CHAPTER 1

BLOOD AND MARROW TRANSPLANTATION

Editors:
Dr. Alan Teh Kee Hean
Prof. Dr. Chan Lee Lee

Expert Panel
Dr. Alan Teh Kee Hean (Chair – Adult)
Prof. Dr. Chan Lee Lee (Chair – Paediatric)
Prof. Dr. Cheong Soon Keng
Dr. Chang Kian Meng
Dr. Gan Gin Gin
Dr. Hishamshah Mohd Ibrahim
Dr. Jameela Sathar
Prof. Dr. Lin Hai Peng
Dr. Mahfuzah Mohamed
Dr. Ng Soo Chin
Dr. Visalachy Purushothaman
Dr. Vijaya Sangkar

Contents

1.0 Introduction

1.1 Stock and Flow of Blood and Marrow Transplantation
- Stock and flow
- Transplant rates
- Places of transplant

1.2 Recipients' Characteristics
- Demographics
- Primary diagnosis

1.3 Transplant Practices
- Graft number
- Type of transplant
- Transplant source and HLA match

1.4 Transplant Outcomes
- Patient survival

1.5 Disease-free survival

List of Tables

Table 1.1.1: Stock and Flow of Blood and Marrow Transplantation, 1987-2005 10
Table 1.1.2: New Transplant Rate per million population (pmp), 1987-2005 11
Table 1.1.3: Centre distribution (SDP), 1987-2005 12
Table 1.2.1: Gender distribution, 1987-2005 14
Table 1.2.2: Ethnic group distribution, 1987-2005 16
Table 1.2.3: Age distribution, 1987-2005 18
Table 1.2.4: Primary Diagnosis, 1987-2005 20
Table 1.3.1: Graft number, 1987-2005 22
Table 1.3.2: Type of transplant, 1987-2005 24
Table 1.3.3: Type of transplant by Centre, 1987-2005 25
Table 1.3.4: Transplant source, 1987-2005 26
Table 1.3.5: HLA Match, 1987-2005 28
Table 1.3.6: Allogeneic Donor Relationship, 1987-2005 29
Table 1.4.1: Cause of Death, 1987-2005 30

List of Figures

Figure 1.1.1: Stock and Flow of Blood and Marrow Transplantation, 1987-2005 10
Figure 1.1.2: New Transplant Rate per million population (pmp), 1987-2005 11
Figure 1.1.3: Centre distribution (SDP), 1987-2005 13
Figure 1.2.1: Gender distribution, 1987-2005 15
Figure 1.2.2: Ethnic group distribution, 1987-2005 17
Figure 1.2.3: Age distribution, 1987-2005 19
Figure 1.3.1: Graft number, 1987-2005 23
Figure 1.3.2: Type of transplant, 1987-2005 24
Figure 1.3.3: Type of transplant by Centre, 1987-2005 25
Figure 1.3.4: Transplant source, 1987-2005 27
Figure 1.4.1: Patient survival by year of transplant, 1987-2005 31
Figure 1.4.2: Patient survival by gender, 1987-2005 31
Figure 1.4.3: Patient survival by age group, 1987-2005 32
Figure 1.4.4: Patient survival by type of transplant, 1987-2005 32
Figure 1.5.1: Disease-free survival for Acute Myeloid Leukaemia, 1987-2005 (Allogeneic vs. Autologous) 33
Figure 1.5.2: Disease-free survival for Acute Lymphoblastic Leukaemia, 1987-2005 (Allogeneic) 33
Figure 1.5.3: Disease-free survival for Thalassaemia, 1987-2005 (Allogeneic) 34
Figure 1.5.4: Disease-free survival for Non-Hodgkin's Lymphoma, 1987-2005 (Allogeneic vs. Autologous) 34
Figure 1.5.5: Disease-free survival for Hodgkin's Disease, 1987-2005 (Autologous) 35
Figure 1.5.6: Disease-free survival for Chronic Myeloid Leukaemia, 1987-2005 (Allogeneic) 35
Figure 1.5.7: Disease-free survival for Aplastic Anaemia, 1987-2005 (Allogeneic) 36
Figure 1.5.8: Disease-free survival by age group for Acute Myeloid Leukaemia, 1987-2005 36
Figure 1.5.9: Disease-free survival by age group for Acute Lymphoblastic Leukaemia, 1987-2005 37
Figure 1.5.10: Disease-free survival by age group for Thalassaemia, 1987-2005 37
Figure 1.5.11: Disease-free survival by age group for Non-Hodgkin's Lymphoma, 1987-2005 38
Figure 1.5.12: Disease-free survival by age group for Hodgkin's Disease, 1987-2005 38
Figure 1.5.13: Disease-free survival by age group for Chronic Myeloid Leukaemia, 1987-2005 39

Figure 1.5.14: Disease-free survival by age group for Aplastic Anaemia, 1987-2005.. 39

1.0 INTRODUCTION

This is the second report on Blood and Marrow Transplant activity recorded by the Blood and Marrow Transplant Registry under the umbrella of the National Transplant Registry.

The registry continues to be 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

At the time of the second report, a cumulative total of 1048 transplants have been performed by the 9 stem cell transplant centres in the country. The number of transplants recorded in 2005, 145, is an increase over the previous year's total of 139.

Table 1.1.1: Stock and Flow of Blood and Marrow Transplantation, 1987-2005

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	6	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	28	27	38	57	67	87	101

Year	**96**	**97**	**98**	**99**	**00**	**01***	**02**	**03**	**04**	**05**
New transplant patients	28	33	49	62	94	108	114	128	139	145
Deaths	11	15	17	15	31	47	30	50	43	39
Lost to follow up	0	0	0	0	0	0	0	0	0	0
Alive at 31st December	118	136	168	215	278	338	422	500	596	699**

*1 patient in year transplant 2001 with no death date
**2 patients with missing outcome status and 1 patient with unknown outcome status
*Out of 1048 patients who were transplanted, there were 40 patients with early death before day 30 of transplant

Figure 1.1.1: Stock and Flow of Blood and Marrow Transplantation, 1987-2005

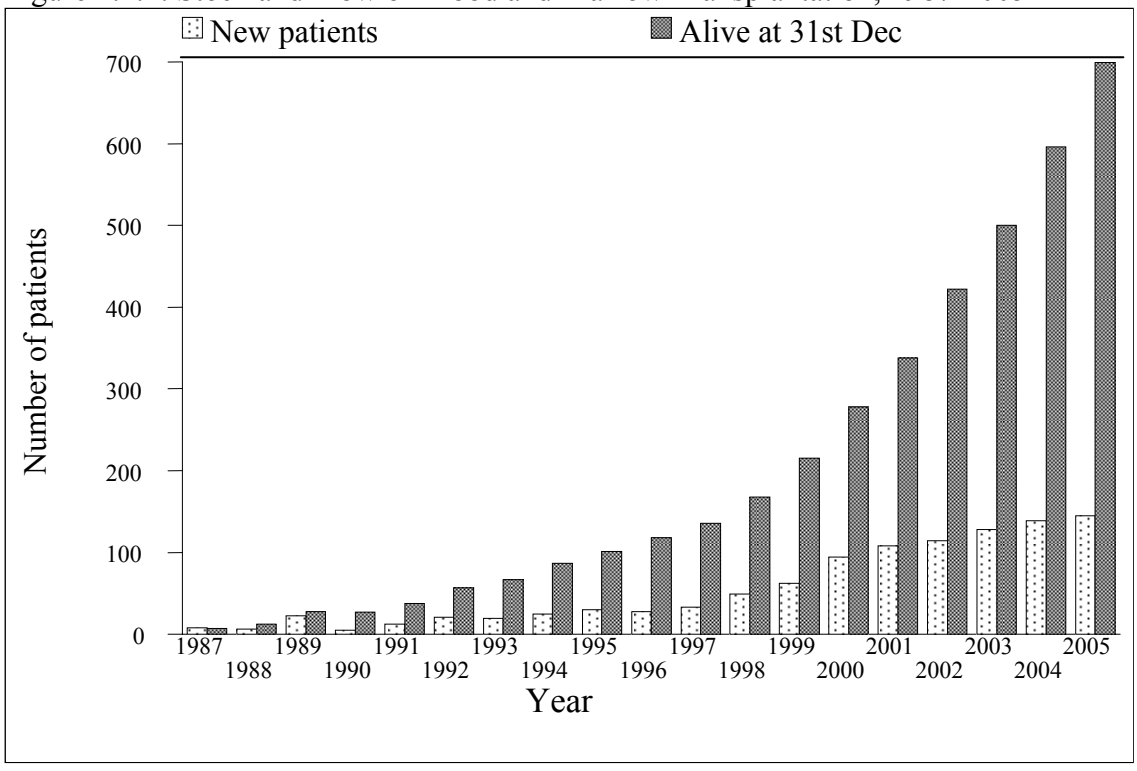
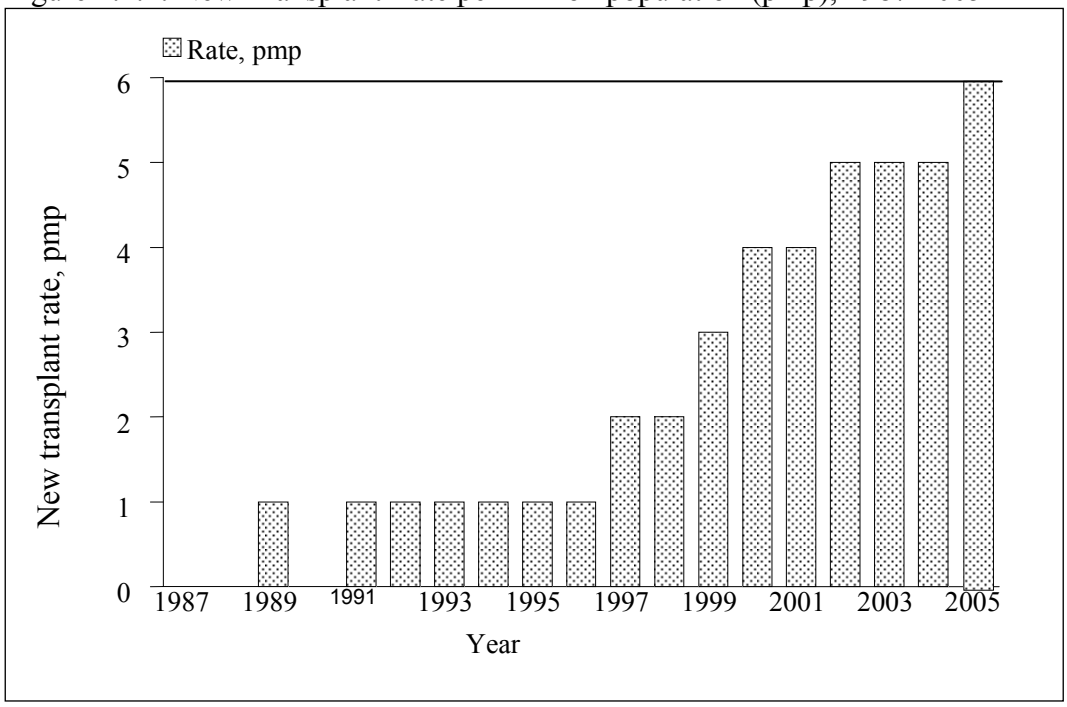


Table 1.1.2: New Transplant Rate per million population (pmp), 1987-2005

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	2005
New transplant patients	28	33	49	62	94	107	114	128	139	145
New transplant rate pmp	1	2	2	3	4	4	5	5	5	6

Figure 1.1.2: New Transplant Rate per million population (pmp), 1987-2005



The number of transplant centres in the country remains unchanged from the previous year (i.e. 9).

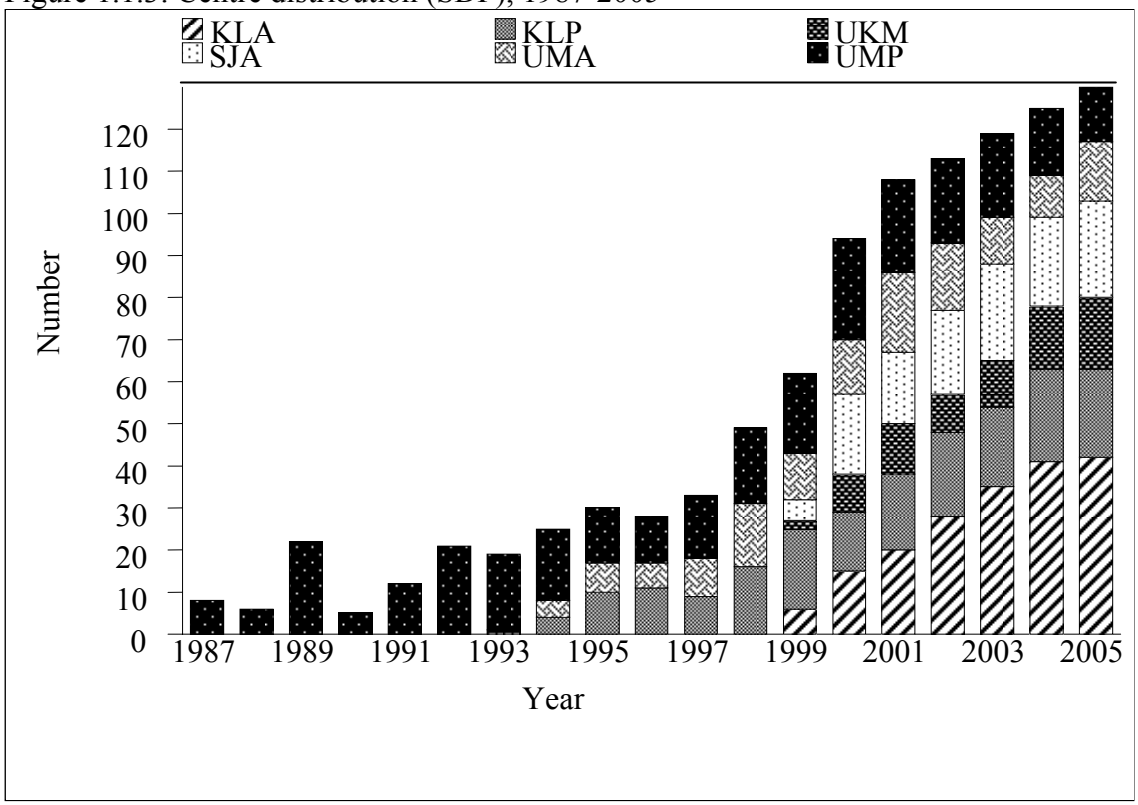
Table 1.1.3: Centre distribution (SDP), 1987-2005

Year	1987		1988		1989		1990		1991		1992		1993	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
KLA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KLP	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UKM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SJA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UMA	0	0	0	0	0	0	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	0	0	0	0	0	0	0
LWE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SJP	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

Year	1994		1995		1996		1997		1998		1999		2000	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
KLA	0	0	0	0	0	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	0	0	0	0	0	2	3	9	10
SJA	0	0	0	0	0	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	0	0	0	0	0	0	0
LWE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SJP	0	0	0	0	0	0	0	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		2005		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
KLA	20	19	28	25	35	27	41	29	42	29	187	18
KLP	18	17	20	18	19	15	22	16	21	14	183	17
UKM	12	11	9	8	11	9	15	11	17	12	75	7
SJA	17	16	20	18	23	18	21	15	23	16	128	12
UMA	19	18	16	14	11	9	10	7	14	10	136	13
UMP	22	20	20	18	20	16	16	12	13	9	300	29
GMC	0	0	0	0	0	0	2	1	2	1	4	0
LWE	0	0	0	0	0	0	6	4	1	1	7	1
SJP	0	0	1	1	9	7	6	4	12	8	28	3
TOTAL	108	100	114	100	128	100	139	100	145	100	1048	100

Figure 1.1.3: Centre distribution (SDP), 1987-2005



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 female preponderance (48% males, 52% 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). However there is an adult preponderance in recent years.

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

Table 1.2.1: Gender distribution, 1987-2005

Year	**1987**		**1988**		**1989**		**1990**		**1991**		**1992**		**1993**		**1994**	
Gender	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	7	88	4	67	12	55	3	60	7	58	13	62	13	68	16	64
Female	1	13	2	33	10	45	2	40	5	42	8	38	6	32	9	36
TOTAL	8	100	6	100	22	100	5	100	12	100	21	100	19	100	25	100

Year	**1995**		**1996**		**1997**		**1998**		**1999**		**2000**		**2001**		**2002**	
Gender	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	11	37	15	54	18	55	33	67	36	58	54	57	66	61	62	54
Female	19	63	13	46	15	45	16	33	26	42	40	43	42	39	52	46
TOTAL	30	100	28	100	33	100	49	100	62	100	94	100	108	100	114	100

Year	**2003**		**2004**		**2005**		**TOTAL**	
Gender	No.	%	No.	%	No.	%	No.	%
Male	71	55	83	60	69	48	593	57
Female	57	45	56	40	76	52	455	43
TOTAL	128	100	139	100	145	100	1048	100

Figure 1.2.1: Gender distribution, 1987-2005

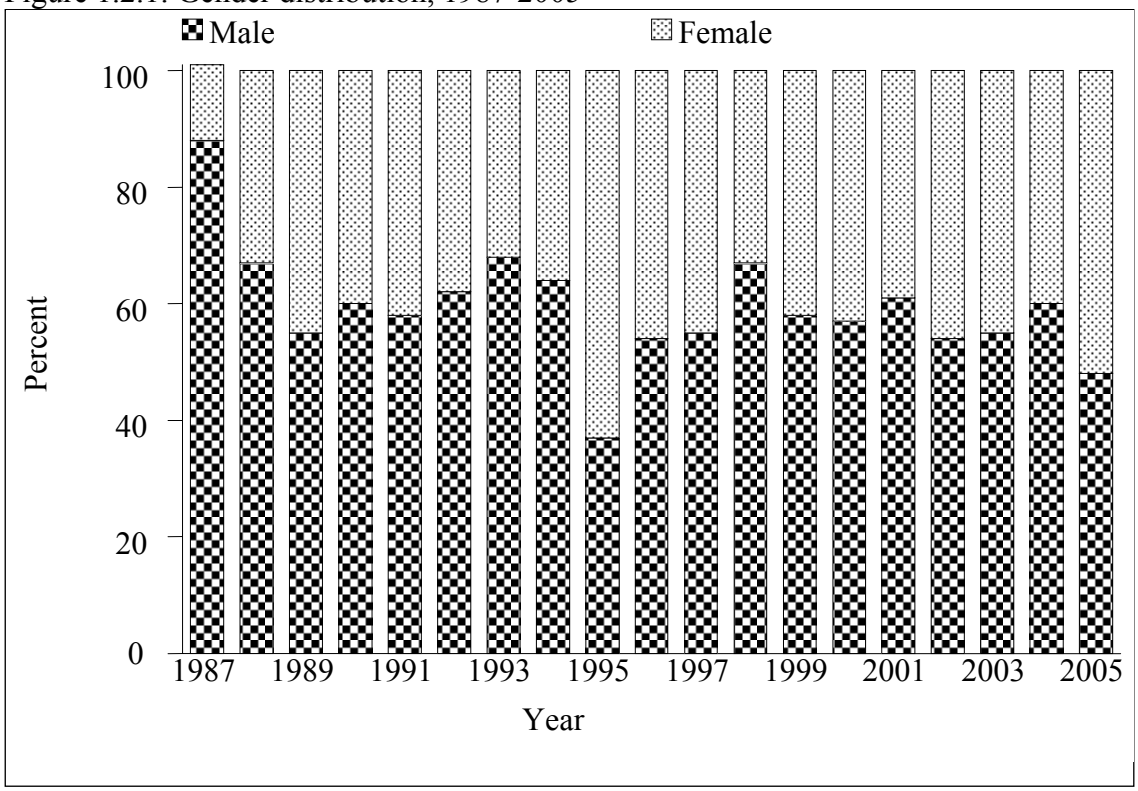


Table 1.2.2: Ethnic group distribution, 1987-2005

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	3	11	0	0	0	0	0	0	0	0
Others	0	0	5	17	0	0	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		2005		TOTAL	
Race	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Malay	47	44	37	32	46	36	51	37	53	37	383	37
Chinese	48	44	65	57	65	51	63	45	67	46	508	48
Indian	8	7	8	7	6	5	9	6	13	9	75	7
Bumiputra Sabah	1	1	1	1	4	3	8	6	5	3	34	3
Bumiputra Sarawak	1	1	1	1	4	3	7	5	5	3	23	2
Others	3	3	2	2	3	2	1	1	2	1	25	2
TOTAL	108	100	114	100	128	100	139	100	145	100	1048	100

Figure 1.2.2: Ethnic group distribution, 1987-2005

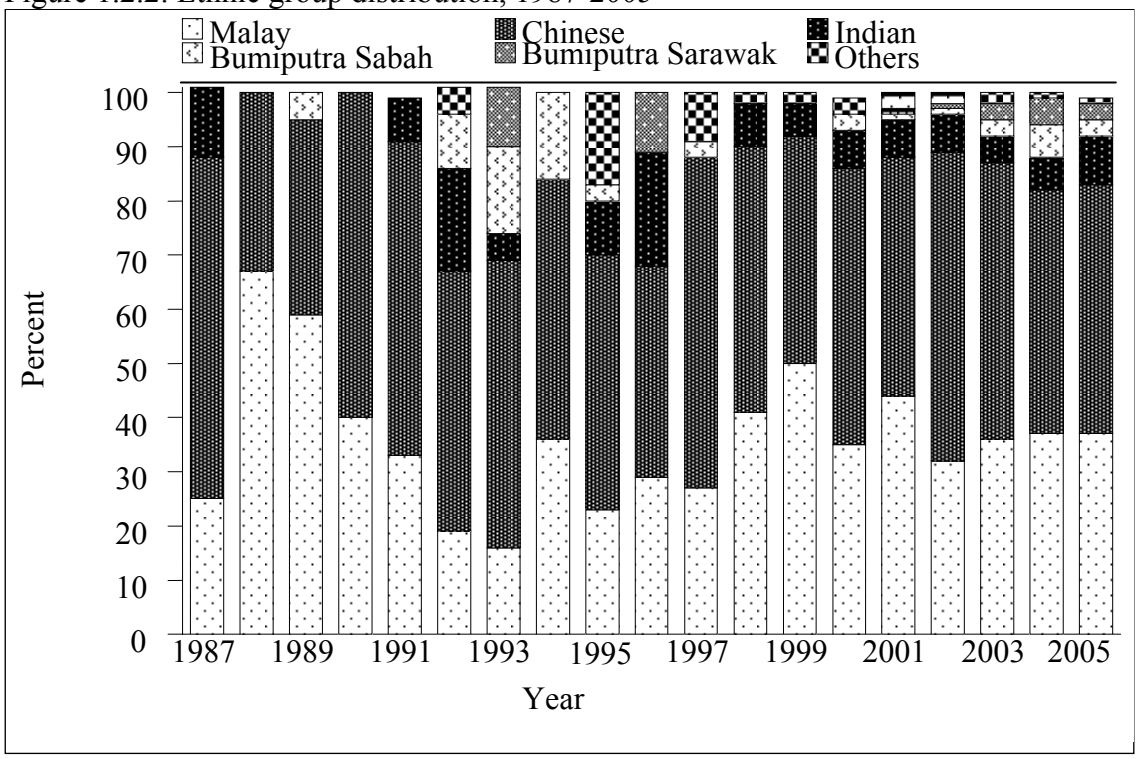


Table 1.2.3: Age distribution, 1987-2005

Year	1987		1988		1989		1990		1991		1992		1993	
Age group	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	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		11		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		2005		TOTAL	
Age group	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0-9	23	21	30	26	42	33	26	19	29	20	345	33
10-19	28	26	25	22	18	14	41	29	30	21	273	26
20-39	40	37	36	32	47	37	52	37	50	34	283	27
40-59	16	15	23	20	21	16	18	13	35	24	142	14
>=60	1	1	0	0	0	0	2	1	1	1	5	0
TOTAL	108	100	114	100	128	100	139	100	145	100	1048	100
Mean	23		23		22		23		26		19	
SD	16		16		15		15		16		15	
Median	22		22		23		20		25		14	
Minimum	1 month		1		5 months		1		1		1 month	
Maximum	64		55		52		70		66		70	

*Age=date of transplant – date of birth

Figure 1.2.3: Age distribution, 1987-2005

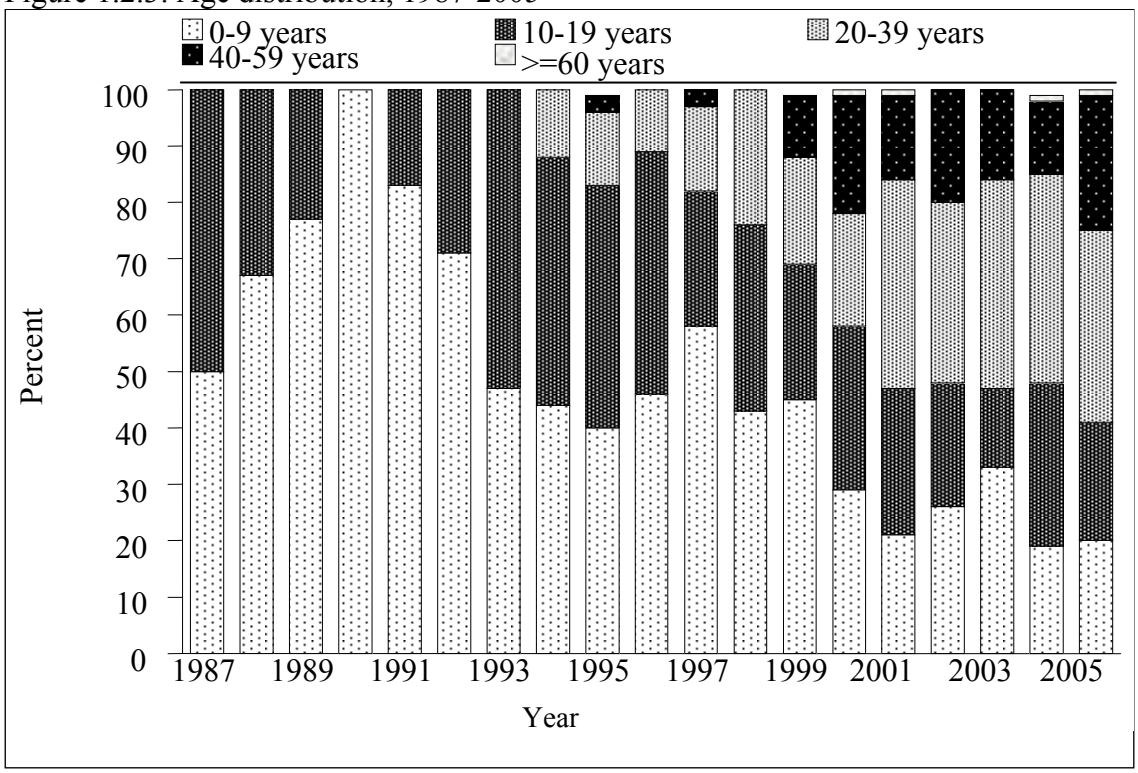


Table 1.2.4: Primary Diagnosis, 1987-2005

Year	1987		1988		1989		1990		1991		1992		1993	
Diagnosis	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Acute leukaemia	5	63	4	67	8	36	6	32	2	40	1	8	4	19
Chronic leukaemia	0	0	0	0	1	5	2	11	1	20	1	8	4	19
Hypoplastic anaemia	2	25	0	0	4	18	4	21	0	0	4	33	5	24
Erythrocytic disorders	0	0	0	0	1	5	0	0	1	20	1	8	1	5
Lymphoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solid tumors	0	0	0	0	0	0	1	5	0	0	0	0	3	14
Myelodysplasia	0	0	0	0	0	0	1	5	0	0	0	0	0	0
Haemoglobinopathy	1	13	2	33	7	32	2	11	1	20	4	33	4	19
Multiple myeloma	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	1	5	3	16	0	0	1	8	0	0
TOTAL	8	100	6	100	22	100	19	100	5	100	12	100	21	100

Year	1994		1995		1996		1997		1998		1999		2000	
Diagnosis	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Acute leukaemia	8	32	10	33	13	46	37	39	11	33	23	47	28	45
Chronic leukaemia	4	16	5	17	5	18	13	14	6	18	7	14	7	11
Hypoplastic anaemia	5	20	8	27	4	14	11	12	5	15	4	8	5	8
Erythrocytic disorders	0	0	0	0	1	4	0	0	0	0	0	0	0	0
Lymphoma	0	0	0	0	0	0	19	20	2	6	5	10	6	10
Solid tumors	1	4	1	3	0	0	2	2	1	3	2	4	5	8
Myelodysplasia	2	8	0	0	0	0	1	1	0	0	1	2	0	0
Haemoglobinopathy	5	20	5	17	5	18	7	7	6	18	2	4	4	6
Multiple myeloma	0	0	0	0	0	0	1	1	0	0	0	0	3	5
Others	0	0	1	3	0	0	3	3	2	6	5	10	4	6
TOTAL	25	100	30	100	28	100	94	100	33	100	49	100	62	100

Year	2001		2002		2003		2004		2005		TOTAL	
Diagnosis	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Acute leukaemia	48	44	48	42	42	33	46	33	53	37	397	38
Chronic leukaemia	18	17	19	17	19	15	22	16	13	9	147	14
Hypoplastic anaemia	7	6	4	4	5	4	12	9	5	3	94	9
Erythrocytic disorders	0	0	1	1	2	2	0	0	0	0	8	1
Lymphoma	23	21	20	18	28	22	35	25	33	23	171	16
Solid tumors	0	0	3	3	2	2	0	0	2	1	23	2
Myelodysplasia	4	4	4	4	3	2	6	4	4	3	26	2
Haemoglobinopathy	4	4	8	7	17	13	9	6	16	11	109	10
Multiple myeloma	1	1	4	4	4	3	3	2	8	6	24	2
Others	3	3	3	3	6	5	6	4	11	8	49	5
TOTAL	108	100	114	100	128	100	139	100	145	100	1048	100

Diagnosis list in the web-application

#	**Diagnosis**	**Categorise as:**
1	Acute leukaemia, unclassified	Acute leukemia
2	Acute undifferentiated leukaemia	
3	ALL	
4	AML denovo	
5	AML post-chemotherapy	
6	AML post-MDS	
7	Chronic lymphocytic leukaemia	Chronic leukemia
8	Chronic myeloid leukaemia	
9	Aplastic anaemia	Hypoplastic anemia
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

Allogeneic transplants still form the majority of transplants, mostly being sibling related transplants. Autologous transplants are increasing and the number of such transplants has exceeded 50 in 2005.

The increasing use of non-myeloablative transplants has enabled older patients to access allogeneic stem cell transplantation, and the upper age limit for such transplants has been steadily increasing.

The number of unrelated donor transplantation is also showing a slow increase.

Table 1.3.1: Graft number, 1987-2005

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**		**2005**		**TOTAL**	
Graft number	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	103	95	113	99	125	98	134	98	114	98	984	97
2	5	5	1	1	3	2	3	2	2	2	31	3
3	0	0	0	0	0	0	0	0	0	0	2	0
TOTAL	108	100	114	100	128	100	137	100	116	100	1017	100

Figure 1.3.1: Graft number, 1987-2005

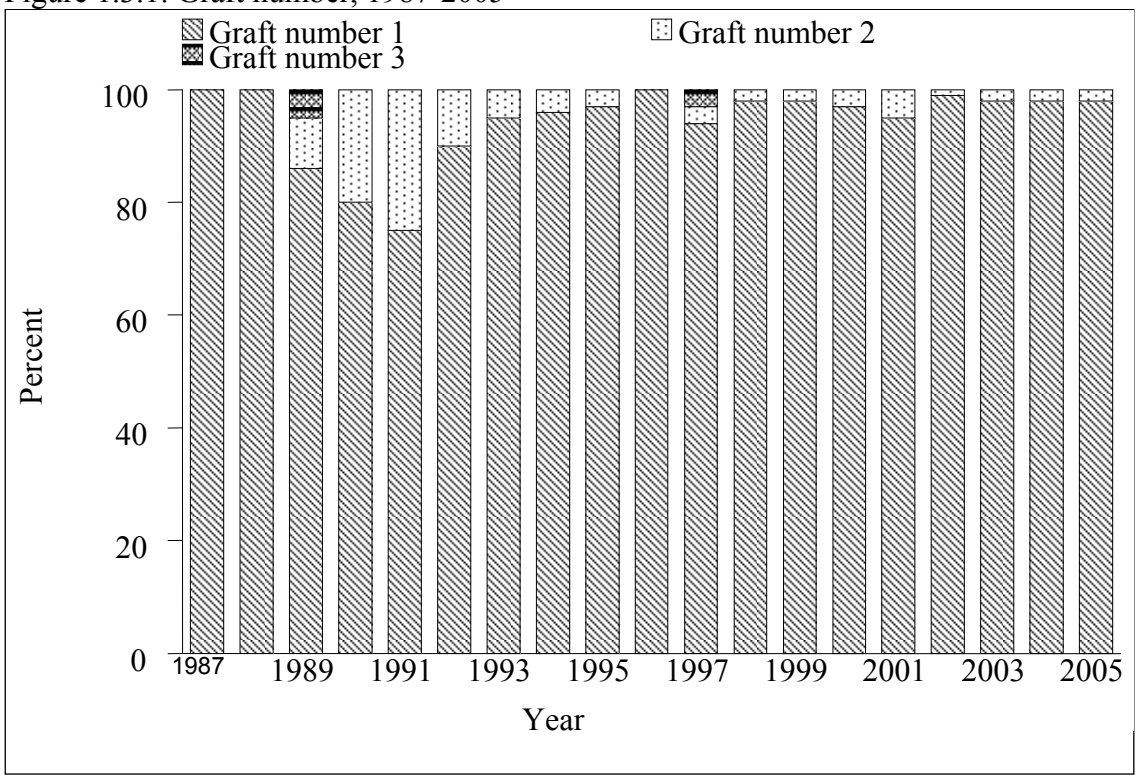


Table 1.3.2: Type of transplant, 1987-2005

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		1999	
Type of transplant	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Allogeneic + Syngeneic	18	95	24	96	29	97	26	93	27	82	32	65	44	71
Autologous	1	5	1	4	1	3	2	7	6	18	17	35	18	29
TOTAL	19	100	25	100	30	100	28	100	33	100	49	100	62	100

Year	2000		2001		2002		2003		2004		2005		TOTAL	
Type of transplant	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Allogeneic + Syngeneic	56	60	75	69	75	66	84	66	90	65	88	61	740	71
Autologous	38	40	33	31	39	34	44	34	49	35	56	39	307	29
TOTAL	94	100	108	100	114	100	128	100	139	100	144	100	1047	100

*6 patients with syngeneic type of transplant

Figure 1.3.2: Type of transplant, 1987-2005

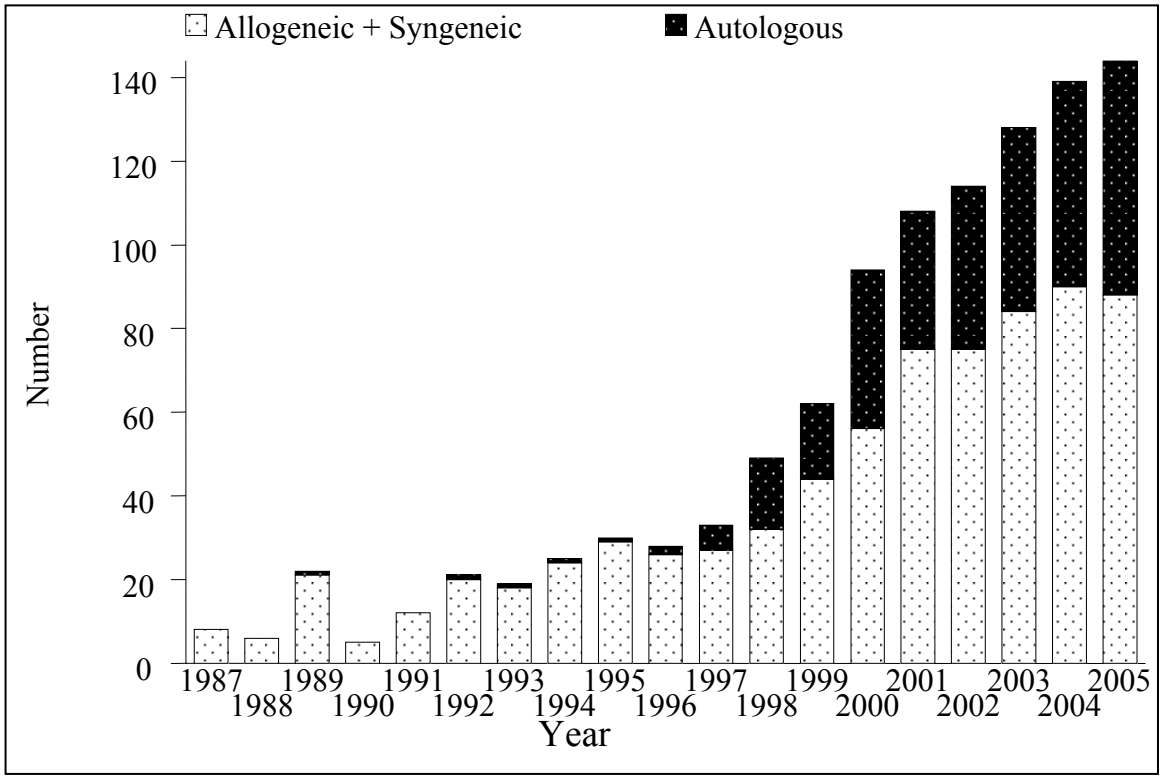


Table 1.3.3: Type of transplant by Centre, 1987-2005

Type of transplant	**Allogeneic + Syngeneic**		**Autologous**		**TOTAL**	
Centre	No.	%	No.	%	No.	%
KLA	96	13	91	30	187	18
KLP	155	21	28	9	183	17
UKM	45	6	30	10	75	7
SJA	45	6	83	27	128	12
UMA	95	13	41	13	136	13
UMP	272	37	27	9	299	29
GMC	1	0	3	1	4	0
LWE	7	1	0	0	7	1
SJP	24	3	4	1	28	3
TOTAL	740	100	307	100	1047	100

Figure 1.3.3: Type of transplant by Centre, 1987-2005

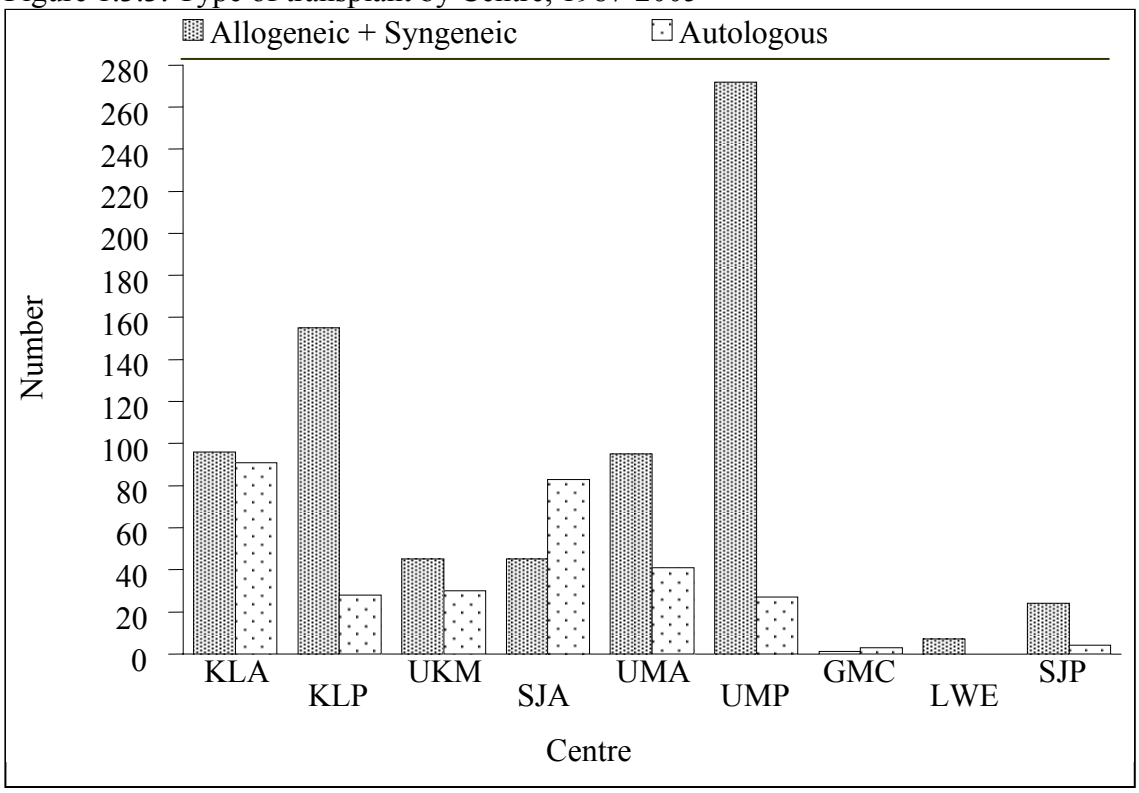


Table 1.3.4: Transplant source, 1987-2005

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	30	28	37	60	31	33
PBSC / Marrow + PBSC	7	21	23	47	74	69	23	37	57	61
Cord blood / Marrow + cord	2	6	1	2	4	4	2	3	6	6
TOTAL	33	100	49	100	108	100	62	100	94	100

Year	**2002**		**2003**		**2004**		**2005**		**TOTAL**	
Transplant source	No.	%	No.	%	No.	%	No.	%	No.	%
Marrow	31	27	44	34	30	22	23	16	451	43
PBSC / Marrow + PBSC	79	69	79	62	100	72	115	79	557	53
Cord blood / Marrow + cord	4	4	5	4	9	6	7	5	40	4
TOTAL	114	100	128	100	139	100	145	100	1048	100

Figure 1.3.4: Transplant source, 1987-2005

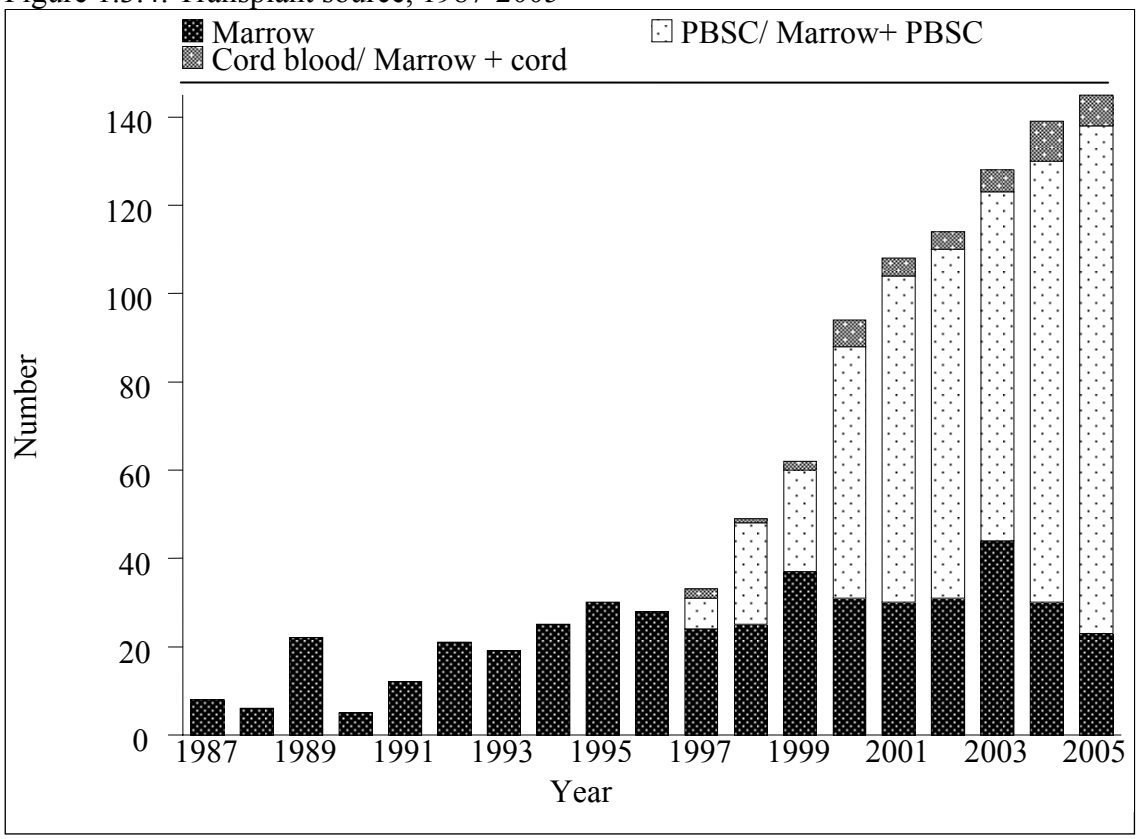


Table 1.3.5: HLA Match, 1987-2005

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	23	96	29	100	26	100	18	100
1 AG	0	0	1	4	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	20	100	24	100	29	100	26	100	18	100

Year	**1997**		**1998**		**1999**		**2000**		**2001**	
HLA Match	No.	%	No.	%	No.	%	No.	%	No.	%
Identical	25	93	31	97	69	92	40	91	52	93
1 AG	2	7	0	0	4	5	3	7	0	0
2 AG	0	0	1	3	1	1	1	2	4	7
>=3 AG Disparate	0	0	0	0	1	1	0	0	0	0
TOTAL	27	100	32	100	75	100	44	100	56	100

Year	**2002**		**2003**		**2004**		**2005**		**TOTAL**	
HLA Match	No.	%	No.	%	No.	%	No.	%	No.	%
Identical	70	93	79	94	83	92	78	94	695	95
1 AG	3	4	3	4	3	3	4	5	23	3
2 AG	2	3	2	2	4	4	1	1	16	2
>=3 AG Disparate	0	0	0	0	0	0	0	0	1	0
TOTAL	75	100	84	100	90	100	83	100	735	100

*excluding autologous

Table 1.3.6: Allogeneic Donor Relationship, 1987-2005

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	72	96	44	100	55	98
Unrelated	1	4	0	0	3	4	0	0	1	2
Others	0	0	0	0	0	0	0	0	0	0
TOTAL	27	100	32	100	75	100	44	100	56	100

Year	**2002**		**2003**		**2004**		**2005**		**TOTAL**	
Allogeneic Donor Relationship	No.	%	No.	%	No.	%	No.	%	No.	%
Sibling	71	95	81	96	81	90	79	91	707	96
Unrelated	4	5	3	4	9	10	8	9	29	4
Others	0	0	0	0	0	0	0	0	3	0
TOTAL	75	100	84	100	90	100	87	100	739	100

*excluding autologous, including syngeneic

1.4 TRANSPLANT OUTCOMES

The major cause of death is relapse/underlying disease with sepsis being the second commonest cause of death (Table 1.4.1).

Table 1.4.1: Cause of Death, 1987-2005

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	6	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
Organ Failure	0	0	0	0	0	0	0	0	0	0
Interstitial pneumonitis	0	0	0	0	0	0	0	0	0	0
Secondary malignancy	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	6	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	4	25	0	0
Underlying disease	0	0	6	67	3	60	2	13	3	27
Haemorrhage	0	0	1	11	0	0	2	13	1	9
VOD	0	0	0	0	0	0	1	6	1	9
Organ Failure	1	50	0	0	1	20	2	13	0	0
Interstitial pneumonitis	0	0	0	0	0	0	0	0	0	0
Secondary malignancy	0	0	0	0	0	0	1	6	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	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	1	6	4	9	6	40	2	6
GVHD	0	0	2	12	4	9	1	7	2	6
Underlying disease	9	60	11	65	33	70	7	47	22	71
Haemorrhage	0	0	1	6	2	4	0	0	3	10
VOD	0	0	1	6	2	4	0	0	1	3
Organ Failure	1	7	0	0	0	0	1	7	0	0
Interstitial pneumonitis	0	0	1	6	2	4	0	0	1	3
Secondary malignancy	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	15	100	17	100	47	100	15	100	31	100

Year	2002		2003		2004		2005		TOTAL	
Cause of death	No.	%	No.	%	No.	%	No.	%	No.	%
Sepsis	4	13	14	28	10	23	9	25	71	21
GVHD	3	10	5	10	9	21	6	17	37	11
Underlying disease	19	63	27	54	21	49	14	39	188	55
Haemorrhage	0	0	0	0	2	5	2	6	15	4
VOD	0	0	0	0	0	0	0	0	6	2
Organ Failure	3	10	2	4	0	0	1	3	12	4
Interstitial pneumonitis	0	0	1	2	0	0	2	6	7	2
Secondary malignancy	0	0	0	0	0	0	0	0	1	0
Others	0	0	0	0	0	0	1	3	1	0
Unknown	1	3	1	2	1	2	1	3	4	1
TOTAL	30	100	50	100	43	100	36*	100	342	100

*3 patients with missing cause of death reported

In the 2005 report there is inclusion of additional survival estimates. Besides overall survival there is also survival by age, transplant type and key disease entities (leukaemia, lymphoma, aplastic anemia and thalassaemia).

Figure 1.4.1: Patient survival by year of transplant, 1987-2005

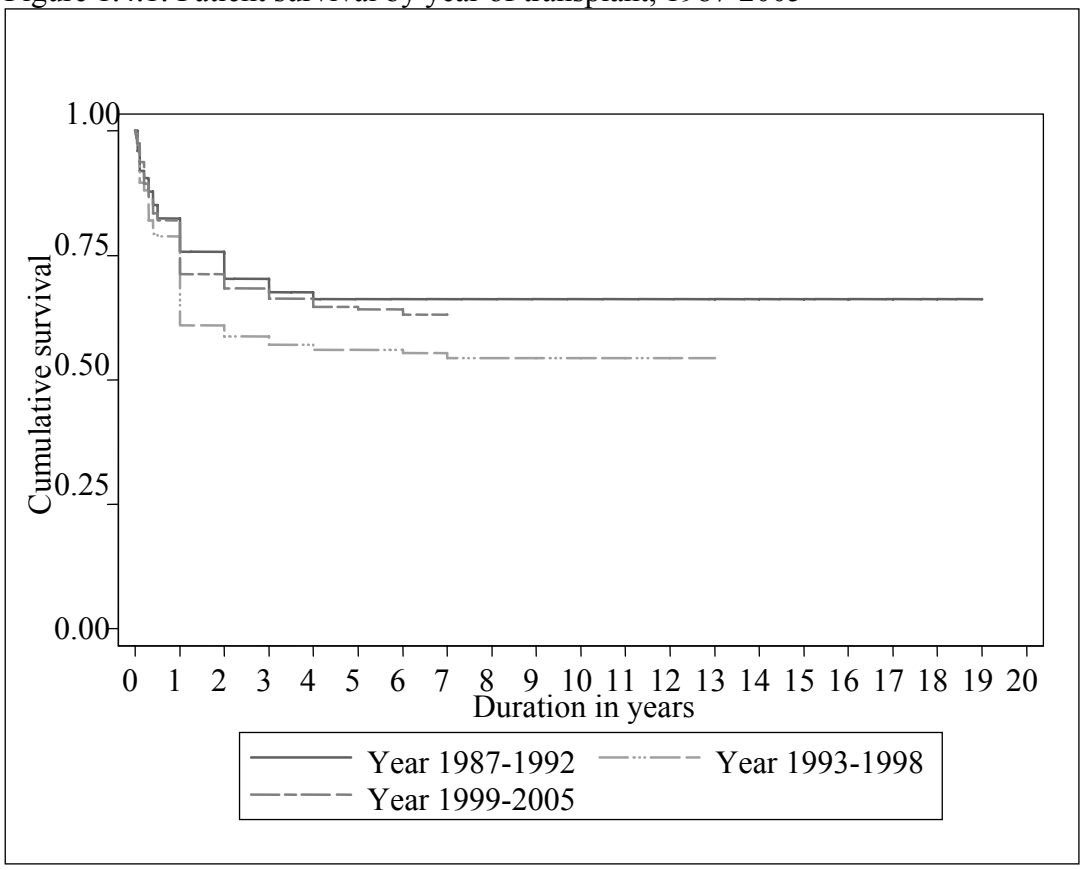


Figure 1.4.2: Patient survival by gender, 1987-2005

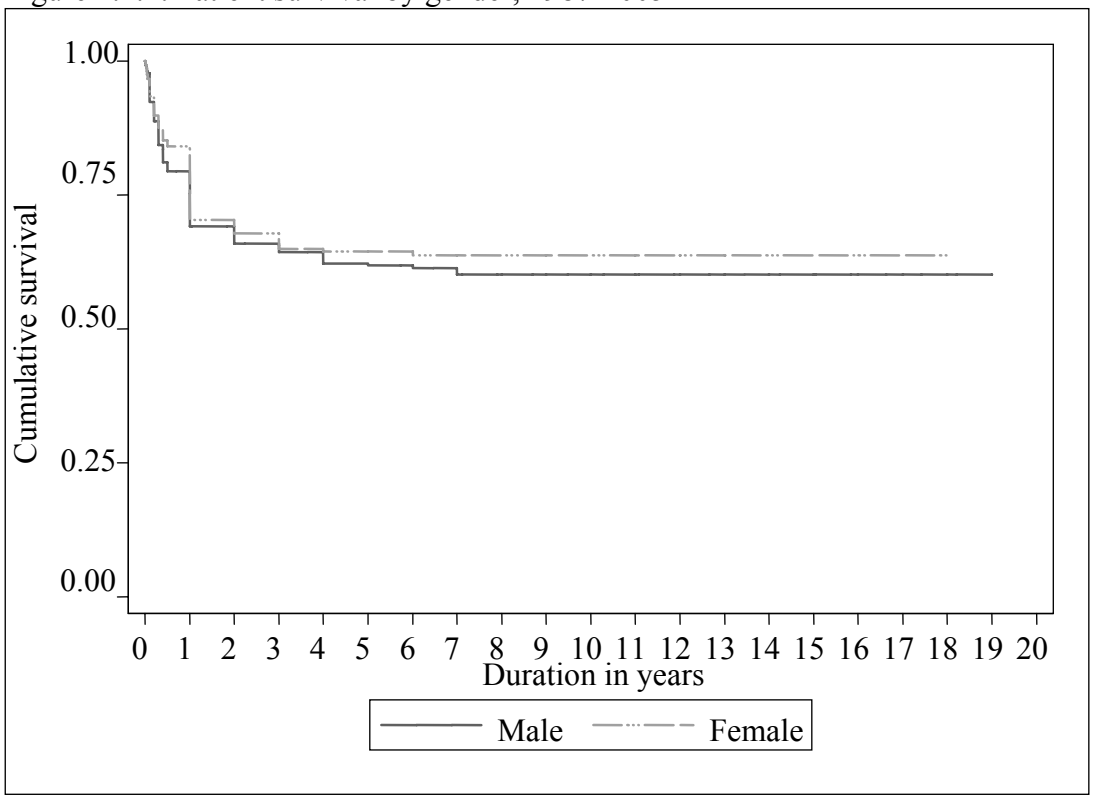


Figure 1.4.3: Patient survival by age group, 1987-2005

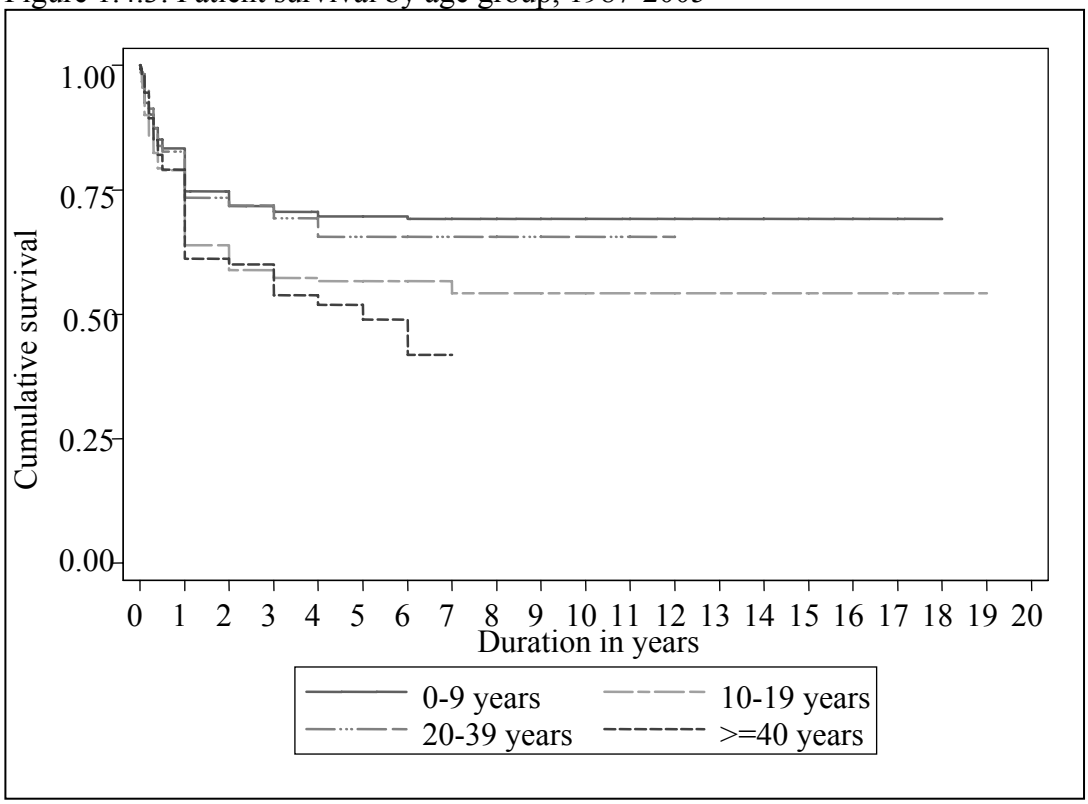
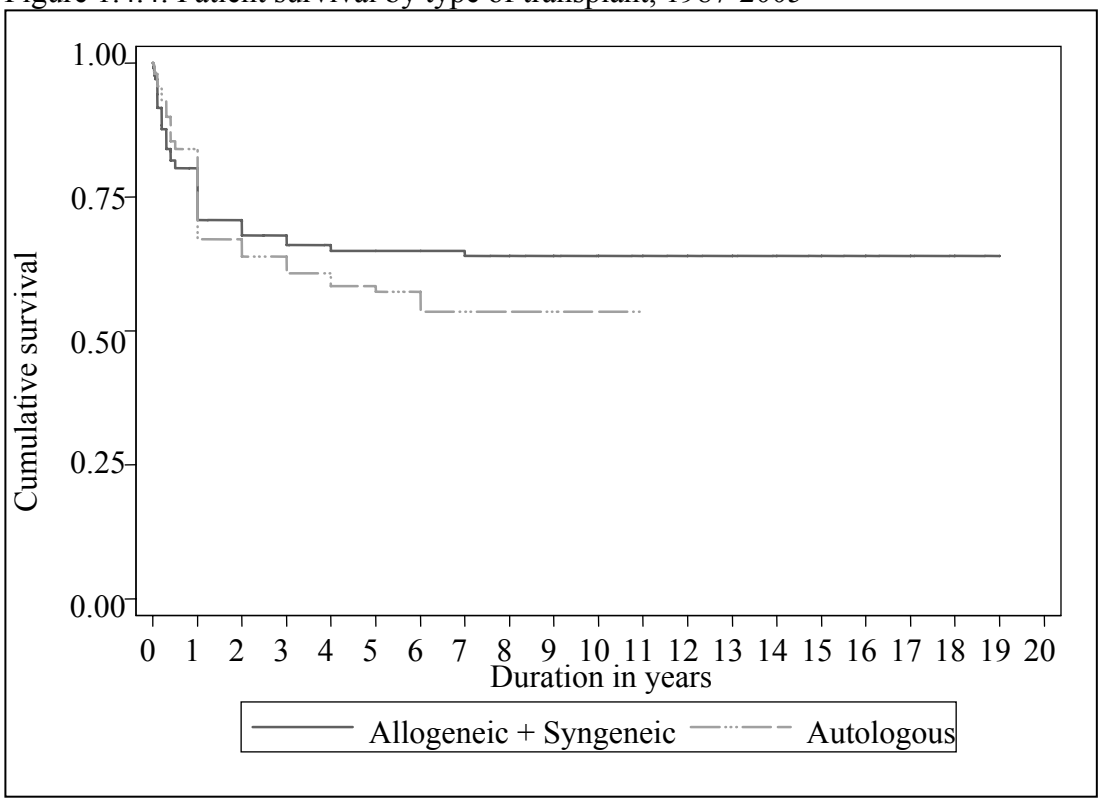


Figure 1.4.4: Patient survival by type of transplant, 1987-2005



1.5 DISEASE-FREE SURVIVAL

Figure 1.5.1: Disease-free survival for Acute Myeloid Leukaemia, 1987-2005 (Allogeneic vs. Autologous)

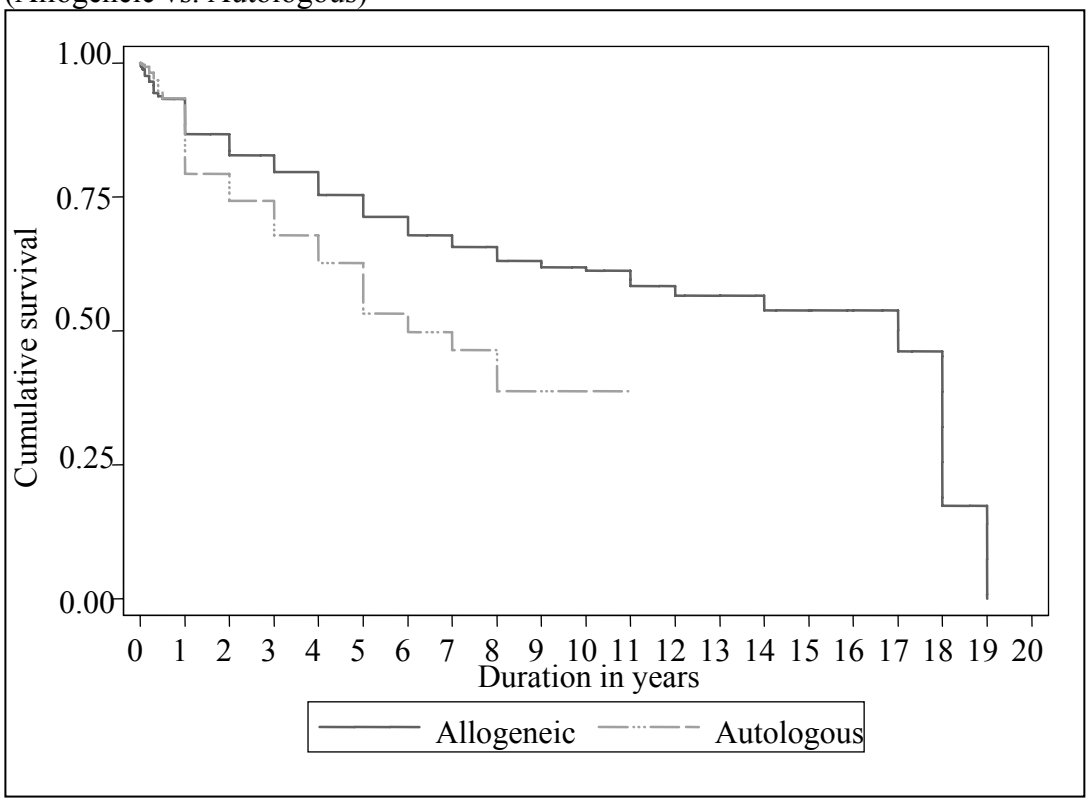


Figure 1.5.2: Disease-free survival for Acute Lymphoblastic Leukaemia, 1987-2005 (Allogeneic)

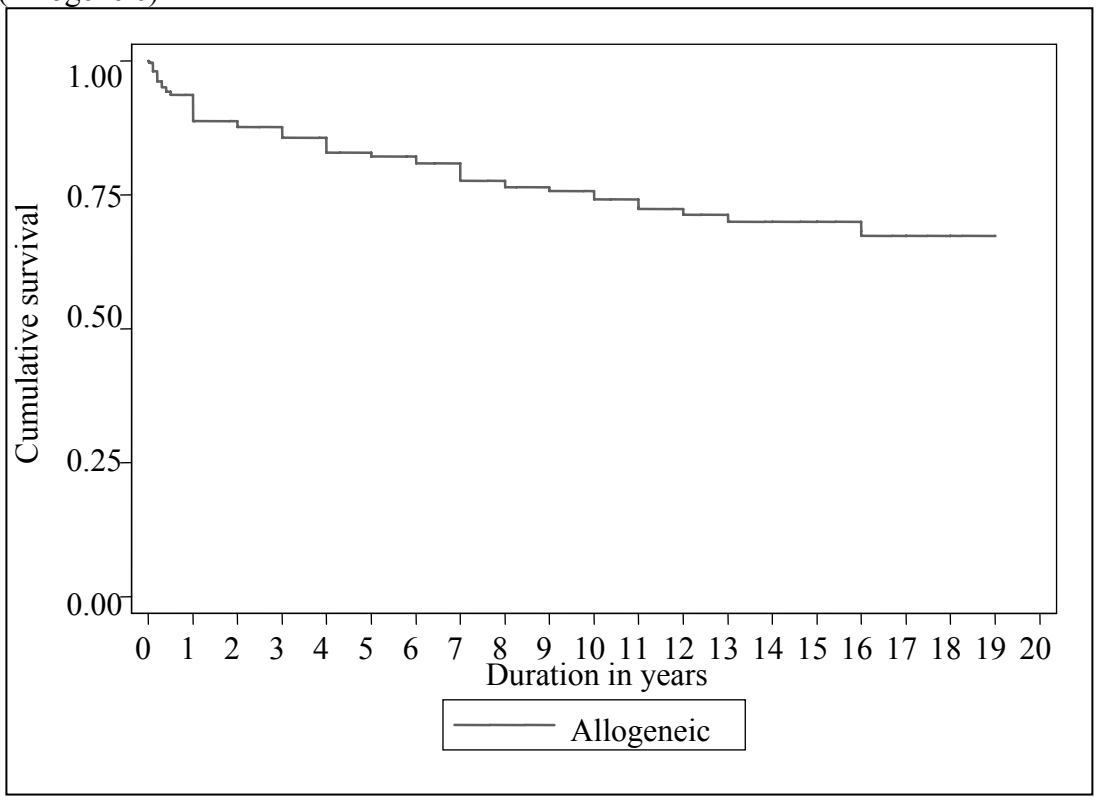


Figure 1.5.3: Disease-free survival for Thalassaemia, 1987-2005 (Allogeneic)

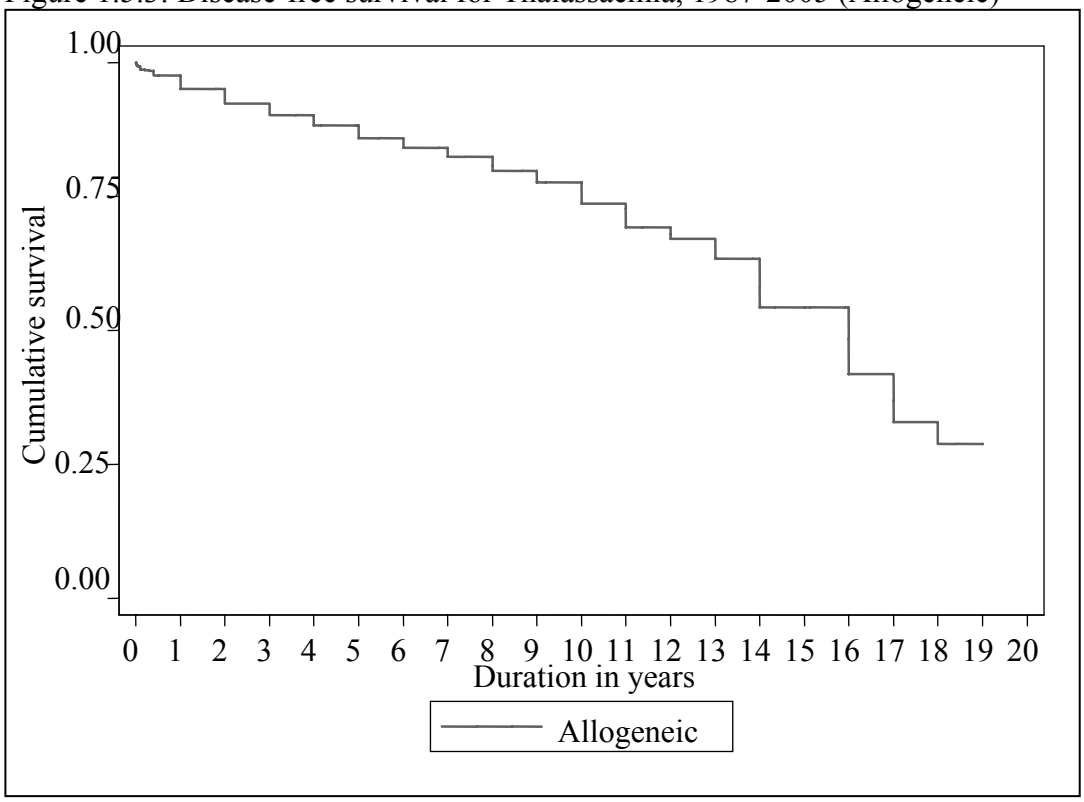


Figure 1.5.4: Disease-free survival for Non-Hodgkin's Lymphoma, 1987-2005 (Allogeneic vs. Autologous)

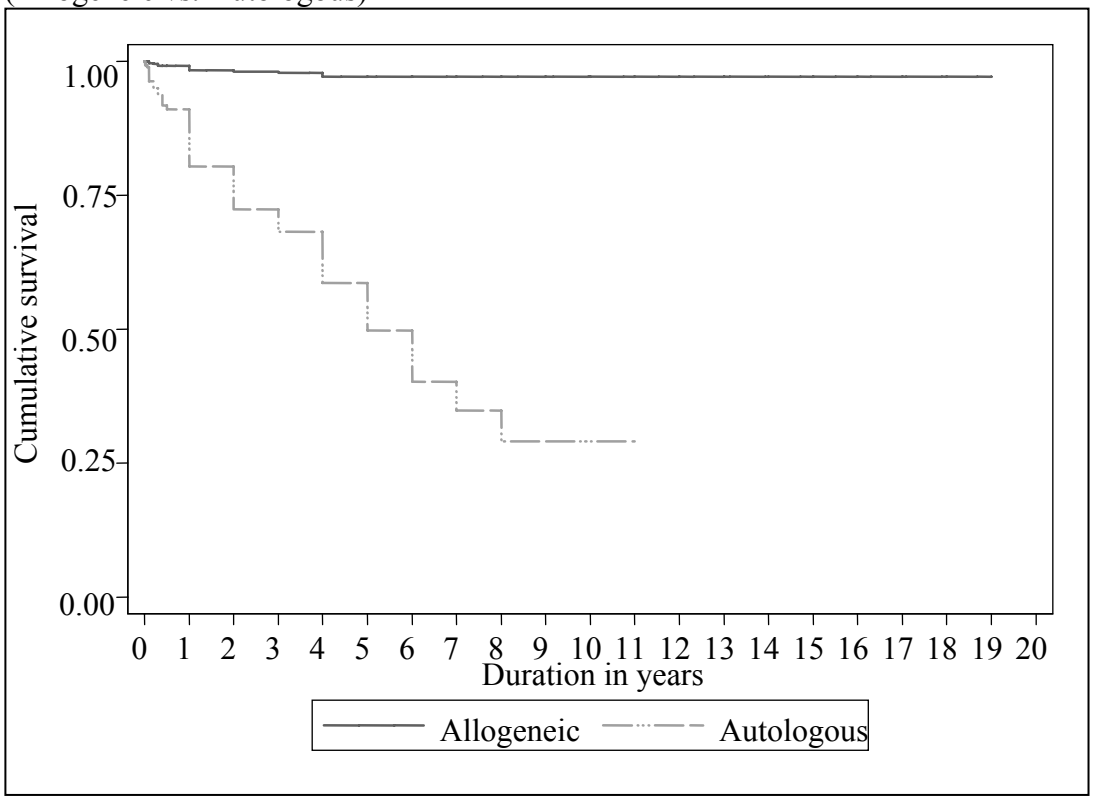


Figure 1.5.5: Disease-free survival for Hodgkin's Disease, 1987-2005 (Autologous)

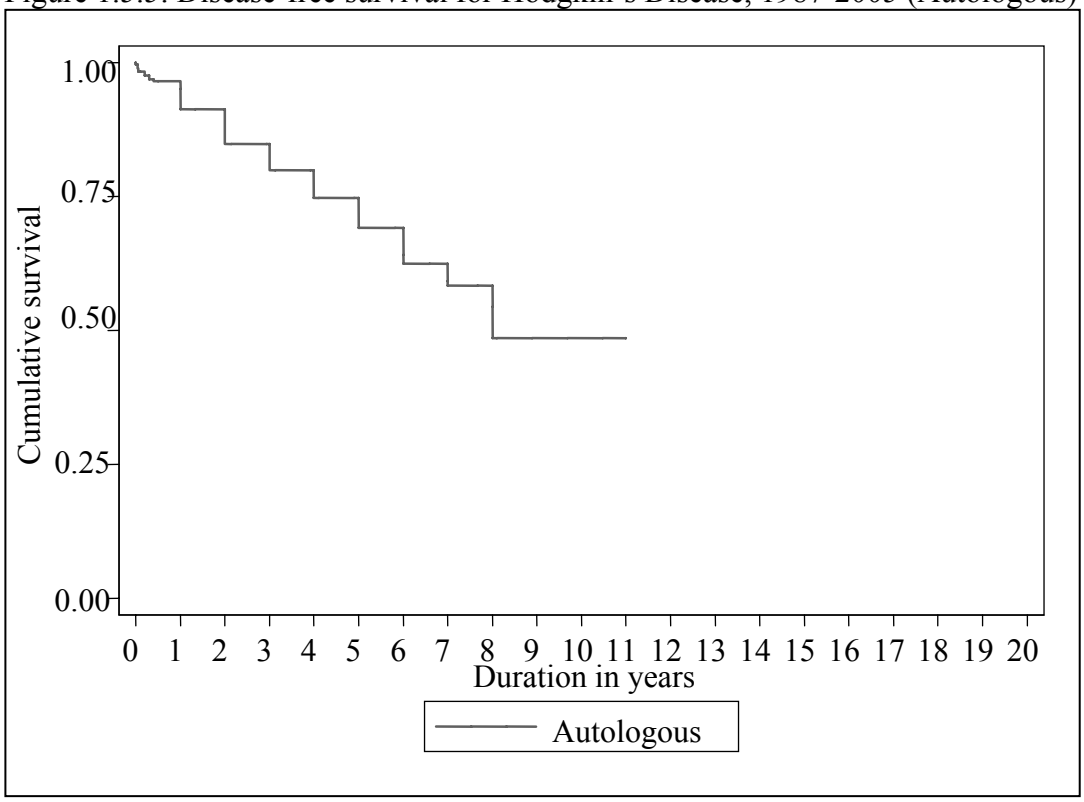


Figure 1.5.6: Disease-free survival for Chronic Myeloid Leukaemia, 1987-2005 (Allogeneic)

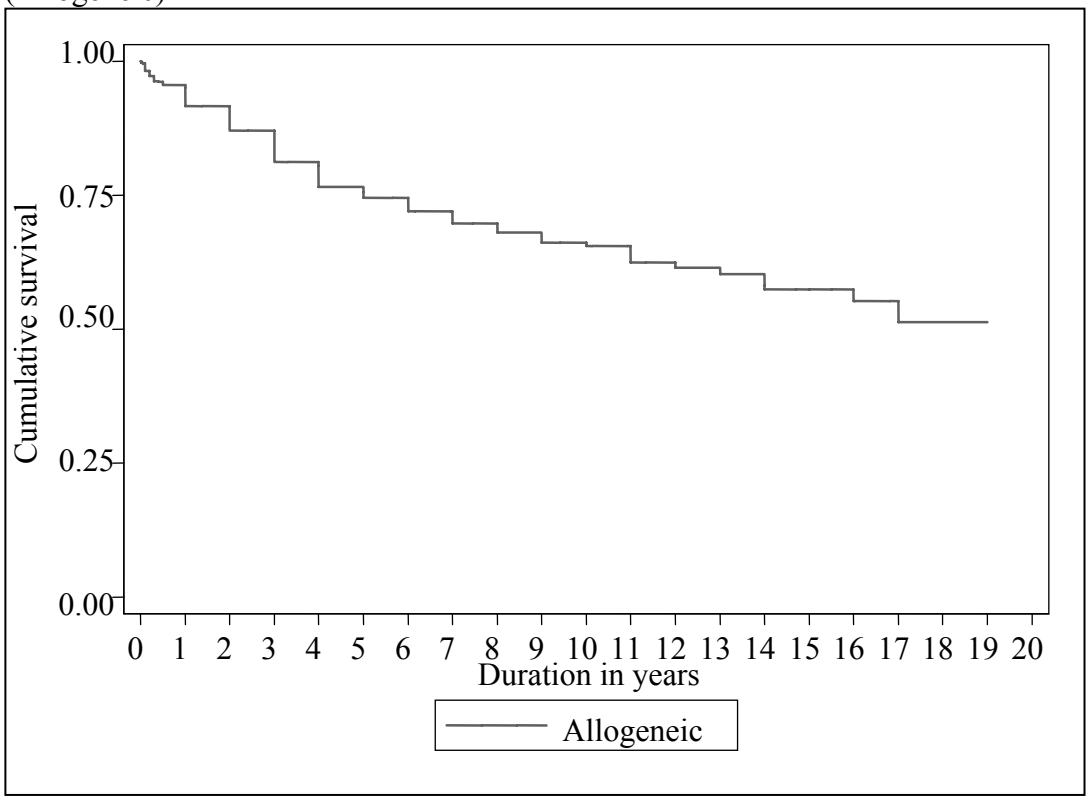


Figure 1.5.7: Disease-free survival for Aplastic Anaemia, 1987-2005 (Allogeneic)

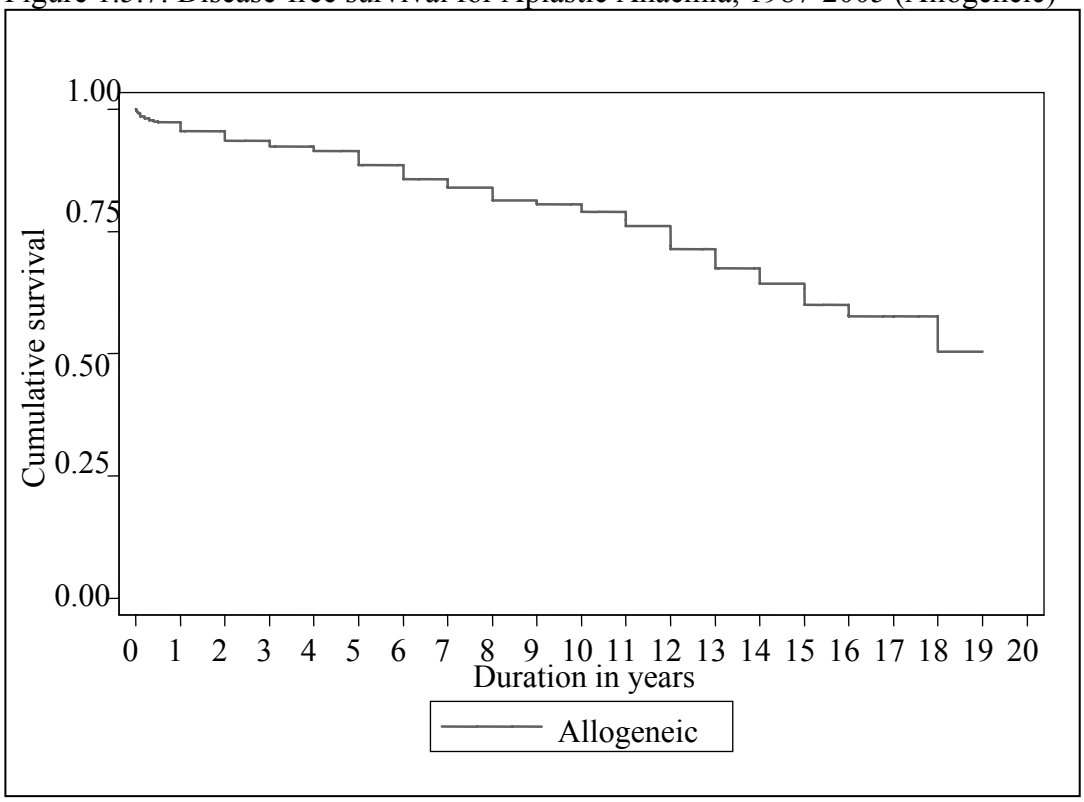
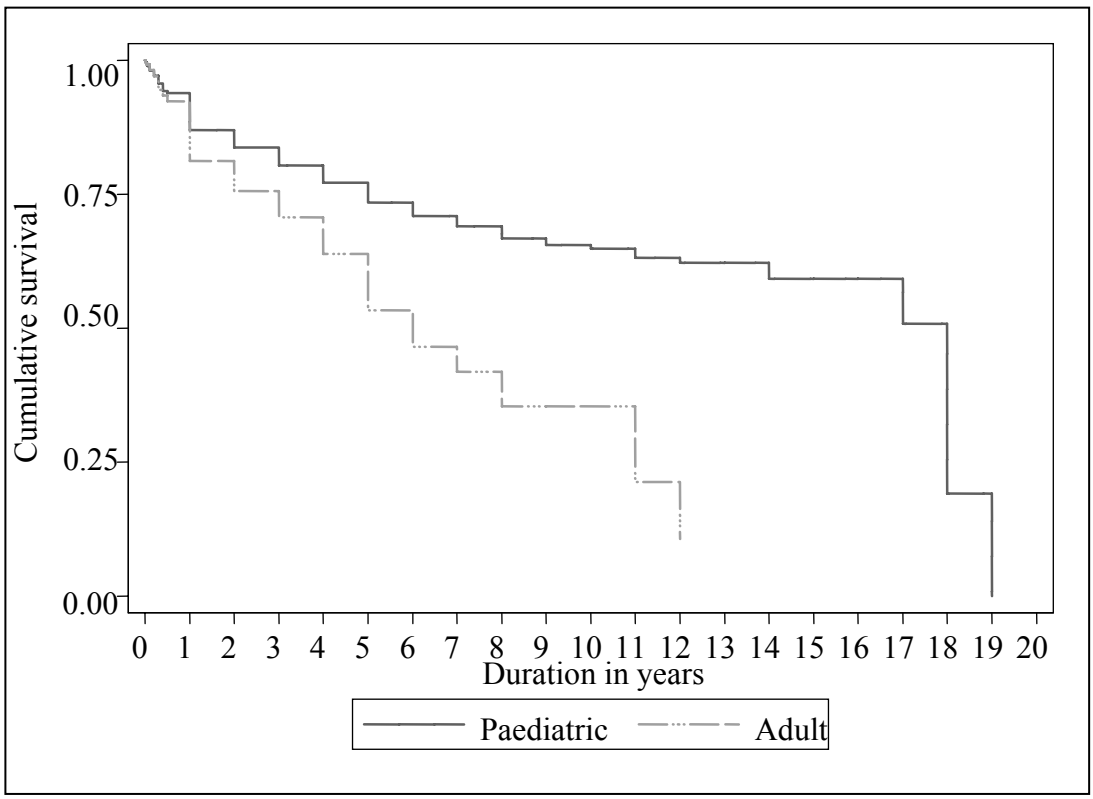
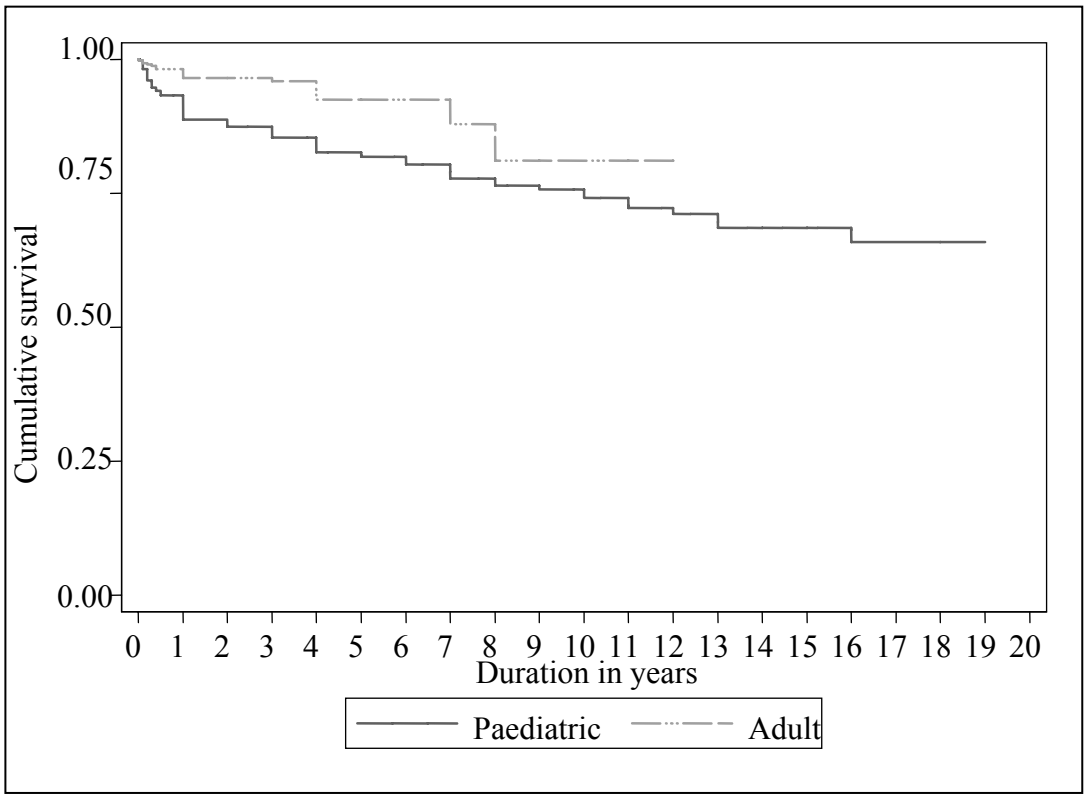


Figure 1.5.8: Disease-free survival by age group for Acute Myeloid Leukaemia, 1987-2005



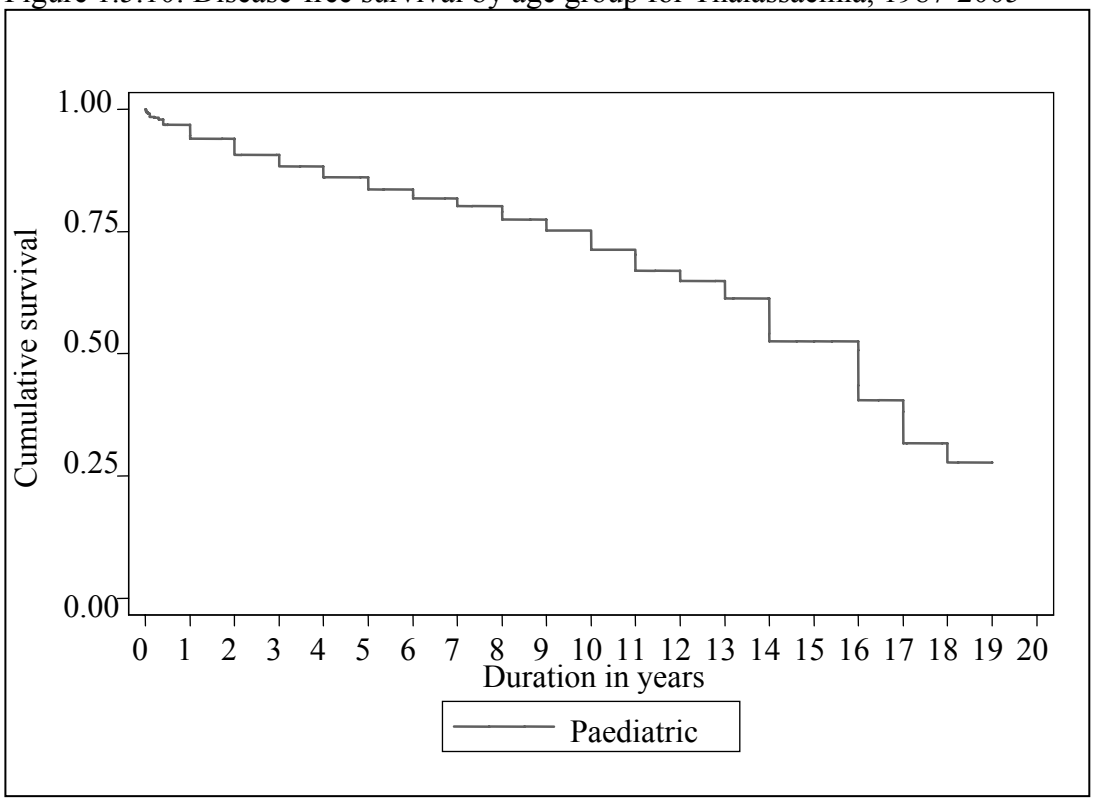
Paediatric is defined as age ≤18 years and adult age >18 years

Figure 1.5.9: Disease-free survival by age group for Acute Lymphoblastic Leukaemia, 1987-2005



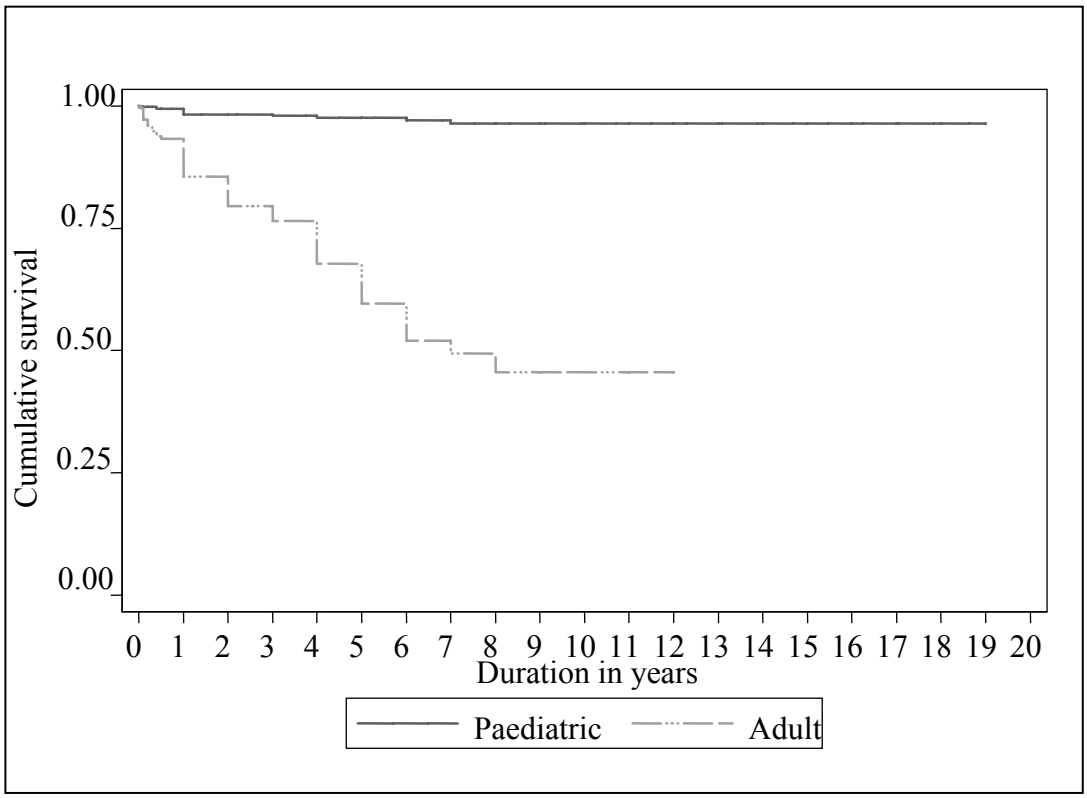
Paediatric is defined as age ≤18 years and adult age >18 years

Figure 1.5.10: Disease-free survival by age group for Thalassaemia, 1987-2005



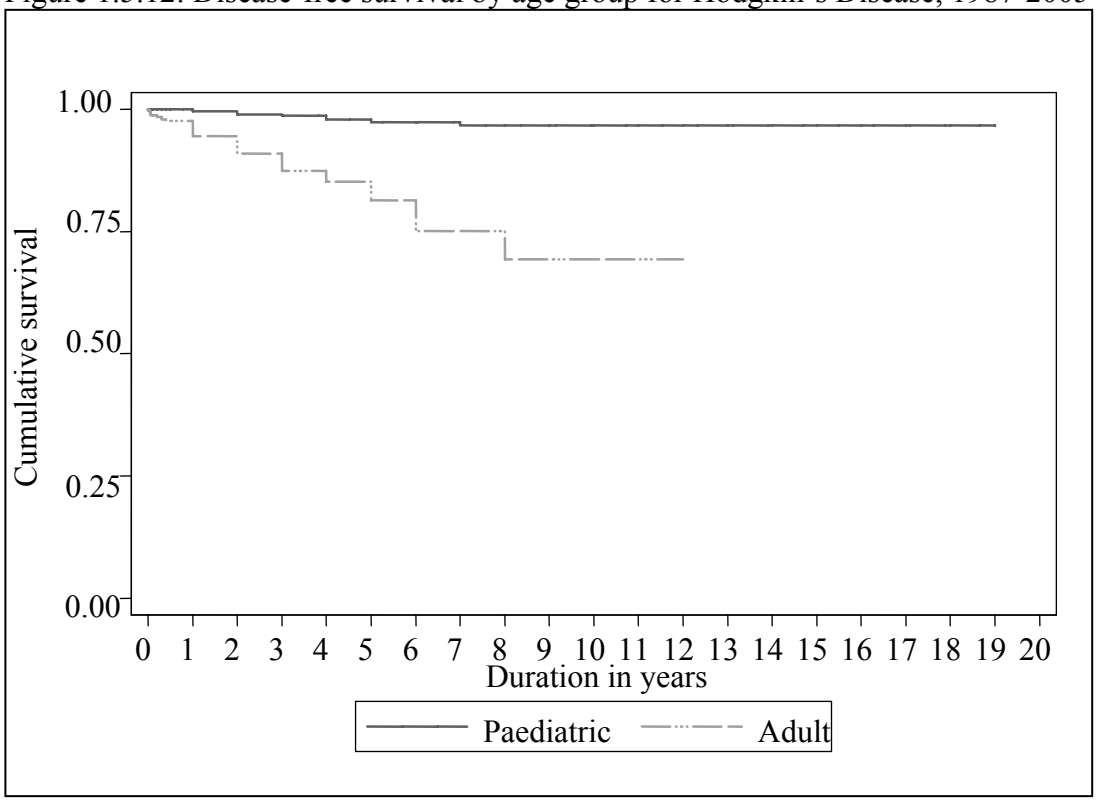
* No adult cases reported for Thalassaemia.
Paediatric is defined as age ≤18 years and adult age >18 years

Figure 1.5.11: Disease-free survival by age group for Non-Hodgkin's Lymphoma, 1987-2005



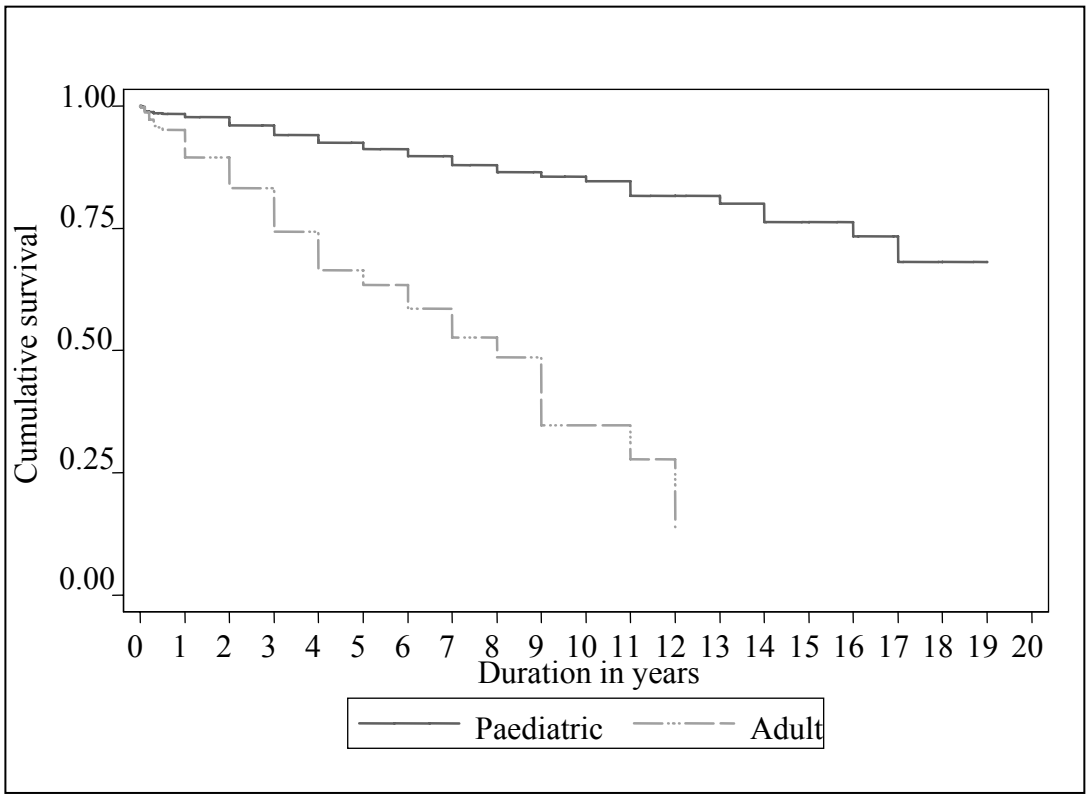
Paediatric is defined as age ≤18 years and adult age >18 years

Figure 1.5.12: Disease-free survival by age group for Hodgkin's Disease, 1987-2005



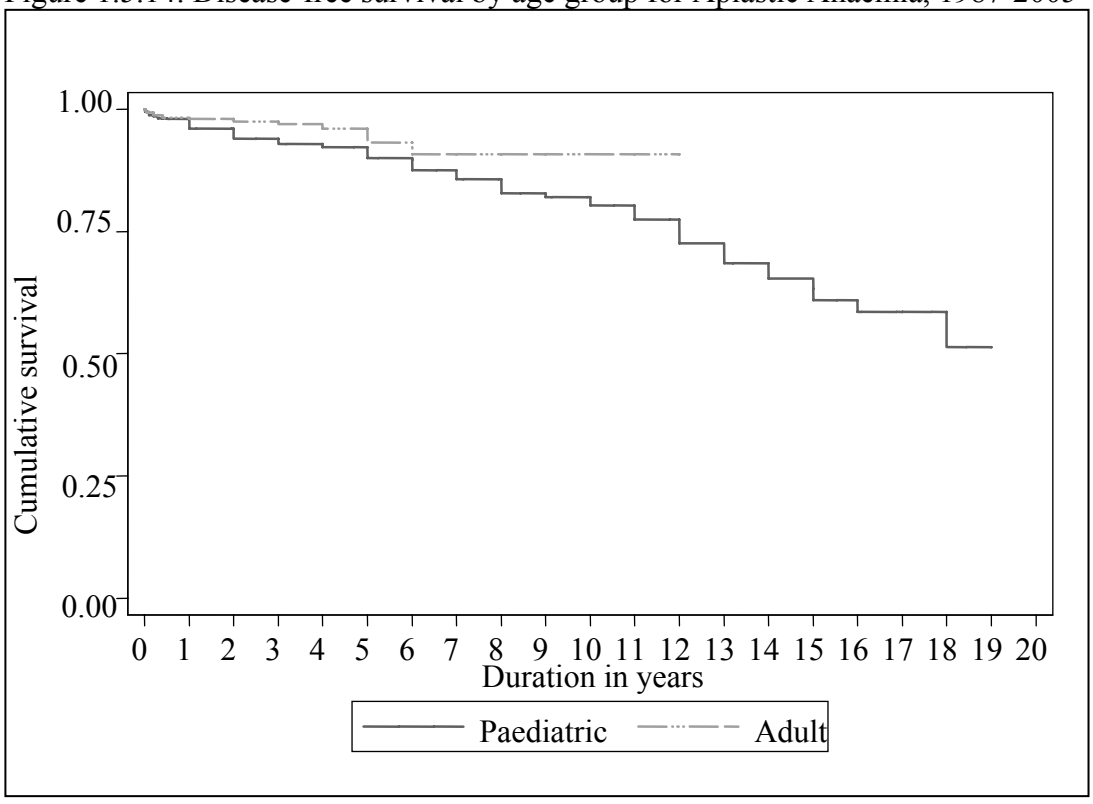
Paediatric is defined as age ≤18 years and adult age >18 years

Figure 1.5.13: Disease-free survival by age group for Chronic Myeloid Leukaemia, 1987-2005



Paediatric is defined as age ≤18 years and adult age >18 years

Figure 1.5.14: Disease-free survival by age group for Aplastic Anaemia, 1987-2005



Paediatric is defined as age ≤18 years and adult age >18 years