1	57	6

\*n=Number at risk SE=standard error

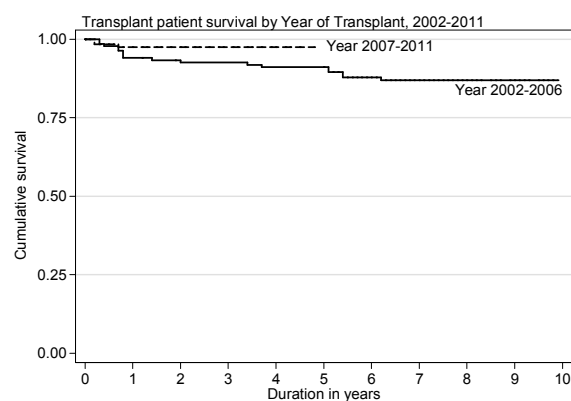
Patient and graft survival for living related transplants were compared between two cohorts. The patient survival for 2002-2006 cohort and the 2007-2011 cohorts were comparable (Figures 5.5.5). However, graft survival for living related transplants (Figure 5.5.6) were better in patients in the 2006-2010 cohort even from the outset.

**Table 5.5.5:** Patient survival by year of transplant (Living related transplant, 2002-2011)

Year of Transplant Interval (years)	2002-2006			2007-2011		
	n	% Survival	SE	n	% Survival	SE
0	139	100		131	100	
1	130	94	2	98	97	1
2	124	93	2	78	97	1
3	124	93	2	50	97	1
4	122	91	2	23	97	1
5	120	91	2	5	-	-
6	92	88	3			
7	59	87	3			
8	41	87	3			
9	22	87	3			
10	1	-	-			

\*n=Number at risk SE=standard error

**Figure 5.5.5:** Patient survival by year of transplant (Living related transplant, 2002-2011)

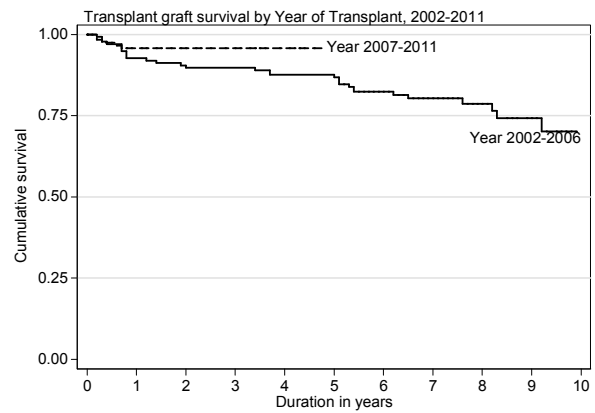


**Table 5.5.6:** Graft survival by year of transplant (Living related transplant, 2002-2011)

Year of Transplant Interval (years)	2002-2006			2007-2011		
	n	% Survival	SE	n	% Survival	SE
0	139	100		131	100	
1	130	93	2	98	96	2
2	124	90	3	78	96	2
3	124	90	3	50	96	2
4	122	88	3	23	96	2
5	120	87	3	5	-	-
6	92	82	3			
7	59	80	3			
8	41	79	4			
9	22	74	5			
10	1	-	-			

\*n=Number at risk SE=standard error

**Figure 5.5.6:** Graft survival by year of transplant (Living related transplant, 2002-2011)

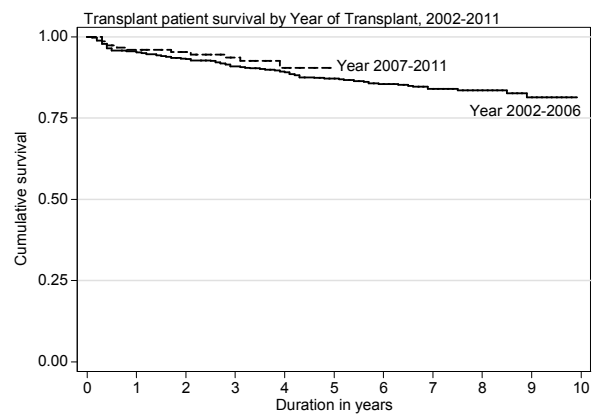


Patient and graft survival for commercial transplants were comparable between the 2002-2006 cohort and the 2007-2011 cohort (Figures 5.5.7). This result was also comparable to the living related renal transplant done in the country.

**Table 5.5.7:** Patient survival by year of transplant (Commercial cadaver transplant, 2002-2011)

Year of Transplant Interval (years)	2002-2006			2007-2011		
	n	% Survival	SE	n	% Survival	SE
0	552	100		154	100	
1	515	95	1	143	96	2
2	494	93	1	130	95	2
3	477	91	1	97	94	2
4	457	89	1	42	90	3
5	440	87	1	3	90	3
6	360	85	2	3	-	-
7	262	84	2			
8	147	84	2			
9	68	81	2			
10	4	-	-			

**Figure 5.5.7:** Patient survival by year of transplant (Commercial cadaver transplant, 2002-2011)

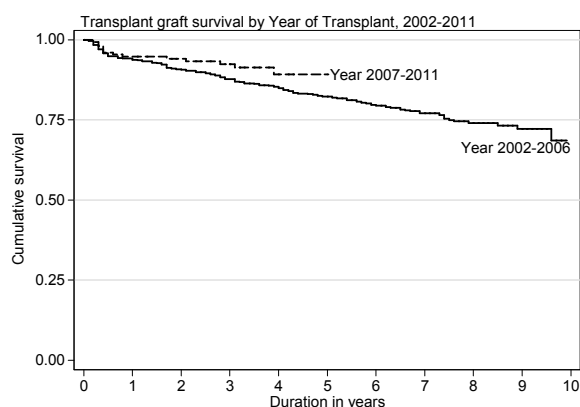


**Table 5.5.8:** Graft survival by year of transplant (Commercial cadaver transplant, 2002-2011)

Year of Transplant Interval (years)	2002-2006			2007-2011		
	n	% Survival	SE	n	% Survival	SE
0	552	100		154	100	
1	515	94	1	143	95	2
2	494	91	1	130	94	2
3	477	88	1	97	92	2
4	457	85	2	42	89	3
5	440	82	2	3	89	3
6	360	79	2	3	-	-
7	262	77	2			
8	147	74	2			
9	68	72	2			
10	4	-	-			

\*n=Number at risk SE=standard error

**Figure 5.5.8:** Graft survival by year of transplant (Commercial cadaver transplant, 2002-2011)



## SECTION 5.6: CARDIOVASCULAR RISK IN RENAL TRANSPLANT RECIPIENTS

### 5.6.1 Risk factors for Ischaemic Heart Disease (IHD)

In 2011, 86.8% of patients were hypertensive, 22.1% were diabetic and 46.5 % had renal insufficiency fulfilling CKD III and above. Forty-nine point four percent of patients had 2 cardiovascular risk factors while 6% had all 3 major risk factors.

**Table 5.6.1:** Risk factors for IHD in renal transplant recipients at year 2007-2011

	2007	2008	2009	2010	2011
Diabetes	25 (1.6)	18 (1.1)	28 (1.8)	34 (2.0)	36 (2.1)
Hypertension**	588 (37.3)	664 (41.8)	646 (41.1)	636 (37.9)	678 (39.2)
CKD	127 (8.1)	117 (7.4)	156 (9.9)	166 (9.9)	161 (9.3)
Diabetes + Hypertension**	177 (11.2)	203 (12.8)	163 (10.4)	197 (11.7)	212 (12.2)
Diabetes + CKD	11 (0.7)	22 (1.4)	18 (1.1)	22 (1.3)	31 (1.8)
CKD + Hypertension**	517 (32.8)	457 (28.7)	474 (30.2)	516 (30.8)	509 (29.4)
Diabetes + CKD + Hypertension**	132 (8.4)	109 (6.9)	86 (5.5)	107 (6.4)	104 (6.0)

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

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

GFR (mL/min/1.73m<sup>2</sup>) = 1.2\*(140-age(year))\*weight(kg) / creatinine (µmol/L) if male

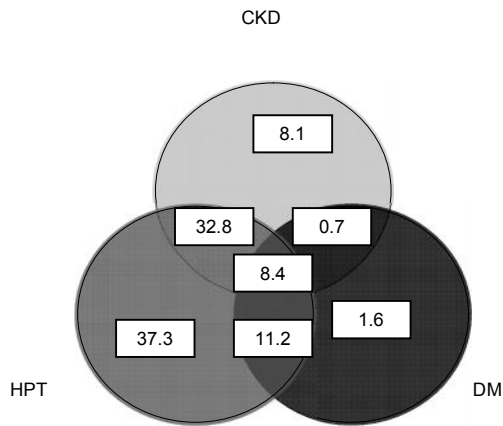
GFR (mL/min/1.73m<sup>2</sup>) = 0.85\*(1.2\*(140-age(year))\*weight(kg) / creatinine (µmol/L) if female

CKD stage III-GFR, 30-60

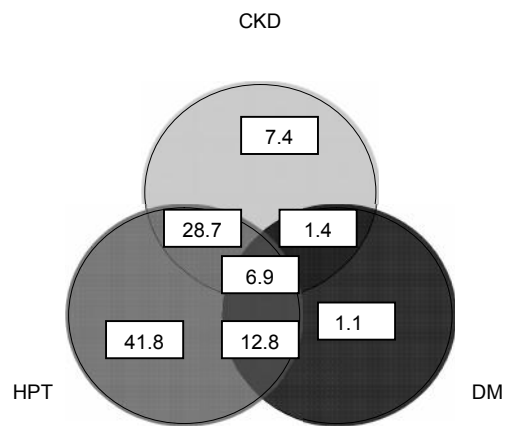
CKD stage IV-GFR, 15-30

CKD stage V-GFR, <15

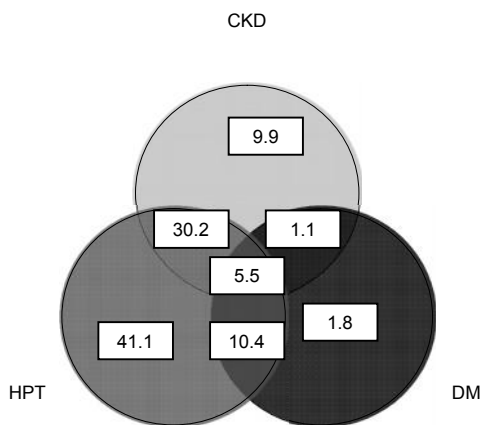
**Figure 5.6.1(a):** Venn diagram for pre and post transplant complications (in %) at year 2007



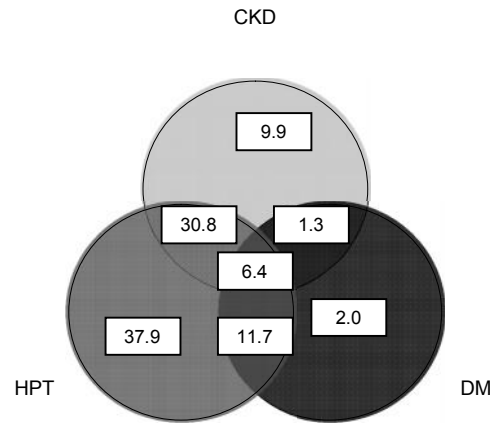
**Figure 5.6.1(b):** Venn diagram for pre and post transplant complications (in %) at year 2008



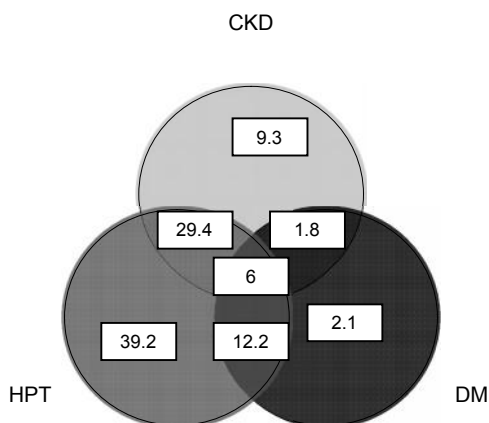
**Figure 5.6.1(c):** Venn diagram for pre and post transplant complications (in %) at year 2009



**Figure 5.6.1(d):** Venn diagram for pre and post transplant complications (in %) at year 2010



**Figure 5.6.1(e):** Venn diagram for pre and post transplant complications (in %) at year 2011



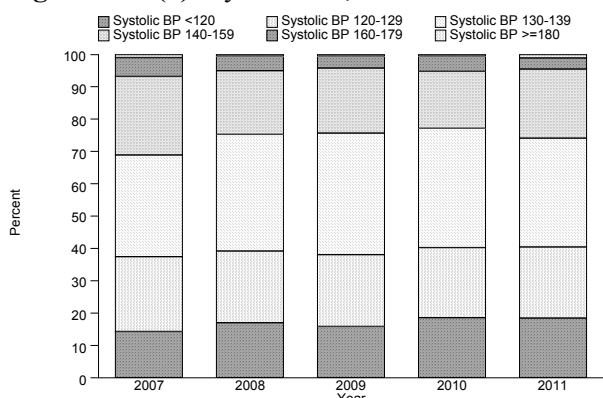
**5.6.2 Blood Pressure classification according to JNC VI criteria, 2007-2011**

In 2011, 21% of renal transplant recipients had stage I hypertension whereas 3.4% had stage II hypertension and 1.1 % had stage III hypertension despite being on treatment (Table 5.6.2 (a)). In terms of diastolic hypertension 11% had stage I hypertension, 1.1% of patients had stage II diastolic hypertension and 0.16% of patients had stage III diastolic hypertension despite being on treatment (Table 5.6.2 (b)).

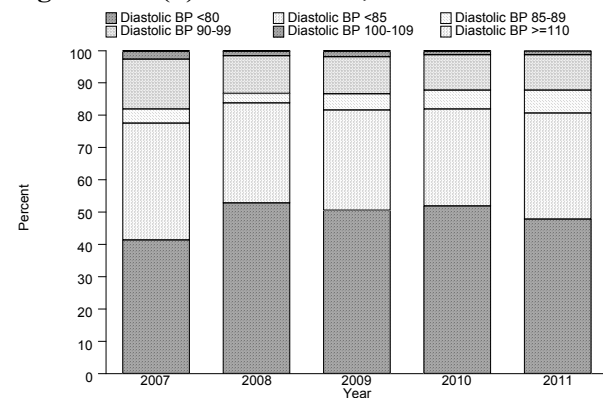
**Table 5.6.2(a): Systolic BP, 2007-2011**

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
<120	240	14.22	289	17.02	269	15.87	340	18.57	352	18.48
120-129	392	23.22	377	22.20	376	22.18	397	21.68	419	21.99
130-139	531	31.46	612	36.04	638	37.64	676	36.92	640	33.60
140-159	409	24.23	335	19.73	340	20.06	321	17.53	408	21.42
160-179	99	5.86	75	4.42	62	3.66	87	4.75	65	3.41
≥180	17	1.01	10	0.59	10	0.59	10	0.55	21	1.10

**Figure 5.6.2(a): Systolic BP, 2007-2011**



**Figure 5.6.2(b): Diastolic BP, 2007-2011**



**Table 5.6.2(b): Diastolic BP, 2007-2011**

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
<80	699	41.41	898	52.89	856	50.50	950	51.88	911	47.82
80-84	610	36.14	525	30.92	528	31.15	549	29.98	626	32.86
85-89	74	4.38	50	2.94	84	4.96	108	5.90	135	7.09
90-99	261	15.46	198	11.66	195	11.50	201	10.98	209	10.97
100-109	39	2.31	22	1.30	27	1.59	19	1.04	21	1.10
≥110	5	0.30	5	0.29	5	0.29	4	0.22	3	0.16

## RENAL TRANSPLANTATION

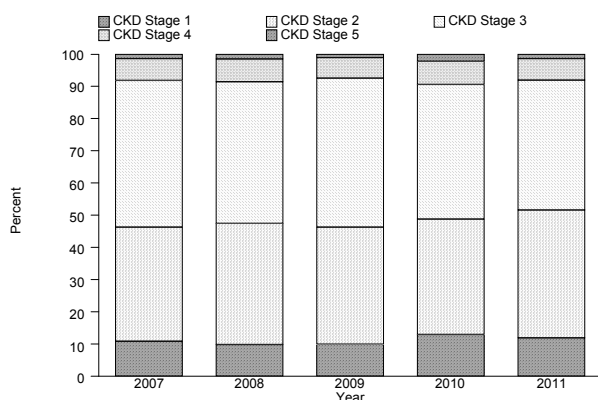
### 5.6.3 Level of allograft function

Table and Figure 5.6.3 shows the CKD Stage classification by year and in 2011, 40.4% of renal transplant recipients had CKD Stage III, whilst another 6.7% had CKD Stage IV. CKD Stage V (impending renal replacement therapy) was found in 1.4% of renal transplant recipients.

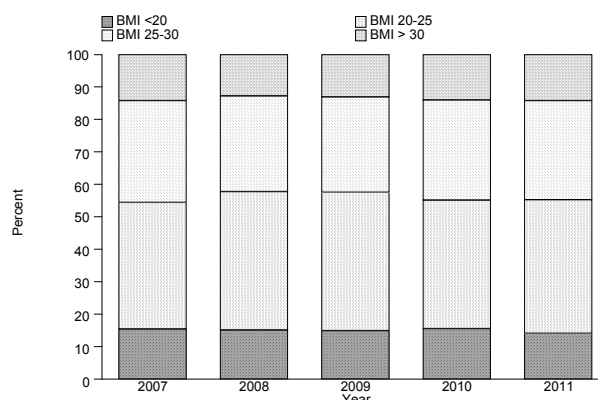
**Table 5.6.3:** CKD stages, 2007-2011

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
Stage 1	180	10.78	164	9.80	165	9.92	233	12.93	219	11.90
Stage 2	593	35.51	629	37.57	605	36.36	645	35.79	730	39.65
Stage 3	761	45.57	737	44.03	770	46.27	755	41.90	744	40.41
Stage 4	113	6.77	118	7.05	106	6.37	128	7.10	123	6.68
Stage 5	23	1.38	26	1.55	18	1.08	41	2.28	25	1.36

**Figure 5.6.3:** CKD stages by year



**Figure 5.6.4:** BMI, 2007-2011



### 5.6.4 Body Mass Index

In 2011, 55.2% of renal transplant recipients had BMIs of 25 or below. However 30.6% were overweight and another 14.2% were obese.

There is a slow but steady increase in numbers of obese patients over the last few years.

**Table 5.6.4:** BMI, 2007-2011

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
<20	260	15.40	256	15.08	252	14.87	284	15.51	267	14.02
20-25	658	38.98	725	42.70	723	42.65	725	39.60	785	41.21
25-30	530	31.40	500	29.45	498	29.38	566	30.91	583	30.60
>30	240	14.22	217	12.78	222	13.10	256	13.98	270	14.17

### 5.6.5 LDL cholesterol

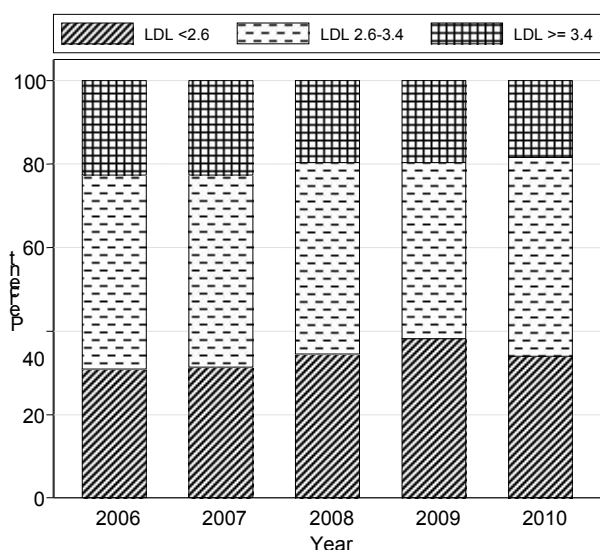
LDL cholesterol has been identified as the primary lipid target for prevention of coronary heart disease by NCEP with a log linear relationship between risk of CHD and level of LDL cholesterol.

In 2011, 31.9% of our renal transplant recipients have LDL levels below 2.6 mol/l. This has been relatively the same since 2006. Whether or not this translates into less cardiovascular mortality in the transplant population is still questionable. Patients with serum LDL >3.4 also demonstrated downward trend over the last few years. In terms of other cholesterol parameters, 48.3% had total cholesterol levels < 5.2 and 7 % had HDL cholesterol levels < 1.0 .

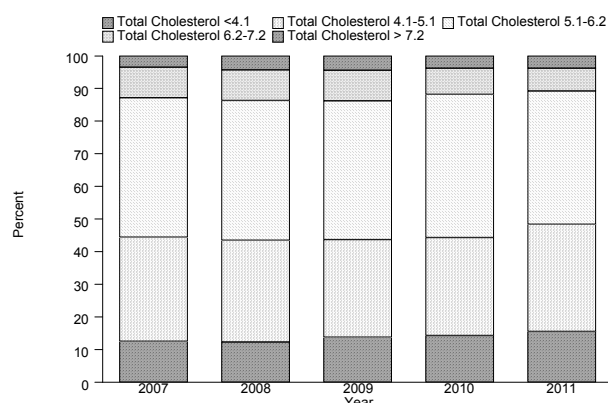
**Table 5.6.5(a):** LDL, 2007-2011

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
< 2.6	528	31.28	586	34.51	648	38.23	619	33.81	608	31.92
2.6-3.4	779	46.15	779	45.88	715	42.18	872	47.62	960	50.39
≥ 3.4	381	22.57	333	19.61	332	19.59	340	18.57	337	17.69

**Figure 5.6.5(a):** LDL, 2007-2011



**Figure 5.6.5(b):** Total cholesterol, 2007-2011



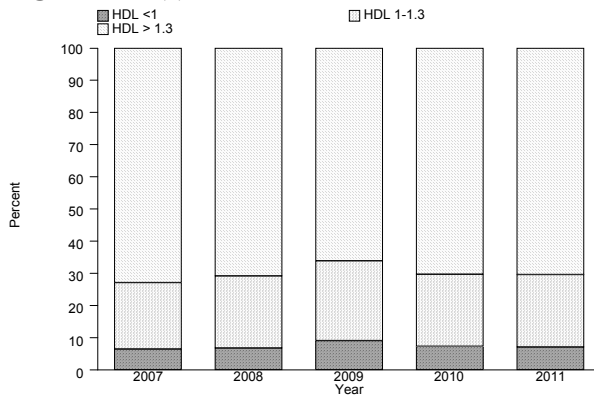
**Table 5.6.5(b):** Total cholesterol, 2007-2011

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
<4.1	210	12.44	208	12.25	233	13.75	261	14.25	296	15.54
4.1-5.1	539	31.93	529	31.15	507	29.91	549	29.98	625	32.81
5.1-6.2	721	42.71	728	42.87	721	42.54	804	43.91	779	40.89
6.2- 7.2	159	9.42	160	9.42	159	9.38	148	8.08	132	6.93
> 7.2	59	3.50	73	4.30	75	4.42	69	3.77	73	3.83

**Table 5.6.5(c): HDL, 2007-2011**

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
<1	108	6.40	114	6.71	153	9.03	133	7.26	134	7.03
1-1.3	350	20.73	382	22.50	421	24.84	410	22.39	429	22.52
>1.3	1230	72.87	1202	70.79	1121	66.14	1288	70.34	1342	70.45

**Figure 5.6.5(c): HDL, 2007-2011**



**5.6.6: Blood Pressure Control**

In 2011, 82% of patients were on antihypertensives; 31% were on 1 antihypertensive drug, 32% on 2 antihypertensives and 14% on 3 antihypertensives. Six percent of patients still had systolic BP of > 160 mmHg and 14% had diastolic BP of > 90 mmHg despite being given antihypertensive(s). This is an improvement from previous years.

**Table 5.6.6(a): Treatment for hypertension, 2007-2011**

Year	n	% on anti-hypertensives	% on 1 anti-hypertensive drug	% on 2 anti-hypertensives	% on 3 anti-hypertensives
2007	1688	85	25	31	21
2008	1698	78	25	28	19
2009	1695	81	29	29	17
2010	1831	82	34	27	15
2011	1905	83	31	32	14

**Table 5.6.6(b): Distribution of systolic BP without anti-hypertensives, 2007-2011**

Year	n	Mean	SD	Median	LQ	UQ	% Patients ≥ 160mmHg
2007	196	125.2	16.5	120	113	134	4
2008	178	123.7	15.5	120	110	130	3
2009	230	123.9	15.3	120	111	130	3
2010	273	128.8	42.3	123	117	136	4
2011	283	124.2	15.1	122	112	130	2



**Table 5.6.6(c):** Distribution of diastolic BP without anti-hypertensives, 2007-2011

Year	n	Mean	SD	Median	LQ	UQ	% patients $\geq$ 90mmHg
2007	196	76.6	10	80	70	80	12
2008	177	75.1	10	80	70	80	10
2009	230	77.4	9.1	80	70	80	12
2010	272	76.9	10.5	80	70	82	15
2011	283	76.9	9	80	70	80	10

**Table 5.6.6(d):** Distribution of systolic BP on anti-hypertensives, 2007-2011

Year	n	Mean	SD	Median	LQ	UQ	% Patients $\geq$ 160mmHg
2007	1389	132.6	16	130	120	140	8
2008	1269	129.9	16.6	130	120	140	6
2009	1222	131	15.9	130	120	140	5
2010	1352	130.1	16.1	130	120	140	6
2011	1451	131.1	16	130	120	140	6

**Table 5.6.6(e):** Distribution of diastolic BP on anti-hypertensives, 2007-2011

Year	n	Mean	SD	Median	LQ	UQ	% Patients $\geq$ 90 mmHg
2007	1388	79.1	9.6	80	70	85	20
2008	1255	77.6	10	80	70	80	16
2009	1220	78.3	9.5	80	70	82	16
2010	1347	77.9	21.3	80	70	82	14
2011	1451	77.7	9.8	80	70	83	14

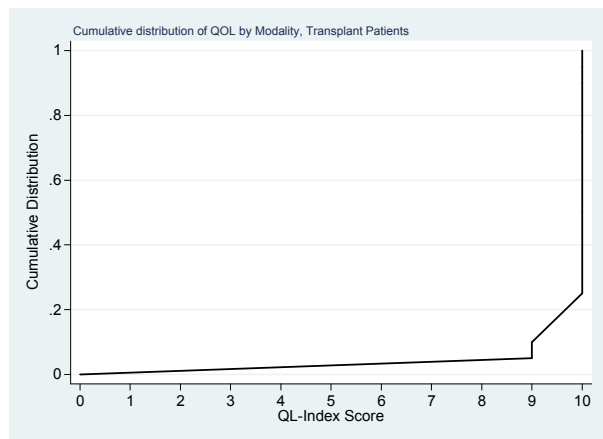
**SECTION 5.7: QOL INDEX SCORE IN RENAL TRANSPLANT RECIPIENTS**

1276 patients who were transplanted between 2002-2011 were analyzed for QoL index score. They reported median QoL index score of 10 (Table 5.7.1 and Figure 5.7.1). It was interesting to note that for those who underwent renal transplantation within this period, diabetics and non-diabetics had the same median QoL index score of 10 (Table 5.7.2 and Figure 5.7.2), and this is in contrast to HD and CAPD patients where diabetics reported lower QoL index score than non-diabetics. There was also no difference seen for gender (Table 5.7.3 and Figure 5.7.3) and age (Table 5.7.4 and Figure 5.7.4). It is worthwhile to note that those above 60 years old also enjoyed the same QoL index score (10) as their younger counterparts (Table 5.7.4 and Figure 5.7.4). This trend of high QoL index score among renal transplant patients was maintained over the last 10 years (Table 5.7.5 and Figure 5.7.5).

**Table 5.7.1:** Cumulative distribution of QoL-Index score in relation to dialysis modality, transplant recipient patients 2002-2011

Dialysis modality	QoL score
Number of patients	1276
Centile	
0	0
0.05	9
0.1	9
0.25 (LQ)	10
0.5 (median)	10
0.75 (UQ)	10
0.9	10
0.95	10
1	10

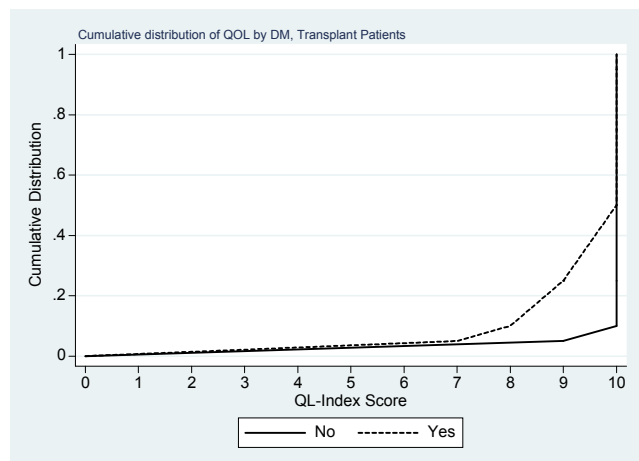
**Figure 5.7.1:** Cumulative distribution of QoL-Index score in relation to dialysis modality, transplant recipient patients 2002-2011



**Table 5.7.2:** Cumulative distribution of QoL-Index score in relation to diabetes mellitus, transplant recipient patients 2002-2011

Diabetes mellitus	No	Yes
Number of patients	1240	36
Centile		
0	0	0
0.05	9	7
0.1	10	8
0.25 (LQ)	10	9
0.5 (median)	10	10
0.75 (UQ)	10	10
0.9	10	10
0.95	10	10
1	10	10

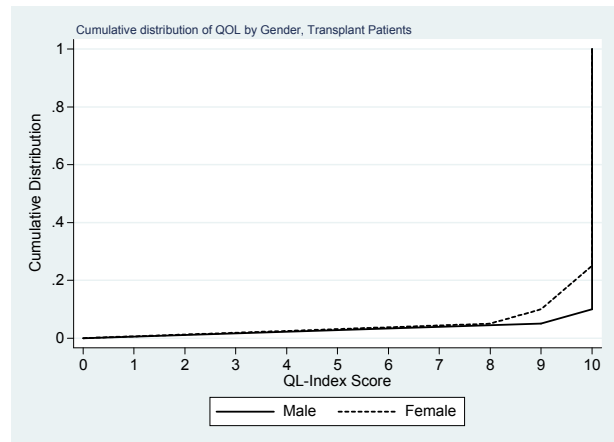
**Figure 5.7.2:** Cumulative distribution of QoL-Index score in relation to diabetes mellitus, transplant recipient patients 2002-2011



**Table 5.7.3:** Cumulative distribution of QoL-Index score in relation to gender, transplant recipient patients 2002-2011

Gender	Male	Female
Number of patients	810	466
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

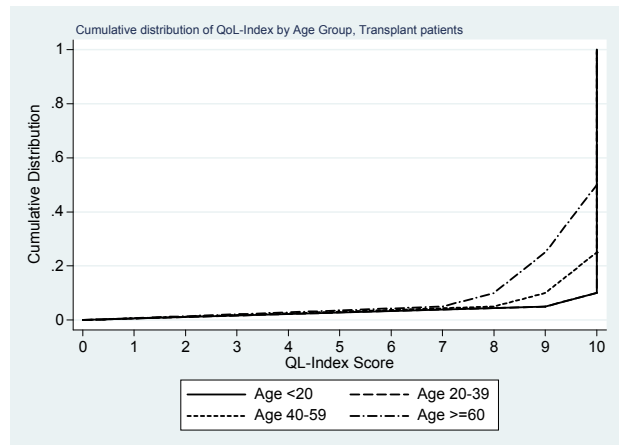
**Figure 5.7.3:** Cumulative distribution of QoL-Index score in relation to gender, transplant recipient patients 2002-2011



**Table 5.7.4:** Cumulative distribution of QoL-Index score in relation to age, transplant recipient patients 2002-2011

Age group (years)	<20	20-39	40-59	≥60
Number of patients	141	482	561	92
Centile				
0	0	0	0	0
0.05	9	9	8	7
0.1	10	10	9	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 5.7.4:** Cumulative distribution of QoL-Index score in relation to age, transplant recipient patients 2002-2011



**Table 5.7.5:** Cumulative distribution of QoL-Index score in relation to year of entry, transplant recipient patients 2002-2011

Year of Entry	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of patients	145	138	169	154	139	99	111	127	111	83
Centile										
0	0	0	0	0	0	0	0	0	0	0
0.05	9	8	9	9	9	8	8	9	6	9
0.1	10	9	9	10	9	9	10	10	9	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

**Figure 5.7.5:** Cumulative distribution of QoL-Index score in relation to year of entry, transplant recipient patients 2002-2011

