

CHAPTER 4

LIVER TRANSPLANTATION

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4.1 STOCK AND FLOW

Over the last 18 years the Liver Registry has collected data relating to activities and outcomes of liver transplantation in Malaysia.

A total of one hundred and thirteen (n=113) transplants had been done as of 2010. The number of transplants peaked in 2004 but subsequently decreased in the last few years.

Table 4.1.1 Stock and Flow of Liver Transplantation, 1993-2010

Year	93	94	95	96	97*	98	99	2000	01	02	03**	04	05	06	07	08	09	10
New transplant patients	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8	4
Deaths	0	0	3	4	1	1	4	1	2	5	1	5	6	4	3	2	4	2
Re-transplant	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lost to follow up	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Functioning graft at 31st December	1	2	7	16	18	19	23	25	28	33	37	48	46	50	54	58	62	64

*1 patient who was alive until 5/12/1997 is recorded dead with missing date of death

** 1 patient who had transplanted in 2003 is recorded as dead with missing date of death

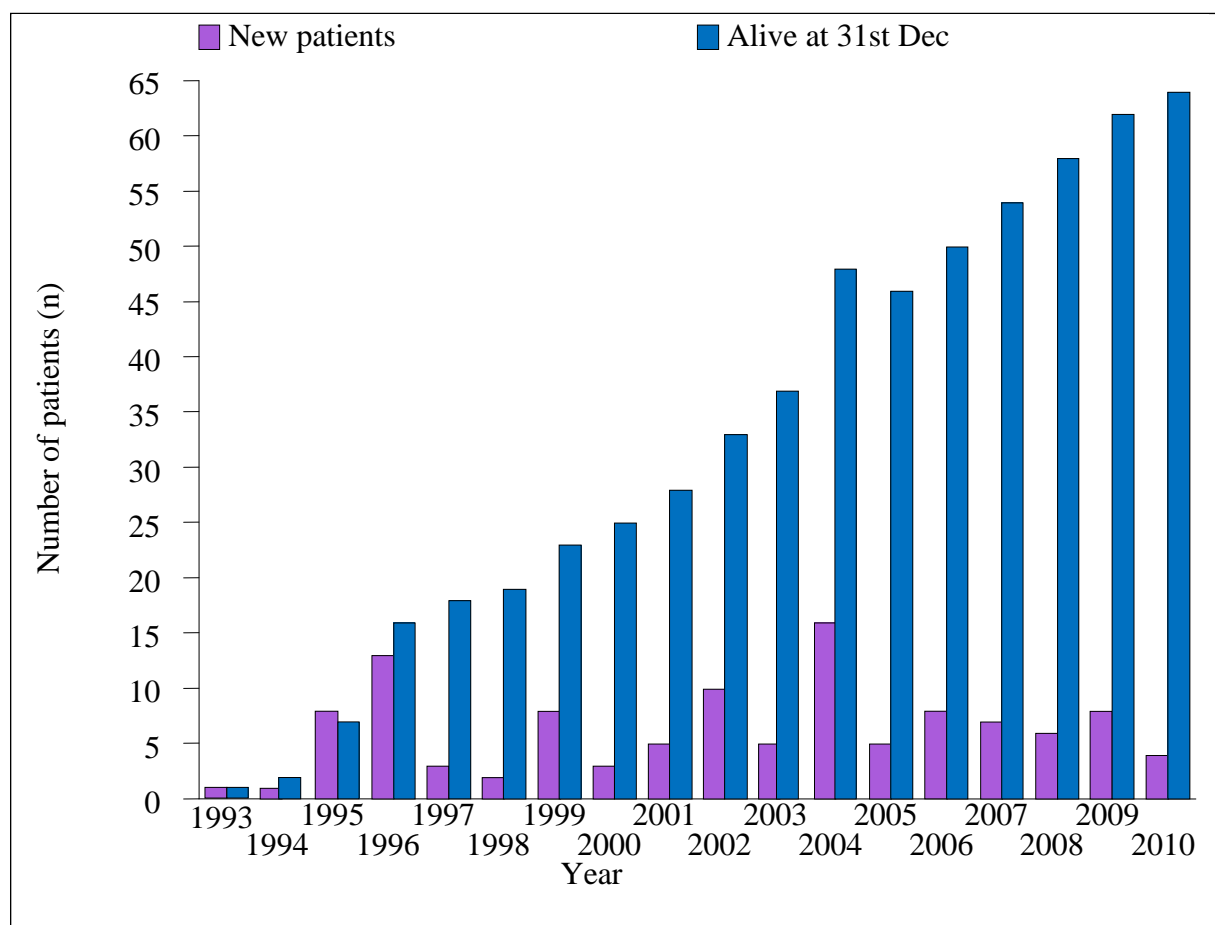


Figure 4.1.1 Stock and Flow of Liver Transplantation, 1993-2010

Table 4.1.2 shows that 85% of transplant cases were performed locally while 15% were done overseas.

Table 4.1.2 Distribution of Patients by Place of Transplant, 1993-2010

Place of transplant	Year (No.)																			TOTAL
	93	94	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	10		
Local	0	0	8	10	1	1	8	3	5	9	2	14	5	8	7	5	6	4	96	
Overseas	1	1	0	3	2	1	0	0	0	1	3	2	0	0	0	1	2	0	17	
TOTAL	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8	4	113	

Table 4.1.3 Distribution of Patients by Centres for Liver Transplantation, 1993-2010

Transplant Centre	Year (No.)																			TOTAL
	93	94	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	10		
Sime Darby Medical Centre, Subang Jaya	0	0	8	10	1	1	8	3	5	6	2	7	0	0	0	0	0	0	51	
Hospital Selayang, Department of Hepatobiliary	0	0	0	0	0	0	0	0	0	3	0	7	5	8	7	5	6	4	45	
Royal Children's Hospital, Brisbane	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
National University Hospital, Singapore	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	2	0	5	
Queensland Liver Transplant Service, Australia	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
King's Collage Hospital, UK	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Tianjin, China	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2	
Asian Centre for Liver Disease & Transplantation, Singapore	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	4	
TOTAL	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8	4	113	

4.2 RECIPIENTS' CHARACTERISTICS

Male to female ratio was 1:1. There were 56 (49.6%) males and 57 (50.4%) females. The ethnic distribution was 37.2% (n=42) Malay, 53% (n=60) Chinese, 8.0% (n=9) Indian and 1.8 % (n=2) others.

Table 4.2.1 Distribution of Patients by Gender, 1993-2010

Gender	Year (No.)																			TOTAL
	93	94	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	10		
Male	0	0	6	5	2	1	3	1	2	7	5	10	2	6	3	1	1	1	56	
Female	1	1	2	8	1	1	5	2	3	3	0	6	3	2	4	5	7	3	57	
TOTAL	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8	4	113	

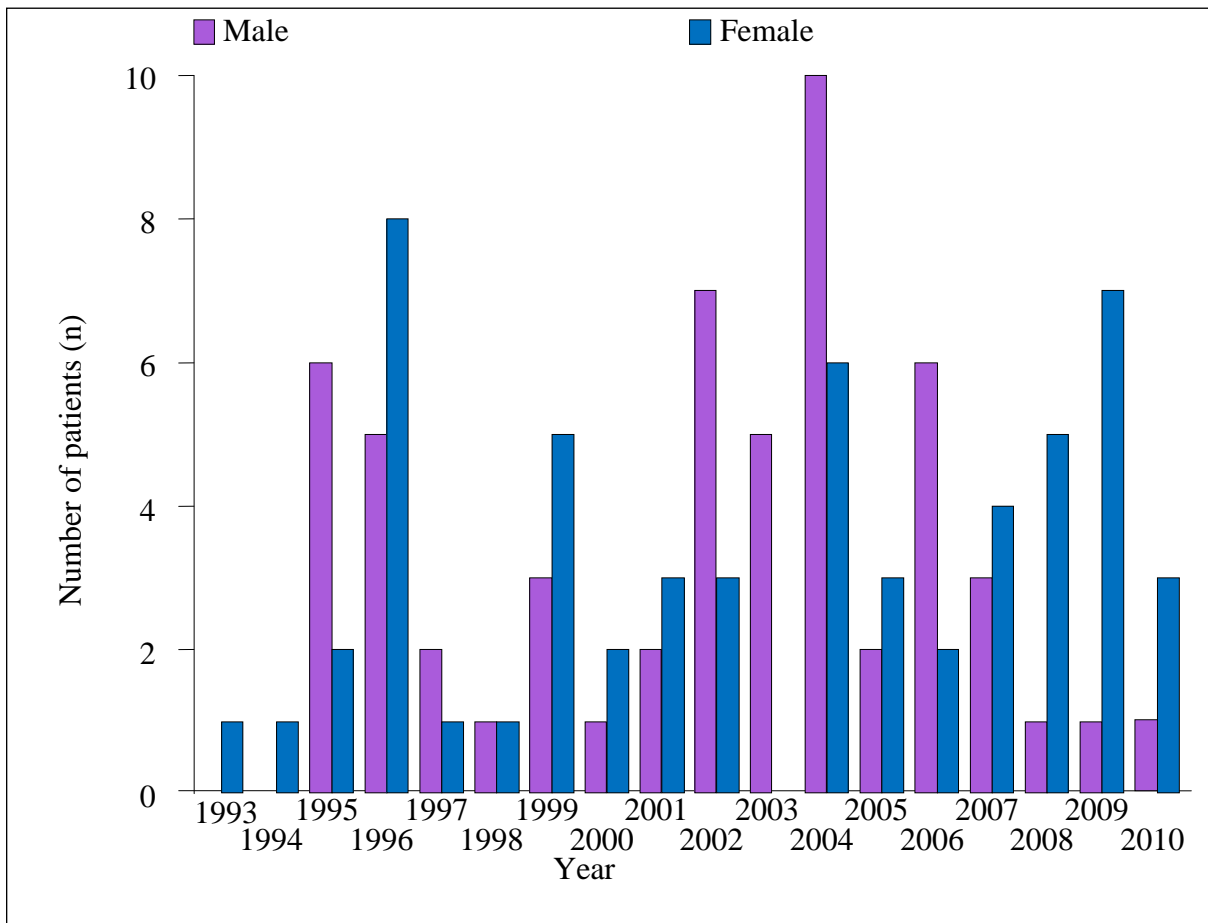


Figure 4.2.1 Distribution of Patients by Gender, 1993-2010

Table 4.2.2 Distribution of Patients by Ethnic Group, 1993-2010

Ethnic group	Year (No.)																		TOTAL
	93	94	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	10	
Malay	0	1	2	3	1	0	4	1	2	3	1	11	3	3	2	2	1	2	42
Chinese	1	0	6	8	2	1	2	2	3	6	4	5	1	3	4	4	7	1	60
Indian	0	0	0	2	0	1	1	0	0	0	0	0	1	2	1	0	0	1	9
Others	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2
TOTAL	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8	4	113

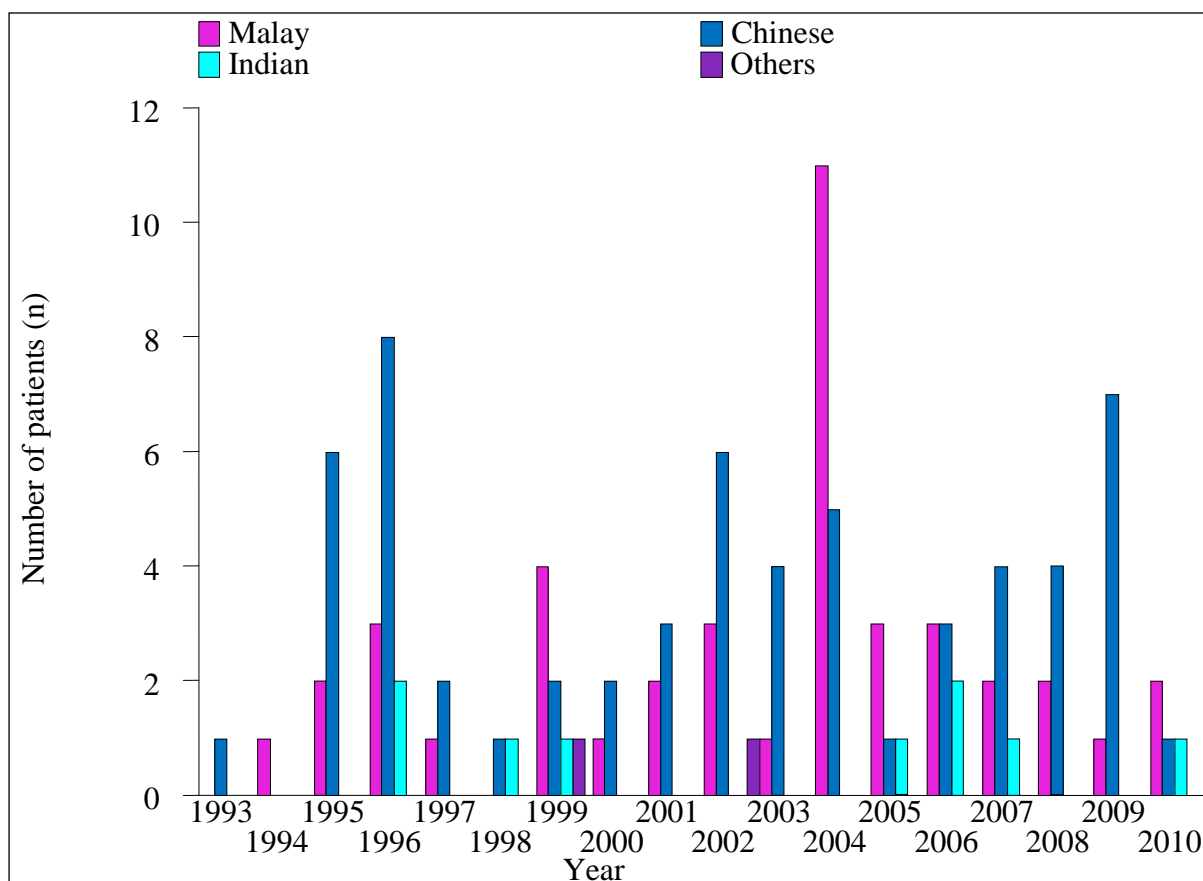


Figure 4.2.2 Distribution of Patients by Ethnic Group, 1993-2010

Ninety-nine (88%) of transplants were done involving patients below 20 years of age. Biliary atresia (68%) was the commonest primary liver disease. The common indications for liver transplantation were poor liver function and failure to thrive. Forty-one (36.3%) of recipients were from blood group O.

Table 4.2.3 Distribution of Patients by Age, 1993-2010

Age group	Year (No.)																			TOTAL
	93	94	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	10		
<1	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	1	0	5	
1-4	1	1	3	11	3	2	5	3	5	6	1	8	2	4	4	1	3	0	63	
5-9	0	0	3	1	0	0	2	0	0	2	1	3	2	1	1	1	2	2	21	
10-14	0	0	1	1	0	0	0	0	0	0	0	1	0	1	1	0	1	0	6	
15-19	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2	4	
20-39	0	0	1	0	0	0	0	0	0	1	0	0	0	2	1	3	1	0	9	
40-59	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	3	
≥60	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2	
TOTAL	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8	4	113	
Mean	2	4.4	9.2	3.8	1.8	2.3	4.4	1.4	2.2	10.4	26.9	12.5	4.5	12.2	9.5	13.9	8.6	14.6	9.1	
SD	-	-	9.2	3.6	0.7	1.4	4.8	0.1	1.6	14.2	32.7	21.6	2.9	15.2	12.8	11.3	8.2	5.9	13.8	
Median	2	4.4	5.4	2.3	2	2.3	2.2	1.5	1.8	4	9.3	3.4	4.5	4.3	4.7	15.7	6.6	14.6	3.7	

Minimum	2	4.4	2.2	1.6	1.1	1.4	1.1	1.3	1	1.3	11.8 months	11.8 months	11.9 months	1.5	1.5	10.6 months	8.9 months	9.1	8.9 months
Maximum	2	4.4	30	14.1	2.4	3.3	15	1.6	4.9	46	72.7	73.9	8.1	38.8	37.5	25.9	26.9	19.9	73.9

** Age=date if transplant – date of birt

Table 4.2.4 Primary Diagnosis, 1993-2010

Primary diagnosis	Year (No.)																		
	93	94	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	10	TOTAL
Biliary atresia	1	1	7	12	3	1	7	2	5	6	2	10	4	2	6	4	3	1	77
Metabolic liver disease	0	0	1	1	0	0	0	0	0	2	0	2	0	0	0	0	1	0	7
Cholestatic liver disease	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	1	4
Primary biliary cirrhosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Primary sclerosing cholangitis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Autoimmune hepatitis	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Chronic hepatitis B	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	5
Chronic hepatitis C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alcoholic liver disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malignancies	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	1	5
Acute liver failure	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	0	0	4
Idiopathic/ Cryptogenic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Others	0	0	0	0	0	0	0	0	0	2	0	1	1	4	1	3	4	1	17
TOTAL	1	1	8	13	3	2	8	3	5	11	7	17	6	9	7	7	9	5	122

** 9 patients have more than one primary disease

Table 4.2.5 Indication for Transplantation, 1993-2010

Indication for transplantation	Year (No.)																		
	93	94	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	10	TOTAL
Recurrent encephalopathy	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	3
Uncontrolled bleeding varices	0	0	0	7	1	0	4	1	1	0	0	2	0	0	0	0	0	0	16
Intractable ascites	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spontaneous bacterial peritonitis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poor liver function	1	1	7	11	3	1	8	3	5	9	3	11	4	1	4	1	4	0	77
Malignancy	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	2
Unacceptable quality of life	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	2	0	5
Failure to thrive and growth retardation in paediatric patients	0	0	6	10	3	2	6	3	5	7	2	10	3	1	0	1	5	1	65
Others	0	0	0	0	0	0	0	0	0	0	0	1	2	8	3	5	6	3	28
No data	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	4
TOTAL	1	1	14	28	7	3	19	7	11	19	7	26	10	10	7	8	17	5	200

** 43 patients had 1 indication for transplant, 70 had more than 1 indication for transplantation

Table 4.2.6 Recipients' Blood Group, 1993-2010

Blood group	Year (No.)																			TOTAL
	93	94	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	10		
A	0	1	2	0	0	0	3	0	1	3	1	4	1	4	2	1	1	1	25	
B	0	0	1	2	0	1	2	0	1	1	0	1	1	3	3	1	1	1	19	
AB	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0	0	1	0	5	
O	0	0	2	5	1	0	3	3	3	5	1	8	2	1	2	2	2	1	41	
No data	1	0	3	5	2	0	0	0	0	1	3	2	0	0	0	2	3	1	23	
TOTAL	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8	4	113	

4.3 TRANSPLANT PRACTICES

Seventy percent of liver transplants were from living donors while 30% were from cadaveric donors. Among the living donors 86% were from first degree relatives with mother to child being the most common type of donation. Tacrolimus (n=87) and steroids (n=71) were the most commonly used immunosuppressive medications.

Table 4.3.1 Distribution of Patients by Type of Donors, 1993-2010

Type of donor	Year (No.)																			TOTAL
	93	94	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	10		
Cadaveric	1	0	0	3	1	0	0	0	0	1	1	4	2	4	4	4	6	3	34	
Living Related - Mother	0	1	5	2	1	2	5	2	2	2	2	7	1	1	0	0	2	1	36	
Living Related - Father	0	0	2	7	1	0	2	0	2	3	0	1	1	3	3	2	0	0	27	
Living Related - Daughter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Living Related - Son	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2	
Living Related - Brother	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	
Living Related - Sister	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Living Related - Monozygotic twin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Living Related - Dizygotic twin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Living Related - Others	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	
Living Related - Emotionally	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	
Living Unrelated	0	0	1	1	0	0	1	1	1	3	0	3	0	0	0	0	0	0	11	
TOTAL patients	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8	4	113	

Table 4.3.2 Immunosuppressive Drug Treatment at Transplantation, 1993-2010

Immunosuppressive drugs	Year (No.)																			TOTAL
	93	94	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	10		
Steroids	0	0	2	5	0	2	5	2	5	5	1	12	5	8	6	5	6	2	71	
Azathioprine	0	0	0	0	0	0	0	0	0	0	0	4	5	8	4	2	0	0	23	
Cyclosporin A	1	1	1	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	6	
Tacrolimus (FK506)	0	0	3	7	2	2	8	2	5	9	5	12	5	8	5	4	7	3	87	
Mycophenolate Mofetil (MMF)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	6	
Rapamycin	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	3	
Monoclonal/Polyclonal Antiodies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Anti IL2 Antibodies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
No data	0	0	4	3	1	0	0	0	0	1	0	4	0	0	1	0	0	0	14	
TOTAL patients	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8	4	113	

Note: 41 patients had 1 type of drug, 47 patients had 2 types, 25 patients had 3 types

4.4 TRANSPLANT OUTCOMES

The first year survival rate for the period 1993-1998 and 1999-2010 were 71% and 70% respectively. The most common cause of death was sepsis.

Table 4.4.1 Patient Survival by Year of Transplant, 1993-2010

Interval (months)	Year of transplant			
	1993-1998		1999-2010	
	% Survival	SE	% Survival	SE
1	82	7	82	4
6	71	9	71	5
12	71	9	70	5

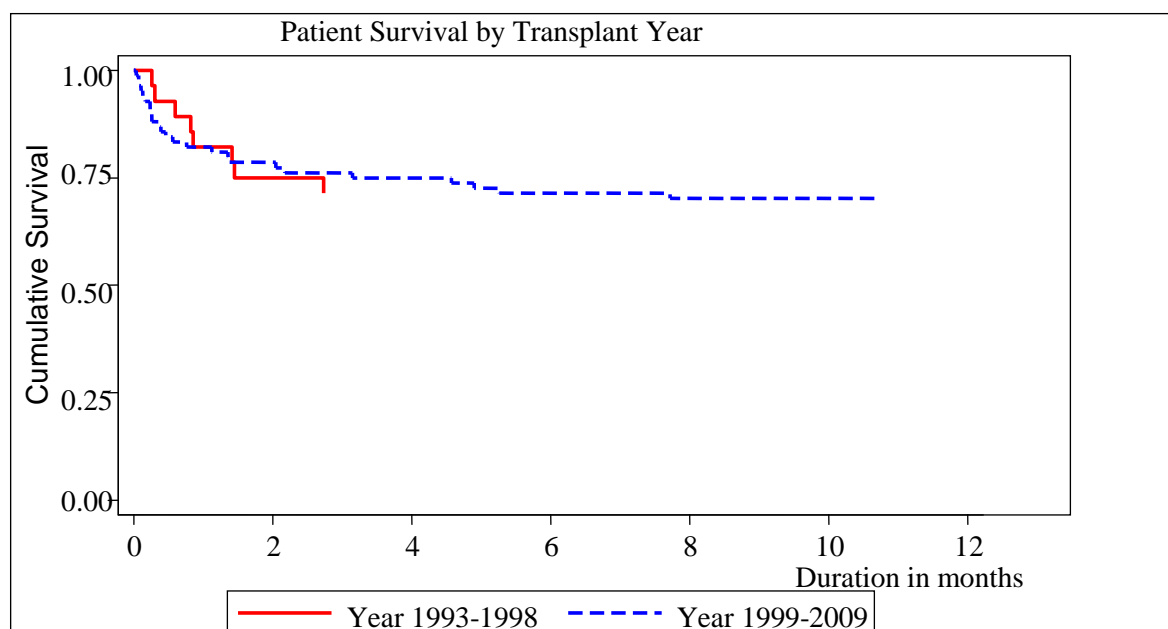


Figure 4.4.1 Patient Survival by Year of Transplant, 1993-2010

Table 4.4.2 Patient Survival by Gender, 1993-2010

Interval (months)	Gender			
	Male		Female	
	% Survival	SE	% Survival	SE
1	82	5	82	5
6	71	6	72	6
12	69	6	72	6

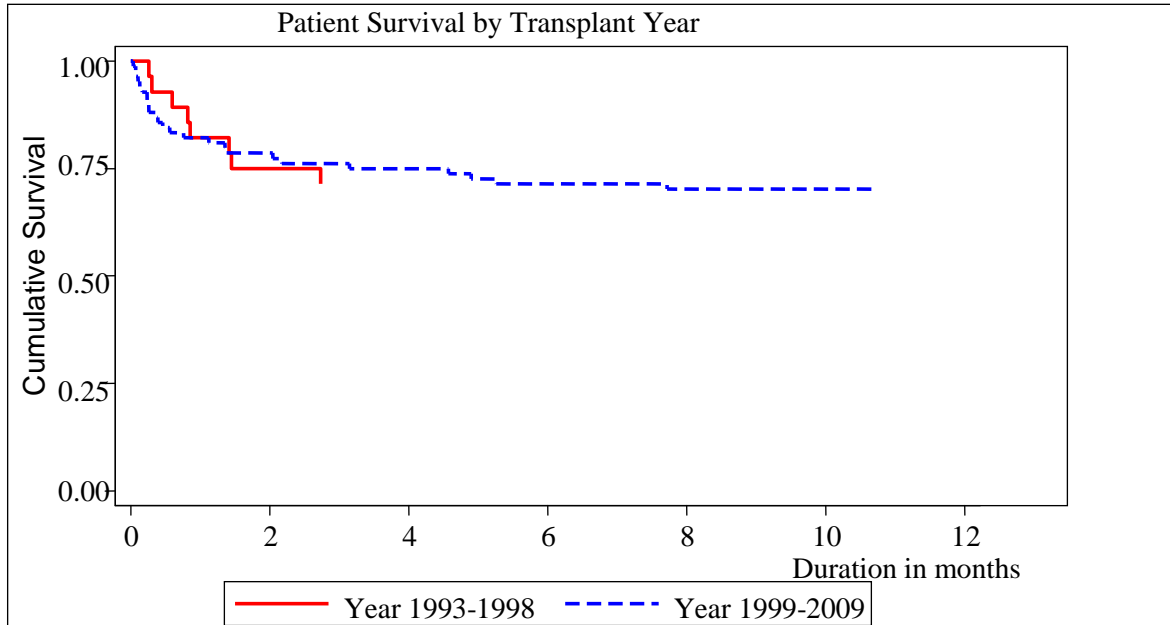


Figure 4.4.2 Patient Survival by Gender, 1993-2010

Table 4.4.3 Patient Survival by Age Group, 1993-2010

Interval (months)	Age Group			
	0-9 years		≥10 years	
	% Survival	SE	% Survival	SE
1	80	4	91	6
6	69	5	83	8
12	69	5	78	9

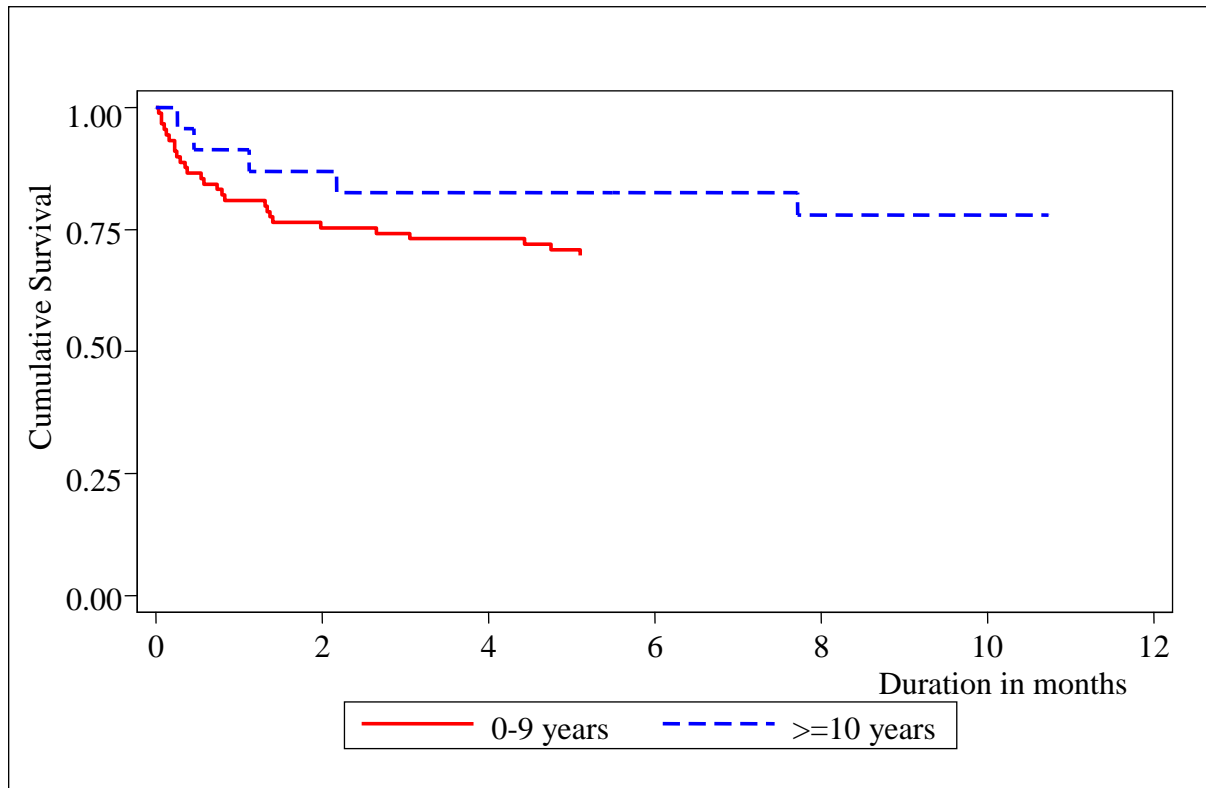


Figure 4.4.3 Patient Survival by Age Group, 1993-2010

Table 4.4.4 Distribution of Patients by Cause of Death, 1993-2010

Cause of death	93	94	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	10	TOTAL
Graft failure	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	3
Portal Vein Thrombosis	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Chronic graft rejection	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Intra-abdominal Bleeding	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Ischaemic liver necrosis	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Peritonitis and Septicaemia	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Graft versus host reaction	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
CMV Pneumonia	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Decompensated Liver cirrhosis post liver transplant with DIVC	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Died at home	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Intra-cerebral Haemorrhage	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Intracranial Haemorrhage	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Metastasis to scalp and chest	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Oesophageal Varices / Bleeding	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Pneumonia and Respiratory Failure	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Post Transplant Lymphoproliferative Disease and Septicaemia	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Sepsis	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Sepsis severe and multi-organ failure	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Bleeding oesophageal varices	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2
Septicaemia	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	4
Septicaemia and DIVC	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
Gram negative Septicaemia	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Acute liver failure secondary to portal vein thrombosis post liver transplant	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Cholelithiasis	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
End stage liver failure recurrent ascending cholangitis	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Retroperitoneal Haematoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Viral Bronchopneumonia	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Acute on Chronic Liver Failure	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2
Staph aureus Septicaemia, Drug induced immunodeficiency	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Hepatitis B	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Acute graft rejection, post-transplant lymphoproliferative disorder, massive upper GI bleed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Chronic rejection complicated by Pneumocytis pneumonia infection*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Bronchopneumonia, sepsis, renal failure*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Malignant Lymphoma post Liver Transplant*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Post liver transplant pancreatitis with portal vein thrombosis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Sepsis secondary to bronchopneumonia underlying disease Byler's disease with ESL disease*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Unknown	0	0	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4
Total death	0	0	3	4	1	1	4	1	2	5	1	5	6	4	3	2	4	2	48

*Additional cause of death