

CHAPTER 3

HEART AND LUNG TRANSPLANTATION

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3.0 INTRODUCTION

The first heart transplant in Malaysia was in 1997, and the first lung transplant in Malaysia was in 2005. Since then the numbers of thoracic transplants have remained few and far in between. For end stage heart failure patients, the use of left ventricular assist device (LVAD) as a bridge to heart transplant has been employed, to keep the patients alive when their condition deteriorated while on the heart transplant waiting list.

In 2012, there was no thoracic transplant performed. There was 2 LVAD implanted as a bridge to heart transplant. After almost 15 years since heart transplant started in Malaysia, this option for the treatment of patients with end stage heart failure remains limited.

The Kaplan Meier survival curve is about 58% at 1 year and 46% at 5 years. Most of the patients succumb early post heart transplant.

The rest of the report that follows will review the results of heart and lung transplantation in Malaysia till end of 2012.

HEART TRANSPLANTATION

3.1 STOCK AND FLOW

Table 3.1.1a: Stock and Flow of Heart Transplantation, 1997-2012

Year	97	98	99	2000	01	02	03	04	05	06	07	08	09	10	11	12
New transplant patients	1	3	2	3	4	0	2	0	1	1	1	0	1	0	3	0
Deaths	0	1	0	3	1	3	1	0	0	1	0	0	1	0	0	1
Retransplanted	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Lost to follow up	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alive at 31 st December	1	3	5	5	8	5	6	6	7	7	8	8	8	8	11	10

Note: The same patient was re-transplanted in the year 2007, thus only counted as one

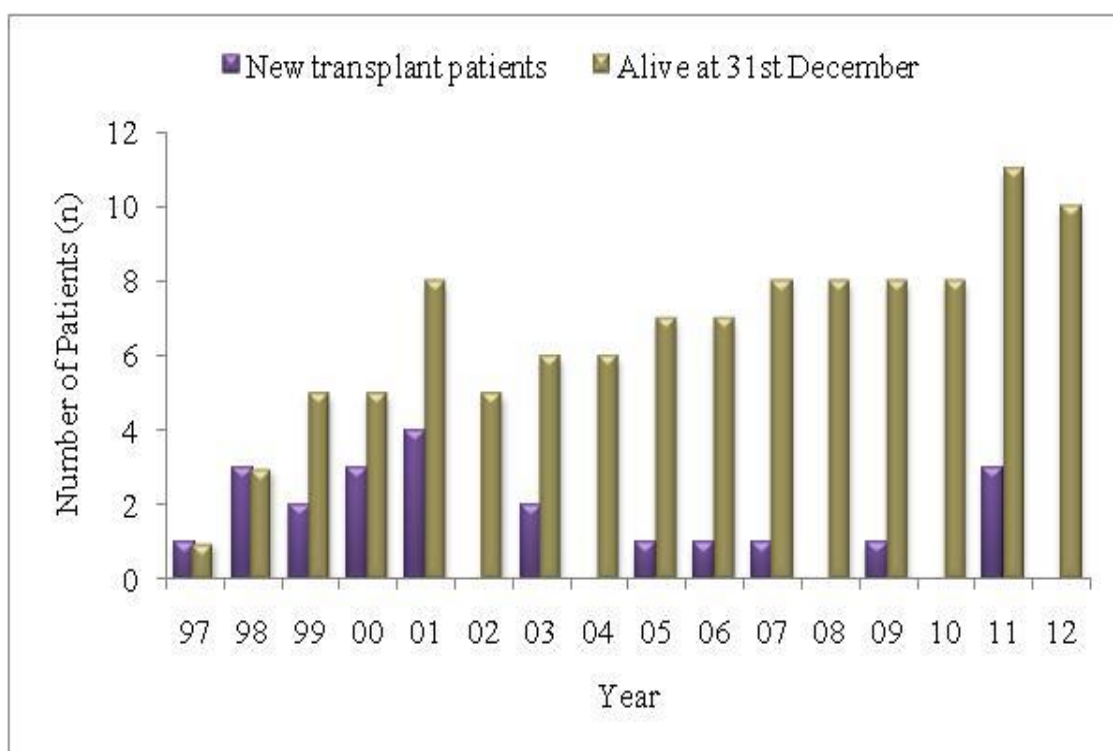


Figure 3.1.1a: Stock and Flow of Heart Transplant, 1997-2012

3.2 RECIPIENTS' CHARACTERISTICS

Table 3.2.1a: Distribution of Patients by Gender, 1997-2012

Year	97	98	99	2000	01	02	03	04	05	06	07	08	09	10	11	12	TOTAL
Gender	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	No.
Male	1	3	0	2	2	0	2	0	1	1	0	0	0	0	3	0	15
Female	0	0	2	1	2	0	0	0	0	0	1	0	1	0	0	0	7
TOTAL	1	3	2	3	4	0	2	0	1	1	1	0	1	0	3	0	22

Note: The same patient was re-transplanted in the year 2007, thus only counted as one

Table 3.2.2a: Distribution of Patients by Ethnic Group, 1997-2012

Year	97	98	99	2000	01	02	03	04	05	06	07	08	09	10	11	12	TOTAL
Ethnic group	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Malay	0	0	1	1	2	0	0	0	1	0	0	0	0	0	2	0	7
Chinese	0	0	0	1	0	0	1	0	0	0	1	0	1	0	1	0	5
Indian	1	3	1	1	2	0	1	0	0	1	0	0	0	0	0	0	10
TOTAL	1	3	2	3	4	0	2	0	1	1	1	0	1	0	3	0	22

Note: The same patient was re-transplanted in the year 2007, thus only counted as one

Table 3.2.3a: Distribution of Patients by Age, 1997-2012

Year	97	98	99	2000	01	02	03	04	05	06	07	08	09	10	11	12	TOTAL
Age, years	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
0-19	0	0	2	1	1	0	0	0	1	0	1	0	0	0	0	0	6
20-39	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	4
40-59	1	1	0	2	3	0	2	0	0	1	0	0	1	0	1	0	12
≥60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1	3	2	3	4	0	2	0	1	1	1	0	1	0	3	0	22
Mean	51	40	15	37	38	-	46	-	15	44	14	-	41	-	36	0	35
SD	-	9	1	22	17	-	8	-	-	-	-	-	-	-	13	0	15
Median	51	37	15	44	43	-	46	-	15	44	14	-	41	-	33	0	40
Minimum	51	33	15	13	14	-	40	-	15	44	14	-	41	-	25	0	13
Maximum	51	50	16	55	54	-	52	-	15	44	14	-	41	-	50	0	54

Age=date of transplant-date of birth

Note: The same patient was re-transplanted in the year 2007, thus only counted as one

Age for 2007 patient was same for 1st and 2nd transplant

Table 3.2.4a: Distribution of Patients by Primary Diagnosis, 1997-2012

Year	97	98	99	2000	01	02	03	04	05	06	07	08	09	10	11	12	TOTAL
Primary diagnosis	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Ischaemic Cardiomyopathy	1	3	0	1	1	0	2	0	0	1	0	0	0	0	0	0	9
Idiopathic Dilated Cardiomyopathy	0	0	2	1	2	0	0	0	1	0	0	0	0	0	1	0	7
Restrictive Cardiomyopathy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
End Stage Valvular Heart Disease	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2
Hypertrophic Cardiomyopathy	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Others	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	3
TOTAL	1	3	2	3	4	0	2	0	1	1	1	0	1	0	3	0	22

Note: The same patient was re-transplanted in the year 2007, thus only counted as one

3.3 TRANSPLANT PRACTICES

Table 3.3.1a: Distribution of Patients by Heart Procedure, 1997-2012.

Year	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	TOTAL
Heart Procedure	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Orthotopic Bicaval	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	4
Orthotopic Traditional	0	2	2	3	4	0	2	0	1	1	1	0	1	0	1	0	18
Heterotopic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1	3	2	3	4	0	2	0	1	1	1	0	1	0	3	0	22

Table 3.3.2a: Distribution of Patients by Immunosuppressive Used, 1997-2012

Year	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	Total
Type of immunosuppressive	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Steroids																	
Prednisolone	1	3	2	3	4	0	1	0	1	0	1	0	1	0	3	0	20
Methylprednisolone	1	3	2	3	4	0	2	0	1	1	2	0	1	0	3	0	23
Calcineurin Inhibitors																	
Neoral®	1	3	2	3	4	0	1	0	1	1	1	0	1	0	3	0	21
Tacrolimus (FK506)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Antimetabolites																	
Azathioprine (AZA)	1	3	2	3	4	0	2	0	0	1	0	0	0	0	0	0	16
Mycophenolate Mofetil (MMF)	0	0	0	0	1	0	0	0	1	0	2	0	1	0	3	0	8
Anti-lymphocyte Receptor Antibodies																	
Anti-thymocyte globulin (ATG)	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
Simulect	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
TOTAL patients at notification	1	3	2	3	4	0	2	0	1	1	1	0	1	0	3	0	22

Table 3.3.3a: Immunosuppressive Used at Time of Last Follow-up up to 2012

Year of follow up*	2004	2005	2006	2007	2008	2009	2010	2011	2012
Type of immunosuppressive	n	n	n	n	n	n	n	n	n
Steroids									
Prednisolone	3	4	4	3	4	3	3	2	1
Methylprednisolone	1	1	0	0	2	2	1	0	0
Everolimus	0	0	0	0	0	0	0	1	0
Calcineurin Inhibitors									
Cyclosporin A	0	0	0	0	0	0	0	0	0
Neoral®	6	6	7	7	7	7	7	6	10
FK506	0	0	0	0	1	1	1	1	1
Antimetabolites									
Azathioprine (AZA)	3	3	3	3	2	2	1	1	1
Mycophenolate Mofetil (MMF)	3	3	5	5	6	6	6	6	9
TOTAL patients at follow-up	6	6	7	7	8	8	8	8	11

*Data according to year of follow up of transplanted patients

Table 3.3.4a: Duration of Waiting Time on Waiting List, 1997-2012

Year	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	TOTAL
Duration (months)*	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
<5	0	2	1	0	1	0	1	0	0	0	0	0	0	0	2	0	7
5≤10	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	4
10≤15	0	0	0	1	0	0	0	0	0	1	1	0	1	0	0	0	4
15<20	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
20≤25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25≤30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30≤35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35≤40	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
40≤45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45≤50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50≤55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55≤60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60≤65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
TOTAL	1	2	2	2	2	0	2	0	1	1	1	0	1	0	3	0	18
Mean	6	2	4	15	5	-	20	-	9	10	13	-	13	-	21	-	11
SD	-	0	1	6	5	-	25	-	-	-	0	-	-	-	34	-	7
Median	6	2	4	15	5	-	20	-	9	10	13	-	13	-	2	-	15
Minimum	6	2	3	10	1	-	2	-	9	10	13	-	13	-	1	-	1
Maximum	6	2	5	19	8	-	37	-	9	10	13	-	13	-	61	-	61

*Duration=date of transplant-date added to wait list

3.4 TRANPLANT OUTCOMES

Table 3.4.1: Post Transplant Events at Last Follow-up up to 2012

Year of transplant*	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	TOTAL
Type of post transplant events	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Drug Treated Hypertension	0	1	1	0	2	0	1	0	1	0	0	0	0	0	1	0	7
Bone Disease (Symptomatic)	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Chronic Liver Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cataracts	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diabetes	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	3
Renal Dysfunction	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	2
Stroke	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drug-Treated Hyperlipidaemia	0	1	1	0	2	0	1	0	1	0	1	0	1	0	3	0	11
TOTAL patients at follow-up	0	1	1	0	2	0	1	0	1	0	1	0	1	0	3	0	11

*Data according to year of transplant of patient

Table 3.4.2: Post Transplant Malignancies at Follow-up up to 2012

Year of transplant*	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	TOTAL
Type of post transplant malignancies	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Donor related	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recurrence of pre-transplant tumor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
De novo solid tumor	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
De novo lymphoproliferative	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Skin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total patients at follow up	0	1	1	0	2	0	1	0	1	0	1	0	1	0	3	0	11

*Data according to year of transplant of patient

Table 3.4.3: Non-compliance at Follow-up up to 2012

Year of transplant*	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	TOTAL
Non-compliance during follow-up	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
• Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
• No	0	1	1	0	2	0	1	0	1	0	1	0	1	0	3	0	8
TOTAL patients at follow-up	0	1	1	0	2	0	1	0	1	0	1	0	1	0	3	0	11
<i>Areas of non-compliance:</i>																	
• Immunosuppress-ion medication	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
• Patient unable to afford immunosuppress-ion medications	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
• Other medication	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
• Other therapeutic regimen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL patients with noncompliance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Data according to year of transplant of patient

Table 3.4.4: Patient Treated for Rejection at Follow-up up to 2012

Year of transplant*	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	TOTAL
Patient treated for rejection	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
• Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
• No	0	1	1	0	2	0	1	0	1	0	0	0	1	0	0	0	7
TOTAL patients at follow-up	0	1	1	0	2	0	1	0	1	0	1	0	1	0	3	0	11
<i>Number of rejection events</i>															0		
• 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
• 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL patients with rejection	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Data according to year of transplant of patient

Table 3.4.5a: Distribution of Patients by Time of Deaths, 1997-2012

Year of discharge	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	TOTAL
Time of deaths*	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
<3 months (at discharge)	0	1	0	2	0	1	1	0	0	1	0	0	0	0	0	0	6
3-<6 months	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 months-1 year	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
>1 year	0	0	0	1	1	1	0	0	0	0	0	0	1	0	0	1	4
TOTAL patients who died	0	1	0	3	1	3	1	0	0	1	0	0	1	0	0	1	12

*Time=Date of death–date of transplant

Table 3.4.6: Patient Survival, 1997-2012

Year of Transplant	1997-2012	
Interval	% Survival	SE
1 year	58	0.10
3 year	52	0.11
5 year	46	0.11
10 year	37	0.12

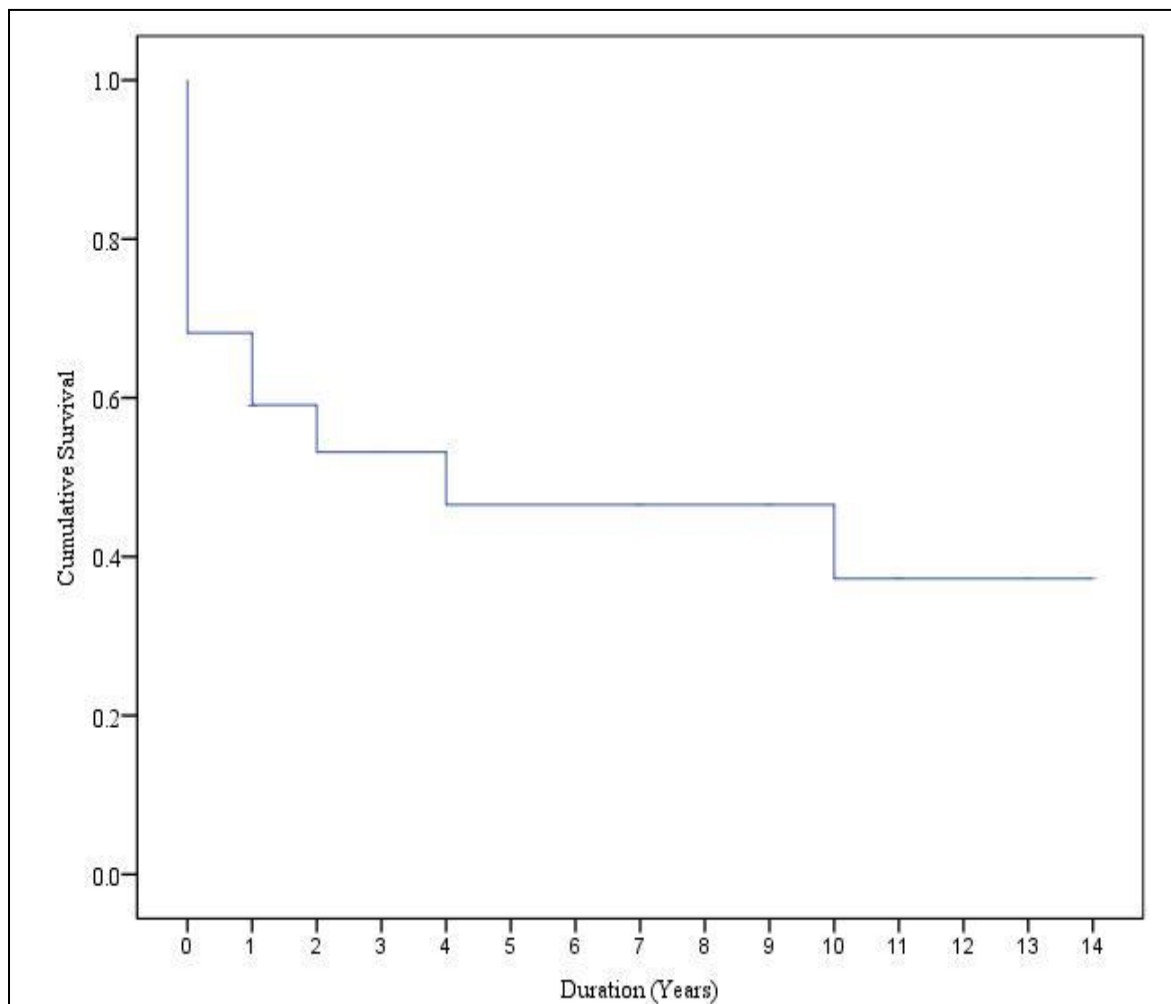


Figure 3.4.6: Patient Survival, 1997-2012

Table 3.4.7: Cause of Death at Discharge, 1997-2012

Year	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	TOTAL
Cause of death	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Hyperacute rejection	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Multi organ failure	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Respiratory failure secondary to septicaemia	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Respiratory failure, renal function and liver failure, ARDS, septicaemia	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Septicaemia, multiorgan failure	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Graft failure	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
TOTAL patients who died at discharge	0	1	0	2	0	1	1	0	0	1	0	0	0	0	0	6

Table 3.4.8: Cause of Death at Follow-up, 1997-2012

Year	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	TOTAL
Cause of death	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Severe Bleeding	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Lung cancer, small cell type bronchopneumonia	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Rejection due to non compliance	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Sudden death due most likely to graft CAD	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
Unknown	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
TOTAL patients who died at follow up	0	0	0	1	1	2	0	0	0	0	0	0	1	0	0	1	6

LUNG TRANSPLANTATION

Table 3.1.1b: Stock and Flow of Lung Transplantation, 2005-2012

Year	2005	2006	2007	2008	2009	2010	2011	2012
New Heart and Lung Transplant Patients	0	0	1	0	0	0	3	0
New Lung Transplant Patients	1	1	1	0	0	1	1	0
Deaths	0	1	1	0	0	2	1	1
Retransplanted	0	0	0	0	0	0	0	0
Lost to follow up	0	0	0	0	0	0	0	0
Alive at 31 st December	1	1	2	2	2	1	4	3

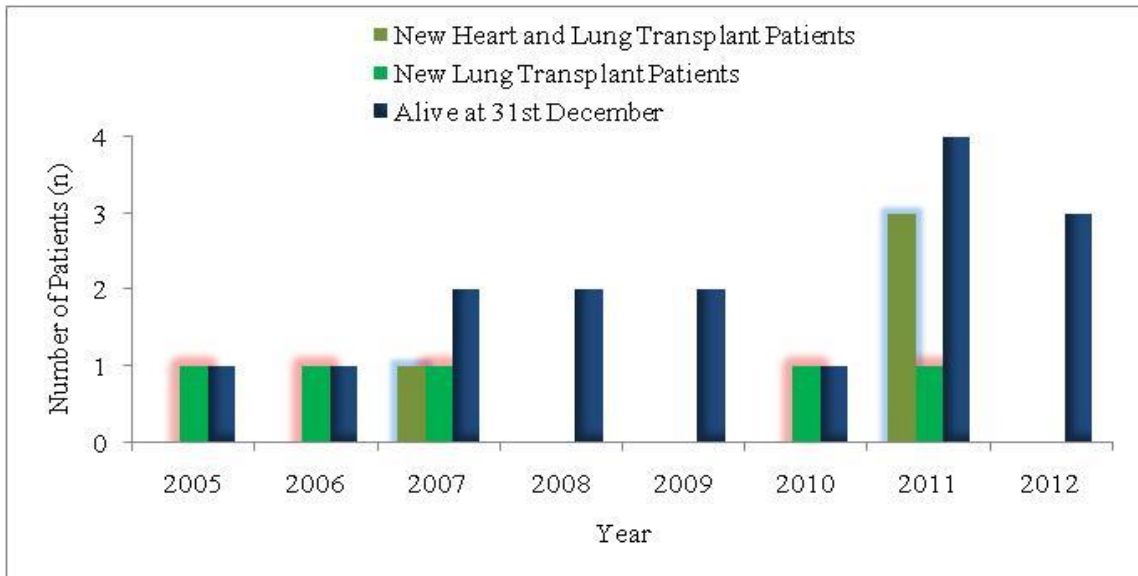


Figure 3.1.1b Stock and Flow of Lung Transplant and Heart Lung Transplant

3.2 RECIPIENTS' CHARACTERISTICS

Table 3.2.1b: Distribution of Patients by Gender, 2005-2012

Year	2005	2006	2007	2008	2009	2010	2011	2012	TOTAL
Gender	n	n	n	n	n	n	n	n	n
Male	1	1	1	0	0	0	3	0	6
Female	0	0	1	0	0	1	1	0	3
TOTAL	1	1	2	0	0	1	4	0	9

Table 3.2.2b: Distribution of Patients by Ethnic Group, 2005-2012

Year	2005	2006	2007	2008	2009	2010	2011	2012	TOTAL
Ethnic group	n	n	n	n	n	n	n	n	n
Malay	0	0	1	0	0	0	2	0	3
Chinese	0	0	0	0	0	0	1	0	1
Indian	1	1	0	0	0	1	1	0	4
Bumiputra Sarawak	0	0	1	0	0	0	0	0	1
TOTAL	1	1	2	0	0	1	4	0	9

Table 3.2.3b: Distribution of Patients by Age, 2005-2012

Year	2005	2006	2007	2008	2009	2010	2011	2012	TOTAL
Age, years	n	n	n	n	n	n	n	n	n
0-19	0	0	1	0	0	0	0	0	1
20-39	0	1	1	0	0	0	2	0	4
40-59	1	0	0	0	0	1	2	0	4
≥60	0	0	0	0	0	0	0	0	0
TOTAL	1	1	2	0	0	1	4	0	9

Age=date of transplant-date of birth

Table 3.2.4b: Distribution of Patients by Primary Diagnosis, 2005-2012

Year	2005	2006	2007	2008	2009	2010	2011	2012	TOTAL
Primary diagnosis	n	n	n	n	n	n	n	n	n
Idiopathic pulmonary fibrosis	1	1	1	0	0	1	1	0	5
Idiopathic pulmonary arterial hypertension	0	0	1	0	0	0	1	0	2
Chronic obstructive pulmonary disease	0	0	0	0	0	0	0	0	0
Bronchiectasis	0	0	0	0	0	0	1	0	1
Others	0	0	0	0	0	0	1*	0	1
TOTAL	1	1	2	0	0	1	4	0	9

* ventricular septal defect (VSD) and Eisenmenger's syndrome

3.3 TRANSPLANT PRACTICES

Table 3.3.1b: Distribution of Patients by Thoracic Transplant Procedure, 2005-2012

Year	2005	2006	2007	2008	2009	2010	2011	2012	TOTAL
Heart Procedure	n	n	n	n	n	n	n	n	n
Single lung transplant	1	0	0	0	0	0	0	0	1
Double lung transplant	0	1	1	0	0	1	1	0	4
Heart-Lung transplant	0	0	1	0	0	0	3	0	4
TOTAL	1	1	2	0	0	1	4	0	9

Table 3.3.3b: Immunosuppressive Used at Time of Last Follow-up up to 2012

Year of follow up*	2005	2006	2007	2008	2009	2010	2011	2012
Type of immunosuppressive	n	n	n	n	n	n	n	n
Steroids:								
Prednisolone	1	2	2	1	0	0	0	0
Methylprednisolone	1	1	2	0	0	0	0	0
Calcineurin Inhibitors:								
Neoral®	1	2	3	0	0	0	0	0
FK506 (Tacrolimus)	0	0	0	2	2	1	0	0
Cyclosporin A	0	0	0	0	0	1	1	3
Antimetabolites:								
Mycophenolate Mofetil (MMF)	1	2	3	2	0	0	1	3
TOTAL patients at follow-up	1	2	3	2	2	1	1	3

*Data according to year of follow up of transplanted patients

3.4 TRANSPLANT OUTCOMES

Table 3.4.5b: Distribution of Patients by Time of Deaths, 2005-2012

Year of discharge	2005	2006	2007	2008	2009	2010	2011	2012	TOTAL
Time of deaths*	n	n	n	n	n	n	n	n	n
<3 months (at discharge)	0	1	1	0	0	1	1	0	4
3-<6 months	0	0	0	0	0	0	0	0	0
6 months-1 year	0	0	0	0	0	0	0	1	1
>1 year	0	0	0	0	0	1	0	0	1
TOTAL patients who died	0	1	1	0	0	2	1	1	6

*Time=Date of death–date of transplant