

CHAPTER 4

LIVER TRANSPLANTATION

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4.1 STOCK AND FLOW

The number of liver transplants performed from 1993 to 2009 is one hundred and nine. Ninety two (84%) were performed locally and seventeen (16%) were performed at overseas centres. Eight new liver transplants were done in 2009 of which six were done locally at Selayang Hospital and two were done overseas.

Table 4.1.1 Stock and Flow of Liver Transplantation, 1993-2009

Year	93	94	95	96	97*	98	99	00	01	02	03**	04	05	06	07	08	09
New transplant patients	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8
Deaths	0	0	3	4	1	1	4	1	2	5	1	5	6	4	3	2	4
Re-Transplant	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
Functioning graft at 31st December	1	2	7	16	18	19	23	25	28	33	37	48	46	50	54	58	62

*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, 1993-2009

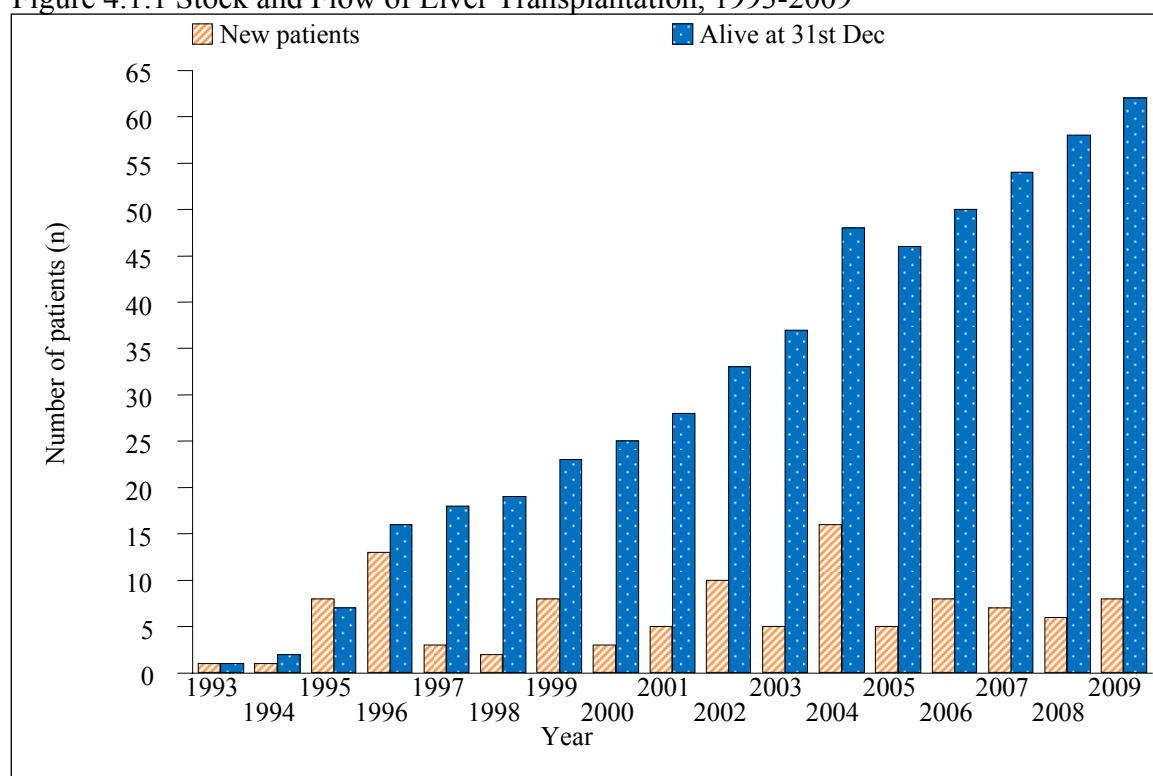


Table 4.1.2 Distribution of Patients by Place of Transplant, 1993-2009

Place of Transplant	Year (No.)																	
	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	Total
Local	0	0	8	10	1	1	8	3	5	9	2	14	5	8	7	5	6	92
Overseas	1	1	0	3	2	1	0	0	0	1	3	2	0	0	0	1	2	17
TOTAL	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8	109

Table 4.1.3 Distribution of Patients by Centres for Liver Transplantation, 1993-2009

Transplant Centre	Year (No.)																	
	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	TOTAL
Sime Darby Medical Centre, Subang Jaya	0	0	8	10	1	1	8	3	5	6	2	7	0	0	0	0	0	51
Hospital Selayang	0	0	0	0	0	0	0	0	0	3	0	7	5	8	7	5	6	41
Royal Children's Hospital, Brisbane	0	0	0	2	1	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	5
Queensland Liver Transplant Service, Australia	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
King Collage Hospital, UK	0	1	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	2
Asian Centre for Liver Disease & Transplantation, Singapore	0	0	0	0	0	0	0	0	0	1	2	1	-	-	-	-	-	4
TOTAL	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8	109

4.2 RECIPIENTS' CHARACTERISTICS

Fifty five (50%) were males and fifty four (50%) were females. The ethnic distribution of the liver transplant recipients are as follows: Chinese 59 (54%), Malays 40 (37%), Indians 8 (7%), Others 2 (2%).

Eighty seven (80%) of the transplant recipients were between 1 and 9 years of age at the time of transplantation. Biliary atresia was the primary liver disease in seventy six (70%) of the recipients. The commonest indication for liver transplantation was failure to thrive with growth retardation and poor liver function. The commonest blood group amongst the liver transplant recipients was group O. (37%)

Table 4.2.1 Distribution of Patients by Gender, 1993-2009

Gender	Year (No.)																	
	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	TOTAL
Male	0	0	6	5	2	1	3	1	2	7	5	10	2	6	3	1	1	55
Female	1	1	2	8	1	1	5	2	3	3	0	6	3	2	4	5	7	54
TOTAL	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8	109

Figure 4.2.1 Distribution of Patients by Gender, 1993-2009

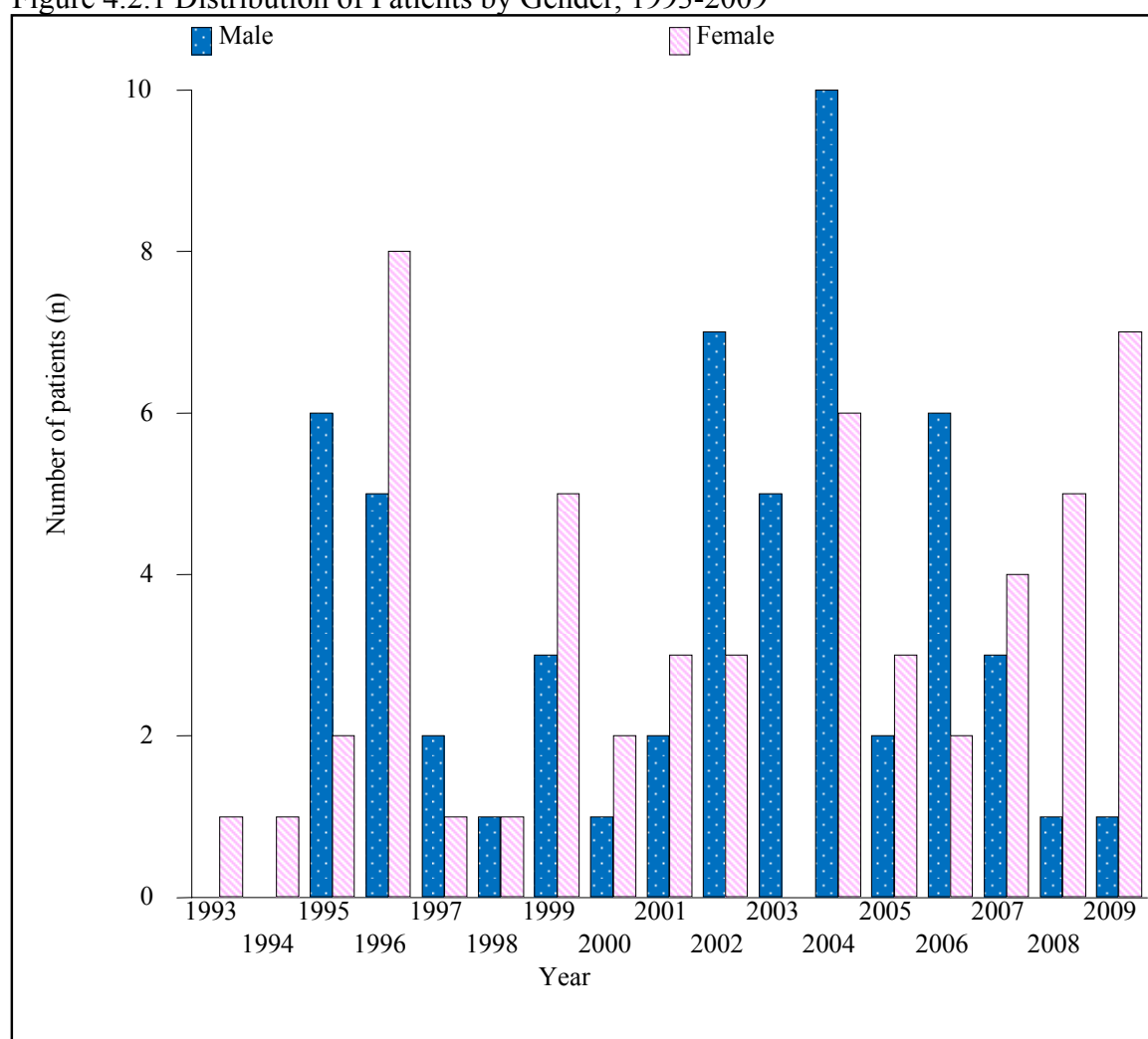


Table 4.2.2 Distribution of Patients by Ethnic Group, 1993-2009

Ethnic group	Year (No.)																	
	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	TOTAL
Malay	0	1	2	3	1	0	4	1	2	3	1	11	3	3	2	2	1	40
Chinese	1	0	6	8	2	1	2	2	3	6	4	5	1	3	4	4	7	59
Indian	0	0	0	2	0	1	1	0	0	0	0	0	1	2	1	0	0	8
Others	0	0	0	0	0	0	1	0	0	1	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	109

Figure 4.2.2 Distribution of Patients by Ethnic Group, 1993-2009

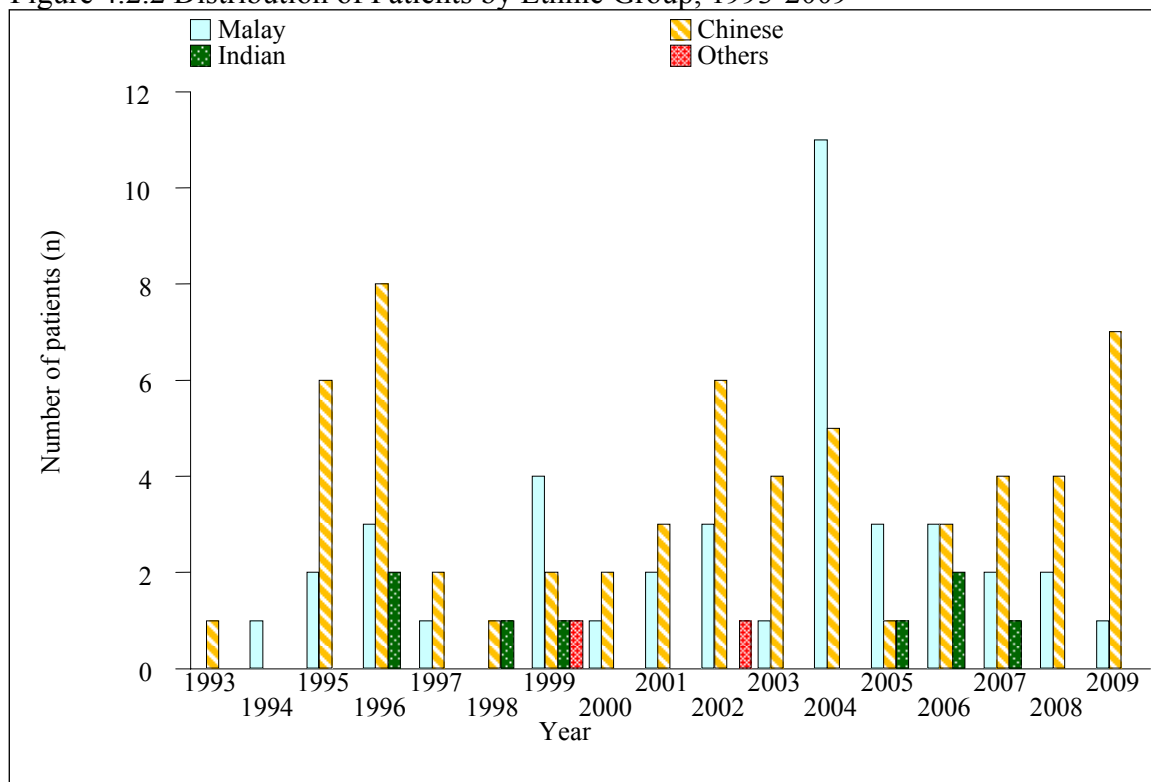


Table 4.2.3 Distribution of Patients by Age, 1993-2009

Age group	Year (No.)																	TOTAL
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
<1	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	1	5
1-4	1	1	3	11	3	2	5	3	5	6	1	8	2	4	4	1	3	63
5-9	0	0	3	1	0	0	2	0	0	2	1	3	2	1	1	1	2	19
10-14	0	0	1	1	0	0	0	0	0	0	0	1	0	1	1	0	1	6
15-19	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2
20-39	0	0	1	0	0	0	0	0	0	1	0	0	0	2	1	3	1	9
40-59	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	3
≥60	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
TOTAL	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8	109
Mean	2	4.4	9.2	3.8	1.8	2.3	4.4	1.4	2.2	10.4	26.8	12.5	4.5	12.2	9.5	13.9	8.6	8.9
SD	-	-	9.2	3.6	0.7	1.4	4.8	0.1	1.6	14.2	32.8	21.6	2.9	15.2	12.8	11.3	8.2	14
Median	2	4.4	5.4	2.3	2	2.3	2.2	1.5	1.8	4	8.9	3.4	4.5	4.3	4.7	15.7	6.6	3.2
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	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	73.9

** Age=date if transplant – date of birth

Table 4.2.4 Primary Diagnosis, 1993-2009 (N=109)

Primary diagnosis	Year (No.)													TOTAL				
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005		2006	2007	2008	2009
Biliary atresia	1	1	7	12	3	1	7	2	5	6	2	10	4	2	6	4	3	76
Metabolic liver disease	0	0	1	1	0	0	0	0	0	2	0	2	0	0	0	0	1	7
Cholestatic liver disease	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	3
Primary biliary cirrhosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary sclerosing cholangitis	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	1
Chronic hepatitis B	0	0	0	0	0	0	0	0	0	0	3	2	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
Alcoholic liver disease	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	4
Acute liver failure	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	0	4
Idiopathic/ Cryptogenic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Others	0	0	0	0	0	0	0	0	0	2	0	1	1	4	1	3	4	16
TOTAL	1	1	8	13	3	2	8	3	5	11	7	17	6	9	7	7	9	117

** 8 patients have more than one primary disease

Table 4.2.5 Indication for Transplantation, 1993-2009 (N=109)

Indication for transplantation	Year (No.)																	TOTAL
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Recurrent encephalopathy	0	0	1	0	0	0	1	0	0	1	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	16
Intractable ascites	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
Poor liver function	1	1	7	11	3	1	8	3	5	9	3	11	4	1	4	1	4	77
Malignancy	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Unacceptable quality of life	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	2	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	64
Others	0	0	0	0	0	0	0	0	0	0	0	1	2	8	3	5	6	25
No data	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	4
TOTAL	1	1	14	28	7	3	19	7	11	19	7	26	10	10	7	8	17	195

** 36 patients had 1 indication for transplant, 73 had more than 1 indication for transplantation

Table 4.2.6 Recipients' Blood Group, 1993-2009

Blood group	Year (No.)																	TOTAL
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
A	0	1	2	0	0	0	3	0	1	3	1	4	1	4	2	1	1	24
B	0	0	1	2	0	1	2	0	1	1	0	1	1	3	3	1	1	18
AB	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0	0	1	5
O	0	0	2	5	1	0	3	3	3	5	1	8	2	1	2	2	2	40
No Data	1	0	3	5	2	0	0	0	1	3	2	0	0	0	0	2	3	22
TOTAL	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8	109

4.3 TRANSPLANT PRACTICES

72% of liver transplants were living donor transplants while 28% were from cadaveric donors. 60% of living donors were first degree relatives with mother to child being the most common.

The immunosuppressive medications most commonly used are tacrolimus and steroids.

Table 4.3.1 Distribution of Patients by Type of Donors, 1993-2009

Type of donor	Year (No.)													TOTAL				
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005		2006	2007	2008	2009
Cadaveric	1	0	0	3	1	0	0	0	0	1	1	4	2	4	4	4	6	31
Living Related - Mother	0	1	5	2	1	2	5	2	2	2	2	7	1	1	0	0	2	35
Living Related - Father	0	0	2	7	1	0	2	0	2	3	0	1	1	3	3	2	0	27
Living Related - Daughter	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	2
Living Related - Brother	0	0	0	0	0	0	0	0	0	1	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
Living Related - Monozygotic twin	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
Living Related - Others	0	0	0	0	0	0	0	0	0	0	0	0	1	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	1
Living Unrelated	0	0	1	1	0	0	1	1	1	3	0	3	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	109

Table 4.3.2 Immunosuppressive Drug Treatment at Transplantation, 1993-2009 (N=109)

Immunosuppressive drugs	Year (No.)												TOTAL					
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004		2005	2006	2007	2008	2009
Steroids	0	0	2	5	0	2	5	2	5	5	1	12	5	8	6	5	6	69
Azathioprine	0	0	0	0	0	0	0	0	0	0	0	4	5	8	4	2	0	23
Cyclosporin A	1	1	1	2	0	0	0	1	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	84
Mycophenolate Mofetil (MMF)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	4
Rapamycin	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	3
Monoclonal/Polyclonal Antidiodes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anti IL2R Antibodies	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
No Data	0	0	4	3	1	0	0	0	0	1	0	4	0	0	1	0	0	14
TOTAL patients	1	1	8	13	3	2	8	3	5	10	5	16	5	8	7	6	8	109

Note: 26 patients had 1 type if drug, 44 patients had 2 types, 25 patients had 3 types

4.4 TRANSPLANT OUTCOME

The 1 year survival rate for the period 1993 - 1998 and 1999 – 2009 was 71% and 65% respectively. The most common cause of death was sepsis.

Table 4.4.1 Patient Survival by Year of Transplant, 1993-2009 (N=109)

Interval (months)	Year of transplant			
	1993-1998		1999-2009	
	% Survival	SE	% Survival	SE
1	82	7	79	5
6	71	9	67	6
12	71	9	65	6

Figure 4.4.1 Patient Survival by Year of Transplant, 1993-2009

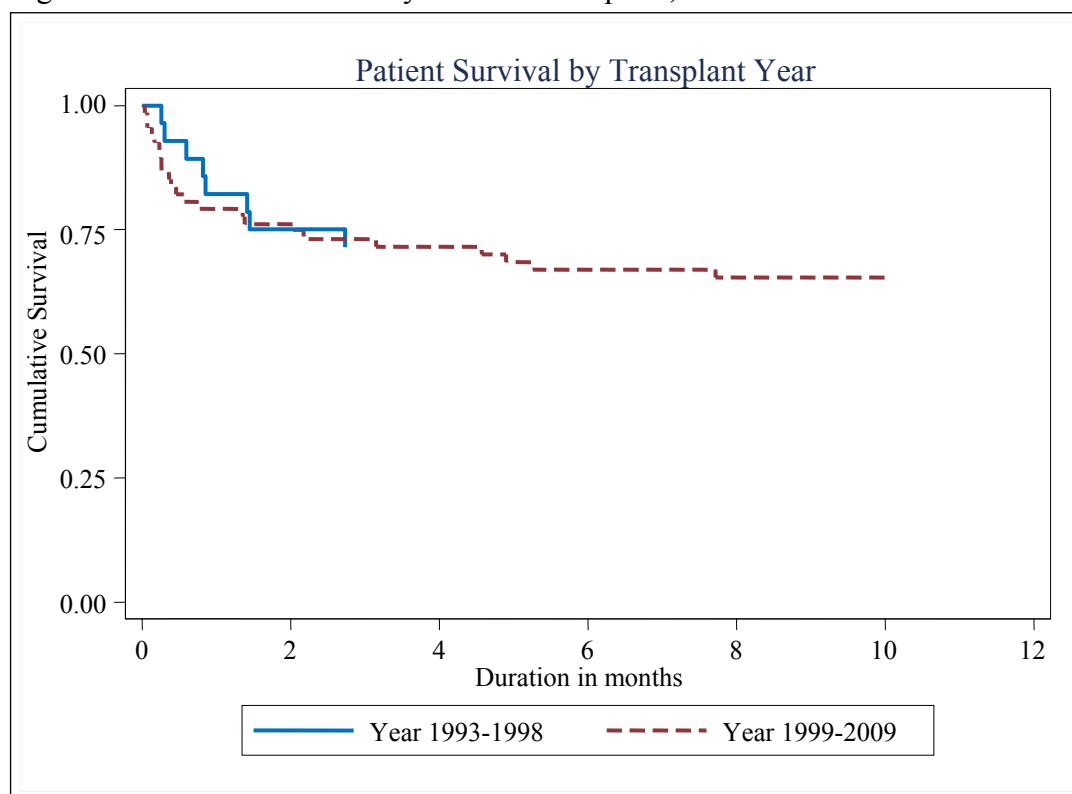


Table 4.4.2 Patient Survival by Gender, 1993-2009 (N=109)

Interval (months)	Gender			
	Male		Female	
	% Survival	SE	% Survival	SE
1	82	5	77	6
6	71	6	66	7
12	69	7	66	7

Figure 4.4.2 Patient Survival by Gender, 1993-2009

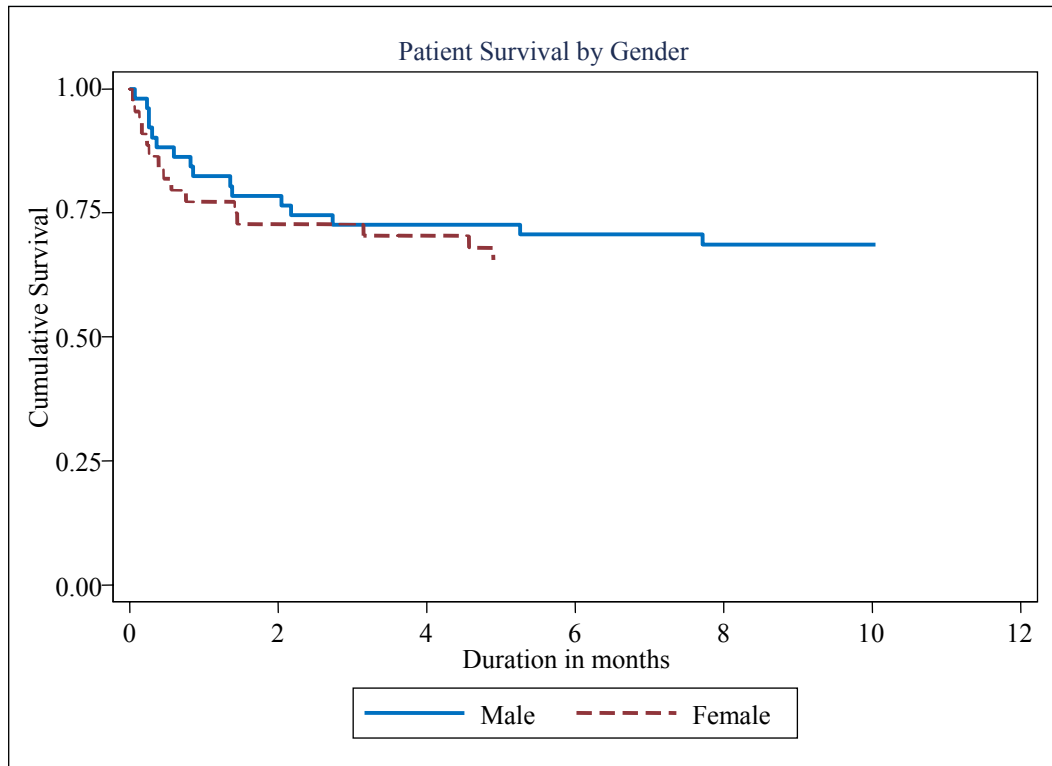


Table 4.4.3 Patient Survival by Age Group, 1993-2009 (N=109)

Interval (months)	Age Group			
	0-9 years		≥10 years	
	% Survival	SE	% Survival	SE
1	79	5	88	8
6	66	5	82	9
12	66	5	75	11

Figure 4.4.3 Patient Survival by Age Group, 1993-2009

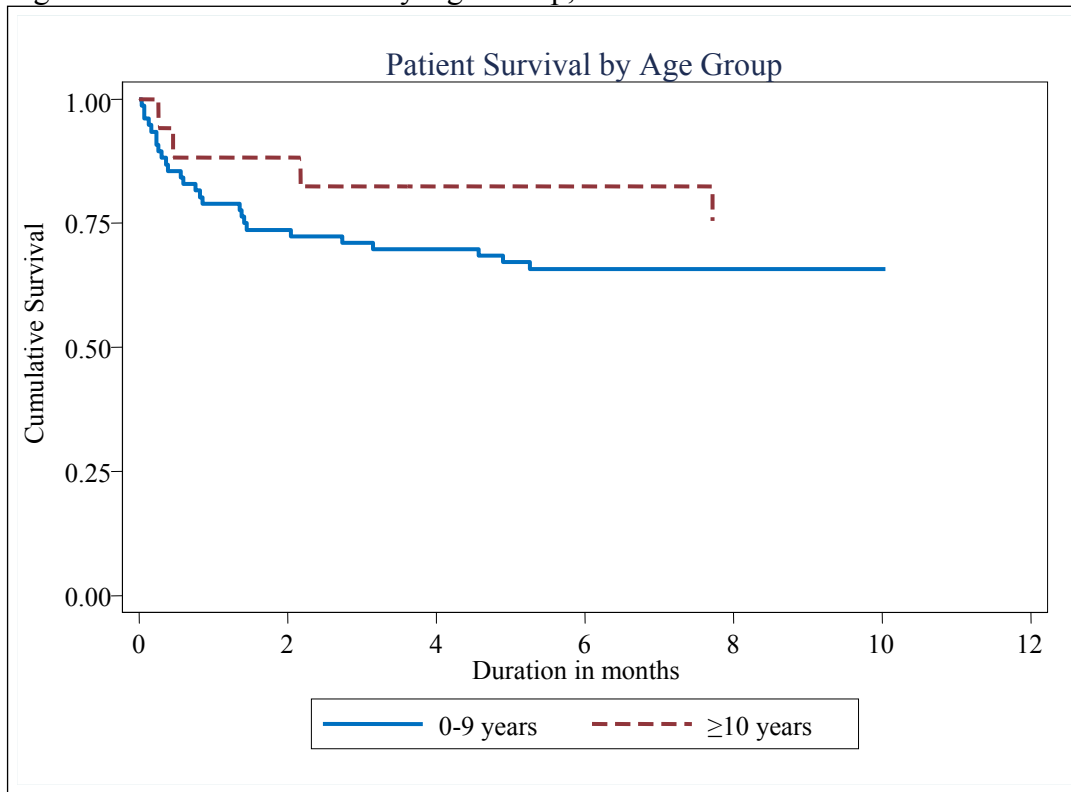


Table 4.4.4 Distribution of Patients by Cause of Death, 1993-2009 (N=109)

Cause of death	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
Graft failure	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	3
Portal Vein Thrombosis	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Chronic graft rejection	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	1
Ischaemic liver necrosis	0	0	0	0	0	0	0	1	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	1
Graft versus host reaction	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
CMV Pneumonia	0	0	0	0	0	0	1	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	1
Died at home	0	0	0	0	0	0	0	0	0	0	0	1	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	1
Intracranial Haemorrhage	0	0	0	1	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	1
Oesophageal Varices / Bleeding	0	0	0	0	0	0	1	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	1
Post Transplant Lymphoproliferative Disease and Septicaemia	0	0	0	0	0	0	0	0	1	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	1
Sepsis severe and multi-organ failure	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Bleeding oesophageal	0	0	0	0	1	0	1	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	4
Septicaemia and DIVC	0	0	0	1	0	0	0	0	0	1	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	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	1
Cholelithiasis	0	0	0	0	0	0	0	0	0	0	0	0	1	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	1
Retroperitoneal Hematoma	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	1
Acute on Chronic Liver Failure	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	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	1
Hepatitis B	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Unknown	0	0	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4
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	1
Chronic rejection complicated by Pneumocystis pneumonia infection	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Total death	0	0	3	4	1	1	4	1	2	5	1	5	6	4	3	2	2	44