

CHAPTER 13

Renal Transplantation

Rosnawati Yahya

Ng Kok Peng

Suryati Binti Yakaob

Mohd Zaimi Abd Wahab

Yee Seow Ying

Wong Hin Seng

SECTION 13.1: STOCK AND FLOW

The number of new transplant patients decreased from 113 in 2007 to its lowest in 2016 with only 82 transplant surgeries performed in 2016. This substantial reduction in the number of new transplants was predominantly due to reduction in the number of transplantation performed in Kuala Lumpur and Selayang Hospital which have been the main transplant centres in Malaysia. The number of transplant performed in China has remained relatively static. However, there was an increase in the number of transplant performed in other overseas countries. It is disturbing to observe that the number of new transplants decreased by 41% with only 48 transplants performed in 2016.

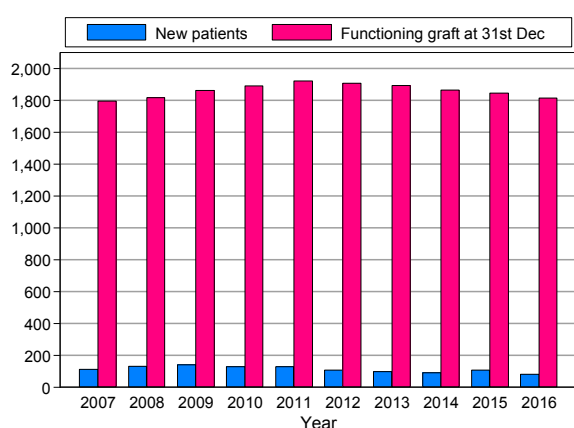
The number of functioning renal transplants had increased by 8% from 1795 in 2007 to 1922 in 2011 and declined steadily from 2011 onwards with 1814 functioning renal transplants in 2016 (Table 13.1.1).

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, 2007-2016

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
New transplant patients	113	131	141	128	130	107	99	91	108	82
Died	46	59	49	48	55	64	57	65	67	49
Graft failure	38	39	37	45	40	46	49	45	55	54
Lost to Follow up	8	11	10	5	5	11	7	9	5	12
Functioning graft at 31 st December	1795	1817	1862	1892	1922	1908	1894	1866	1847	1814

Figure 13.1.1: Stock and flow of renal transplantation, 2007-2016



The incidence rate of renal transplantation had remained static in the last ten years which is between 3 to 5 per million population (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), 2007-2016

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
New transplant patients	113	131	141	128	130	107	99	91	108	82
New transplant rate, pmp	4	5	5	4	4	4	3	3	4	3

Table 13.1.3: Transplant prevalence rate per million population (pmp), 2007-2016

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Functioning graft at 31 st December	1795	1817	1862	1892	1922	1908	1894	1866	1847	1814
Transplant prevalence rate, pmp	66	66	67	66	66	65	64	62	61	59

The transplant prevalence rate continue to drop over the last 10 years at 66 per million population in 2007 to 59 per million population in 2016 (Table & Figure 13.1.3).

Figure 13.1.2: New transplant rate, 2007-2016

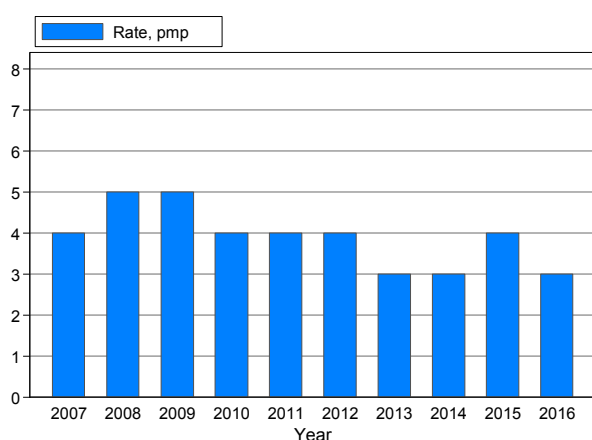
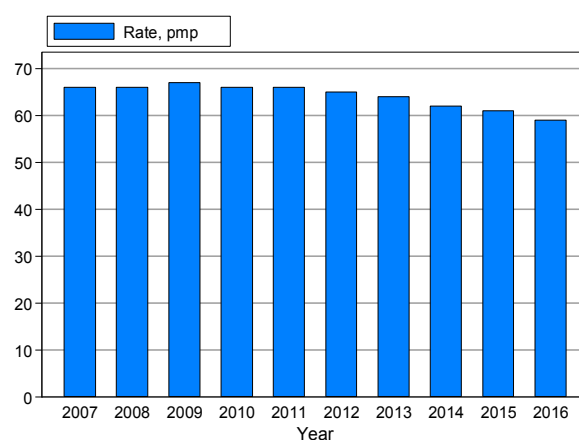


Figure 13.1.3: Transplant prevalence rate, 2007-2016



Transplantation in local centers increased with 51 transplants performed in 2006, increasing to 86 transplants in 2010. Unfortunately, this increase was not sustained and the number of renal transplants performed in local centers had remained static in 2012 and 2013, and subsequently decline to its lowest level at 48 transplants performed in 2016. This is disturbing 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 was encouraging to see that the number of transplants performed in China continued to drop from 65 cases (49.6%) in 2008 down to 10 cases (10.1 %) in 2013. Unfortunately, the figure rose to 16 cases (14.8%) in 2016. It is worrying to see the number of transplants performed in other overseas centres continue to increase with 21 cases reported in 2016 (Table 13.1.4 and Figure 13.1.4 (a)). The number of transplants performed in Hospital Kuala Lumpur dropped significantly from 39 transplants in 2015 to only 18 transplant in 2016. Similar trend was seen in Selayang Hospital from 26 transplants performed in 2015 to only 9 transplants erformed in 2016 The number of transplants performed in University Malaya Medical Centre is showing an encouraging improvement with 8 tranplants in 2010 to 17 transplants in 2016 (Table 13.1.4 and Figure 13.1.4 (b)).

Figure 13.1.4(a): Places of transplantation, 2007-2016

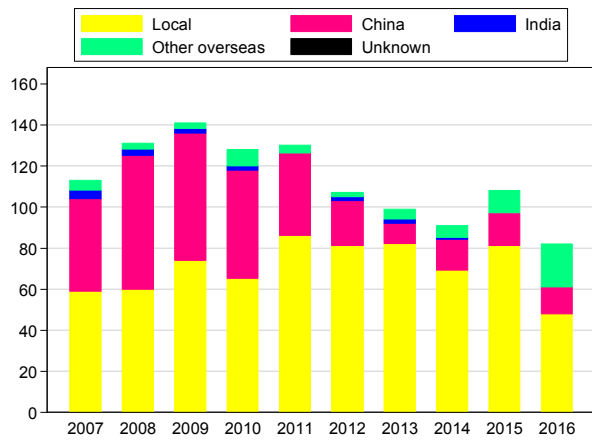


Figure 13.1.4(b): Place of transplantation within Malaysia

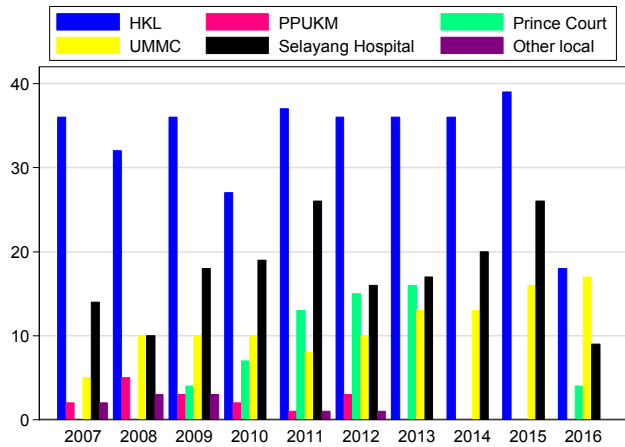


Table 13.1.4: Place of transplantation, 2007-2016

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
HKL	36	31.9	32	24.4	36	25.5	27	21.1	37	28.5
PPUKM	2	1.8	5	3.8	3	2.1	2	1.6	1	0.8
Prince Court Medical Centre	0	0	0	0	4	2.8	7	5.5	13	10
UMMC	5	4.4	10	7.6	10	7.1	10	7.8	8	6.2
Selayang Hospital	14	12.4	10	7.6	18	12.8	19	14.8	26	20
Other local	2	1.8	3	2.3	3	2.1	0	0	1	0.8
China	45	39.8	65	49.6	62	44	53	41.4	40	30.8
India	4	3.5	3	2.3	2	1.4	2	1.6	0	0
Other overseas	5	4.4	3	2.3	3	2.1	8	6.3	4	3.1
Unknown	0	0	0	0	0	0	0	0	0	0
Total	113	100	131	100	141	100	128	100	130	100

Year	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
HKL	36	33.6	36	36.4	36	39.6	39	36.1	18	22
PPUKM	3	2.8	0	0	0	0	0	0	0	0
Prince Court Medical Centre	15	14	16	16.2	0	0	0	0	4	4.9
UMMC	10	9.3	13	13.1	13	14.3	16	14.8	17	20.7
Selayang Hospital	16	15	17	17.2	20	22	26	24.1	9	11
Other local	1	0.9	0	0	0	0	0	0	0	0
China	22	20.6	10	10.1	15	16.5	16	14.8	13	15.9
India	2	1.9	2	2	1	1.1	0	0	0	0
Other overseas	2	1.9	5	5.1	6	6.6	11	10.2	21	25.6
Unknown	0	0	0	0	0	0	0	0	0	0
Total	107	100	99	100	91	100	108	100	82	100

SECTION 13.2: RECIPIENTS' CHARACTERISTICS

Over the last 10 years, the mean age of recipients at the time of transplantation increased steadily from 37 years to 44 years. More male patients underwent renal transplantation yearly (Table 13.2.1). For the past ten years, the proportion of diabetic patients who underwent renal transplantation decreased slowly from 18% in 2006 and only 12% in 2015, however there was a rebound in the number of diabetic patients who went for transplant in 2016. Patients with hepatitis B had decreased from 7% earlier to 0-6% yearly in the last 3 years. The overall number of patients with hepatitis C who went for renal transplantation remained low which ranged from 1 % to 9% yearly

In terms of underlying cause of end stage renal failure (Table 13.2.2), the commonest cause was glomerulonephritis (GN), hypertension followed by diabetes. The proportion of transplant recipients having end stage renal disease due to unknown causes had decreased from 44% in 2006 to 15% in 2016.

Table 13.2.1: Renal transplant recipients' characteristics, 2007-2016

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
New Transplant Patients	113	131	141	128	130	107	99	91	108	82
Age at transplant (years), Mean	37	37	38	40	38	37	35	39	42	44
Age at transplant (years), SD	16	14	14	14	15	13	13	13	13	14
% Male	64	60	64	66	70	60	62	55	58	66
% Diabetic (co-morbid/ primary renal disease)	14	18	18	19	14	18	13	12	12	24
% HBsAg positive	7	3	2	4	3	3	0	4	1	6
% Anti-HCV positive	9	3	7	3	3	1	3	4	5	2

Table 13.2.2: Primary causes of end stage renal failure, 2007-2016

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
New transplant patients	113		131		141		128		130	
Glomerulonephritis	38	34	41	31	55	39	49	38	35	27
Diabetes Mellitus	13	12	20	15	26	18	20	16	19	15
Hypertension	38	34	32	24	40	28	46	36	46	35
Obstructive uropathy	6	5	6	5	6	4	7	5	7	5
ADPKD	3	3	1	1	8	6	5	4	3	2
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	46	41	60	46	44	31	38	30	55	42
Others	0	0	6	5	0	0	5	4	5	4

Table 13.2.2: Primary causes of end stage renal failure, 2007-2016 ('cont)

Year	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
New transplant patients	107		99		91		108		82	
Glomerulonephritis	37	35	41	41	32	35	48	44	34	41
Diabetes Mellitus	17	16	13	13	9	10	12	11	15	18
Hypertension	29	27	17	17	26	29	38	35	38	46
Obstructive uropathy	11	10	4	4	3	3	5	5	0	0
ADPKD	2	2	4	4	2	2	3	3	2	2
Drugs/ toxic nephropathy	0	0	2	2	1	1	0	0	1	1
Hereditary nephritis	0	0	0	0	3	3	1	1	0	0
Unknown	30	28	29	29	21	23	20	19	12	15
Others	3	3	2	2	8	9	1	1	3	4

SECTION 13.3: TRANSPLANT PRACTICES

13.3.1: Type of renal transplantation

The proportion of commercial transplantation had reduced in time from 44.2 % in 2007 to 39 % in 2016. This was predominantly due to the marked decline in commercial cadaveric transplantation (39.8% in 2007 to 4 % in 2013). However, since 2014, the percentage of commercial cadaveric transplantation has slowly increased to 12.2% in 2016. There number of commercial living transplantation fluctuated from 4.4 % in 2007, peaked at 26.6 % in 2010 gradually decline then but slowly increase and peaked at 26.8 % in 2016.

Local cadaveric transplantation made up 11% of transplants (9 recipients) in 2016, which was the lowest number ever seen in the last ten years.

Local living donor transplantation had shown an initial rise from 36 transplants in 2007, peaked at 63 transplants (67.3%) in 2013. Unfortunately, this rise was not sustained and the number of local living donor transplants dropped to 35 (31.3%) recipients in 2014 and 30 (27.4%) in 2015. In 2016, there was a rise in number of local living donor transplants, 41 recipients (50% out of all renal transplantations).

The year 2007 marked the first time where there were more local transplants (55%) compared to overseas commercial transplants (45%). Since then, the proportion of local transplants continued to rise which peaked in 2013 with 86.9% of the total transplantation performed locally. However, then onwards proportion declined slowly with 79.2% in 2014, 75% in 2015 and 61% in 2016. The declined in numbers were mainly due to lower number of renal transplant operations in 2014-2015 for various technical reasons.

Table 13.3.1: Type of renal transplantation, 2007-2016

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
Commercial cadaver donor	45	39.8	62	47.3	38	27.0	22	17.2	10	7.7
Commercial live donor	5	4.4	3	2.3	26	18.4	34	26.6	32	24.6
Live donor (genetically related)	22	19.5	36	27.5	27	19.1	25	19.5	32	24.6
Live donor (emotionally related)	14	12.4	6	4.6	15	10.6	13	10.2	16	12.3
Cadaver donor	27	23.9	24	18.3	35	24.8	34	26.6	40	30.8
Total	113	100.0	131	100.0	141	99.9	128	100.1	130	100.0

Year	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
Commercial cadaver donor	7	6.5	4	4.0	7	7.7	11	10.2	10	12.2
Commercial live donor	18	16.8	9	9.1	12	13.2	16	14.8	22	26.8
Live donor (genetically related)	37	34.6	48	48.5	24	26.4	22	20.4	27	32.9
Live donor (emotionally related)	16	15.0	15	15.2	9	9.9	8	7.4	14	17.1
Cadaver donor	29	27.1	23	23.2	39	42.9	51	47.2	9	11.0
Total	107	100.0	99	100.0	91	100.1	108	100.0	82	100.0

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

13.3.2: Biochemical data

Table 13.3.2 summarised the biochemical data for all the transplant recipients from 2012 to 2016.

Table 13.3.2 Biochemical data, 2012 to 2016.

Biochemical parameter	Summary	2012	2013	2014	2015	2016
Creatinine, umol/L	n	1688	1698	1695	1831	1872
	Mean	130.5	131.2	128.1	129.7	126.7
	SD	69.3	76.6	62.8	79.7	74.4
	Median	116	115	115	112	110
	Minimum	36	29	11	10	10
	Maximum	922	898	657	882	970
Hb, g/dL	n	1688	1698	1695	1831	1872
	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	5.2	4.5
	Maximum	18.7	18.6	18.5	18.5	18.9
Albumin, g/L	n	1688	1698	1695	1831	1872
	Mean	40.3	39.9	39.6	39.2	39.7
	SD	4.5	4.6	4.8	4.6	4.3
	Median	40	40	40	40	40
	Minimum	20	19	20	20	19
	Maximum	57	54	56	64	52
Calcium, mmol/L	n	1688	1698	1695	1831	1872
	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	1.0	1.1	1.1	1.0
	Maximum	3.2	3.5	3.3	3.2	4.0
Phosphate, mmol/L	n	1688	1698	1695	1831	1872
	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	3.0
Alkaline phosphate (ALP), U/L	n	1688	1698	1695	1831	1872
	Mean	79.6	79.1	80.1	82.7	81.4
	SD	39.8	46.5	45.3	58.6	42.9
	Median	72.5	72.0	73.0	73.0	73.0
	Minimum	22	20	21	20	21
	Maximum	508	985	732	964	650
ALT, U/L	n	1688	1698	1695	1831	1872
	Mean	29.6	29.9	29.7	26.9	26.4
	SD	25.7	37.8	32.5	25.1	22.1
	Median	23	23	24	21	21
	Minimum	4	4	4	4	4
	Maximum	356	881	881	410	371
Total cholesterol, mmol/L	n	1688	1698	1695	1831	1872
	Mean	5.2	5.4	5.2	5.2	5.1
	SD	1.0	2.9	1.5	1.5	1.1
	Median	5.1	5.1	5.1	5.1	5.1
	Minimum	1.7	2.0	0.7	1.3	1.0
	Maximum	11.4	58.0	46.0	49.0	14.9

Table 13.3.2 summarised the biochemical data for all the transplant recipients from 2012 to 2016. ('cont.)

Biochemical parameter	Summary	2011	2012	2013	2014	2015
LDL cholesterol, mmol/L	n	1688	1698	1695	1831	1872
	Mean	2.9	2.8	2.8	2.8	2.9
	SD	0.8	0.8	1.0	0.9	0.8
	Median	2.8	2.8	2.8	2.8	2.8
	Minimum	1.0	0.9	0.9	0.9	1.0
	Maximum	8.9	7.7	10.8	10.4	12.2
HDL cholesterol, mmol/L	n	1688	1698	1695	1831	1872
	Mean	1.5	1.6	1.5	1.5	1.5
	SD	0.4	0.5	0.5	0.5	0.5
	Median	1.5	1.5	1.5	1.5	1.5
	Minimum	0.4	0.5	0.4	0.4	0.5
	Maximum	7.5	7.5	6.9	6.8	9.0
Systolic blood pressure, mmHg	n	1688	1698	1695	1831	1872
	Mean	131.6	129.4	130.1	129.7	130.1
	SD	15.7	15.3	14.7	14.8	15.4
	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	1872
	Mean	78.8	77.5	78.1	77.5	77.6
	SD	9.3	8.9	8.7	9.1	9.2
	Median	80.0	78.2	79.0	78.2	80.0
	Minimum	30	42	40	30	30
	Maximum	116	120	120	124	114

13.3.3: Immunosuppression medications

Majority of patients were on combination immunosuppression with very small numbers on single immunosuppression drugs either prednisolone predominantly, followed by calcineurin inhibitors, antiproliferative agents and proliferation signal inhibitor (PSI).

Calcineurin-inhibitor based therapy remained the mainstay immunosuppressive therapy with 86% of patients receiving it in 2016. Cyclosporin was the most widely used calcineurin inhibitors until 2013. However, there was a gradual decline in cyclosporine usage with 51% in 2012 to 36% in 2016 which coincided with the increasing use of tacrolimus, of which 39% in 2012 to 45% in 2014 and 50% in 2016.

The usage of anti-proliferative agents had shown similar trend over the last 5 years. The used of azathioprine continue to decline from 15% in 2012 to 12% in 2015 and remain static in 2016. The use of mycophenolic acid fluctuated between 61 to 68% from 2012 to 2016. (Figure 13.3.3)

The use of proliferation signal inhibitor (PSI) has increased slowly in time from 6% in 2012 to 9% in 2016.

Table 13.3.3: Immunosuppressive Medications, 2012-2016

Medication data	Single drug treatment									
	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
All	1881	100	1933	100	1922	100	1906	100	1827	100
(i) Immunosuppressive drug(s) treatment										
Prednisolone	18	1	12	1	18	1	18	1	37	2
Cyclosporin A	6	0	7	0	3	0	7	0	6	0
Tacrolimus (FK506)	3	0	2	0	4	0	7	0	6	0
Azathioprine	0	0	1	0	2	0	0	0	0	0
MPA	4	0	4	0	1	0	3	0	6	0
PSI	0	0	4	0	2	0	0	0	4	0
Others	0	0	0	0	0	0	0	0	0	0

Medication data	Combined drug treatment									
	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
All	1881	100	1933	100	1922	100	1906	100	1827	100
(i) Immunosuppressive drug(s) treatment										
Prednisolone	1786	95	1826	94	1826	95	1786	94	1731	95
Cyclosporin A	950	51	898	46	837	44	781	41	664	36
Tacrolimus (FK506)	725	39	811	42	862	45	917	48	905	50
Azathioprine	290	15	320	17	266	14	238	12	226	12
MPA	1213	64	1294	67	1310	68	1251	66	1116	61
PSI	107	6	112	6	110	6	143	8	165	9
Others	0	0	2	0	0	0	0	0	0	0

13.3.4: Non immunosuppression medications

In terms of non-immunosuppressive medications, calcium channel blockers are the most commonly used antihypertensive as a single or combination agent contributing to 65% of usage. This is followed by beta blockers with 42% of patients on it either alone or in combination with other medications in 2016.

The use of ACE inhibitors or angiotensin receptor blocker or both showed 10% increment over the last 5 years; 35% of patients were on ACE inhibitors or angiotensin II receptor blockers (AIIRB) or both in 2012 and this has increased to 40 % in 2014 and 45% in 2016. The usage of alpha blockers either as single drug or in combination has been consistently low as there may be an associated risk of heart failure with usage of the drug.

Despite CAD related death is high amongst recipients, the usage of anti-lipid remains very low. (I have doubt with this data)

Table 13.3.4: Non immunosuppressive medications, 2012-2016

Medication data	Single drug treatment									
	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
All	1881	100	1933	100	1922	100	1906	100	1827	100
Non Immunosuppressive drug(s) treatment										
Alpha blocker	14	1	18	1	20	1	19	1	15	1
Beta blocker	200	11	193	10	166	9	166	9	168	9
Calcium channel blocker	338	18	303	16	345	18	329	17	329	18
ACE inhibitor	90	5	105	5	98	5	71	4	81	4
ARBs	65	3	91	5	69	4	89	5	105	6
Anti-lipid	1	0	3	0	1	0	0	0	1	0
Other antihypertensive	9	0	6	0	2	0	4	0	1	0

Medication data	Combined drug treatment									
	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
All	1881	100	1933	100	1922	100	1906	100	1827	100
Non Immunosuppressive drug(s) treatment										
Alpha blocker	121	6	150	8	160	8	138	7	135	7
Beta blocker	619	33	659	34	646	34	620	33	604	33
Calcium channel blocker	835	44	851	44	942	49	901	47	866	47
ACE inhibitor	278	15	342	18	329	17	292	15	324	18
ARBs	231	12	280	14	261	14	305	16	306	17
Anti-lipid	3	0	5	0	2	0	1	0	3	0
Other antihypertensive	32	2	26	1	20	1	16	1	12	1

SECTION 13.4: TRANSPLANT OUTCOMES

13.4.1: Post transplant complications

Hypertension remained as the most common comorbidity seen in the kidney transplant recipients pre and post-transplantation with 53% and 33% respectively. Only 12% of the patients had diabetes pre-transplant. 6% either developed diabetes post operatively or had existing diabetes as a comorbid after the transplant. Future data should focus on the development of NODAT and try to explain the discrepancy between the drop in proportion of patients with diabetes pre and post-operatively. In terms of cardiovascular and cerebrovascular disease, 3% had either or both prior to transplant and another 2% developed these complications post transplanted. This should raise concerns with regards to the detection of cardiovascular diseases as the proportion diagnosed were small given that cardiovascular event was the third most common cause of death in our transplant recipients. Cancer remains uncommon both before and after transplantation.

Table 13.4.1: Post transplant complications, 2012-2016

	Pre transplant									
	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
All patients	1784	100	1845	100	1832	100	1792	100	1752	100
Diabetes (either as primary renal disease or comorbid)	252	14	253	14	243	13	231	13	218	12
Cancer	2	0	2	0	1	0	1	0	1	0
Cardiovascular disease + cerebrovascular disorder	54	3	50	3	46	3	45	3	48	3
Hypertension	1004	56	1034	56	992	54	955	53	920	53

	Post transplant									
	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
All patients	1784	100	1845	100	1832	100	1792	100	1752	100
Diabetes (either as primary renal disease or comorbid)	105	6	100	5	125	7	145	8	99	6
Cancer	11	1	15	1	18	1	19	1	21	1
Cardiovascular disease + cerebrovascular disorder	26	1	30	2	40	2	32	2	40	2
Hypertension	492	28	538	29	582	32	557	31	582	33

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

13.4.2: Deaths and graft loss

In 2016, 49 transplant recipients died and 54 lost their grafts. The annual rates of transplant death dropped to 2.7% while grafts lost remained static at 3% (Table 13.4.2).

The main cause of death in 2016 was unknown in 29% of the transplant recipients. This was followed by infection with 28% and cardiovascular with 26% respectively. The proportion of patients who died from infection showed an improvement but the proportions of unknown causes were much higher in 2016 compared to 2015. Establishing the cause of death will be important to devise a better management plan for our patients. The proportion of patient who died at home, which was usually presumed to be cardiovascular related was 7%. Death due to cancers in 2016 contributed to 10% of all deaths (Table 13.4.3).

Majority of the graft losses had an unknown cause with 43%. Rejection was second with 24% followed by chronic allograft nephropathy/IFTA with 13% (Table 13.4.4). Determining the cause of graft loss is of utmost importance to better understand the reasons for graft failure in our population. Therefore, the need to diagnose them appropriately should be attempted whenever possible.

Table 13.4.2: Transplant patient death rate and graft loss, 2007-2016

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Number at risk	1794	1805	1839	1876	1906	1914	1900	1879	1856	1816
Transplant death	46	59	49	48	55	64	57	65	67	49
Transplant death rate %	2.6	3.3	2.7	2.6	2.9	3.3	3	3.5	3.6	2.7
Graft loss	38	39	37	45	40	46	49	45	55	54
Graft loss rate %	2.1	2.2	2	2.4	2.1	2.4	2.6	2.4	3	3
Acute rejection	14	24	32	81	53	20	0	0	0	0
Acute rejection rate %	0.8	1.3	1.7	4.3	2.8	1	0	0	0	0
All losses	84	98	86	93	95	110	106	110	122	103
All losses rate %	4.7	5.4	4.7	5	5	5.7	5.6	5.9	6.6	5.7

*Graft loss=graft failure

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

Figure 13.4.2(a): Transplant recipient death rate, 2007-2016

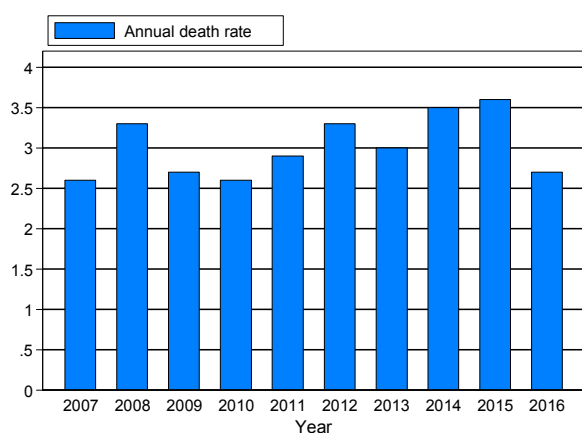


Figure 13.4.2(b): Transplant recipient graft loss rate, 2007-2016

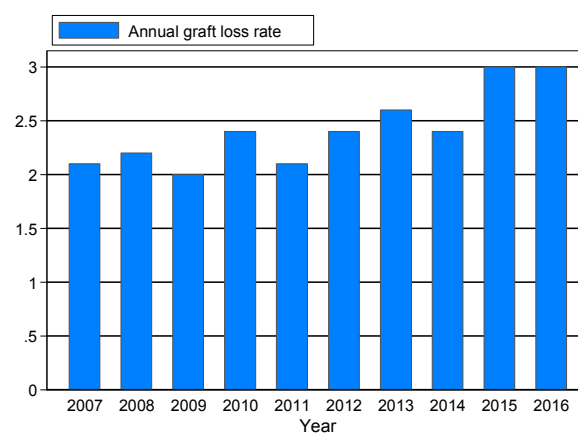


Table 13.4.3: Causes of death in transplant recipients, 2007-2016

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
Cardiovascular	11	24	12	20	11	22	11	23	10	18
Died at home	4	9	10	17	8	16	7	15	4	7
Infection	18	39	19	32	19	39	18	38	21	38
Graft failure	0	0	0	0	0	0	0	0	0	0
Cancer	4	9	9	15	6	12	6	13	5	9
Liver disease	0	0	0	0	2	4	2	4	2	4
Accidental death	0	0	0	0	0	0	0	0	0	0
Others	1	2	3	5	1	2	1	2	6	11
Unknown	15	33	13	22	9	18	12	25	14	25
Total	46	100	59	100	49	100	48	100	55	100

Year	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
Cardiovascular	12	19	10	18	13	20	15	22	11	22
Died at home	5	8	6	11	4	6	4	6	4	8
Infection	28	44	22	39	26	40	24	36	13	27
Graft failure	0	0	2	4	1	2	2	3	1	2
Cancer	7	11	8	14	4	6	5	7	5	10
Liver disease	4	6	3	5	1	2	2	3	1	2
Accidental death	0	0	0	0	0	0	0	0	2	4
Others	2	3	0	0	0	0	1	1	1	2
Unknown	14	22	11	19	17	26	20	30	14	29
Total	64	100	57	100	65	100	67	100	49	100

Table 13.4.4: Causes of graft failure, 2007-2016

Year	2007		2008		2009		2010		2011	
	n	%	n	%	n	%	n	%	n	%
Rejection	23	61	22	56	20	54	18	40	14	35
Calcineurin toxicity	1	3	0	0	0	0	1	2	1	3
Other drug toxicity	0	0	0	0	1	3	1	2	0	0
Ureteric obstruction	0	0	0	0	0	0	0	0	0	0
Infection	0	0	2	5	0	0	0	0	0	0
Vascular causes	1	3	4	10	1	3	2	4	1	3
Recurrent/ de novo renal disease	0	0	1	3	0	0	1	2	0	0
Chronic allograft nephropathy / IFTA	0	0	0	0	0	0	0	0	0	0
Technical problem	0	0	0	0	0	0	0	0	0	0
Others	2	5	2	5	0	0	2	4	4	10
Unknown	11	29	11	28	15	41	21	47	22	55
Total	38	100	39	100	37	100	45	100	40	100

Year	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
Rejection	22	48	27	55	30	67	21	38	13	24
Calcineurin toxicity	4	9	3	6	1	2	2	4	4	7
Other drug toxicity	0	0	0	0	0	0	0	0	0	0
Ureteric obstruction	0	0	1	2	0	0	0	0	0	0
Infection	1	2	0	0	2	4	1	2	5	9
Vascular causes	2	4	1	2	1	2	3	5	4	7
Recurrent/ de novo renal disease	1	2	3	6	2	4	3	5	3	6
Chronic allograft nephropathy / IFTA	0	0	0	0	3	7	8	15	7	13
Technical problem	0	0	0	0	0	0	1	2	1	2
Others	1	2	3	6	2	4	3	5	2	4
Unknown	20	43	16	33	8	18	20	36	23	43
Total	46	100	49	100	45	100	55	100	54	100

SECTION 13.5: PATIENT AND GRAFT SURVIVAL

13.5.1: Patient survival

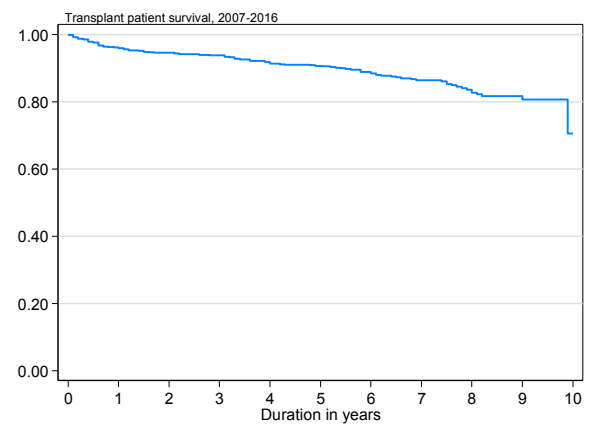
Patient survival rates from 2007 – 2016 were 96% at year 1, 90% at year-5 and 71% at year-10 post transplantation.

Risk factors affecting patient survival were primary diagnosis and type of transplant. Patients with deceased donor renal transplantation had higher risk of mortality compared to living renal transplant.

Table 13.5.1(a): Patient survival, 2007-2016

Interval (years)	n	% Survival	SE
0	1130	100	
1	955	96	1
2	837	95	1
3	745	94	1
4	631	91	1
5	526	90	1
6	401	88	1
7	291	86	1
8	181	83	2
9	84	81	2
10	5	71	10

Figure 13.5.1(a): Patient survival, 2007-2016



*n=Number at risk SE=standard error

Table 13.5.1(b): Risk factors for transplant recipient mortality 2007-2016

Factors	n	Hazard Ratio	95% CI	P value
Year of transplant				
2007-2011 ^(ref*)	479	1.000		
2012-2016	354	1.544	(0.946, 2.519)	0.082
Age at transplant				
20-39 ^(ref*)	370	1.000		
40-54	429	1.441	(0.983, 2.113)	0.061
>=55	34	1.551	(0.592, 4.065)	0.372
Gender				
Male ^(ref*)	527	1.000		
Female	306	0.983	(0.675, 1.431)	0.927
Primary diagnosis				
Unknown primary ^(ref*)	177	1.000		
Diabetes mellitus	53	0.803	(0.295, 2.183)	0.667
GN/SLE	234	1.168	(0.676, 2.016)	0.578
Polycystic kidney	23	0.367	(0.049, 2.763)	0.331
Obstructive nephropathy	16	2.318	(0.849, 6.326)	0.101
Others	300	1.857	(1.131, 3.051)	0.014
Type of transplant				
Commercial cadaver ^(ref*)	172	1.000		
Commercial live donor	146	1.478	(0.817, 2.674)	0.197
Living donor	322	1.140	(0.677, 1.921)	0.621
Cadaver (Deceased donor)	193	2.508	(1.504, 4.184)	0.000
HBsAg				
Negative ^(ref*)	833	1.000		
Positive	0	NA	NA	NA
Anti-HCV				
Negative ^(ref*)	833	1.000		
Positive	0	NA	NA	NA

13.5.2: Graft survival

Graft loss rates reported below was not censored for death.

Graft survival rates were 92% at year-1, 82% at year-5 and 57% at year-10 post transplantation. Older age and patients with cadaver renal transplantation had higher risk of graft loss.

Table 13.5.2(a): Graft survival, 2007-2016

Interval (years)	n	% Survival	SE
0	1130	100	
1	955	92	1
2	837	90	1
3	745	88	1
4	631	85	1
5	526	82	1
6	401	79	1
7	291	74	2
8	181	69	2
9	84	65	2
10	5	57	8

*n=Number at risk SE=standard error

Figure 13.5.2(a): Graft survival, 2007-2016

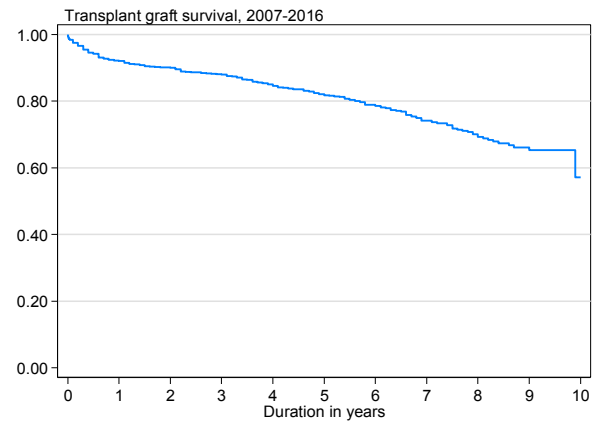


Table 13.5.2(b): Risk factors for transplant graft loss 2007-2016

Factors	n	Hazard Ratio	95% CI	P value
Year of transplant				
2007-2011 ^(ref*)	479	1.000		
2012-2016	354	0.680	(0.309, 1.496)	0.337
Age at transplant				
20-39 ^(ref*)	370	1.000		
40-54	429	3.193	(1.663, 6.131)	<0.001
>=55	34	4.694	(1.522, 14.471)	0.007
Gender				
Male ^(ref*)	527	1.000		
Female	306	1.005	(0.585, 1.728)	0.984
Primary diagnosis				
Unknown primary ^(ref*)	177	1.000		
Diabetes mellitus	53	0.988	(0.298, 3.277)	0.984
GN/SLE	234	0.825	(0.362, 1.879)	0.648
Polycystic kidney	23	0.683	(0.086, 5.415)	0.718
Obstructive nephropathy	16	4.016	(1.060, 15.211)	0.041
Others	300	1.800	(0.910, 3.560)	0.091
Type of transplant				
Commercial cadaver ^(ref*)	172	1.000		
Commercial live donor	146	1.071	(0.491, 2.336)	0.864
Living donor	322	0.558	(0.256, 1.218)	0.143
Cadaver	193	2.365	(1.242, 4.504)	0.009
HBsAg				
Negative ^(ref*)	833	1.000		
Positive	0	NA	NA	NA
Anti-HCV				
Negative ^(ref*)	833	1.000		
Positive	0	NA	NA	NA

13.5.3: Patient survival according to type of transplant

Outcomes of renal transplantation by type of transplant are shown in Table 13.5.3, Figures 13.5.3 and 13.5.4. Patient survival of cadaveric renal transplant was worse in comparison to live donor transplant.

The patient survival of local living renal transplant was 98% and 96% at year-1 and year-5 respectively. In comparison, the patients who had commercial live donor renal transplant had slightly poorer survival beyond year-5 post transplant. Overall, patient survival of local cadaveric transplant is worst among all type of transplant, likely due to older age, longer dialysis vintage and more comorbidity.

Table 13.5.3: Unadjusted patient survival by type of transplant, 2007-2016

Type of Transplant Interval (years)	Commercial Cadaver Donor			Commercial Live Donor			Live Donor			Cadaver Donor		
	n	% Survival	SE	n	% Survival	SE	n	% Survival	SE	n	% Survival	SE
0	216	100		177	100		426	100		311	100	
1	193	95	0	149	99	0	357	98	0	256	92	0
2	178	94	0	131	98	0	325	97	0	203	89	0
3	168	93	0	117	97	0	292	97	0	168	88	0
4	157	89	0	105	95	0	227	96	0	142	86	0
5	149	88	0	91	93	0	174	96	0	112	85	0
6	133	84	0	59	90	0	128	96	0	81	83	0
7	111	82	0	27	86	0	100	95	0	53	81	0
8	80	78	0	8	86	0	61	92	0	32	74	0
9	33	75	0	5	86	0	29	92	0	18	71	0
10	3	75	0	1	43	0	1	92	0	3		

*n=number at risk SE=standard error

Figure 13.5.3: Patient survival by type of transplant, 2007-2016

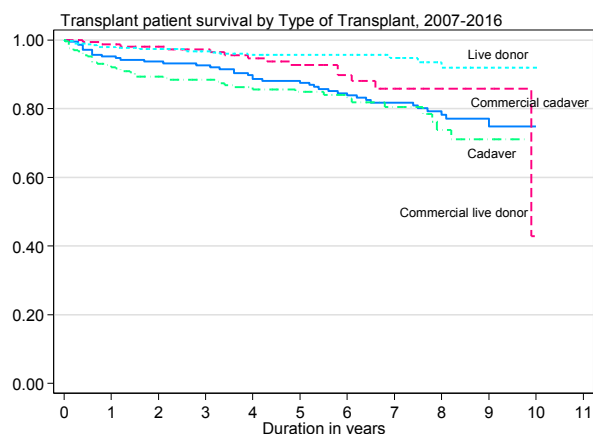
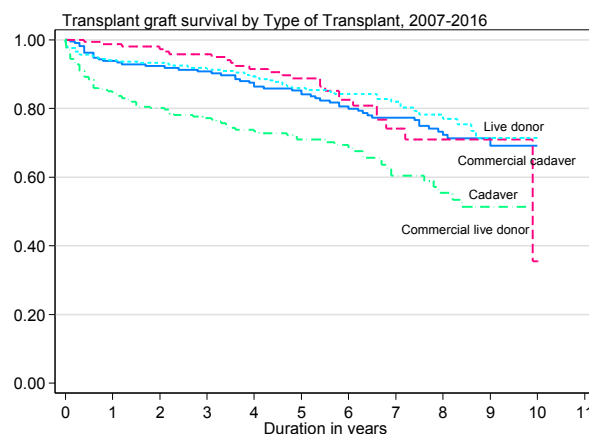


Figure 13.5.4: Graft survival by type of transplants, 2007-2016



13.5.4: Graft survival according to type of transplant

The graft survival rates reported were not censored for death.

Local live donor graft survival at year-1, year-3 and year-5 was 94%, 92% and 86% respectively. The graft survival of commercial live donor and commercial cadaveric transplant were similar to graft survival of local living renal transplant. Local cadaveric transplant had worst graft survival; 84% at year-1 and 71% at year-5 post transplant.

Table 13.5.4: Graft survival by type of transplant, 2007-2016

Type of Transplant Interval (years)	Commercial Cadaver Donor			Commercial Live Donor			Live Donor			Cadaver Donor		
	n	% Survival	SE	n	% Survival	SE	n	% Survival	SE	n	% Survival	SE
0	216	100		177	100		426	100		311	100	
1	193	94	0	149	99	0	357	94	0	256	84	0
2	178	92	0	131	97	0	325	93	0	203	80	0
3	168	91	0	117	96	0	292	92	0	168	77	0
4	157	86	0	105	92	0	227	89	0	142	73	0
5	149	84	0	91	89	0	174	86	0	112	71	0
6	133	80	0	59	83	0	128	84	0	81	69	0
7	111	77	0	27	74	0	100	82	0	53	60	0
8	80	72	0	8	71	0	61	77	0	32	55	0
9	33	69	0	5	71	0	29	71	0	18	51	0
10	3	69	0	1	36	0	1	71	0	3		

*n=number at risk SE=standard error

13.5.5: Outcome of living related renal transplantation

Patient survival of local live donor renal transplant appeared to be better in those transplanted in 2012-2016 compared to those transplanted in 2007-2011. However, graft survival (not censored for death) between these two cohorts was similar.

Table 13.5.5(a): Patient survival by year of transplant (Living related transplant, 2007-2016)

Year of Transplant Interval (years)	2006-2010			2011-2015		
	n	% Survival	SE	n	% Survival	SE
0	206	100		220	100	
1	192	97	0	166	99	0
2	188	96	0	138	98	0
3	187	96	0	106	98	0
4	179	94	0	49	98	0
5	172	94	0	2	98	0
6	128	94	0	2		
7	100	93	0	2		
8	61	91	0	2		
9	29	91	0	2		
10	1	91	0	2		

*n=number at risk SE=standard error

Figure 13.5.5(a): Patient survival by year of transplant (Living related transplant, 2007-2016)

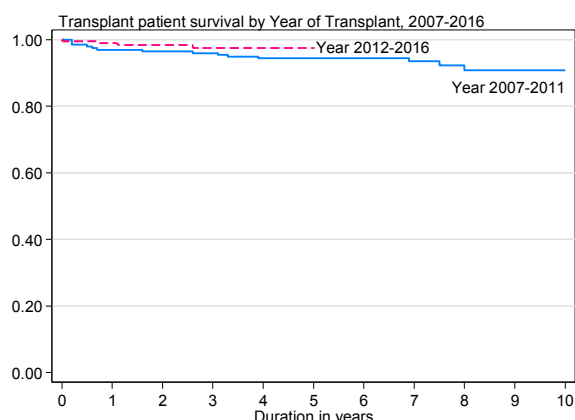


Figure 13.5.5(b): Graft survival by year of transplant (Living related transplant, 2007-2016)

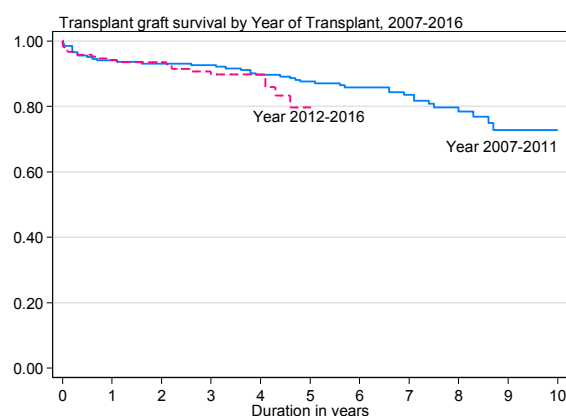


Table 13.5.5(b): Graft survival by year of transplant (Living related transplant, 2007-2016)

Year of Transplant Interval (years)	2007-2011			2012-2016		
	n	% Survival	SE	n	% Survival	SE
0	206	100		220	100	
1	192	94	0	166	94	0
2	188	93	0	138	94	0
3	187	93	0	106	90	0
4	179	90	0	49	90	0
5	172	88	0	2	80	0
6	128	86	0	2		
7	100	84	0	2		
8	61	78	0	2		
9	29	73	0	2		
10	1	73	0	2		

*n=number at risk SE=standard error

13.5.6: Outcome of commercial cadaveric transplantation

Patient survival and graft survival (not censored for death) of commercial cadaveric transplant appeared to be better in those transplanted in 2007-2011 compared to 2012-2016. However the small number of commercial renal transplants in the latter cohort may have skewed the result

Table 13.5.6(a): Patient survival by year of transplant (Commercial cadaver transplant, 2007-2016)

Year of Transplant Interval (years)	2007-2011			2012-2016		
	n	% Survival	SE	n	% Survival	SE
0	177	100		39	100	
1	167	96	0	27	92	0
2	164	95	0	16	88	0
3	159	94	0	9	88	0
4	153	90	0	5	88	0
5	149	88	0	1		
6	133	85	0	1		
7	111	83	0	1		
8	80	79	0	1		
9	33	75	0	1		
10	3	75	0	1		

*n=number at risk SE=standard error

Figure 13.5.6(a): Patient survival by year of transplant (Commercial cadaver transplant, 2007-2016)

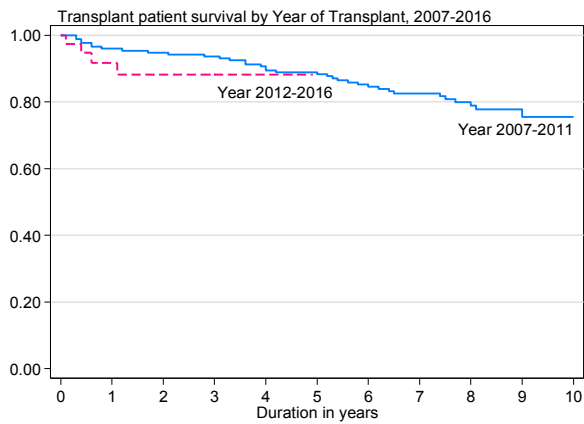


Figure 13.5.6(b): Graft survival by year of transplant (Commercial cadaver transplant, 2007-2016)

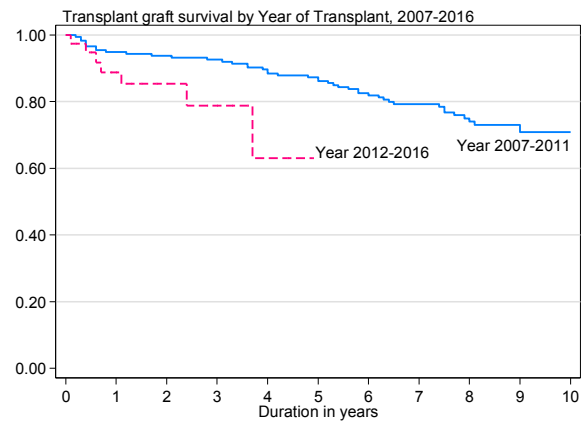


Table 13.5.6(b): Graft survival by year of transplant (commercial cadaver transplant, 2007-2016)

Year of Transplant Interval (years)	2007-2011			2012-2016		
	n	% Survival	SE	n	% Survival	SE
0	177	100		39	100	
1	167	95	0	27	89	0
2	164	94	0	16	85	0
3	159	93	0	9	79	0
4	153	88	0	5	63	0
5	149	86	0	1		
6	133	82	0	1		
7	111	79	0	1		
8	80	74	0	1		
9	33	71	0	1		
10	3	71	0	1		

*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 2016, 89.5% of renal transplant recipients has hypertension, 21.2% has diabetes and 46.9% had chronic kidney disease (CKD) stage III and above. Approximately 10% of renal transplant recipients had all three major risk factors for cardiovascular disease. Prevalence of hypertension appeared to be increasing in the recent 5 years but prevalence of CKD showed a decreasing trend.

Table 13.6.1: Risk factors for IHD in renal transplant recipients at year 2012-2016

	2012	2013	2014	2015	2016
Diabetes	27 (1.7)	34 (2.1)	27 (1.6)	24 (1.5)	26 (1.7)
Hypertension**	594 (37.1)	635 (38.4)	653 (39.8)	658 (40.1)	691 (43.9)
CKD	167 (10.4)	148 (8.9)	123 (7.5)	147 (9.0)	110 (7.0)
Diabetes + Hypertension**	98 (6.1)	98 (5.9)	113 (6.9)	119 (7.3)	119 (7.6)
Diabetes + CKD	41 (2.6)	41 (2.5)	36 (2.2)	46 (2.8)	28 (1.8)
CKD + Hypertension**	464 (29.0)	502 (30.4)	482 (29.4)	435 (26.5)	440 (28.0)
Diabetes + CKD + Hypertension**	211 (13.2)	196 (11.9)	207 (12.6)	210 (12.8)	159 (10.1)

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

OR have either Beta blocker / Calcium channel blocker / ACE inhibitor / AIIRB / Other antihypertensive drugs

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

GFR (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 2012

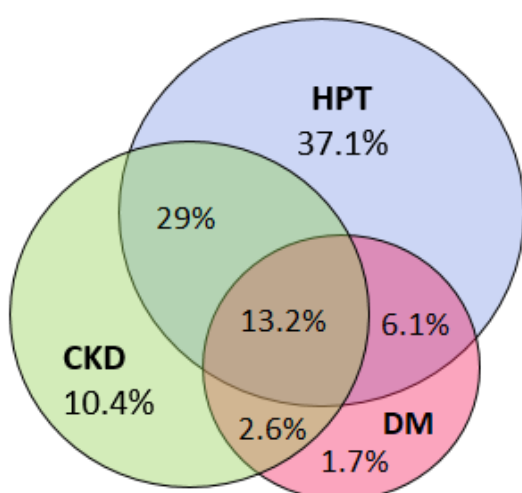


Figure 13.6.1(b): Venn diagram for pre and post transplant complications (in %) at year 2013

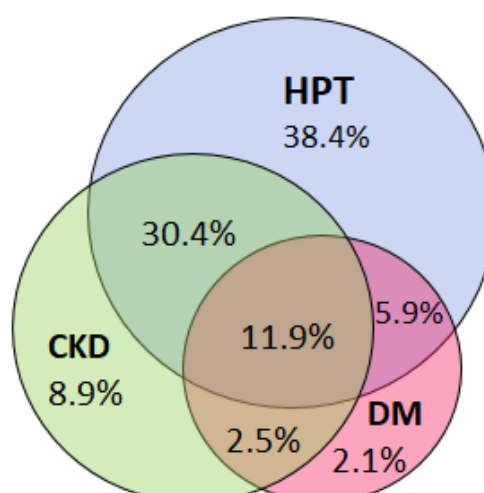


Figure 13.6.1(c): Venn diagram for pre and post transplant complications (in %) at year 2014

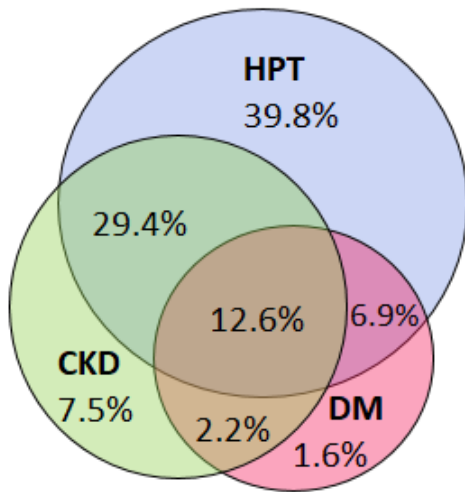


Figure 13.6.1(d): Venn diagram for pre and post transplant complications (in %) at year 2015

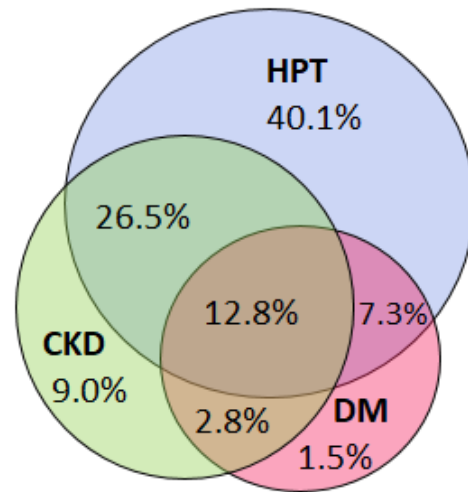
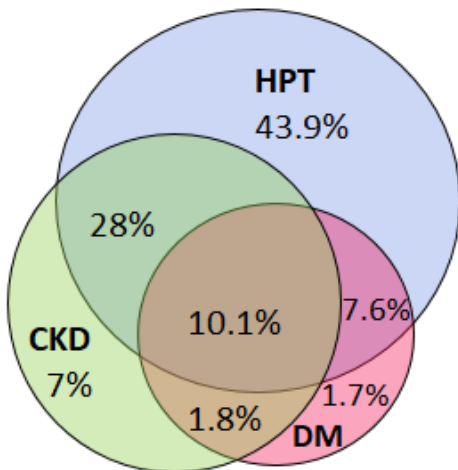


Figure 13.6.1(e): Venn diagram for pre and post transplant complications (in %) at year 2016



13.6.2: Blood Pressure 2012-2016

Overall, blood pressure of renal transplant recipients was similar over the recent 5 years. In 2016, a quarter of renal transplant recipients had systolic blood pressure of ≥ 140 mmHg and 10% had diastolic blood pressure of ≥ 90 mmHg .

Table 13.6.2(a): Systolic BP, 2012-2016

Year	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
<120	333	18	346	18	304	16	283	15	273	15
120-129	550	29	492	26	514	27	480	26	472	26
130-139	579	31	615	32	582	31	582	31	599	33
140-159	360	19	409	22	431	23	437	24	402	22
160-179	45	2	36	2	59	3	67	4	60	3
≥ 180	9	0	4	0	1	0	7	0	7	0

Figure 13.6.2(a): Systolic BP, 2012-2016

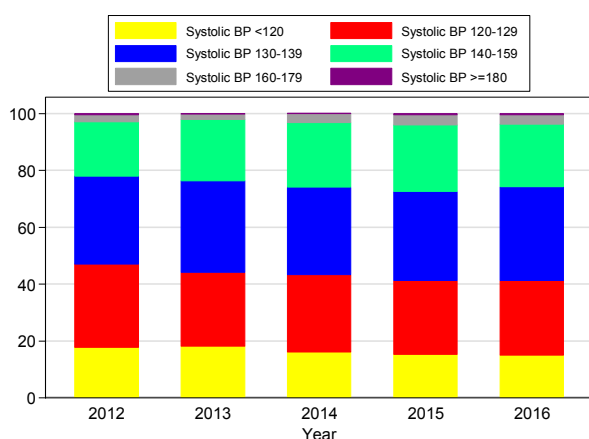
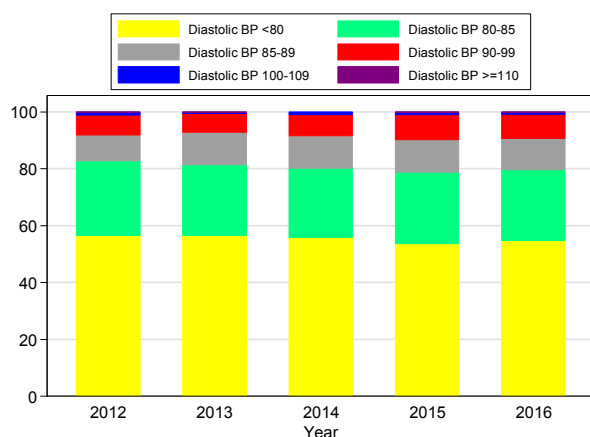


Table 13.6.2(b): Diastolic BP, 2012-2016

Year	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
<80	1068	57	1084	57	1057	56	993	54	992	55
80-84	493	26	473	25	460	24	468	25	449	25
85-89	169	9	218	11	214	11	213	11	199	11
90-99	135	7	128	7	144	8	163	9	154	9
100-109	20	1	10	1	18	1	16	1	12	1
≥ 110	2	0	2	0	0	0	2	0	4	0

Figure 13.6.2(b): Diastolic BP, 2012-2016



13.6.3: Blood pressure control

The proportion of renal transplant recipients receiving treatment for hypertension was similar over the recent 5 years. Almost three-quarter of renal transplant recipients received treatment for hypertension in 2016, including 31% who required two or more antihypertensive agents. However, 5% of patients had systolic blood pressure of ≥ 160 mmHg and 10% had diastolic blood pressure of ≥ 90 mmHg despite being on treatment.

Table 13.6.3(a): Treatment for hypertension, 2012-2016

Year	n	% on antihypertensives	% on 1 antihypertensive drug	% on 2 antihypertensives	% on 3 antihypertensives
2012	1881	70	40	24	6
2013	1920	72	40	26	7
2014	1913	74	39	29	5
2015	1874	71	38	26	7
2016	1823	74	41	26	7

Table 13.6.3(b): Distribution of systolic BP without antihypertensives, 2012-2016

Year	n	Mean	SD	Median	LQ	UQ	% Patients ≥ 160 mmHg
2012	528	126.0	13.2	125.4	117.5	133.4	2
2013	515	126.6	13.5	126.5	118.0	135.0	1
2014	486	127.7	13.0	127.0	118.8	136.3	2
2015	515	129.9	15.6	128.3	119.8	138.8	4
2016	435	127.5	14.8	126.7	118.0	135.7	1

Table 13.6.3(c): Distribution of diastolic BP without antihypertensives, 2012-2016

Year	n	Mean	SD	Median	LQ	UQ	% patients ≥ 90 mmHg
2012	528	77.1	8.3	77.4	72.0	82.1	7
2013	515	76.9	8.4	77.8	71.3	82.0	6
2014	486	77.9	8.2	79.0	72.5	83.3	7
2015	515	78.1	8.8	79.0	72.3	83.3	10
2016	437	78.0	8.9	78.0	72.3	83.3	9

Table 13.6.3(d): Distribution of systolic BP on antihypertensives, 2012-2016

Year	n	Mean	SD	Median	LQ	UQ	% Patients ≥ 160mmHg
2012	1242	132.4	13.5	130.3	123.3	140.0	3
2013	1349	132.9	12.5	132.5	124.7	140.0	2
2014	1357	133.8	13.1	132.5	125.0	141.5	4
2015	1299	134.3	13.6	133.5	125.0	142.5	4
2016	1292	134.2	13.5	133.0	125.0	141.8	5

Table 13.6.3(e): Distribution of diastolic BP on antihypertensives, 2012-2016

Year	n	Mean	SD	Median	LQ	UQ	% Patients ≥ 90 mmHg
2012	1244	78.4	8.5	79	73	82.6	10
2013	1349	78.4	8.3	78.8	73	83.7	8
2014	1357	79	8.2	79	73.5	84.3	9
2015	1298	79	8.6	79.8	73.5	84.5	10
2016	1293	79.2	8.7	80	74	84.3	10

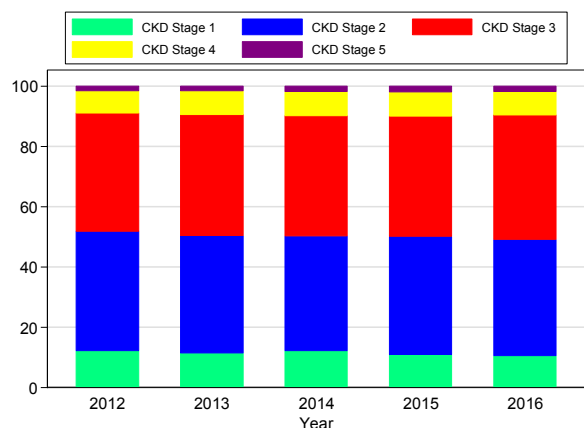
13.6.4: Level of allograft function

Prevalence of CKD in renal transplant recipients according to CKD stage over the last 5 years was similar. In 2016, 41% had CKD stage III and 10% had CKD stage IV and above.

Table 13.6.4: CKD stages, 2012-2016

Year	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
Stage 1	226	12	217	11	230	12	203	11	191	11
Stage 2	742	40	741	39	723	38	728	39	699	38
Stage 3	731	39	766	40	759	40	745	40	752	41
Stage 4	135	7	149	8	149	8	145	8	139	8
Stage 5	32	2	32	2	37	2	40	2	36	2

Figure 13.6.4: CKD stages by year



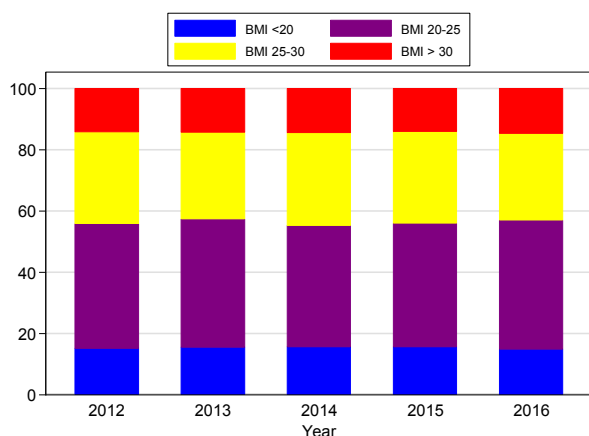
13.6.5: Body mass index (BMI)

BMI of renal transplant recipients in the recent 5 years remains static. In 2016, 28% were overweight and 15% were obese.

Table 13.6.5: BMI, 2012-2016

Year	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
<20	287	15	299	16	303	16	294	16	275	15
20-25	769	41	805	42	761	40	755	40	772	42
25-30	564	30	545	28	580	30	562	30	519	28
> 30	271	14	278	14	279	15	267	14	272	15

Figure 13.6.5: BMI, 2012-2016



13.6.6: LDL cholesterol

Overall, there appeared to be improvement in lipid profile in renal transplant recipients in 2016 when compared to 2012. In 2016, 58% of renal transplant recipients had LDL \geq 2.6mmol/L, 10% had total cholesterol $>$ 6.2mmol/L and 9% had HDL $<$ 1mmol/L.

Table 13.6.6(a): LDL, 2012-2016

Year	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
< 2.6	632	33	794	41	816	42	819	44	769	42
2.6-3.4	906	48	776	40	758	39	708	38	744	40
\geq 3.4	353	19	357	19	349	18	351	19	325	18

Figure 13.6.6(a): LDL, 2012-2016

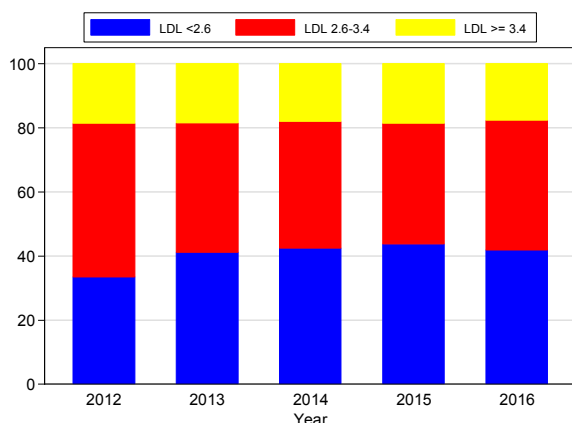


Table 13.6.6(b): Total cholesterol, 2012-2016

Year	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
<4.1	251	13	297	15	304	16	311	17	322	18
4.1-5.1	645	34	659	34	725	38	714	38	626	34
5.1-6.2	784	41	758	39	701	36	657	35	706	38
6.2- 7.2	148	8	167	9	144	7	142	8	132	7
> 7.2	63	3	46	2	49	3	54	3	52	3

Figure 13.6.6(b): Total cholesterol, 2012-2016

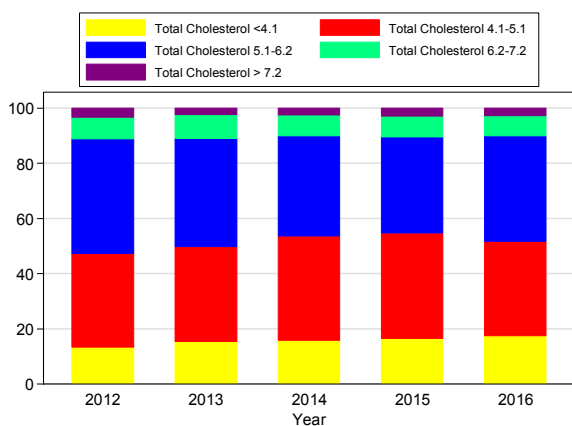
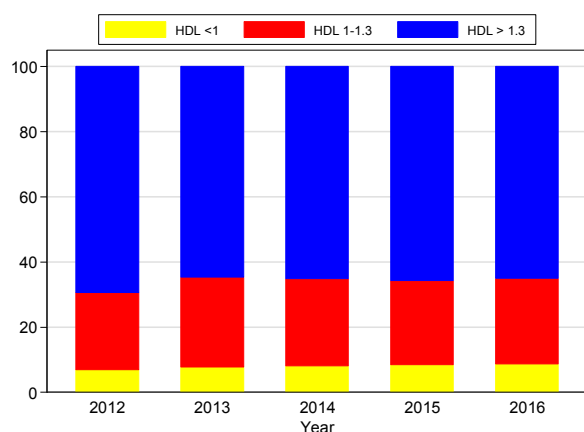


Table 13.6.6(c): HDL, 2012-2016

Year	2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%
<1	132	7	146	8	153	8	157	8	157	9
1-1.3	447	24	534	28	515	27	484	26	484	26
>1.3	1312	69	1247	65	1255	65	1237	66	1197	65

Figure 13.6.6(c): HDL, 2012-2016



SECTION 13.7: QOL INDEX SCORE IN RENAL TRANSPLANT RECIPIENTS

833 patients who were transplanted from 2007-2016 were analysed for QoL index score. The overall QoL was found to be excellent with the 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 years old also enjoyed the same QoL index score (10) as their younger counterparts (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 2007-2016

Dialysis modality	QoL score
Number of patients	833
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

Table 13.7.2: Cumulative distribution of QoL-Index score in relation to diabetes mellitus, transplant recipient patients 2007-2016

Diabetes mellitus	No	Yes
Number of patients	739	94
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 13.7.1: Cumulative distribution of QoL-Index score in relation to dialysis modality, transplant recipient patients 2007-2016

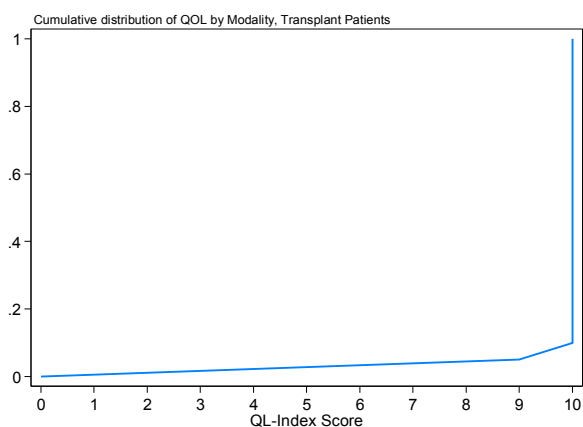


Figure 13.7.2: Cumulative distribution of QoL-Index score in relation to diabetes mellitus, transplant recipient patients 2007-2016

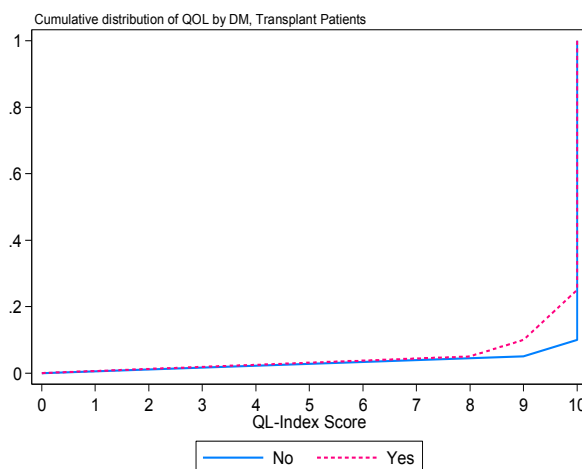


Table 13.7.3: Cumulative distribution of QoL-Index score in relation to gender, transplant recipient patients 2007-2016

Gender	Male	Female
Number of patients	527	306
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 13.7.3: Cumulative distribution of QoL-Index score in relation to gender, transplant recipient patients 2007-2016

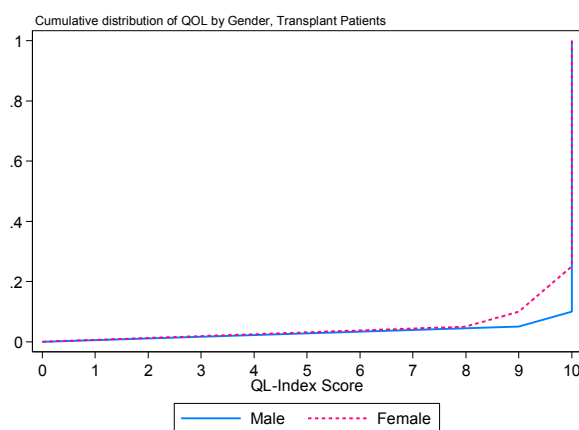


Table 13.7.4: Cumulative distribution of QoL-Index score in relation to age, transplant recipient patients 2007-2016

Age group (years)	<20	20-39	40-59	>=60
Number of patients	0	370	429	34
Centile				
0	-	0	0	0
0.05	-	10	7	8
0.1	-	10	9	9
0.25 (LQ)	-	10	10	9
0.5 (median)	-	10	10	10
0.75 (UQ)	-	10	10	10
0.9	-	10	10	10
0.95	-	10	10	10
1	-	10	10	10

Figure 13.7.4: Cumulative distribution of QoL-Index score in relation to age, transplant recipient patients 2007-2016

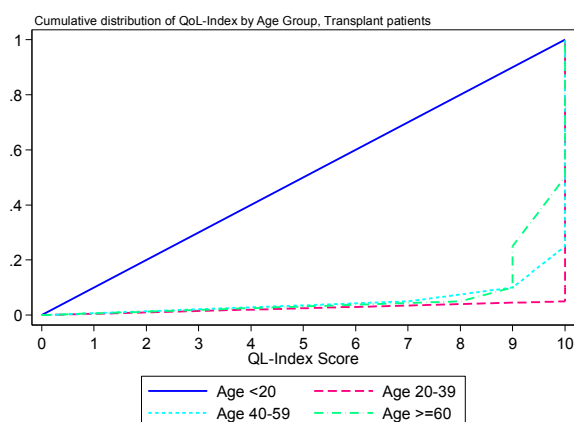


Figure 13.7.5: Cumulative distribution of QoL-Index score in relation to year of entry, transplant recipient patients 2007-2016

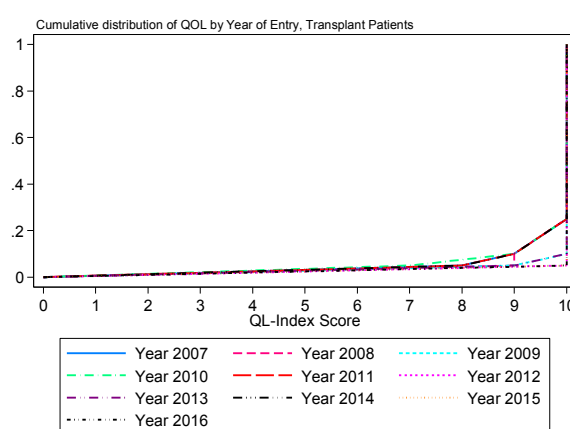


Table 13.7.5: Cumulative distribution of QoL-Index score in relation to year of entry, transplant recipient patients 2007-2016

Year of Entry	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Number of patients	76	94	108	103	98	81	77	71	77	48
Centile										
0	0	0	0	0	0	0	0	0	0	0
0.05	8	9	9	7	8	10	9	8	10	10
0.1	9	9	10	9	9	10	10	9	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