CHAPTER 1

BLOOD AND MARROW TRANSPLANTATION

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1.0 INTRODUCTION

The first bone marrow transplantation in Malaysia was conducted on a paediatric patient in 1987 at University Hospital Kuala Lumpur. Since then other bone marrow transplant centres in Malaysia have been set up. The idea of a common registry was mooted in the late 1990's and the Malaysian Bone Marrow Transplant Recipient Registry was formed in 1999 by the mutual agreement to merge existing transplant databases. The data was maintained online to the best of the group's ability until 2004, when the National Transplant Registry officially took over. Today haematopoietic stem cells can be harvested from blood as well as bone marrow and hence the name has been changed to Blood and Marrow Transplant Registry.

We continue to believe that a registry is an important entity as it not only is a record of national transplant activity, it will be important to provide better data (as larger numbers give greater statistical meaning) to guide clinicians towards future directions in stem cell transplantation.

We believe that a registry is of vital importance as it would serve the following purposes:

1. provide an accurate record of the number of haematopoietic stem cell transplantations performed in the country
2. reflect the changing trends in patient numbers, indications for transplant, mode of transplants and centres involved
3. report on the outcome of haematopoietic stem cell transplantation which would allow national and international comparisons
4. provide data which could guide future needs and directions in the field of haematopoietic stem cell transplantation

1.1 STOCK AND FLOW

The total number of haematopoietic stem cell transplants performed is 896. At the time of the first NTR report a total of 9 haematopoietic stem cell transplant centres have contributed data to the registry.

Table 1.1.1: Stock and Flow of Blood and Marrow Transplantation, 1987-2004

Year	**87**	**88**	**89**	**90**	**91**	**92**	**93**	**94**	**95**
New transplant patients	8	6	22	5	12	21	19	25	30
Deaths	1	1	4	6	1	2	9	5	16
Lost to follow up	0	0	0	0	0	0	0	0	0
Alive at 31st December	7	12	30	29	40	59	69	89	103

Year	**96**	**97**	**98**	**99**	**00**	**01**	**02**	**03**	**04**
New transplant patients	28	33	49	62	94	107	114	128	133
Deaths	11	15	17	15	31	47	30	50	40
Lost to follow up	0	0	0	0	0	0	0	0	0
Alive at 31st December	120	138	170	217	280	340	424	502	595*

*Out of the 896 patients who were transplanted, there were 38 patients with early death before day 30 of transplant

Figure 1.1.1: Stock and Flow of Blood and Marrow Transplantation, 1987-2004

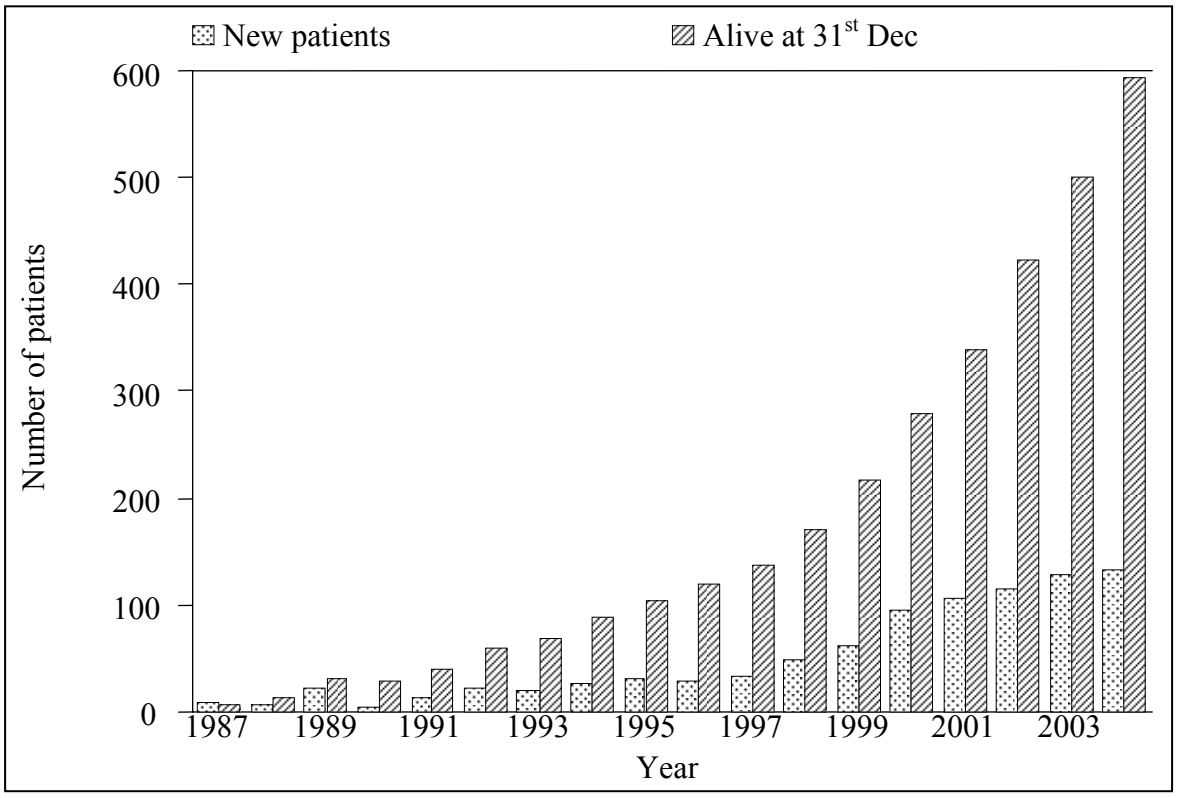


Table 1.1.2: New Transplant Rate per million population (pmp), 1987-2004

Year	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
New transplant patients	8	6	22	5	12	21	19	25	30
New transplant rate pmp	0	0	1	0	1	1	1	1	1

Year	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
New transplant patients	28	33	49	62	94	107	114	128	133
New transplant rate pmp	1	2	2	3	4	4	5	5	5

Figure 1.1.2: New Transplant Rate per million population (pmp), 1987-2004

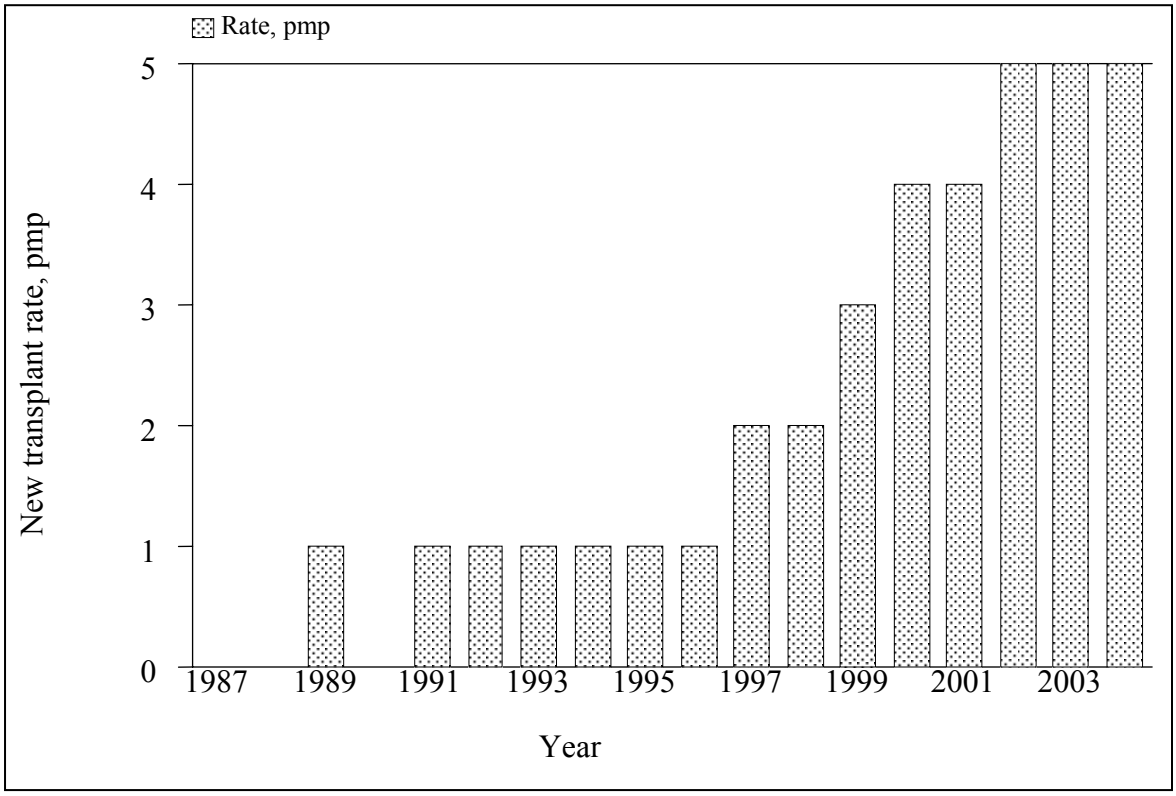


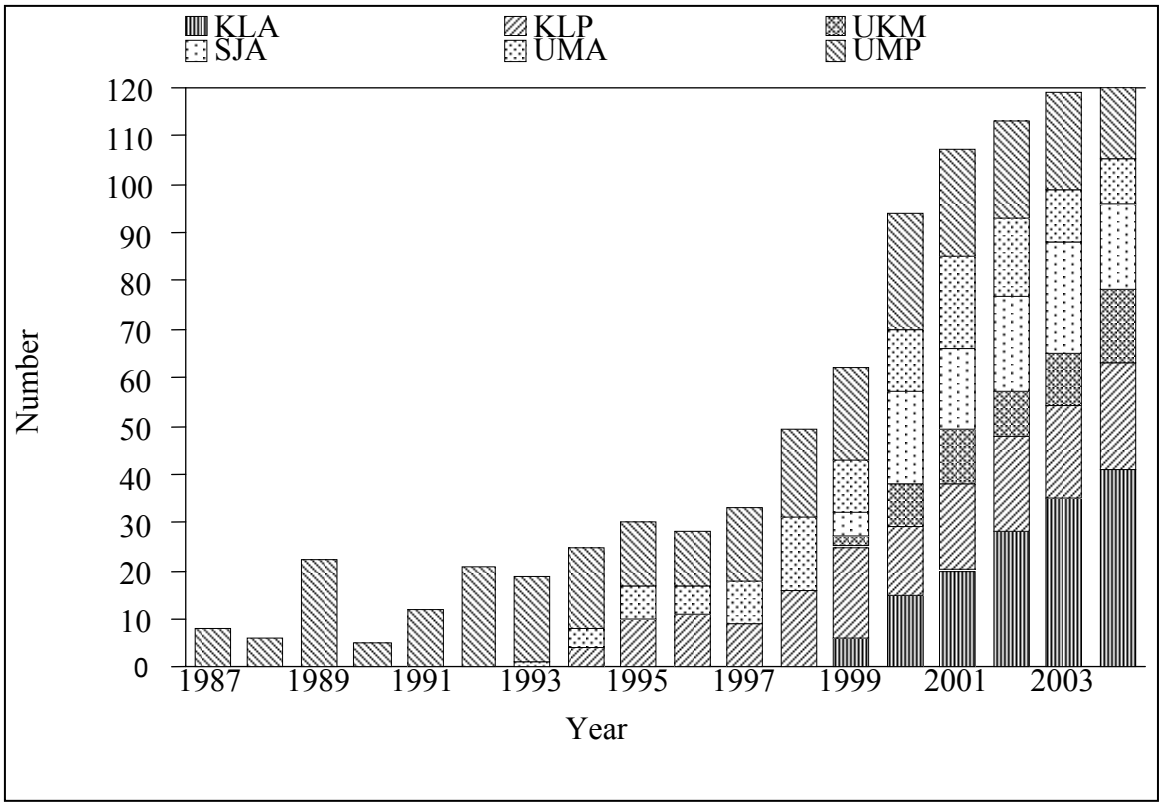
Table 1.1.3: Centre distribution (SDP), 1987-2004

Year	1987		1988		1989		1990		1991		1992		1993	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
KLA	0		0		0		0		0		0		0	
KLP	0		0		0		0		0		0		0	
UKM	0		0		0		0		0		0		0	
SJA	0		0		0		0		0		0		0	
UMA	0		0		0		0		0		0		1	5
UMP	8	100	6	100	22	100	5	100	12	100	21	100	18	95
GMC	0		0		0		0		0		0		0	
LWE	0		0		0		0		0		0		0	
SJP	0		0		0		0		0		0		0	
TOTAL	8	100	6	100	22	100	5	100	12	100	21	100	19	100

Year	1994		1995		1996		1997		1998		1999		2000	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
KLA	0		0		0		0		0		6	10	15	16
KLP	4	16	10	33	11	39	9	27	16	33	19	31	14	15
UKM	0		0		0		0		0		2	3	9	10
SJA	0		0		0		0		0		5	8	19	20
UMA	4	16	7	23	6	21	9	27	15	31	11	18	13	14
UMP	17	68	13	43	11	39	15	45	18	37	19	31	24	26
GMC	0		0		0		0		0		0		0	
LWE	0		0		0		0		0		0		0	
SJP	0		0		0		0		0		0		0	
TOTAL	25	100	30	100	28	100	33	100	49	100	62	100	94	100

Year	2001		2002		2003		2004		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
KLA	20	19	28	25	35	27	41	31	145	16
KLP	18	17	20	18	19	15	22	17	162	18
UKM	11	10	9	8	11	9	15	11	57	6
SJA	17	16	20	18	23	18	18	14	102	11
UMA	19	18	16	14	11	9	9	7	121	14
UMP	22	21	20	18	20	16	15	11	286	32
GMC	0		0		0		2	2	2	0
LWE	0		0		0		5	4	5	1
SJP	0		1	1	9	7	6	5	16	2
TOTAL	107	100	114	100	128	100	133	100	896	100

Figure 1.1.3: Centre distribution (SDP), 1987-2004



KLA	HKL, Adult
KLP	HKL, Paediatric
UMA	UMMC, Adult
UMP	UMMC, Paediatric
SJA	SJMC, Adult
UKM	Hospital UKM

1.2 RECIPIENTS' CHARACTERISTICS

There is a slight male preponderance (58% males, 42% females) (Table 1.2.1). The largest ethnic group of transplant recipients is Chinese followed by Malays and Indians (Table 1.2.2). The young median age reflects the paediatric bias in the registry as transplants first started in paediatric patients and the adult centres started later, in 1993 (Table 1.2.3).

The majority of transplants (about two-thirds) are for malignant disorders and most of these are haematological malignancies like leukaemia and lymphoma. The bulk of non-malignant disorders requiring transplants are thalassaemia and aplastic anaemia (Table 1.2.4).

Table 1.2.1: Gender distribution, 1987-2004

Year	**1987**		**1988**		**1989**		**1990**		**1991**		**1992**		**1993**	
Gender	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	7	88	4	67	12	55	3	60	7	58	13	62	13	68
Female	1	13	2	33	10	45	2	40	5	42	8	38	6	32
TOTAL	8	100	6	100	22	100	5	100	12	100	21	100	19	100

Year	**1994**		**1995**		**1996**		**1997**		**1998**		**1999**	
Gender	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	16	64	11	37	15	54	18	55	33	67	36	58
Female	9	36	19	63	13	46	15	45	16	33	26	42
TOTAL	25	100	30	100	28	100	33	100	49	100	62	100

Year	**2000**		**2001**		**2002**		**2003**		**2004**		**TOTAL**	
Gender	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	54	57	66	62	62	54	71	55	79	59	520	58
Female	40	43	41	38	52	46	57	45	54	41	376	42
TOTAL	94	100	107	100	114	100	128	100	133	100	896	100

Figure 1.2.1: Gender distribution, 1987-2004

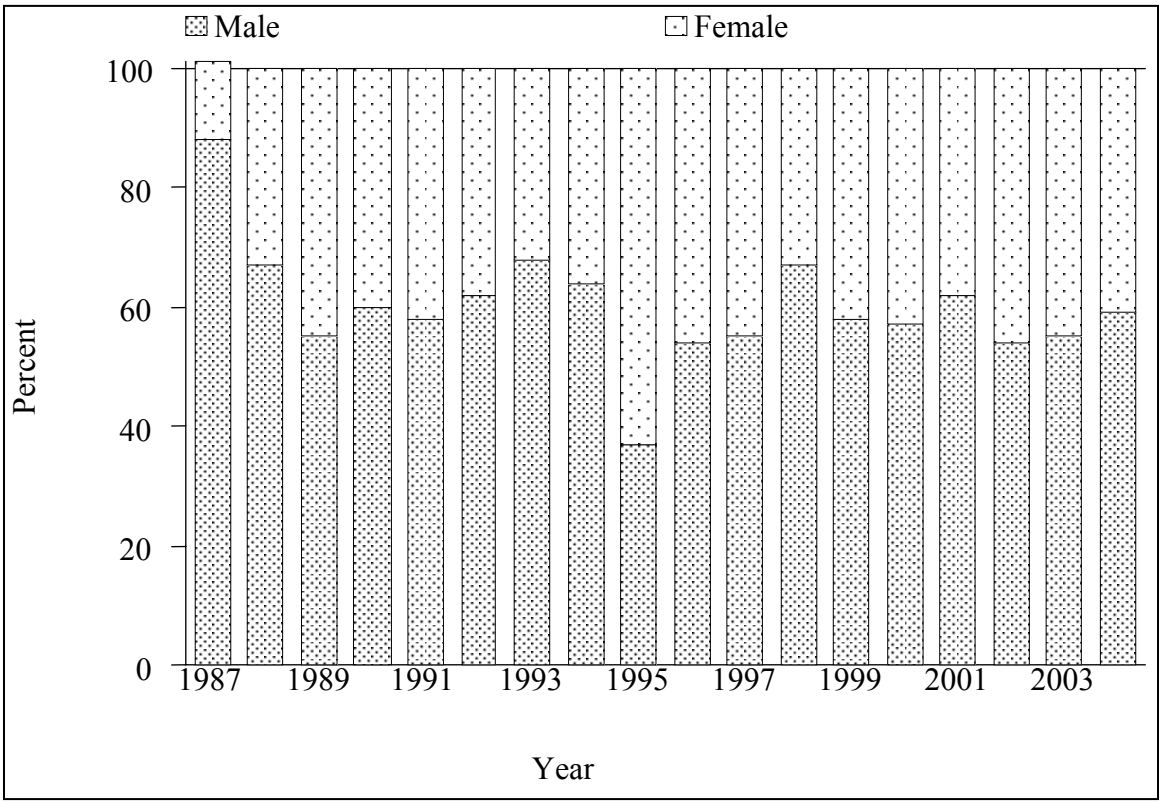


Table 1.2.2: Ethnic group distribution, 1987-2004

Year	**1987**		**1988**		**1989**		**1990**		**1991**		**1992**		**1993**	
Race	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Malay	2	25	4	67	13	59	2	40	4	33	4	19	3	16
Chinese	5	63	2	33	8	36	3	60	7	58	10	48	10	53
Indian	1	13	0	0	0	0	0	0	1	8	4	19	1	5
Bumiputra Sabah	0	0	0	0	1	5	0	0	0	0	2	10	3	16
Bumiputra Sarawak	0	0	0	0	0	0	0	0	0	0	0	0	2	11
Others	0	0	0	0	0	0	0	0	0	0	1	5	0	0
TOTAL	8	100	6	100	22	100	5	100	12	100	21	100	19	100

Year	**1994**		**1995**		**1996**		**1997**		**1998**		**1999**		**2000**	
Race	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Malay	9	36	7	23	8	29	9	27	20	41	31	50	33	35
Chinese	12	48	14	47	11	39	20	61	24	49	26	42	48	51
Indian	0	0	3	10	6	21	0	0	4	8	4	6	7	7
Bumiputra Sabah	4	16	1	3	0	0	1	3	0	0	0	0	3	3
Bumiputra Sarawak	0	0	0	0	2	7	0	0	0	0	0	0	0	0
Others	0	0	5	17	1	4	3	9	1	2	1	2	3	3
TOTAL	25	100	30	100	28	100	33	100	49	100	62	100	94	100

Year	**2001**		**2002**		**2003**		**2004**		**TOTAL**	
Race	No.	%	No.	%	No.	%	No.	%	No.	%
Malay	46	43	37	32	46	36	50	38	328	37
Chinese	48	45	65	57	65	51	59	44	437	49
Indian	8	7	8	7	6	5	8	6	61	7
Bumiputra Sabah	1	1	1	1	4	3	8	6	29	3
Bumiputra Sarawak	1	1	1	1	4	3	7	5	17	2
Others	3	3	2	2	3	2	1	1	24	3
TOTAL	107	100	114	100	128	100	133	100	896	100

Figure 1.2.2: Ethnic group distribution, 1987-2004

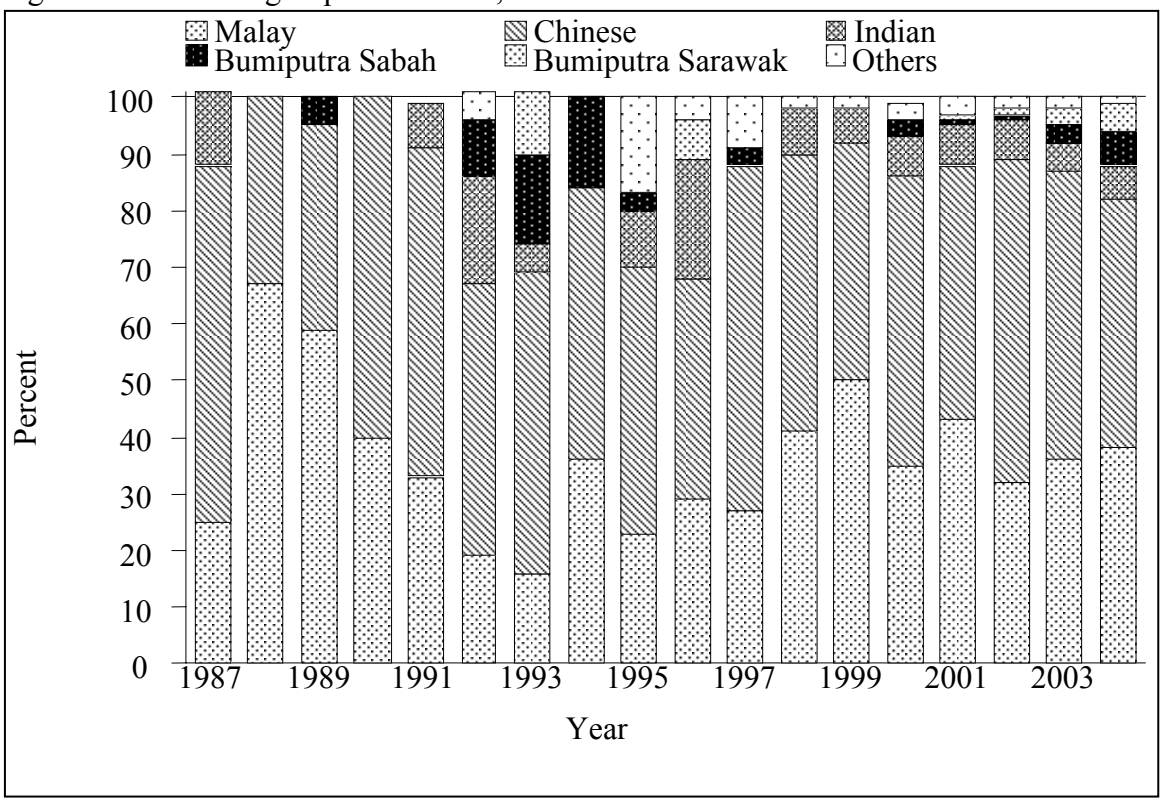


Table 1.2.3: Age distribution, 1987-2004

Year	1987		1988		1989		1990		1991		1992		1993	
Age group (years)	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0-9	4	50	4	67	17	77	5	100	10	83	15	71	9	47
10-19	4	50	2	33	5	23	0	0	2	17	6	29	10	53
20-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40-59	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>=60	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	8	100	6	100	22	100	5	100	12	100	21	100	19	100
Mean	9		7		8		6		6		7		9	
SD	4		3		3		3		4		4		5	
Median	9		8		8		6		6		6		10	
Minimum	2		2		1		2		1		1		1	
Maximum	15		10		13		9		13		14		17	

Year	1994		1995		1996		1997		1998		1999		2000	
Age group (years)	No.	%	No.	%.	No.	%	No.	%	No.	%	No.	%	No.	%
0-9	11	44	12	40	13	46	19	58	21	43	28	45	27	29
10-19	11	44	13	43	12	43	8	24	16	33	15	24	27	29
20-39	3	12	4	13	3	11	5	15	12	24	12	19	19	20
40-59	0	0	1	3	0	0	1	3	0	0	7	11	20	21
>=60	0	0	0	0	0	0	0	0	0	0	0	0	1	1
TOTAL	25	100	30	100	28	100	33	100	49	100	62	100	94	100
Mean	11		13		12		12		13		17		23	
SD	7		9		9		12		10		15		17	
Median	11		11		11		6		10		11		18	
Minimum	1		3		1		1		5 months		1		1	
Maximum	29		41		37		45		39		57		61	

Year	2001		2002		2003		2004		TOTAL	
Age group (years)	No.	%	No.	%	No.	%	No.	%	No.	%
0-9	23	21	30	26	42	33	26	20	316	35
10-19	28	26	25	22	18	14	40	30	242	27
20-39	39	36	36	32	47	37	48	36	228	25
40-59	16	15	23	20	21	16	18	14	107	12
>=60	1	1	0	0	0	0	1	1	3	0
TOTAL	107	100	114	100	128	100	133	100	896	100
Mean	23		23		22		23		19	
SD	16		16		15		15		15	
Median	22		22		23		20		14	
Minimum	1 month		1		5 months		1		1 month	
Maximum	64		55		52		61		64	

*Age=date of transplant – date of birth

Figure 1.2.3: Age distribution, 1987-2004

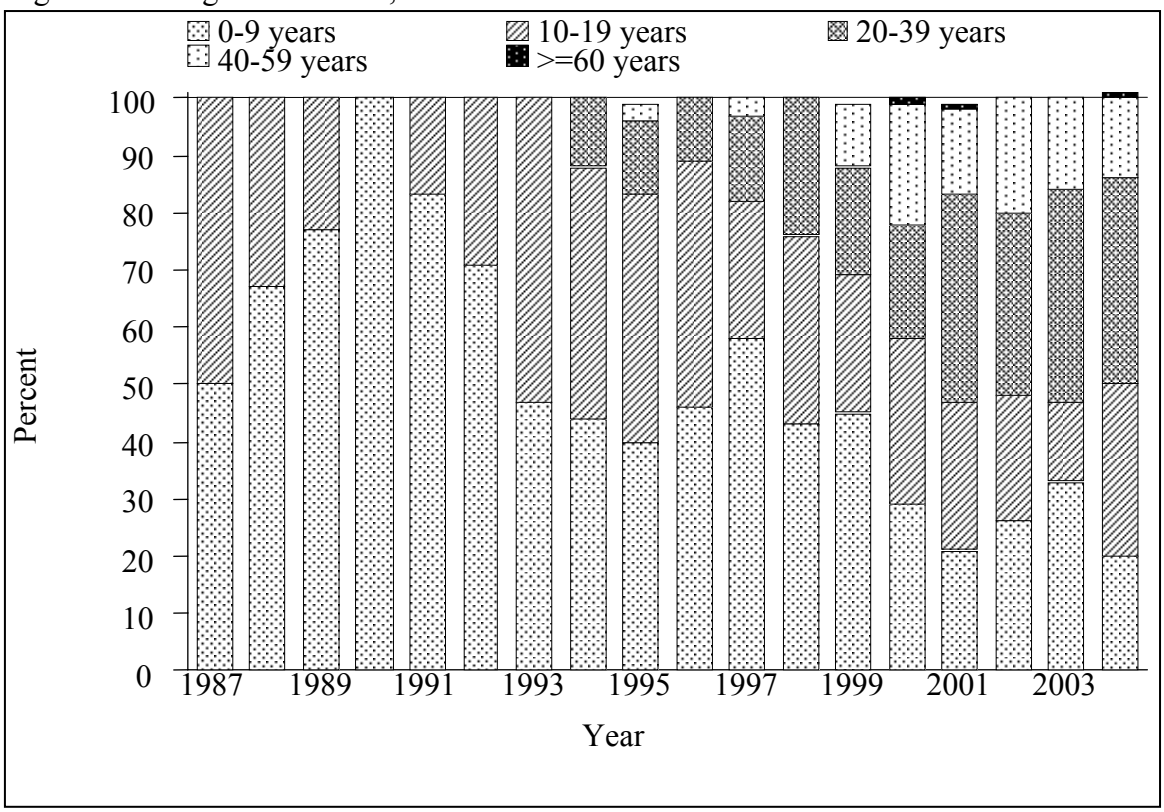


Table 1.2.4: Primary Diagnosis, 1987-2004

Year	1987		1988		1989		1990		1991		1992	
Diagnosis	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Acute leukaemia	5	63	4	67	8	36	2	40	1	8	4	19
Chronic leukaemia	0	0	0	0	1	5	1	20	1	8	4	19
Hypoplastic anaemia	2	25	0	0	4	18	0	0	4	33	5	24
Erythrocytic disorders	0	0	0	0	1	5	1	20	1	8	1	5
Lymphoma	0	0	0	0	0	0	0	0	0	0	0	0
Solid tumors	0	0	0	0	0	0	0	0	0	0	3	14
Myelodysplasia	0	0	0	0	0	0	0	0	0	0	0	0
Haemoglobinopathy	1	13	2	33	7	32	1	20	4	33	4	19
Multiple myeloma	0	0	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	1	5	0	0	1	8	0	0
TOTAL	8	100	6	100	22	100	5	100	12	100	21	100

Year	1993		1994		1995		1996		1997		1998	
Diagnosis	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Acute leukaemia	6	32	8	32	10	33	13	46	11	33	23	47
Chronic leukaemia	2	11	4	16	5	17	5	18	6	18	7	14
Hypoplastic anaemia	4	21	5	20	8	27	4	14	5	15	4	8
Erythrocytic disorders	0	0	0	0	0	0	1	4	0	0	0	0
Lymphoma	0	0	0	0	0	0	0	0	2	6	5	10
Solid tumors	1	5	1	4	1	3	0	0	1	3	2	4
Myelodysplasia	1	5	2	8	0	0	0	0	0	0	1	2
Haemoglobinopathy	2	11	5	20	5	17	5	18	6	18	2	4
Multiple myeloma	0	0	0	0	0	0	0	0	0	0	0	0
Others	3	16	0	0	1	3	0	0	2	6	5	10
TOTAL	19	100	25	100	30	100	28	100	33	100	49	100

Year	1999		2000		2001		2002		2003		2004		TOTAL	
Diagnosis	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Acute leukaemia	28	45	37	39	48	45	48	42	42	33	44	33	342	38
Chronic leukaemia	7	11	13	14	17	16	19	17	19	15	21	16	132	15
Hypoplastic anaemia	5	8	11	12	7	7	4	4	5	4	12	9	89	10
Erythrocytic disorders	0	0	0	0	0	0	1	1	2	2	0	0	8	1
Lymphoma	6	10	19	20	23	21	20	18	28	22	33	25	136	15
Solid tumors	5	8	2	2	0	0	3	3	2	2	0	0	21	2
Myelodysplasia	0	0	1	1	4	4	4	4	3	2	6	5	22	2
Haemoglobinopathy	4	6	7	7	4	4	8	7	17	13	8	6	92	10
Multiple myeloma	3	5	1	1	1	1	4	4	4	3	3	2	16	2
Others	4	6	3	3	3	3	3	3	6	5	6	5	38	4
TOTAL	62	100	94	100	107	100	114	100	128	100	133	100	896	100

Diagnosis list in the web-application

#	**Diagnosis**	**Categorise as:**
1.	Acute leukaemia, unclassified	Acute leukaemia
2.	Acute undifferentiated leukaemia	
3.	ALL	
4.	AML denovo	
5.	AML post-chemotherapy	
6.	AML post-MDS	
7.	Chronic lymphocytic leukaemia	Chronic leukaemia
8.	Chronic myeloid leukaemia	
9.	Aplastic anaemia	Hypoplastic anaemia
10.	Fanconi's anaemia	
11.	Diamond-Blackfan anaemia	Erythrocytic Disorders
12.	Congenital Dyserythropoeitic Anaemia (CDA)	
13.	Hodgkin's lymphoma	Lymphoma
14.	Non-Hodgkin's lymphoma, Aggressive	
15.	Non-Hodgkin's lymphoma, Indolent	
16.	Carcinoma, breast	Solid tumors
17.	Carcinoma, ovary	
18.	GCT-testicular	
19.	GCT-primary non-testis	
20.	Ewing's sarcoma	
21.	Glioma	
22.	Hepatoblastoma	
23.	Neuroblastoma	
24.	Rhabdomyosarcoma	
25.	Soft tissue sarcoma (non-RMS)	
26.	Wilms tumour	
27.	Primitive NET	
28.	Juvenile Myelomonocytic leukaemia	Myelodysplasia
29.	Myelodyplastic syndrome (MDS)	
30.	Myelofibrosis	
31.	Thalassaemia major	Haemoglobinopathy
32.	Sickle Cell Anaemia	
33.	Multiple myeloma	Multiple myeloma
34.	Haemophagocytic Lymphohistiocytosis Syndrome	Others
35.	Congenital Immunodeficiencies	
36.	Osteopetrosis	
37.	Others	

1.3 TRANSPLANT PRACTICES

Autologous transplants started later (in 1997) and hence there currently are more allogeneic stem cell transplants (72%) compared with autologous transplants (28%) though the latter are increasing at a faster rate in the past 7 years (Table 1.3.2). Autologous transplantations have been initially conducted using bone marrow as the stem cell source but increasingly peripheral blood stem cells have been used as the preferred source (Table 1.3.4).

Almost all the allogeneic transplants are sibling related transplants and the majority of these are HLA identical transplants though of late there have been more 1 or 2 antigen mismatched transplants (Table 1.3.5). Unrelated donor transplants started in 1997 with the use of cord blood obtained from overseas cord blood banks but these higher risk transplants are only carried out on a small scale. Unrelated bone marrow transplantation has been performed in 2004 for paediatric patients (Table 1.3.6).

Table 1.3.1: Graft number, 1987-2004

Year	**1987**		**1988**		**1989**		**1990**		**1991**		**1992**		**1993**	
Graft number	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	8	100	6	100	19	86	4	80	9	75	19	90	18	95
2	0	0	0	0	2	9	1	20	3	25	2	10	1	5
3	0	0	0	0	1	5	0	0	0	0	0	0	0	0
TOTAL	8	100	6	100	22	100	5	100	12	100	21	100	19	100

Year	**1994**		**1995**		**1996**		**1997**		**1998**		**1999**		**2000**	
Graft number	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	24	96	29	97	28	100	31	94	48	98	61	98	91	97
2	1	4	1	3	0	0	1	3	1	2	1	2	3	3
3	0	0	0	0	0	0	1	3	0	0	0	0	0	0
TOTAL	25	100	30	100	28	100	33	100	49	100	62	100	94	100

Year	**2001**		**2002**		**2003**		**2004**		**TOTAL**	
Graft number	No.	%	No.	%	No.	%	No.	%	No.	%
1	103	96	113	99	125	98	128	98	864	97
2	4	4	1	1	3	2	3	2	28	3
3	0	0	0	0	0	0	0	0	2	0
TOTAL	107	100	114	100	128	100	131	100	894	100

Figure 1.3.1: Graft number, 1987-2004

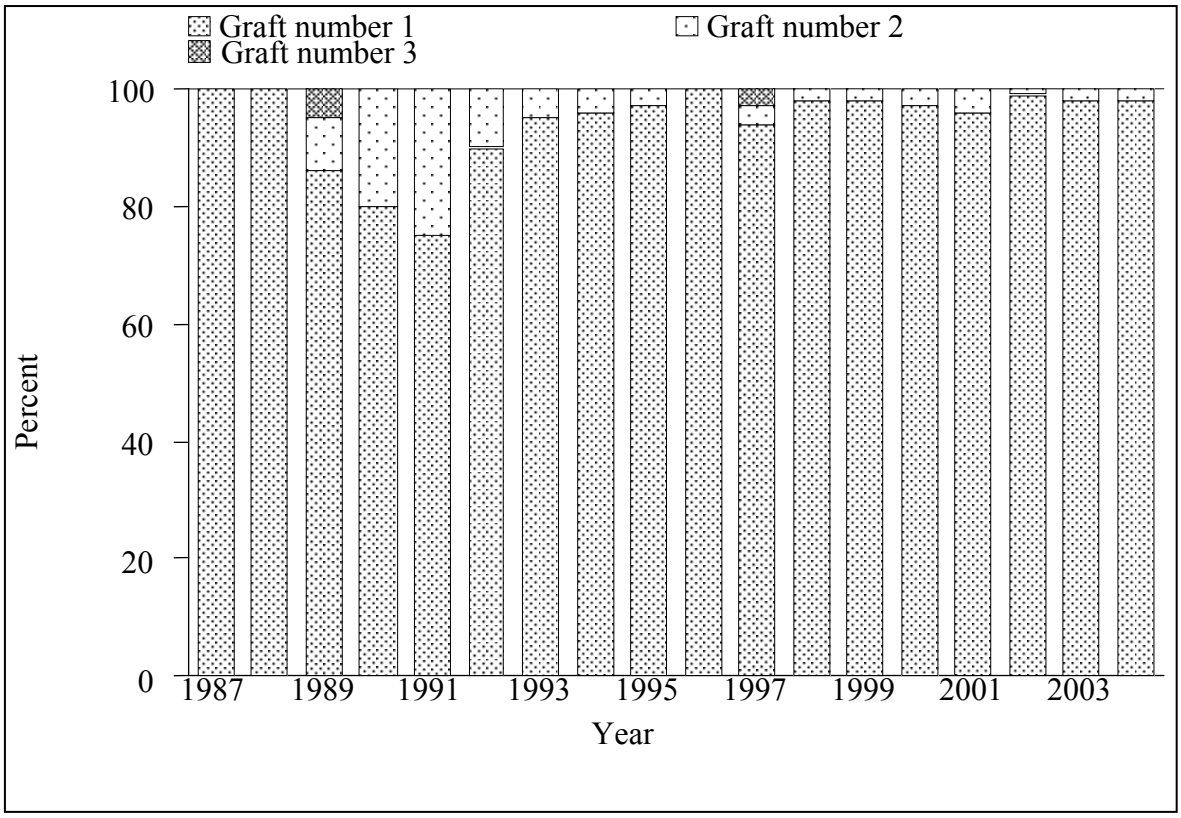


Table 1.3.2: Type of transplant, 1987-2004

Year	1987		1988		1989		1990		1991		1992	
Type of transplant	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Allogeneic + Syngeneic	8	100	6	100	21	95	5	100	12	100	20	95
Autologous	0	0	0	0	1	5	0	0	0	0	1	5
TOTAL	8	100	6	100	22	100	5	100	12	100	21	100

Year	1993		1994		1995		1996		1997		1998	
Type of transplant	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Allogeneic + Syngeneic	18	95	24	96	29	97	26	93	27	82	32	65
Autologous	1	5	1	4	1	3	2	7	6	18	17	35
TOTAL	19	100	25	100	30	100	28	100	33	100	49	100

Year	1999		2000		2001		2002		2003		2004		TOTAL	
Type of transplant	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Allogeneic + Syngeneic	44	71	56	60	74	69	75	66	84	66	87	65	648	72
Autologous	18	29	38	40	33	31	39	34	44	34	46	35	248	28
TOTAL	62	100	94	100	107	100	114	100	128	100	133	100	896	100

*6 patients with syngeneic type of transplant

Figure 1.3.2: Type of transplant, 1987-2004

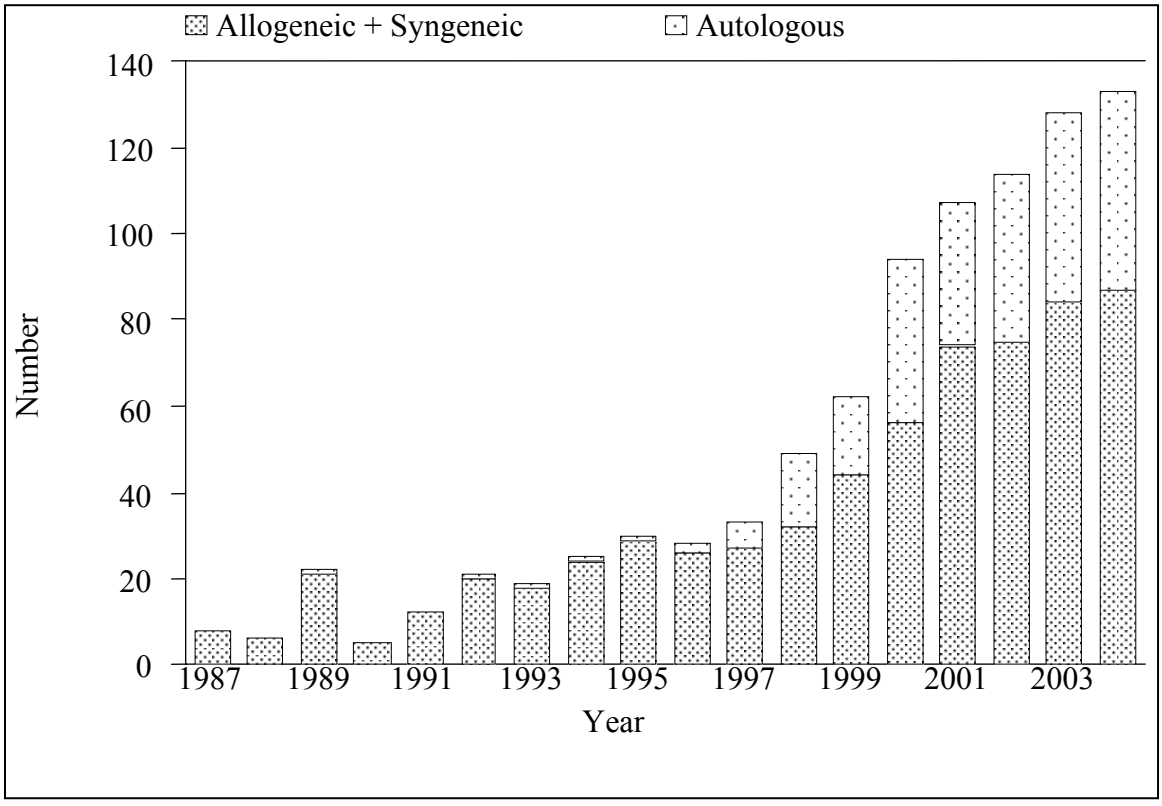


Table 1.3.3: Type of transplant by Centre, 1987-2004

Type of transplant	**Allogeneic + Syngeneic**		**Autologous**		**TOTAL**	
Centre	No.	%	No.	%	No.	%
KLA	78	12	67	27	145	16
KLP	135	21	27	11	162	18
UKM	36	6	21	8	57	6
SJA	35	5	67	27	102	11
UMA	85	13	36	15	121	14
UMP	261	40	25	10	286	32
GMC	0	0	2	1	2	0
LWE	5	1	0	0	5	1
SJP	13	2	3	1	16	2
TOTAL	648	100	248	100	896	100

Figure 1.3.3: Type of transplant by Centre, 1987-2004

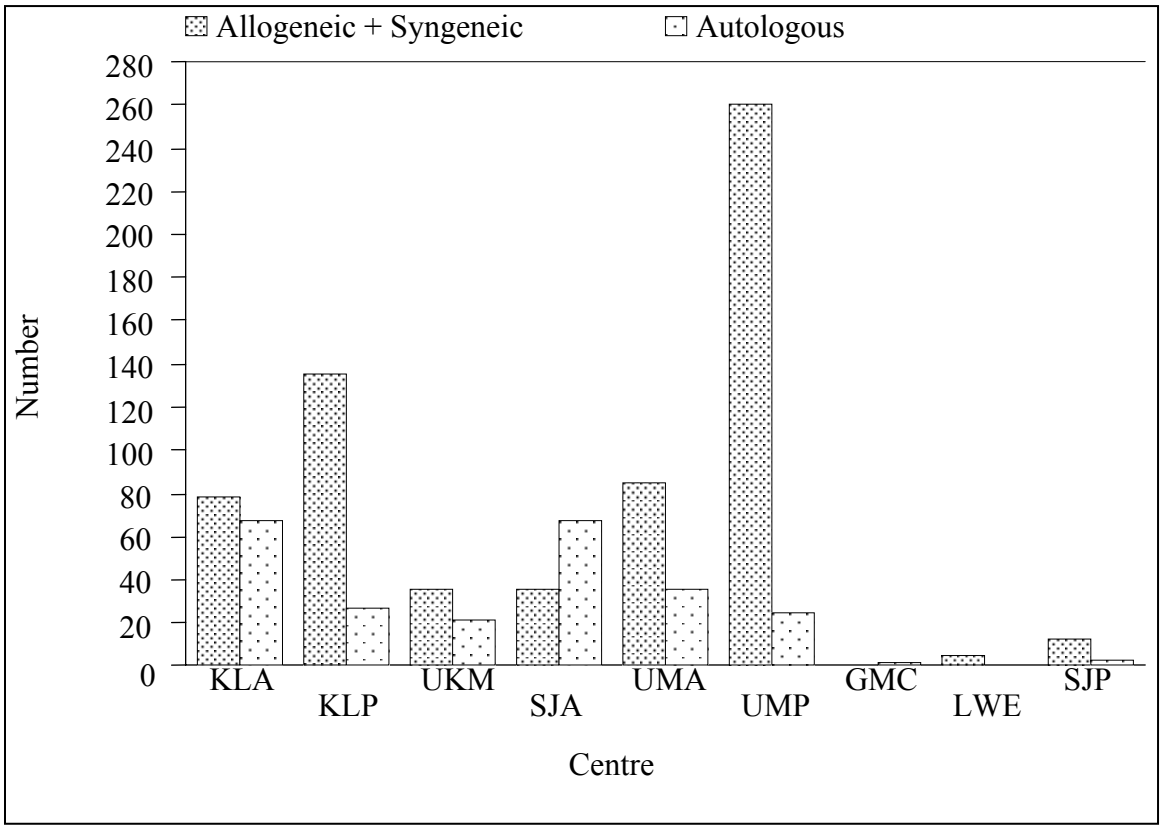


Table 1.3.4: Transplant source, 1987-2004

Year	**1987**		**1988**		**1989**		**1990**		**1991**	
Transplant source	No.	%	No.	%	No.	%	No.	%	No.	%
Marrow	8	100	6	100	22	100	5	100	12	100
PBSC / Marrow + PBSC	0	0	0	0	0	0	0	0	0	0
Cord blood / Marrow + cord	0	0	0	0	0	0	0	0	0	0
TOTAL	8	100	6	100	22	100	5	100	12	100

Year	**1992**		**1993**		**1994**		**1995**		**1996**	
Transplant source	No.	%	No.	%	No.	%	No.	%	No.	%
Marrow	21	100	19	100	25	100	30	100	28	100
PBSC / Marrow + PBSC	0	0	0	0	0	0	0	0	0	0
Cord blood / Marrow + cord	0	0	0	0	0	0	0	0	0	0
TOTAL	21	100	19	100	25	100	30	100	28	100

Year	**1997**		**1998**		**1999**		**2000**		**2001**	
Transplant source	No.	%	No.	%	No.	%	No.	%	No.	%
Marrow	24	73	25	51	37	60	31	33	30	28
PBSC / Marrow + PBSC	7	21	23	47	23	37	57	61	73	68
Cord blood / Marrow + cord	2	6	1	2	2	3	6	6	4	4
TOTAL	33	100	49	100	62	100	94	100	107	100

Year	**2002**		**2003**		**2004**		**TOTAL**	
Transplant source	No.	%	No.	%	No.	%	No.	%
Marrow	31	27	44	34	30	23	428	48
PBSC / Marrow + PBSC	79	69	79	62	95	71	436	49
Cord blood / Marrow + cord	4	4	5	4	8	6	32	4
TOTAL	114	100	128	100	133	100	896	100

Figure 1.3.4: Transplant source, 1987-2004

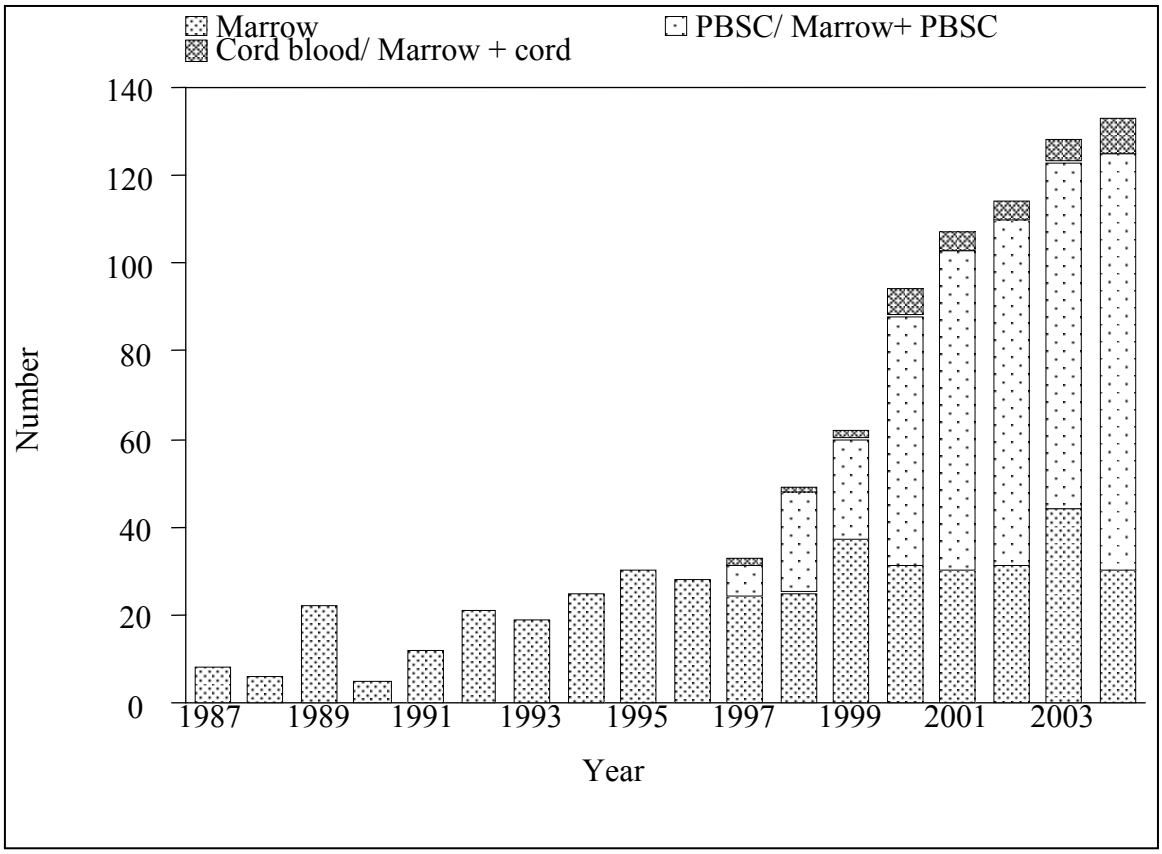


Table 1.3.5: HLA Match, 1987-2004

Year	1987		1988		1989		1990		1991	
HLA Match	No.	%	No.	%	No.	%	No.	%	No.	%
Identical	8	100	6	100	21	100	5	100	12	100
1 AG	0	0	0	0	0	0	0	0	0	0
2 AG	0	0	0	0	0	0	0	0	0	0
>=3 AG Disparate	0	0	0	0	0	0	0	0	0	0
TOTAL	8	100	6	100	21	100	5	100	12	100

Year	1992		1993		1994		1995		1996	
HLA Match	No.	%	No.	%	No.	%	No.	%	No.	%
Identical	20	100	18	100	23	96	29	100	26	100
1 AG	0	0	0	0	1	4	0	0	0	0
2 AG	0	0	0	0	0	0	0	0	0	0
>=3 AG Disparate	0	0	0	0	0	0	0	0	0	0
TOTAL	20	100	18	100	24	100	29	100	26	100

Year	1997		1998		1999		2000		2001	
HLA Match	No.	%	No.	%	No.	%	No.	%	No.	%
Identical	25	93	31	97	40	91	52	93	68	92
1 AG	2	7	0	0	3	7	0	0	4	5
2 AG	0	0	1	3	1	2	4	7	1	1
>=3 AG Disparate	0	0	0	0	0	0	0	0	1	1
TOTAL	27	100	32	100	44	100	56	100	74	100

Year	2002		2003		2004		TOTAL	
HLA Match	No.	%	No.	%	No.	%	No.	%
Identical	70	93	79	94	80	92	613	95
1 AG	3	4	3	4	3	3	19	3
2 AG	2	3	2	2	4	5	15	2
>=3 AG Disparate	0	0	0	0	0	0	1	0
TOTAL	75	100	84	100	87	100	648	100

*excluding autologous

Table 1.3.6: Allogeneic Donor Relationship, 1987-2004

Year	**1987**		**1988**		**1989**		**1990**		**1991**	
Allogeneic Donor Relationship	No.	%	No.	%	No.	%	No.	%	No.	%
Sibling	8	100	6	100	21	100	5	100	11	92
Unrelated	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	0	1	8
TOTAL	8	100	6	100	21	100	5	100	12	100

Year	**1992**		**1993**		**1994**		**1995**		**1996**	
Allogeneic Donor Relationship	No.	%	No.	%	No.	%	No.	%	No.	%
Sibling	20	100	18	100	22	92	29	100	26	100
Unrelated	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	2	8	0	0	0	0
TOTAL	20	100	18	100	24	100	29	100	26	100

Year	**1997**		**1998**		**1999**		**2000**		**2001**	
Allogeneic Donor Relationship	No.	%	No.	%	No.	%	No.	%	No.	%
Sibling	26	96	32	100	44	100	55	98	71	96
Unrelated	1	4	0	0	0	0	1	2	3	4
Others	0	0	0	0	0	0	0	0	0	0
TOTAL	27	100	32	100	44	100	56	100	74	100

Year	**2002**		**2003**		**2004**		**TOTAL**	
Allogeneic Donor Relationship	No.	%	No.	%	No.	%	No.	%
Sibling	71	95	81	96	78	90	624	96
Unrelated	4	5	3	4	9	10	21	3
Others	0	0	0	0	0	0	3	0
TOTAL	75	100	84	100	87	100	648	100

*excluding autologous, including syngeneic

1.4 TRANSPLANT OUTCOMES

The major cause of death appears to be relapse/underlying disease with sepsis being the second commonest cause of death (Table 1.4.1). The probability of survival post-transplant is demonstrated in the Kaplan-Meier survival curves (Figures 1.4.2 – 1.4.5).

Table 1.4.1: Cause of Death, 1987-2004

Year	**1987**		**1988**		**1989**		**1990**		**1991**	
Cause of death	No.	%	No.	%	No.	%	No.	%	No.	%
Sepsis	1	100	0	0	0	0	0	0	1	100
GVHD	0	0	0	0	0	0	1	17	0	0
Underlying disease	0	0	0	0	4	100	5	83	0	0
Haemorrhage	0	0	1	100	0	0	0	0	0	0
VOD	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0
TOTAL	1	100	1	100	4	100	6	100	1	100

Year	**1992**		**1993**		**1994**		**1995**		**1996**	
Cause of death	No.	%	No.	%	No.	%	No.	%	No.	%
Sepsis	1	50	2	22	1	20	4	25	6	55
GVHD	0	0	0	0	0	0	3	19	0	0
Underlying disease	0	0	6	67	3	60	3	19	3	27
Haemorrhage	0	0	1	11	0	0	2	13	1	9
VOD	0	0	0	0	0	0	1	6	1	9
Others	1	50	0	0	1	20	3	19	0	0
Unknown	0	0	0	0	0	0	0	0	0	0
TOTAL	2	100	9	100	5	100	16	100	11	100

Year	**1997**		**1998**		**1999**		**2000**		**2001**	
Cause of death	No.	%	No.	%	No.	%	No.	%	No.	%
Sepsis	5	33	2	12	6	40	3	10	6	13
GVHD	0	0	2	12	1	7	2	6	4	9
Underlying disease	9	60	11	65	7	47	22	71	33	70
Haemorrhage	0	0	1	6	0	0	3	10	2	4
VOD	0	0	1	6	0	0	1	3	2	4
Others	1	7	0	0	1	7	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0
TOTAL	15	100	17	100	15	100	31	100	47	100

Year	**2002**		**2003**		**2004**		**TOTAL**	
Cause of death	No.	%	No.	%	No.	%	No.	%
Sepsis	4	13	15	30	9	23	66	22
GVHD	3	10	5	10	9	23	30	10
Underlying disease	18	60	26	52	21	53	171	57
Haemorrhage	0	0	0	0	1	3	12	4
VOD	0	0	0	0	0	0	6	2
Others	4	13	3	6	0	0	14	5
Unknown	1	3	1	2	0	0	2	1
TOTAL	30	100	50	100	40	100	301	100

Figure 1.4.2: Patient survival by year of transplant, 1987-2004

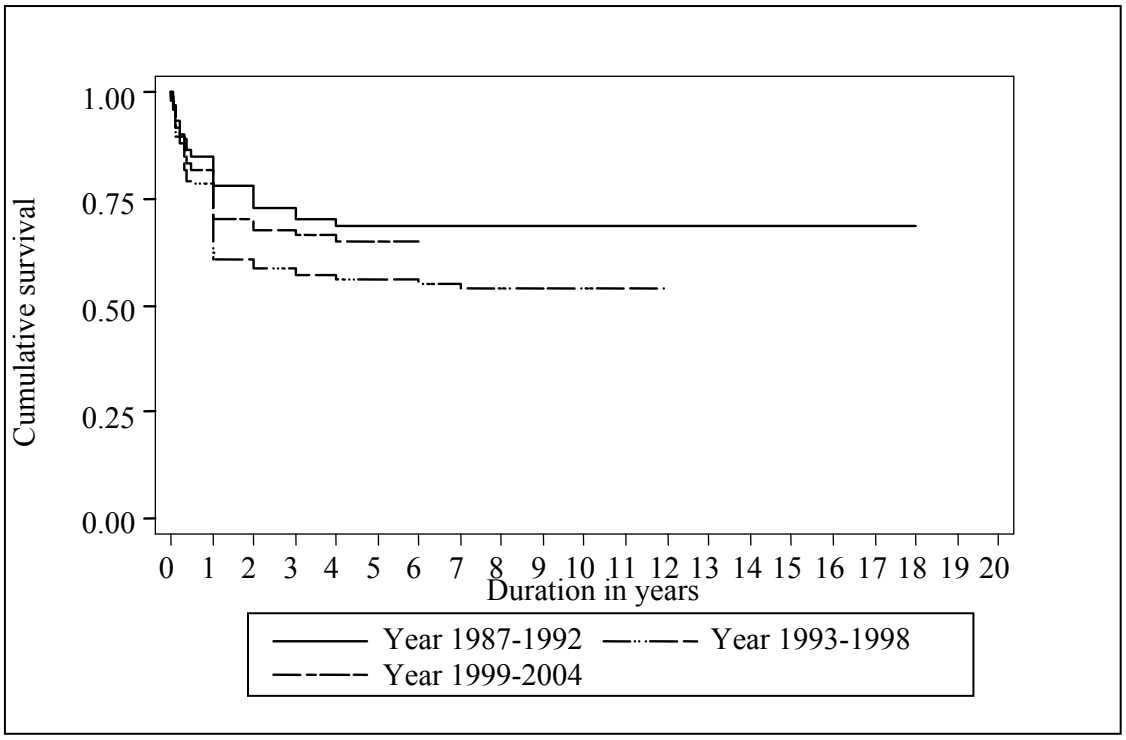


Figure 1.4.3: Patient survival by gender, 1987-2004

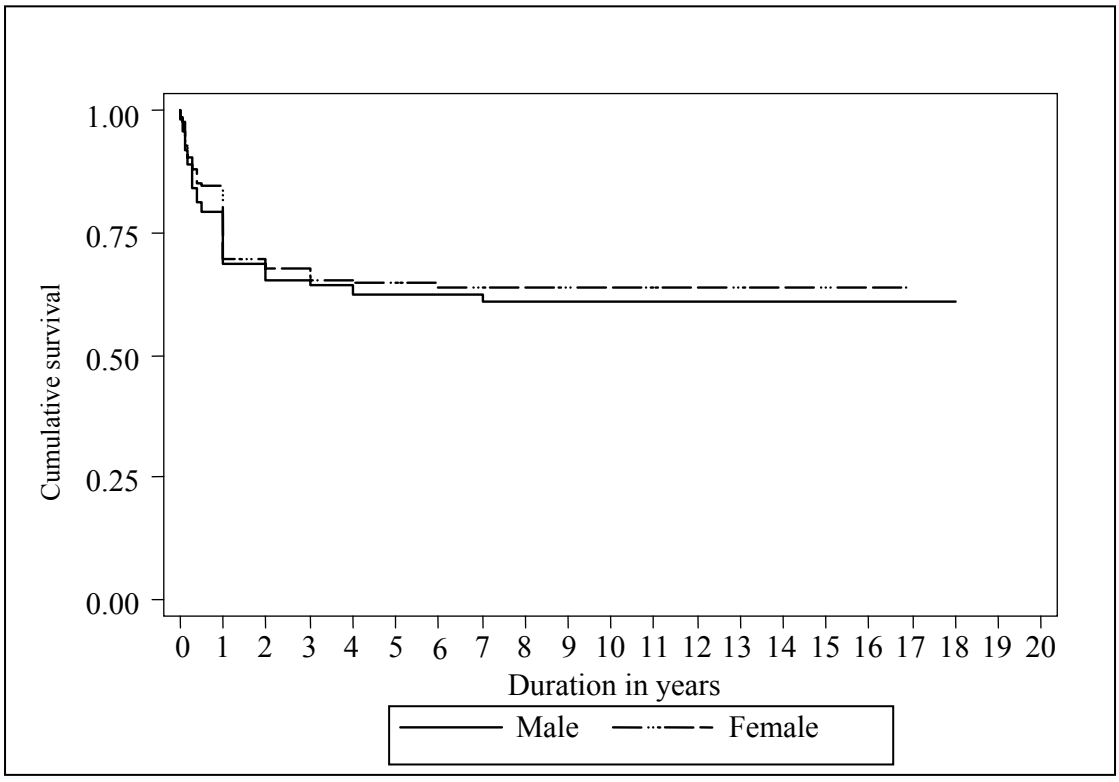


Figure 1.4.4: Patient survival by age group, 1987-2004

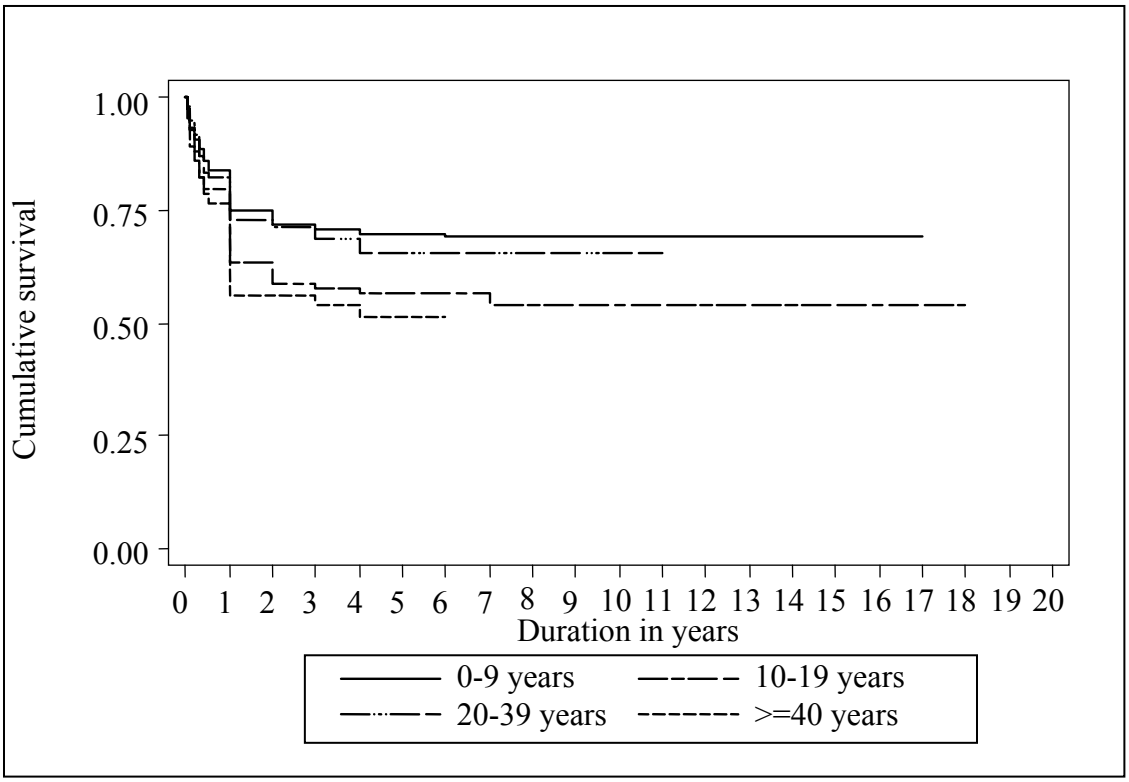


Figure 1.4.5: Patient survival by type of transplant, 1987-2004

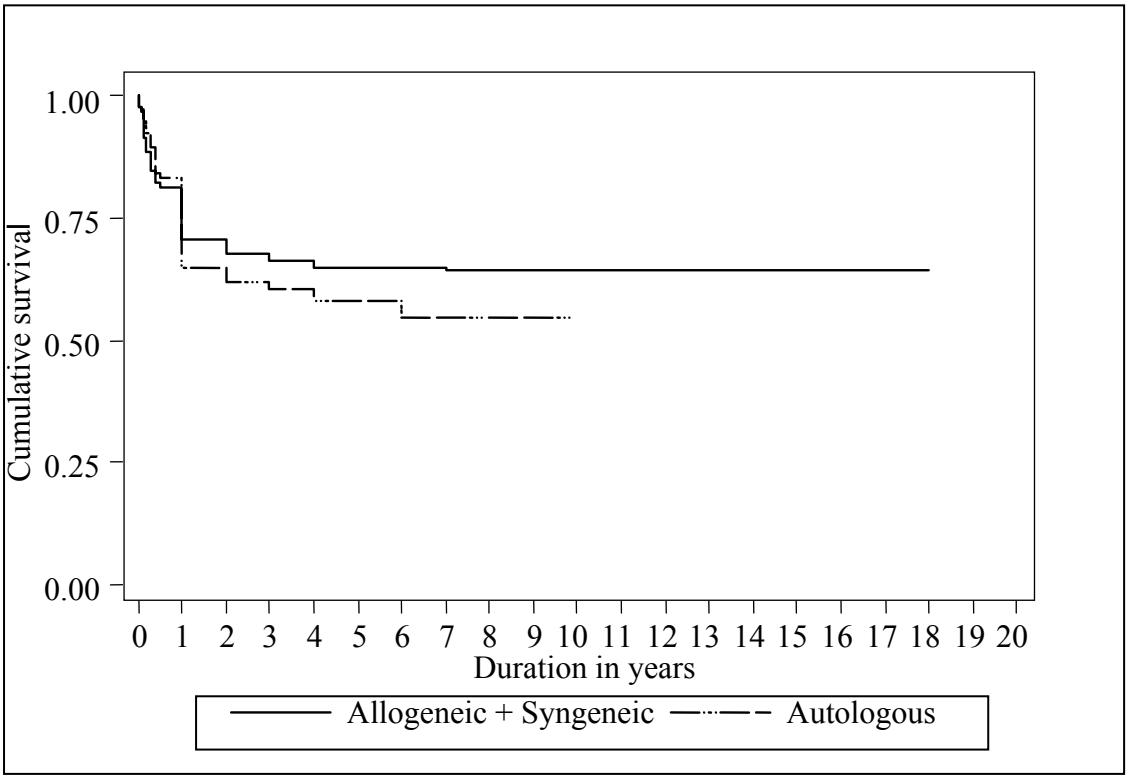


Figure 1.4.2: Patient survival by year of transplant, 1987-2004

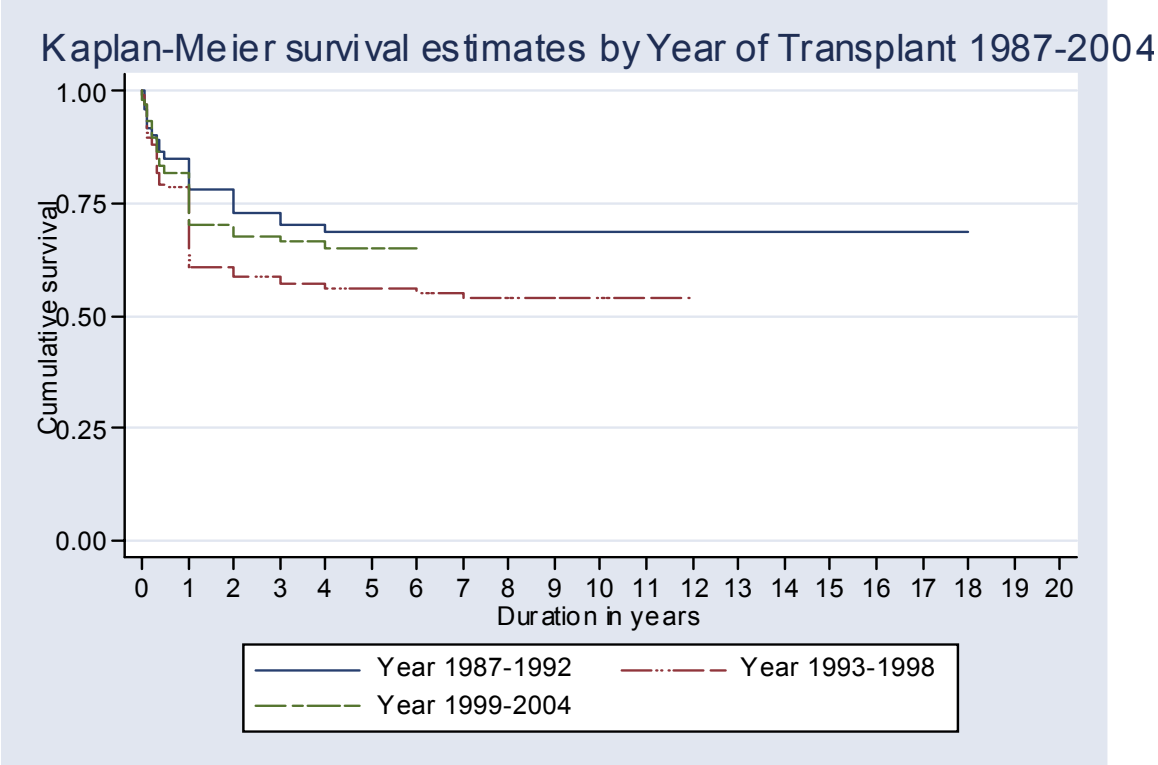


Figure 1.4.3: Patient survival by gender, 1987-2004

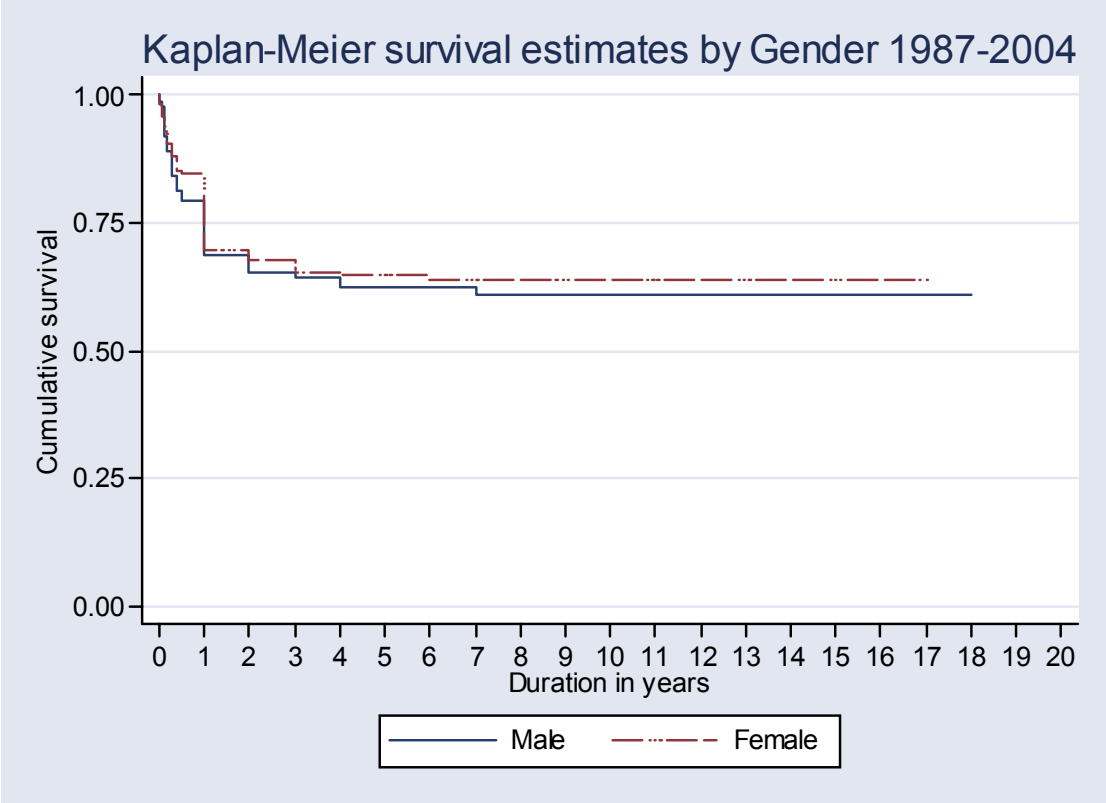


Figure 1.4.4: Patient survival by age group, 1987-2004

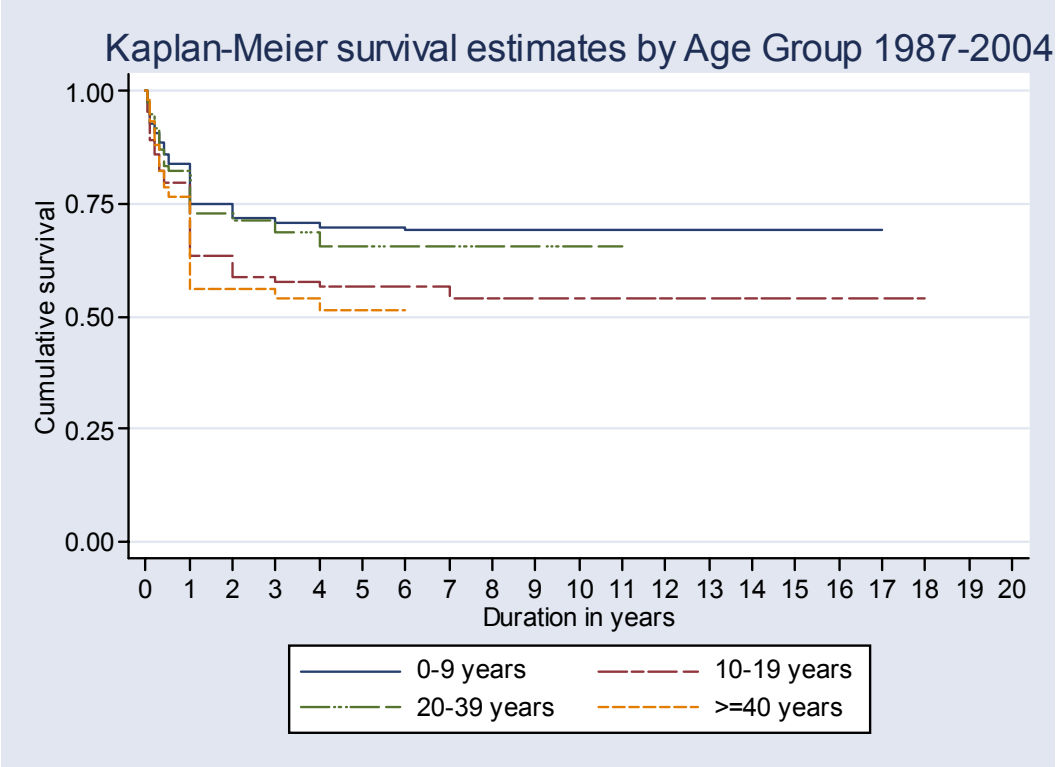


Figure 1.4.5: Patient survival by type of transplant, 1987-2004