CHAPTER 5

Renal Allograft Biopsy

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5.1: Introduction

Of the total of 38 active participating MRRB centres, 22 centres (57.9%) reported performing allograft biopsies in 2012. There were 7 new centres compared to 2010. Majority of these centres that reported allograft renal biopsies were state hospitals under the Ministry of Health.

5.2: Number of renal allograft biopsy

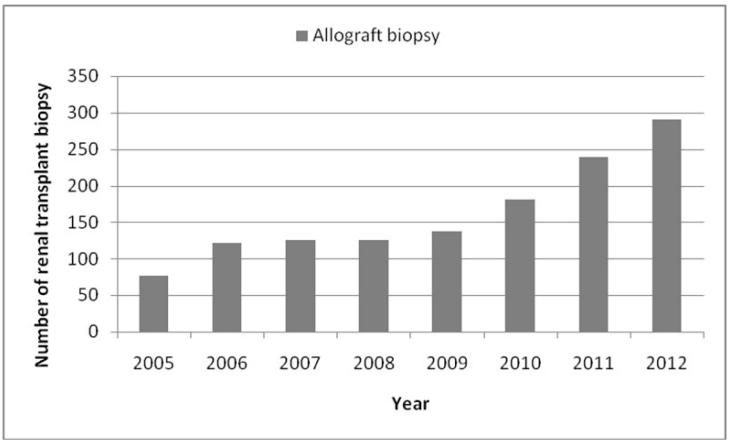
5.2.1: Number of renal allograft biopsy by year

During the span of 8 years (from 2005 till 2012), a total of 1295 renal allograft biopsies were reported (Table & Figure 5.2.1). The number of renal allograft biopsy reported continued to increase over the last 8 years despite a decreasing number of new renal transplant patients and a relatively unchanged number of renal transplant recipients in the last 5 years. This is likely due to the changing pattern in the indications and threshold for renal biopsy rather than a change in the clinical manifestation of renal transplant recipients during this period.

Table 5.2.1: Number of renal allograft biopsy, 2005-2012

Year	2005	2006	2007	2008	2009	2010	2011	2012	Total
Number of renal transplant biopsy	76	121	125	126	137	181	239	290	**1295**

Figure 5.2.1: Number of renal allograft biopsy, 2005-2012



5.2.2: Number of renal allograft biopsy by year and site

In the last 8 years, the four main transplant centres (Hospital Kuala Lumpur, Hospital Selayang, University Malaya Medical Centre and Prince Court Medical Centre) accounted for 72.6% of the total number of renal allograft biopsies reported in this country. Of the 4 transplant centres, the one which performed the least number of allograft biopsies in 2012 (33 allograft biopsies) had the largest number of renal transplant performed in that year while the centre reporting the most allograft biopsies (87 allograft biopsies) , only performed 10 renal transplants that year. This unusual pattern is likely due to differences in allograft biopsy indications and threshold for allograft biopsy between the 4 renal transplant centres. (Table 5.2.2)

5.2.3: Number of renal allograft biopsy by year and age

Majority of the renal allograft biopsies reported were performed for patients aged 25 to 54 years and this accounted for 70.8% of all renal allograft biopsies performed over the last 8 years (Table 5.2.3). This pattern remained relative unchanged and probably a reflection of the age demography of renal transplant recipients in this country.

5.3: Clinical presentation at biopsy

The two most common indications for renal allograft biopsy were acute and gradual allograft dysfunction, accounting for 81.7% of all allograft biopsies reported over the last 8 years (Table 5.3). There has been a decline in the number of allograft biopsies performed for acute graft dysfunction (54.7% in 2005 to 17.8% in 2012) while there has been a corresponding increased in the number of allograft biopsies performed for gradual allograft dysfunction and this increased from 34.7% in 2005 to 66.1% in 2012.

The number of allograft biopsy performed for non or delayed allograft function has been fluctuating over the last 8 years and the pattern appeared to correspond with the number of renal transplant performed in that year especially the deceased donor renal transplantation[1]. The number of allograft biopsy performed for non or delayed allograft function peaked in 2009, which had the largest number of renal transplant, performed.

5.4: Timing of renal allograft biopsy

Allograft biopsies performed in the first 3 months post transplant have gradually increased over the last 8 years and accounted for 38.6% of all allograft biopsies reported in 2012. (Table & Figure 5.4)

Table 5.2.2: Number of renal allograft biopsy by centre, 2005-2012

Centre	2005		2006		2007		2008		2009		2010		2011		2012		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Kuala Lumpur	30	39.5	51	42.2	44	35.2	37	29.4	45	32.9	43	23.8	41	17.2	33	11.4	**324**	**25.0**
Selayang (Adult)	20	26.3	19	15.7	22	17.6	15	11.9	41	29.9	37	20.4	53	22.2	43	14.8	**250**	**19.3**
UMMC	0	0.0	0	0.0	30	24.0	27	21.4	8	5.8	0	0.0	36	15.1	87	30.0	**188**	**14.5**
Prince Court Medical Centre	0	0.0	0	0.0	0	0.0	0	0.0	6	4.4	47	26.0	54	22.6	71	24.5	**178**	**13.8**
Kuala Lumpur (Paed)	1	1.3	14	11.6	9	7.2	17	13.5	12	8.8	10	5.5	9	3.8	8	2.8	**80**	**6.2**
Tengku Ampuan Rahimah	6	7.9	11	9.1	12	9.6	10	7.9	9	6.6	3	1.7	10	4.2	9	3.1	**70**	**5.4**
Penang (Adult)	12	15.8	12	9.9	2	1.6	5	4.0	2	1.5	13	7.2	7	2.9	9	3.1	**62**	**4.8**
Sarawak General	2	2.6	2	1.7	2	1.6	5	4.0	3	2.2	8	4.4	1	0.4	4	1.4	**27**	**2.1**
Sultanah Bahiyah	0	0.0	0	0.0	0	0.0	3	2.4	3	2.2	9	5.0	3	1.3	1	0.3	**19**	**1.5**
PPUKM	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	10	4.2	9	3.1	**19**	**1.5**
Sultan Ismail (Paed)	0	0.0	0	0.0	0	0.0	2	1.6	1	0.7	4	2.2	4	1.7	1	0.3	**12**	**0.9**
Sultanah Aminah	0	0.0	2	1.7	0	0.0	2	1.6	1	0.7	2	1.1	1	0.4	2	0.7	**10**	**0.8**
Melaka	0	0.0	2	1.7	1	0.8	1	0.8	0	0.0	0	0.0	3	1.3	2	0.7	**9**	**0.7**
Tuanku Ja'afar Hospital	0	0.0	1	0.8	1	0.8	1	0.8	2	1.5	0	0.0	1	0.4	2	0.7	**8**	**0.6**
Raja Permaisuri Bainun	1	1.3	2	1.7	2	1.6	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3	**6**	**0.5**
Serdang	0	0.0	0	0.0	0	0.0	0	0.0	3	2.2	1	0.6	0	0.0	3	1.0	**7**	**0.5**
Queen Elizabeth	4	5.3	3	2.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**7**	**0.5**
Sultanah Fatimah	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.6	2	0.8	1	0.3	**4**	**0.3**
Penang (Paed)	0	0.0	1	0.8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3	**2**	**0.2**
Selayang (Paed)	0	0.0	1	0.8	0	0.0	0	0.0	0	0.0	1	0.6	0	0.0	0	0.0	**2**	**0.2**
Normah Medical Specialist Centre	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	0.8	0	0.0	**2**	**0.2**
Fan Medical Renal Clinic	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.6	0	0.0	1	0.3	**2**	**0.2**
KPJ Ampang Puteri Specialist	0	0.0	0	0.0	0	0.0	1	0.8	0	0.0	1	0.6	1	0.4	0	0.0	**3**	**0.2**
Tengku Ampuan Afzan	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3	**1**	**0.1**
Sultanah Nur Zahirah	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.4	0	0.0	**1**	**0.1**
Raja Perempuan Zainab II	0	0.0	0	0.0	0	0.0	0	0.0	1	0.7	0	0.0	0	0.0	0	0.0	**1**	**0.1**
Loh Guan Lye Specialist Centre	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3	**1**	**0.1**
Total	**76**	**100.0**	**121**	**100.0**	**125**	**100.0**	**126**	**100.0**	**137**	**100.0**	**181**	**100.0**	**239**	**100.0**	**290**	**100.0**	**1295**	**100.0**

UMMC: University Malaya Medical Centre. PPUKM: Pusat Perubatan Universiti Kebangsaan Malaysia

Table 5.2.3: Renal allograft biopsy by year and age group, rate per million populations, 2005-2012

Age group	2005			2006			2007			2008			2009		
	n	%	Rate	n	%	Rate	n	%	Rate	n	%	Rate	n	%	Rate
<15	0	0.0	0.0	6	5.0	0.1	7	5.6	0.1	9	7.1	0.1	9	6.6	0.1
15-<25	16	21.1	0.3	26	21.5	0.5	19	15.2	0.4	23	18.3	0.4	15	11.0	0.3
25-<35	11	14.5	0.2	25	20.7	0.6	15	12.0	0.3	20	15.9	0.4	32	23.4	0.7
35-<45	25	32.9	0.7	27	22.3	0.7	49	39.2	1.2	25	19.8	0.6	26	19.0	0.6
45-<55	14	18.4	0.5	25	20.7	0.9	24	19.2	0.8	35	27.8	1.1	38	27.7	1.2
55-<65	8	10.5	0.5	8	6.6	0.5	11	8.8	0.7	10	7.9	0.6	16	11.7	0.9
≥ 65	2	2.6	0.2	4	3.3	0.3	0	0.0	0.0	4	3.2	0.3	1	0.7	0.1
Total	**76**	**100**	**0.3**	**12**	**100**	**0.5**	**125**	**100**	**0.5**	**126**	**100**	**0.5**	**137**	**100**	**0.5**

Age group	2010			2011			2012			Total		
	n	%	Rate	n	%	Rate	n	%	Rate	n	%	Rate
<15	8	4.4	0.1	9	3.8	0.1	8	2.8	0.1	56	**4.3**	**0.1**
15-<25	21	11.6	0.4	34	14.2	0.6	21	7.2	0.4	175	**13.5**	**0.5**
25-<35	30	16.6	0.6	36	15.1	0.8	78	26.9	1.6	247	**19.1**	**0.8**
35-<45	66	36.5	1.6	86	36.0	2.1	77	26.6	1.8	381	**29.4**	**1.4**
45-<55	40	22.1	1.2	44	18.4	1.3	69	23.8	2.0	289	**22.3**	**1.4**
55-<65	12	6.6	0.6	29	12.1	1.4	33	11.4	1.5	127	**9.8**	**1.0**
≥ 65	4	2.2	0.3	1	0.4	0.1	4	1.4	0.3	20	**1.5**	**0.2**
Total	**181**	**100**	**0.6**	**239**	**100**	**0.8**	**290**	**100**	**1.0**	**1295**	**100**	**0.7**

Figure 5.2.3: Renal allograft biopsy by year and age group, rate per million populations, 2005-2012

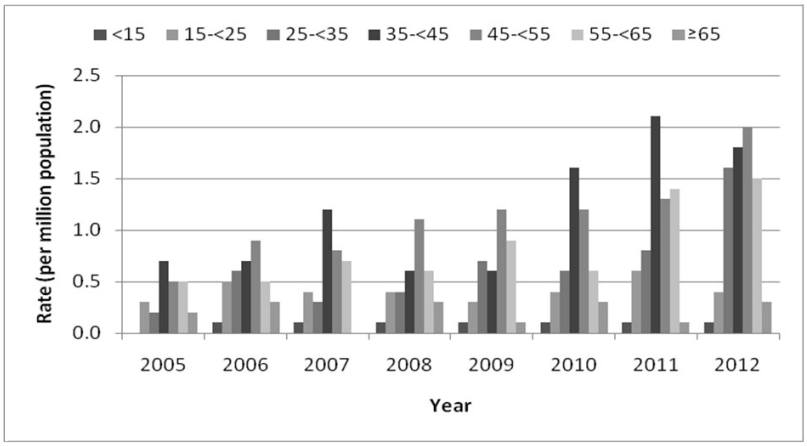


Table 5.3.: Indications for renal allograft biopsy, 2005-2012

Current clinical presentation	2005		2006		2007		2008		2009	
	n	%	n	%	n	%	n	%	n	%
Urine abnormality	1	1.3	3	2.4	2	1.6	10	8.0	13	9.6
Nephrotic syndrome	0	0.0	3	2.4	3	2.5	0	0.0	2	1.5
Gross hematuria	0	0.0	0	0.0	1	0.8	1	0.8	1	0.7
Acute deterioration of graft function	41	54.7	55	44.4	55	45.1	43	34.7	41	30.1
Creeping creatinine	26	34.7	52	41.9	42	34.4	56	45.2	56	41.2
Non/Poor delayed graft function	7	9.3	11	8.9	18	14.8	14	11.3	21	15.4
Missing/Not available	0	0.0	0	0.0	1	0.8	0	0.0	2	1.5
Total	**75**	**100.0**	**124**	**100.0**	**122**	**100.0**	**124**	**100.0**	**136**	**100.0**

Current clinical presentation	2010		2011		2012	
	n	%	n	%	n	%
Urine abnormality	5	2.9	16	7.7	21	8.7
Nephrotic syndrome	1	0.6	2	1.0	1	0.4
Gross hematuria	0	0.0	0	0.0	1	0.4
Acute deterioration of graft function	48	27.9	49	23.4	43	17.8
Creeping creatinine	104	60.5	113	54.1	160	66.1
Non/Poor delayed graft function	13	7.6	27	12.9	15	6.2
Missing/Not available	1	0.6	2	1.0	1	0.4
Total	**172**	**100.1**	**209**	**100.1**	**242**	**100.0**

*** Patients may have one or more clinical presentation**

** 146 patients have no information on clinical presentation (neither urine abnormalities nor graft function)*
For 2006, 4 patients have 2 indications
For 2007, 5 patients have 2 indications
For 2008, 7 patients have 2 indications
For 2009, 11 patients have 2 indications
For 2010, 7 patients have 2 indications
For 2011, 11 patients have 2 indications
For 2012, 17 patients have 2 indications

Figure 5.3: Indications for renal allograft biopsy, 2005-2012

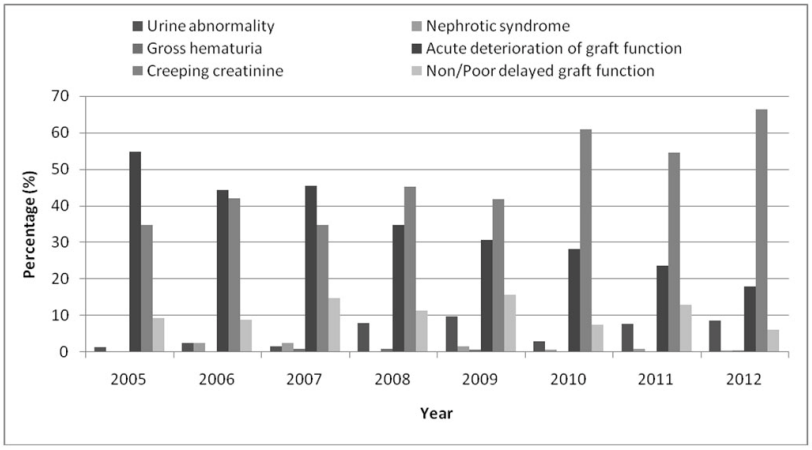
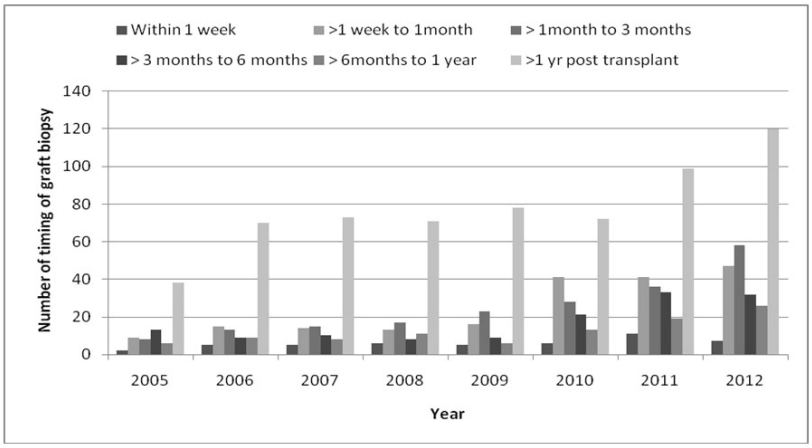


Table 5.4: Timing of renal allograft biopsy, 2005-2012 (dates: date of biopsy & date of transplant)

Timing of renal transplant biopsy	Within 1 week		>1 week to 1 month		> 1month to 3 months		> 3 months to 6 months	
	n	%	n	%	n	%	n	%
2005	2	2.6	9	11.8	8	10.5	13	17.1
2006	5	4.1	15	12.4	13	10.7	9	7.4
2007	5	4.0	14	11.2	15	12.0	10	8.0
2008	6	4.8	13	10.3	17	13.5	8	6.4
2009	5	3.7	16	11.7	23	16.8	9	6.6
2010	6	3.3	41	22.7	28	15.5	21	11.6
2011	11	4.6	41	17.2	36	15.1	33	13.8
2012	7	2.4	47	16.2	58	20.0	32	11.0
Total	**47**	**3.6**	**196**	**15.1**	**198**	**15.3**	**135**	**10.4**

Timing of renal transplant biopsy	> 6months to 1 year		>1 yr post transplant		Total	
	n	%	n	%	n	%
2005	6	7.9	38	50.0	**76**	**100.0**
2006	9	7.4	70	57.9	**121**	**100.0**
2007	8	6.4	73	58.4	**125**	**100.0**
2008	11	8.7	71	56.4	**126**	**100.0**
2009	6	4.4	78	56.9	**137**	**100.0**
2010	13	7.2	72	39.8	**181**	**100.0**
2011	19	8.0	99	41.4	**239**	**100.0**
2012	26	9.0	120	41.4	**290**	**100.0**
Total	**98**	**7.6**	**621**	**48.0**	**1295**	**100.0**

Figure 5.4: Timing of renal allograft biopsy, 2005-2012



5.5: Renal allograft biopsy procedure

5.5.1: Renal allograft biopsy method

Majority of allograft renal biopsies were performed under real-time ultrasonographic guidance and accounted for 84.7% in 2012 (Table & Figure 5.5.1). Allograft biopsy with no ultrasonographic guidance is uncommon and none was performed in 2012.

5.5.2: Number of passes

The number of passes made during renal allograft biopsy remained unchanged over the last 8 years with 88.9% of allograft biopsies having less than 3 passes (average of 1.76 passes/allograft biopsy). Renal allograft biopsies requiring more than 3 passes were uncommon and there was only 3 such cases reported in 2012. (Table & Figure 5.4.2)

5.5.3: Number of glomeruli obtained on biopsy

The success of renal allograft biopsy (as defined by the presence of at least 10 glomeruli in the biopsied renal tissues) has remained relatively unchanged over the last 8 years with an overall success rate of 65.5%. Failure to obtain any glomerulus is uncommon and in 2012 only accounted for 2.4% of all reported allograft biopsies. (Table & Figure 5.5.3)

5.5.4: Type of complications

Complications associated with allograft biopsy that required intervention were extremely uncommon and none was reported in 2012. There were only 2 reported cases of complication occurring after allograft biopsy and both were mild (Table 5.5.4). In 2012, 99.4% of renal allograft biopsies were uncomplicated.

Figure 5.5.1: Biopsy method (censored for missing data), 2005-2012

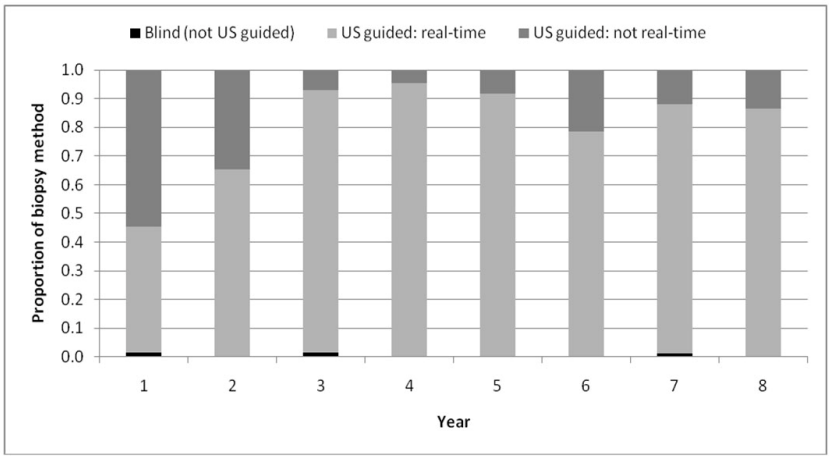


Table 5.5.1: Biopsy method, 2005-2012

Method	2005		2006		2007		2008		2009	
	n	%	n	%	n	%	n	%	n	%
Blind (not US guided)	1	1.4	0	0.0	1	1.3	0	0.0	0	0.0
US guided: real-time	28	38.4	64	56.6	66	83.5	83	89.2	101	90.2
US guided: not real-time	35	47.9	34	30.1	5	6.3	4	4.3	9	8.0
Missing*	9	12.3	15	13.3	7	8.9	6	6.5	2	1.8
Total	**73**	**100.0**	**113**	**100.0**	**79**	**100.0**	**93**	**100.0**	**112**	**100.0**

Method	2010		2011		2012		Total	
	n	%	n	%	n	%	n	%
Blind (not US guided)	0	0.0	2	1.1	0	0.0	**4**	**0.4**
US guided: real-time	110	76.9	160	84.7	154	85.1	**766**	**77.9**
US guided: not real-time	30	21.0	22	11.6	24	13.3	**163**	**16.6**
Missing*	3	2.1	5	2.6	3	1.7	**50**	**5.1**
Total	**143**	**100.0**	**189**	**100.0**	**181**	**100.0**	**983**	**100.0**

**No data on biopsy technique*

Table 5.5.2: Number of passes, 2005-2012

Number of passes	2005		2006		2007		2008		2009	
	n	%	n	%	n	%	n	%	n	%
1	21	28.8	41	36.3	22	27.8	31	33.0	23	20.2
2	35	47.9	47	41.6	37	46.8	45	47.9	70	61.4
3	7	9.6	8	7.1	10	12.7	11	11.7	18	15.8
4	0	0.0	0	0.0	1	1.3	1	1.1	2	1.8
5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Missing/ Not available*	10	13.7	17	15.0	9	11.4	6	6.4	1	0.9
Total	**73**	**100.0**	**113**	**100.0**	**79**	**100.0**	**94**	**100.0**	**114**	**100.0**

Number of passes	2010		2011		2012		Total	
	n	%	n	%	n	%	n	%
1	29	19.6	68	33.0	69	36.5	304	29.9
2	92	62.2	114	55.3	99	52.4	539	53.1
3	20	13.5	18	8.7	17	9.0	109	10.7
4	4	2.7	5	2.4	3	1.6	16	1.6
5	2	1.4	1	0.5	0	0.0	3	0.3
6	1	0.7	0	0.0	0	0.0	1	0.1
Missing/ Not available*	0	0.0	0	0.0	1	0.5	44	4.3
Total	**148**	**100.0**	**206**	**100.0**	**189**	**100.0**	**1016**	**100.0**

** No data information on number of passes*

Figure 5.5.2: Number of passes, 2005-2012

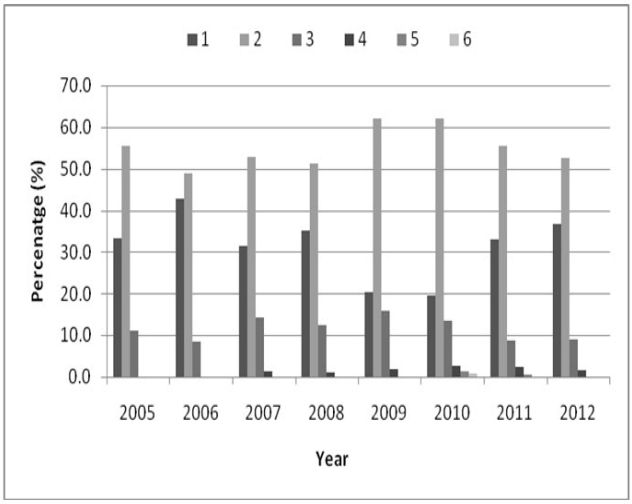


Figure 5.5.3: Number of glomeruli obtained on biopsy, 2005-2012

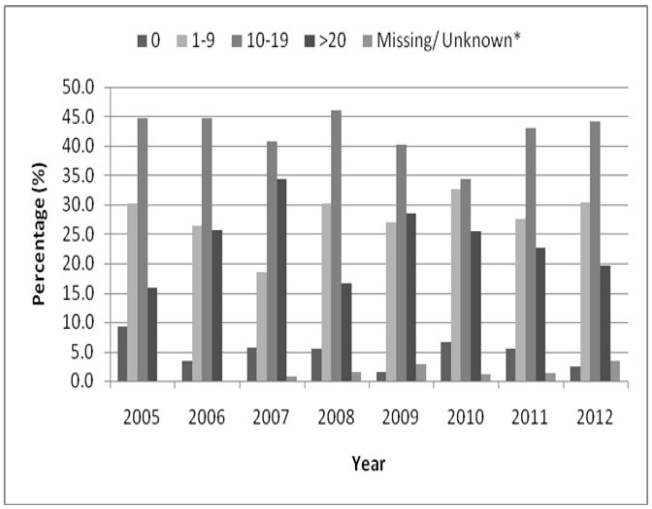


Table 5.5.3: Number of glomeruli obtained on biopsy, 2005-2012

Number of glomeruli obtained	2005		2006		2007		2008		2009	
	n	%	n	%	n	%	n	%	n	%
0	7	9.2	4	3.3	7	5.6	7	5.6	2	1.5
1-9	23	30.3	32	26.5	23	18.4	38	30.2	37	27.0
10-19	34	44.7	54	44.6	51	40.8	58	46.0	55	40.2
≥20	12	15.8	31	25.6	43	34.4	21	16.7	39	28.5
Missing/ Unknown*	0	0.0	0	0.0	1	0.8	2	1.6	4	2.9
Total	**76**	**100.0**	**121**	**100.0**	**125**	**100.0**	**126**	**100.0**	**137**	**100.0**

Number of glomeruli obtained	2010		2011		2012		Total	
	n	%	n	%	n	%	n	%
0	12	6.6	13	5.4	7	2.4	**59**	**4.6**
1-9	59	32.6	66	27.6	88	30.3	**366**	**28.3**
10-19	62	34.3	103	43.1	128	44.1	**545**	**42.1**
≥20	46	25.4	54	22.6	57	19.7	**303**	**23.4**
Missing/ Unknown*	2	1.1	3	1.3	10	3.5	**22**	**1.7**
Total	**181**	**100.0**	**239**	**100.0**	**290**	**100.0**	**1295**	**100.0**

** No data information on the number of glomeruli*

Table 5.5.4: Type of complications, 2005-2012

Type of complications	2005		2006		2007		2008		2009	
	n	%	n	%	n	%	n	%	n	%
No complication	57	79.2	98	87.5	69	86.3	90	96.8	102	91.9
Mild complication[a]	1	1.4	0	0.0	4	5.0	3	3.2	4	3.6
Severe complication[b]	0	0.0	1	0.9	1	1.3	0	0.0	0	0.0
Missing / Unknown[c]	14	19.4	13	11.6	6	7.5	0	0.0	5	4.5
Total	**72**	**100.0**	**112**	**100.0**	**80**	**100.0**	**93**	**100.0**	**111**	**100.0**

Type of complications	2010		2011		2012		Total	
	n	%	n	%	n	%	n	%
No complication	132	91.0	186	98.4	178	98.3	**912**	**92.8**
Mild complication[a]	8	5.5	2	1.1	2	1.1	**24**	**2.4**
Severe complication[b]	0	0.0	1	0.5	0	0.0	**3**	**0.3**
Missing / Unknown[c]	5	3.4	0	0.0	1	0.6	**44**	**4.5**
Total	**145**	**100.0**	**189**	**100.0**	**181**	**100.0**	**983**	**100.0**

[a] Mild complication is defined as presence of gross hematuria, perirenal collection, hematoma, or AVM that do not require intervention
[b] Severe complication is defined as presence of hypotension or complications requiring intervention.
[c] No data information for complications

Table 5.6: Histological diagnosis, 2005-2012

Histological Diagnosis	2005		2006		2007		2008		2009	
	n	%	n	%	n	%	n	%	n	%
Acute rejection	32	38.1	61	33.0	62	42.8	57	44.5	58	36.7
Borderline rejection	10	11.9	8	4.3	6	4.1	6	4.7	24	15.2
Calcineurin inhibitor toxicity	22	26.2	29	15.7	18	12.4	17	13.3	23	14.6
Chronic allograft nephropathy	9	10.7	41	22.2	28	19.3	19	14.8	10	6.3
Acute tubular necrosis	9	10.7	22	11.9	20	13.8	18	14.1	23	14.6
PTLD**	0	0.0	6	3.2	1	0.7	0	0.0	0	0.0
De novo	0	0.0	1	0.5	2	1.4	4	3.1	3	1.9
Recurrent GN	2	2.4	7	3.8	1	0.7	3	2.3	10	6.3
Diabetic nephropathy	0	0.0	5	2.7	2	1.4	1	0.8	3	1.9
Others	0	0.0	5	2.7	5	3.4	3	2.3	4	2.5
Total	**84**	**100.0**	**185**	**100.0**	**145**	**100.0**	**128**	**100.0**	**158**	**100.0**

Histological Diagnosis	2010		2011		2012		Total	
	n	%	n	%	n	%	n	%
Acute rejection	85	45.5	100	39.8	113	38.3	**568**	**39.6**
Borderline rejection	35	18.7	41	16.3	52	17.6	**182**	**12.7**
Calcineurin inhibitor toxicity	21	11.2	28	11.2	35	11.9	**193**	**13.5**
Chronic allograft nephropathy	8	4.3	10	4.0	18	6.1	**143**	**10.0**
Acute tubular necrosis	24	12.8	30	12.0	38	12.9	**184**	**12.8**
PTLD**	0	0.0	1	0.4	0	0.0	**8**	**0.6**
De novo	1	0.5	6	2.4	6	2.0	**23**	**1.6**
Recurrent GN	4	2.1	2	0.8	5	1.7	**34**	**2.4**
Diabetic nephropathy	1	0.5	5	2.0	2	0.7	**19**	**1.3**
Others	8	4.3	28	11.2	26	8.8	**79**	**5.5**
Total	**187**	**100.0**	**251**	**100.0**	**295**	**100.0**	**1433**	**100.0**

**Patients may have more than 1 diagnosis classification **Post Transplant Lymphoproliferative disease*

5.6: Histological diagnosis

Rejection (acute and borderline) has remained the most common histological diagnosis (Table 5.6) and accounted for more than half of all allograft biopsies that were reported in 2012. The increasing trend of allograft biopsies with histological diagnosis of acute rejection appeared to have plateaued off in the last 2 years and in 2012 accounted for 38.3%. Since only 17.8% of allograft biopsies were performed for acute deterioration of allograft function (Table 5.3), it would mean that more than half of all acute rejection did not present with the acute allograft dysfunction. This is likely due to the usage of more potent immunosuppressive agents, which have masked the classical feature of acute rejection.

After an initial reduction, the percentages of allograft biopsies with the diagnosis of calcineurin inhibitors toxicity and chronic allograft nephropathy have plateau off since 2010. In 2012, calcineurin inhibitor toxicity accounted for 11.9% while chronic allograft nephropathy was only seen in 6.1% of all cases reported. These trends were probably due to the lower therapeutic targets of calcineurin inhibitors used during this current era.

Since 66% of allograft biopsies performed in 2012 were for “creeping creatinine” (Table 5.3), it would suggest that calcineurin inhibitor toxicity and chronic allograft nephropathy were not the main reasons for the slow, gradual deterioration of allograft function in 2012. It would seems that a substantial number of renal transplant recipients with acute rejection have presented with this slow gradual allograft dysfunction.

Allograft with a diagnosis of acute tubular necrosis remained relatively unchanged over the last 8 years and in 2012, accounted for 12.9%.

Figure 5.6: Histological diagnosis, 2005-2012