

CHAPTER 1

BLOOD AND MARROW TRANSPLANTATION

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1.0 INTRODUCTION

Haematopoietic Stem Cell Transplantation (HSCT) continued to increase for the year 2010 recording a total of 262 transplantations. A new online case reporting form (CRF) was developed for 2010 which resulted in delayed analysis due to unfamiliarity with the form. The new CRF is expected to generate more details and future annual reports will hopefully reflect this. Information on unrelated donor HSCT, the use of non-myeloablative conditioning or reduced intensity conditioning and specific disease outcome will become available in future reports.

1.1 STOCK AND FLOW

In 2010 a total of 262 transplants were performed, raising the transplant rate per million to 9. Out of the 12 transplant units, Hospital Ampang performed the most number of transplants accounting for 40% of all HSCT activity.

Table 1.1.1: Stock and Flow of Blood and Marrow Transplantation, 1987-2010

Year	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
New transplant patients	8	6	22	5	12	21	19	25	30	28	33	49
Deaths	1	1	6	6	1	2	9	5	17	11	15	17
Lost to follow-up	0	0	0	0	0	0	0	0	0	0	0	0
Alive at 31 st December	7	12	28	27	38	57	67	87	100	117	135	167

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
New transplant patients	62	94	108	114	128	140	148	136	149	181	213	262
Deaths	16	31	47	35	56	52	62	42	50	71	50	58
Lost to follow-up	0	0	0	0	0	0	0	0	0	0	0	0
Alive at 31 st December	213	276	337	416	488	576	662	756	855	965	1128	1332

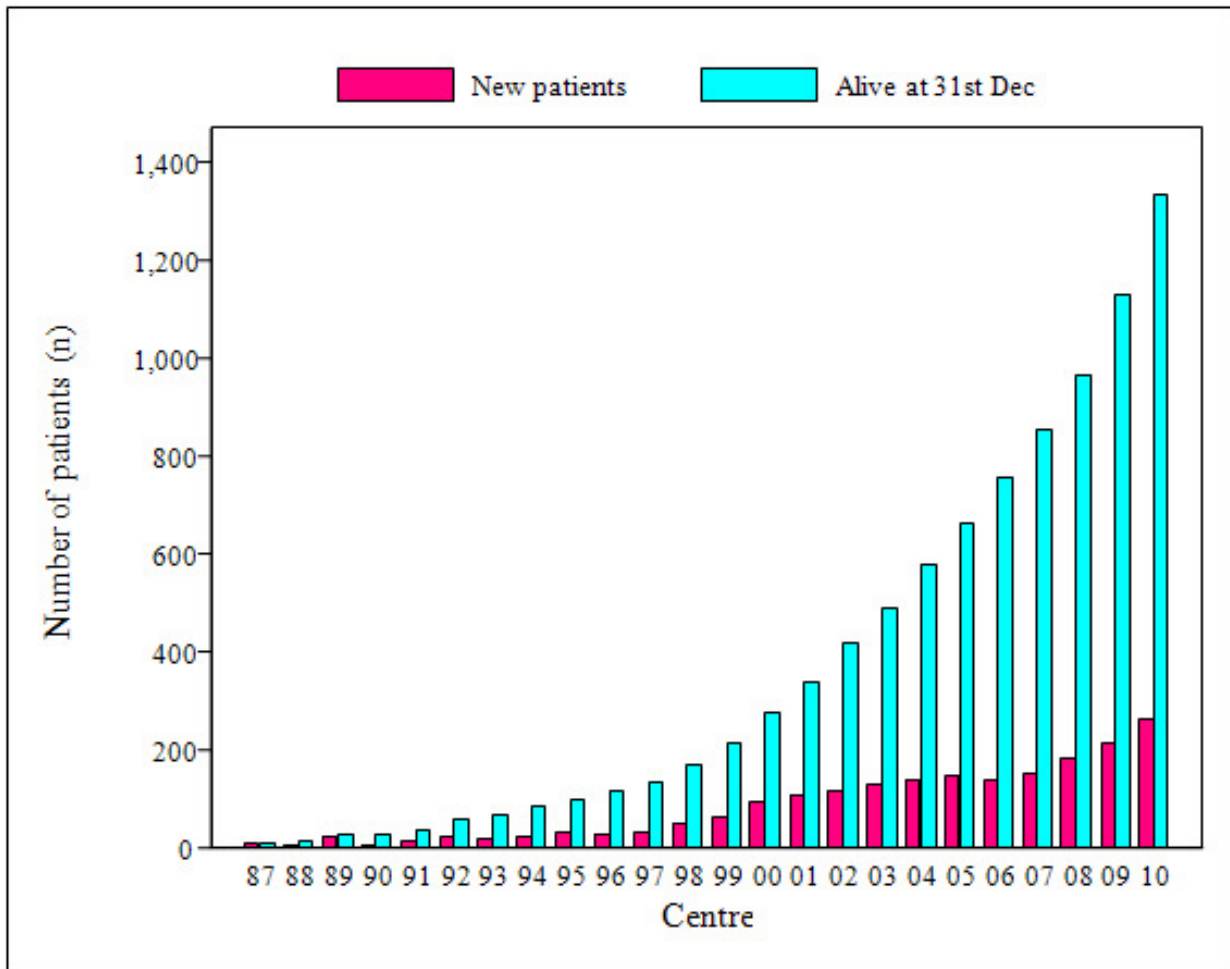


Figure 1.1.1: Stock and Flow of Blood and Marrow Transplantation, 1987-2010

Table 1.1.2: New Transplant Rate per million population (pmp), 1987-2010

Year	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
New transplant patients	8	6	22	5	12	21	19	25	30	28	33	49
New transplant rate pmp	1	0	1	0	1	1	1	1	1	1	2	2
Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
New transplant patients	62	94	108	114	128	140	148	136	149	181	213	262
New transplant rate pmp	3	4	5	5	5	5	6	5	5	7	8	9

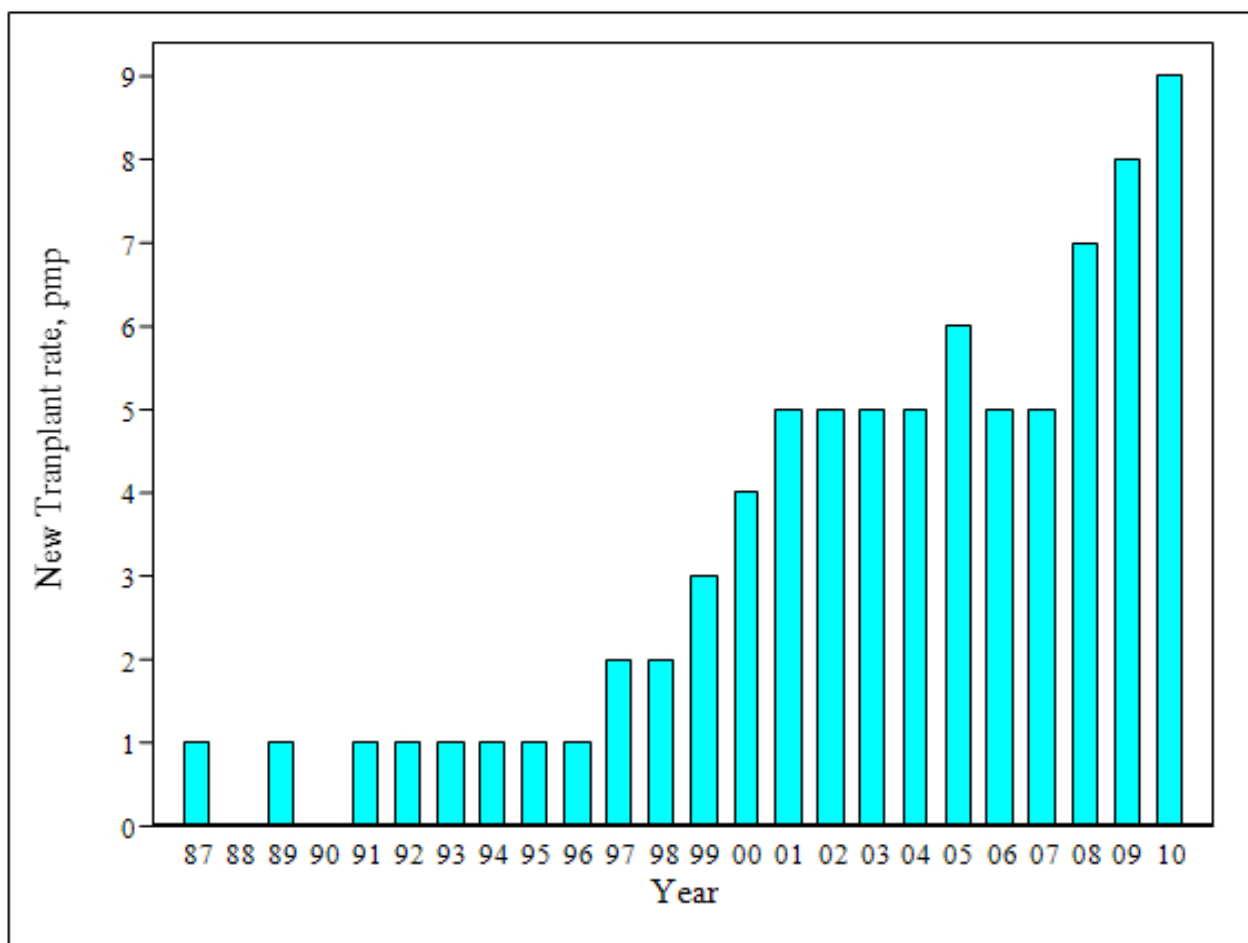


Figure 1.1.2: New Transplant Rate per million population (pmp), 1987-2010

Table 1.1.3: Distribution of Patients by Transplant Centre, 1987-2010

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
HUKM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SJMCA	0	0	0	0	1	5	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	21	95	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
SJMCP	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HUSM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APSH	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HPP	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
TOTAL	8	100	6	100	22	100	5	100	12	100	21	100	19	100

Table 1.1.3: Distribution of Patients by Transplant Centre, 1987-2010 (Cont')

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	10	36	9	27	16	33	19	31	16	17
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	22	23
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	1	4	0	0	0	0	0	0	0	0
HUSM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ASH	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HPP	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
TOTAL	25	100	30	100	28	100	33	100	49	100	62	100	94	100

Year	2001		2002		2003		2004		2005		2006		2007	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
KLA	20	19	28	25	36	28	42	30	45	30	31	23	0	0
KLP	18	17	20	18	19	15	22	16	21	14	26	19	26	17
UKM	12	11	9	8	11	9	14	10	17	11	9	7	21	14
SJA	17	16	20	18	23	18	21	15	23	16	22	16	21	14
UMA	19	18	16	14	10	8	10	7	14	9	9	7	12	8
UMP	22	20	20	18	20	16	16	11	13	9	18	13	15	10
GMC	0	0	0	0	0	0	2	1	2	1	4	3	2	1
LWE	0	0	0	0	0	0	6	4	1	1	2	1	1	1
SJP	0	0	1	1	9	7	6	4	12	8	6	4	6	4
HUSM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ASH	0	0	0	0	0	0	0	0	0	0	1	1	1	1
HA	0	0	0	0	0	0	0	0	0	0	8	6	44	30
HPP	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	1	1	0	0	0	0	0	0
TOTAL	108	100	114	100	128	100	140	100	148	100	136	100	149	100

Table 1.1.3: Distribution of Patients by Transplant Centre, 1987-2010 (Cont')

Year	2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%
KLA	0	0	0	0	0	0	223	11
KLP	29	16	26	12	29	11	320	16
UKM	24	13	19	9	17	6	164	8
SJA	25	14	24	11	27	10	248	12
UMA	17	9	19	9	22	8	214	11
UMP	16	9	17	8	19	7	382	19
GMC	1	1	1	0	6	2	18	1
LWE	0	0	0	0	0	0	10	1
SJP	4	2	0	0	17	6	62	3
HUSM	6	3	10	5	3	1	19	1
ASH	0	0	1	0	3	1	6	0
HA	57	31	86	40	104	40	299	15
HPP	2	1	10	5	14	5	26	1
Others	0	0	0	0	1	0	2	0
TOTAL	181	100	213	100	262	100	1993	100

*Others include Royal Perth Australia Hospital

KLA	Hospital Kuala Lumpur, (Adult)
KLP	Hospital Kuala Lumpur, Institute Paediatrics (Paed)
UKM	Hospital Universiti Kebangsaan Malaysia
SJA	Sime Darby Medical Centre, Subang Jaya (Adult)
UMA	University of Malaya Medical Centre (Adult)
UMP	University of Malaya Medical Centre (Paed)
GMC	Gleneagles Medical Centre, Penang
LWE	Lam Wah Ee Hospital, Penang
SJP	Sime Darby Medical Centre, Subang Jaya (Paed)
HUSM	Hospital Universiti Sains Malaysia
ASH	Ampang Puteri Specialist Hospital
HA	Hospital Ampang
HPP	Hospital Pulau Pinang

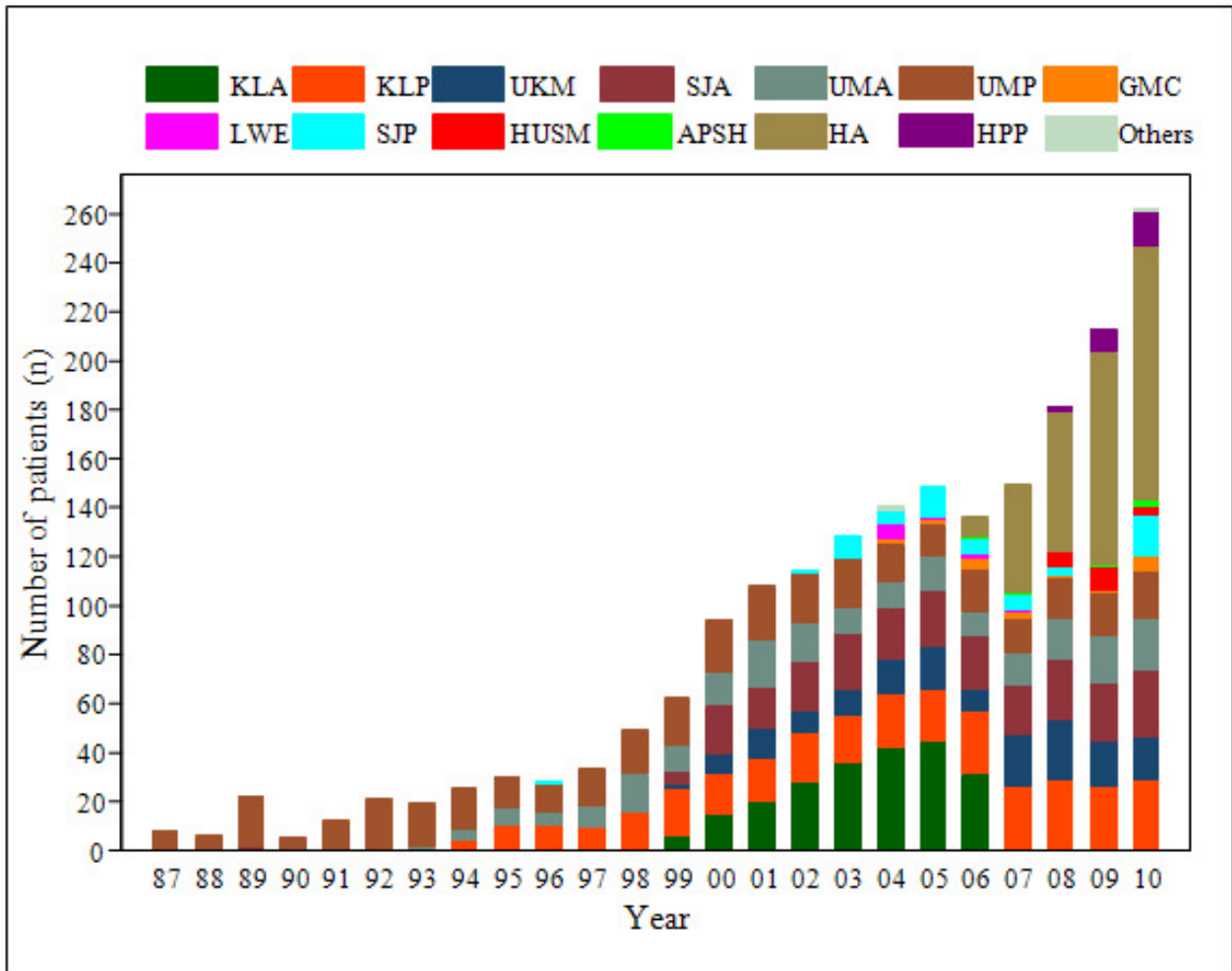


Figure 1.1.3: Distribution of Patients by Centre, 1987-2010

1.2 RECIPIENTS' CHARACTERISTICS

Consistent with the preceding years, males outnumber females as transplant recipients at a ratio of 53:47. The Malay, Chinese and Indian ethnic groups accounted for 41%, 40% and 9% respectively while the remaining 10% comprised Sabahans, Sarawakian, Others and Foreigners. Patients aged 40-59 years formed the largest group of recipients with the median age of a recipient lying at 27 years. The paediatric population i.e. age <20 years comprised 36% of all HSCT performed in contrast to 3% where 9 patients were aged >60 years. The most common indications for HSCT remained Acute Leukaemias followed by Lymphomas.

Table 1.2.1: Distribution of Patients by Gender, 1987-2010

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		2006		2007		2008		2009		2010		Total	
Gender	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	71	55	84	60	71	48	80	59	90	60	99	55	124	58	138	53	1127	57
Female	57	45	56	40	77	52	56	41	59	40	82	45	89	42	124	47	866	43
TOTAL	128	100	140	100	148	100	136	100	149	100	181	100	213	100	262	100	1993	100

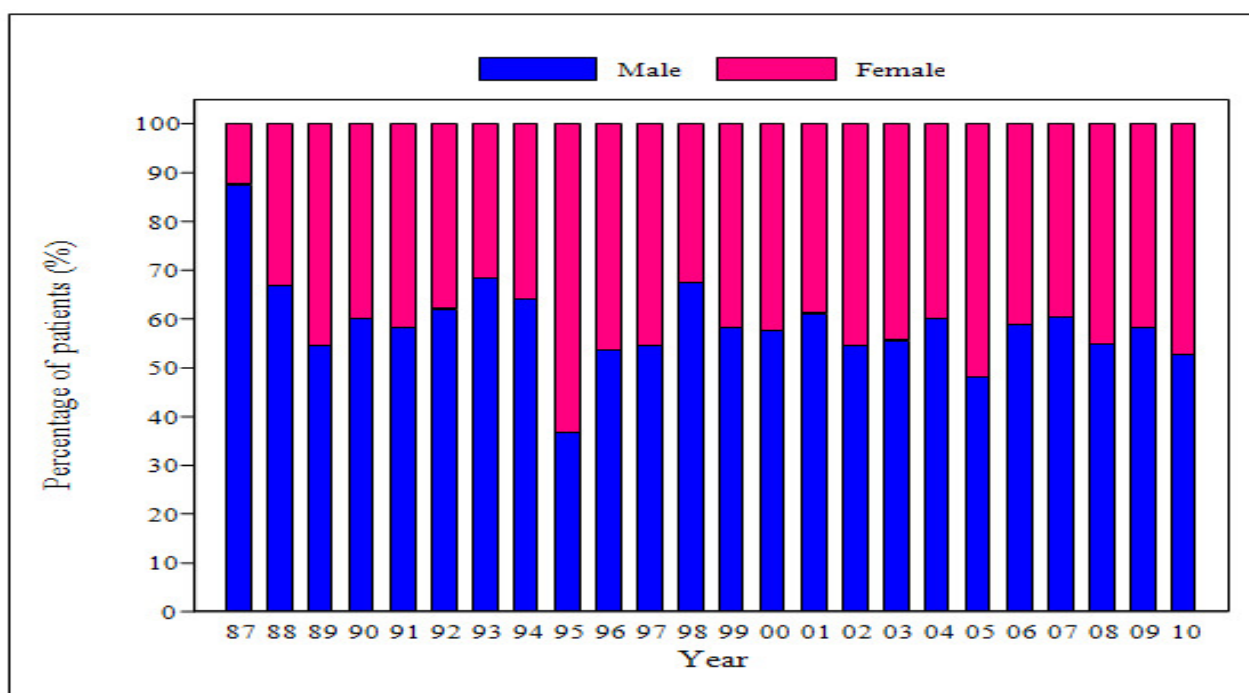


Figure 1.2.1: Distribution of Patients by Gender, 1987-2010

Table 1.2.2: Distribution of Patients by Ethnic Group, 1987-2010

Year	1987		1988		1989		1990		1991		1992		1993		1994	
Gender	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Malay	2	25	4	67	13	59	2	40	4	33	4	19	3	16	9	36
Chinese	5	63	2	33	8	36	3	60	7	58	10	48	10	53	12	48
Indian	1	13	0	0	0	0	0	0	1	8	4	19	1	5	0	0
Bumiputra Sabah	0	0	0	0	1	5	0	0	0	0	2	10	3	16	4	16
Bumiputra Sarawak	0	0	0	0	0	0	0	0	0	0	0	0	2	11	0	0
Others Malaysian	0	0	0	0	0	0	0	0	0	0	1	5	0	0	0	0
Foreigner	0	0	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	25	100

Year	1995		1996		1997		1998		1999		2000		2001		2002	
Gender	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Malay	7	23	8	29	9	27	20	41	31	50	33	35	47	44	37	32
Chinese	14	47	11	39	20	61	24	49	26	42	48	51	48	44	65	57
Indian	3	10	6	21	0	0	4	8	4	6	7	7	8	7	8	7
Bumiputra Sabah	1	3	0	0	1	3	0	0	0	0	3	3	2	2	1	1
Bumiputra Sarawak	0	0	3	11	0	0	0	0	0	0	0	0	1	1	1	1
Others Malaysian	3	10	0	0	3	9	1	2	1	2	3	3	2	2	2	2
Foreigner	2	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	30	100	28	100	33	100	49	100	62	100	94	100	108	100	114	100

Year	2003		2004		2005		2006		2007		2008		2009		2010		Total	
Gender	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Malay	46	36	51	36	53	36	61	45	59	40	77	43	99	46	108	41	787	39
Chinese	65	51	63	45	69	47	50	37	59	40	71	39	79	37	106	40	875	44
Indian	6	5	9	6	14	9	11	8	18	12	12	7	14	7	24	9	155	8
Bumiputra Sabah	4	3	9	6	6	4	7	5	6	4	14	8	9	4	16	6	89	4
Bumiputra Sarawak	4	3	7	5	5	3	2	1	1	1	5	3	7	3	6	2	44	2
Others Malaysian	2	2	1	1	1	1	3	2	3	2	0	0	2	1	0	0	28	1
Foreigner	1	1	0	0	0	0	2	1	3	2	2	1	3	1	2	1	15	1
TOTAL	128	100	140	100	148	100	136	100	149	100	181	100	213	100	262	100	1993	100

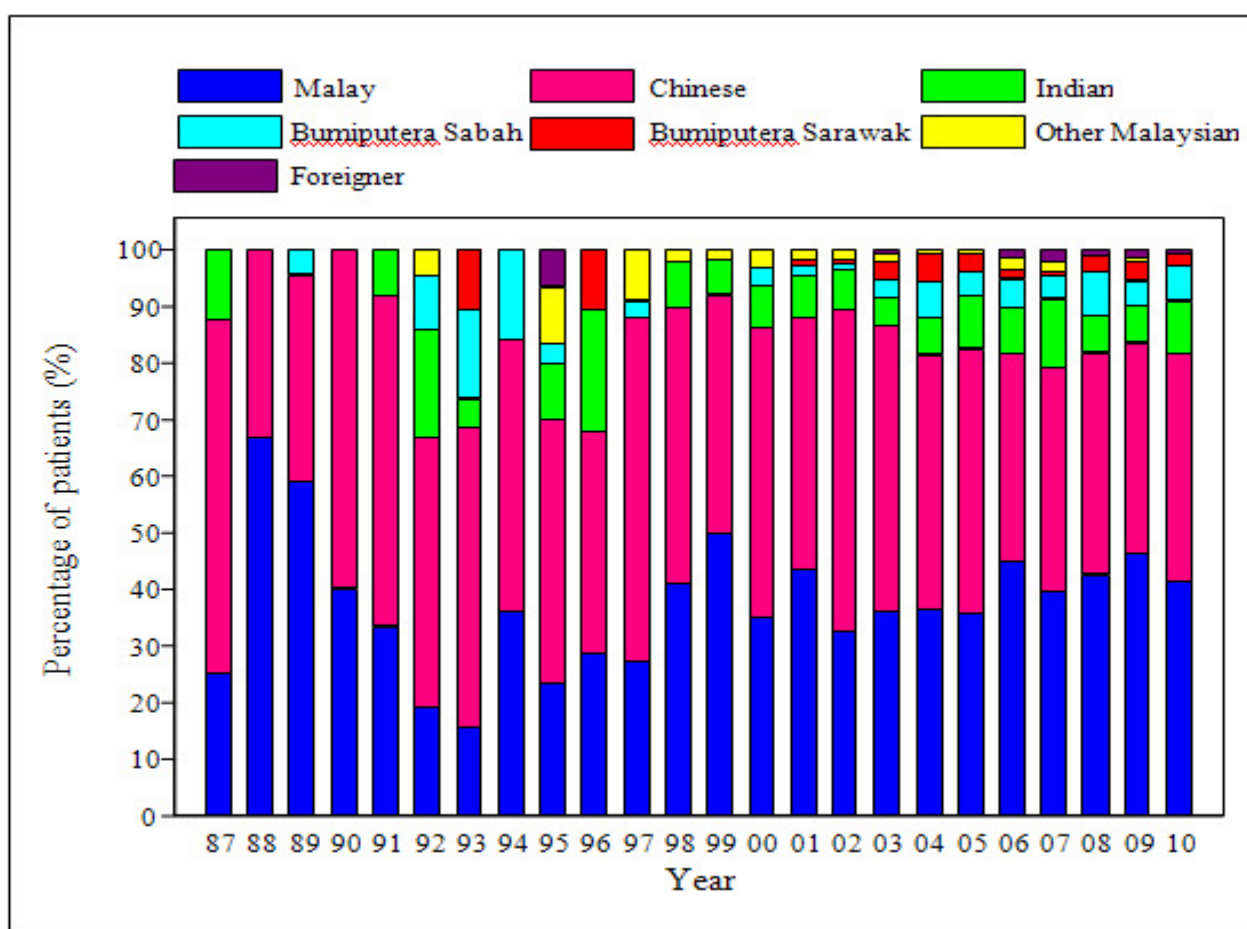


Figure 1.2.2: Distribution of Patients by Ethnic Group, 1987-2010

Table 1.2.3: Distribution of Patients by Age Group, 1987-2010

Year	1987		1988		1989		1990		1991		1992		1993		1994	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0-9	4	50	4	67	17	77	5	100	10	83	15	71	9	47	11	44
10-19	4	50	2	33	5	23	0	0	2	17	6	29	10	53	11	44
20-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	12
40-59	0	0	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	0	0
TOTAL	8	100	6	100	22	100	5	100	12	100	21	100	19	100	25	100
Mean	9		7		8		6		6		7		9		11	
SD	4		3		3		3		4		4		5		7	
Median	9		8		8		6		6		6		10		11	
Minimum	2		2		1		2		1		1		1		1	
Maximum	15		10		13		9		13		14		17		29	

Table 1.2.3: Distribution of Patients by Age Group, 1987-2010 (cont'.)

Year	1995		1996		1997		1998		1999		2000		2001		2002	
Age group	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0-9	12	40	13	46	19	58	21	43	28	45	27	29	23	21	30	26
10-19	13	43	12	43	8	24	16	33	15	24	27	29	28	26	25	22
20-39	4	13	3	11	5	15	12	24	12	19	19	20	40	37	36	32
40-59	1	3	0	0	1	3	0	0	7	11	20	21	16	15	23	20
≥60	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
TOTAL	30	100	28	100	33	100	49	100	62	100	94	100	108	100	114	100
Mean	13		11		12		13		17		23		23		23	
SD	9		9		12		10		15		17		16		16	
Median	11		11		6		10		11		18		22		22	
Minimum	3		1		1		5 Month		1		1		1 Month		1	
Max	41		37		45		39		57		61		64		55	

Year	2003		2004		2005		2006		2007		2008		2009		2010		Total	
Age group	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0-9	42	33	26	19	29	20	40	29	38	26	25	14	36	17	36	14	520	26
10-19	18	14	41	29	32	22	29	21	22	15	42	23	26	12	58	22	452	23
20-39	47	37	52	37	50	34	38	28	35	23	63	35	76	36	73	28	568	28
40-59	21	16	19	14	36	24	25	18	43	29	47	26	67	31	86	33	412	21
≥60	0	0	2	1	1	1	4	3	11	7	4	2	8	4	9	3	41	2
TOTAL	128	100	140	100	148	100	136	100	149	100	181	100	213	100	262	100	1993	100
Mean	22		23		26		24		29		28		31		29		24	
SD	15		15		16		18		20		17		18		19		17	
Median	23		20		24		19		28		25		28		27		20	
Minimum	5 Month		1		1		1		1		2		1		1		1 Month	
Max	52		70		66		69		68		66		72		64		72	

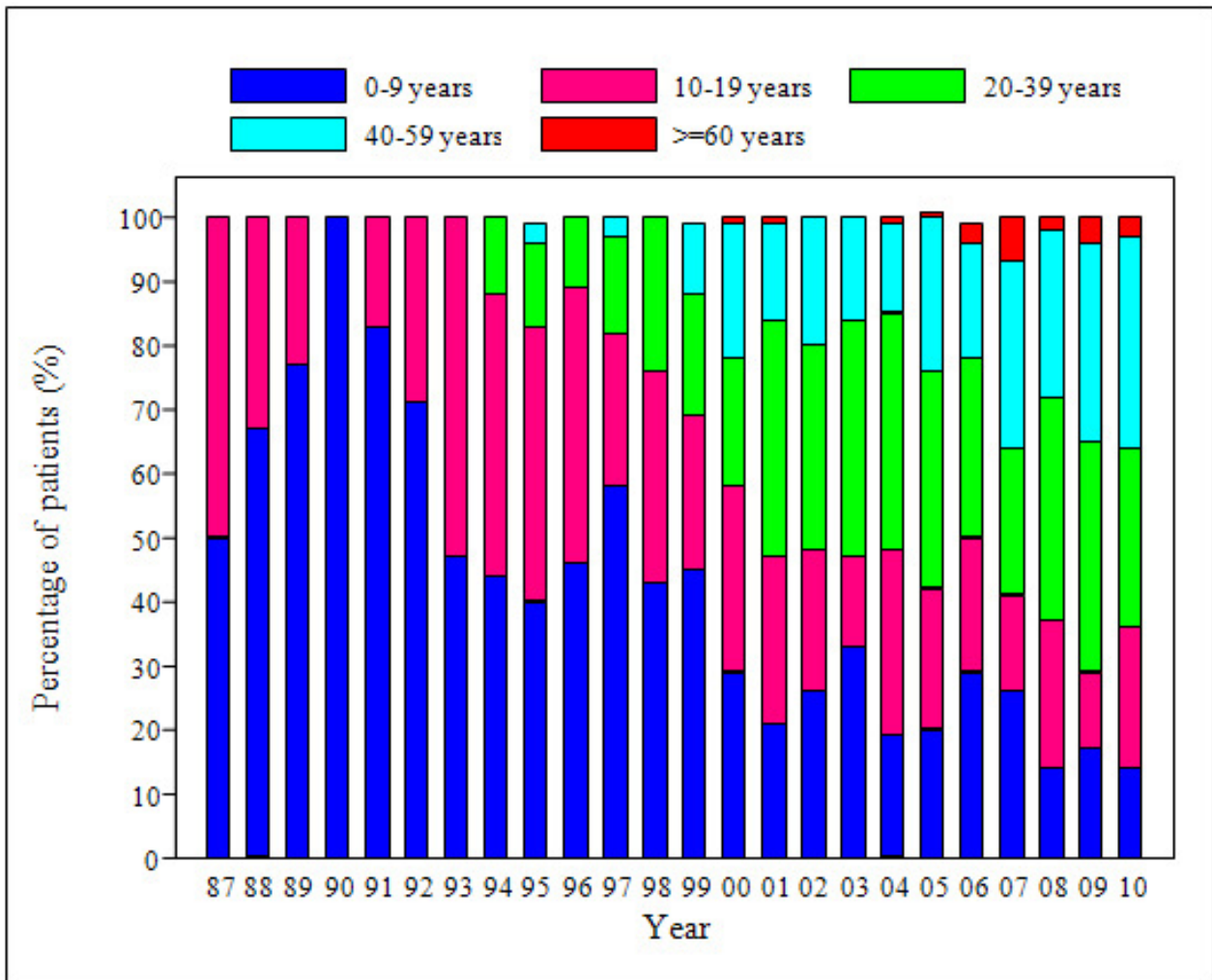


Figure 1.2.3: Distribution of Patients by Age Group, 1987-2010

Table 1.2.4: Distribution of Patients by Primary Diagnosis, 1987-2010

Year	1987		1988		1989		1990		1991		1992		1993		1994	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Acute leukemias	5	63	4	67	8	36	2	40	1	8	4	19	6	32	8	32
Chronic Myelogenous Leukemia (CML)	0	0	0	0	1	5	1	20	1	8	4	19	2	11	4	16
Other Leukemias	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lymphomas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myelodysplastic Syndrome (MDS)	0	0	0	0	0	0	0	0	0	0	0	0	1	5	1	4
Combined Myelodysplastic/Myeloproliferative Syndrome (MD/MPS)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4
Myeloproliferative Syndrome	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plasma Cell Disorder including Multiple Myeloma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anaemia	2	25	0	0	5	23	1	20	5	42	6	29	4	21	5	20
Hemoglobinopathy	1	13	2	33	7	32	1	20	4	33	4	19	2	11	5	20
Other Malignancies	0	0	0	0	0	0	0	0	0	0	3	14	2	11	1	4
Primary Immune Deficiencies	0	0	0	0	0	0	0	0	0	0	0	0	2	11	0	0
Inherited Disorders of Metabolism	0	0	0	0	1	5	0	0	0	0	0	0	0	0	0	0
Platelet and Other Inherited Disorders	0	0	0	0	0	0	0	0	1	8	0	0	0	0	0	0
Histiocytic Disorders	0	0	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	25	100

Table 1.2.4: Distribution of Patients by Primary Diagnosis, 1987-2010 (cont'.)

Year	1995		1996		1997		1998		1999		2000		2001		2002	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Acute leukemias	10	33	13	46	11	33	23	47	28	45	37	39	48	44	48	42
Chronic Myelogenous Leukemia (CML)	5	17	5	18	6	18	7	14	7	11	13	14	18	17	19	17
Other Leukemias	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lymphomas	0	0	0	0	2	6	5	10	6	10	19	20	23	21	20	18
Myelodysplastic Syndrome (MDS)	0	0	0	0	0	0	0	0	0	0	0	0	2	2	4	4
Combined Myelodysplastic/Myeloproliferative Syndrome (MD/MPS)	0	0	0	0	0	0	1	2	0	0	1	1	2	2	0	0
Myeloproliferative Syndrome	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plasma Cell Disorder including Multiple Myeloma	0	0	0	0	0	0	0	0	3	5	1	1	1	1	4	4
Anaemia	9	30	5	18	5	15	4	8	5	8	11	12	7	6	6	5
Hemoglobinopathy	5	17	5	18	6	18	2	4	4	6	7	7	4	4	8	7
Other Malignancies	1	3	0	0	2	6	5	10	7	11	2	2	1	1	4	4
Primary Immune Deficiencies	0	0	0	0	0	0	1	2	2	3	3	3	2	2	1	1
Inherited Disorders of Metabolism	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0
Platelet and Other Inherited Disorders	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0
Histiocytic Disorders	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	30	100	28	100	33	100	49	100	62	100	94	100	108	100	114	100

Table 1.2.4: Distribution of Patients by Primary Diagnosis, 1987-2010 (cont'.)

Year	2003		2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Acute leukemias	44	34	46	33	58	39	42	31	57	38	68	38	83	39	107	41	761	38
Chronic Myelogenous Leukemia (CML)	18	14	22	16	13	9	9	7	5	3	3	2	8	4	15	6	186	9
Other Leukemias	0	0	0	0	0	0	0	0	3	2	2	1	1	0	1	0	7	0
Lymphomas	28	22	36	26	38	26	35	26	36	24	50	28	70	33	64	24	432	22
Myelodysplastic Syndrome (MDS)	2	2	3	2	4	3	2	1	1	1	4	2	2	1	4	2	30	2
Combined Myelodysplastic/Myeloproliferative Syndrome (MD/MPS)	1	1	2	1	0	0	1	1	0	0	1	1	1	0	0	0	11	1
Myeloproliferative Syndrome	0	0	1	1	1	1	2	1	0	0	1	1	2	1	1	0	8	0
Plasma Cell Disorder including Multiple Myeloma	5	4	3	2	7	5	10	7	16	11	18	10	17	8	24	9	109	5
Anaemia	7	5	12	9	7	5	16	12	13	9	20	11	15	7	13	5	183	9
Hemoglobinopathy	17	13	9	6	17	11	12	9	13	9	12	7	12	6	13	5	172	9
Other Malignancies	3	2	2	1	2	1	6	4	5	3	1	1	2	1	17	6	66	3
Primary Immune Deficiencies	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	13	1
Inherited Disorders of Metabolism	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0
Platelet and Other Inherited Disorders	1	1	3	2	0	0	0	0	0	0	0	0	0	0	1	0	7	0
Histiocytic Disorders	1	1	1	1	1	1	1	1	0	0	1	1	0	0	0	0	5	0
Total	128	100	140	100	148	100	136	100	149	100	181	100	213	100	262	100	1993	100

	Diagnosis	Categorisation
1	Acute leukaemia, unclassified	Acute leukaemia
2	Acute undifferentiated leukaemia	
3	Acute Lymphocytic Leukaemia (ALL)	
4	Acute Myelogenous Leukaemia (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 Dyserythropoietic 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	Germ Cell Tumour (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 Neuroectodermal Tumour (NET)	
28	Juvenile Myelomonocytic leukaemia	Myelodysplasia
29	Myelodysplastic 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

In 2010, there were 122 matched sibling donor transplants accounting for 90% of all allogeneic HSCT performed. Unrelated donor and mismatched related donor formed 8% and 2% respectively of the remaining transplants. The paediatric centres continued to be the ones performing more allogeneic compared with autologous transplants. The most common stem cell source was Peripheral Blood which accounted for 85% of all HSCT. This is the preferred stem cell source particularly in autologous transplants. Use of cord blood remained low at 3% only.

Table 1.3.1: Distribution of Patients by Transplantation Type, 1987-2010

Year	1987		1988		1989		1990		1991		1992		1993		1994	
Type of transplant	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Allogeneic + Syngeneic	8	100	6	100	21	95	5	100	12	100	20	95	18	95	24	96
Autologous	0	0	0	0	1	5	0	0	0	0	1	5	1	5	1	4
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	
Type of transplant	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Allogeneic + Syngeneic	29	97	26	93	27	82	32	65	44	71	56	60	75	69	75	66
Autologous	1	3	2	7	6	18	17	35	18	29	38	40	33	31	39	34
TOTAL	30	100	28	100	33	100	49	100	62	100	94	100	108	100	114	100

Year	2003		2004		2005		2006		2007		2008		2009		2010		Total	
Type of transplant	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Allogeneic + Syngeneic	83	65	90	64	91	61	87	64	75	50	115	64	110	52	136	52	1265	63
Autologous	45	35	50	36	57	39	49	36	74	50	66	36	103	48	126	48	728	37
TOTAL	128	100	140	100	148	100	136	100	149	100	181	100	213	100	262	100	1993	100

Table 1.3.2: Type of Transplant by Centre, 1987-2010

Type of transplant	Allogeneic + Syngeneic		Autologous		TOTAL	
Centre	No.	%	No.	%	No.	%
HKLA	112	9	111	15	223	11
HKLP	291	23	29	4	320	16
HUKM	86	7	78	11	164	8
SJMCA	91	7	157	22	248	12
UMMCA	141	11	73	10	214	11
UMMCP	333	26	49	7	382	19
GMC	5	0	13	2	18	1
LWE	9	1	1	0	10	1
SJMCP	45	4	17	2	62	3
HUSM	0	0	19	3	19	1
APSH	3	0	3	0	6	0
HA	146	12	153	21	299	15
HPP	1	0	25	3	26	1
Other	2	0	0	0	2	0
TOTAL	1265	100	728	100	1993	100

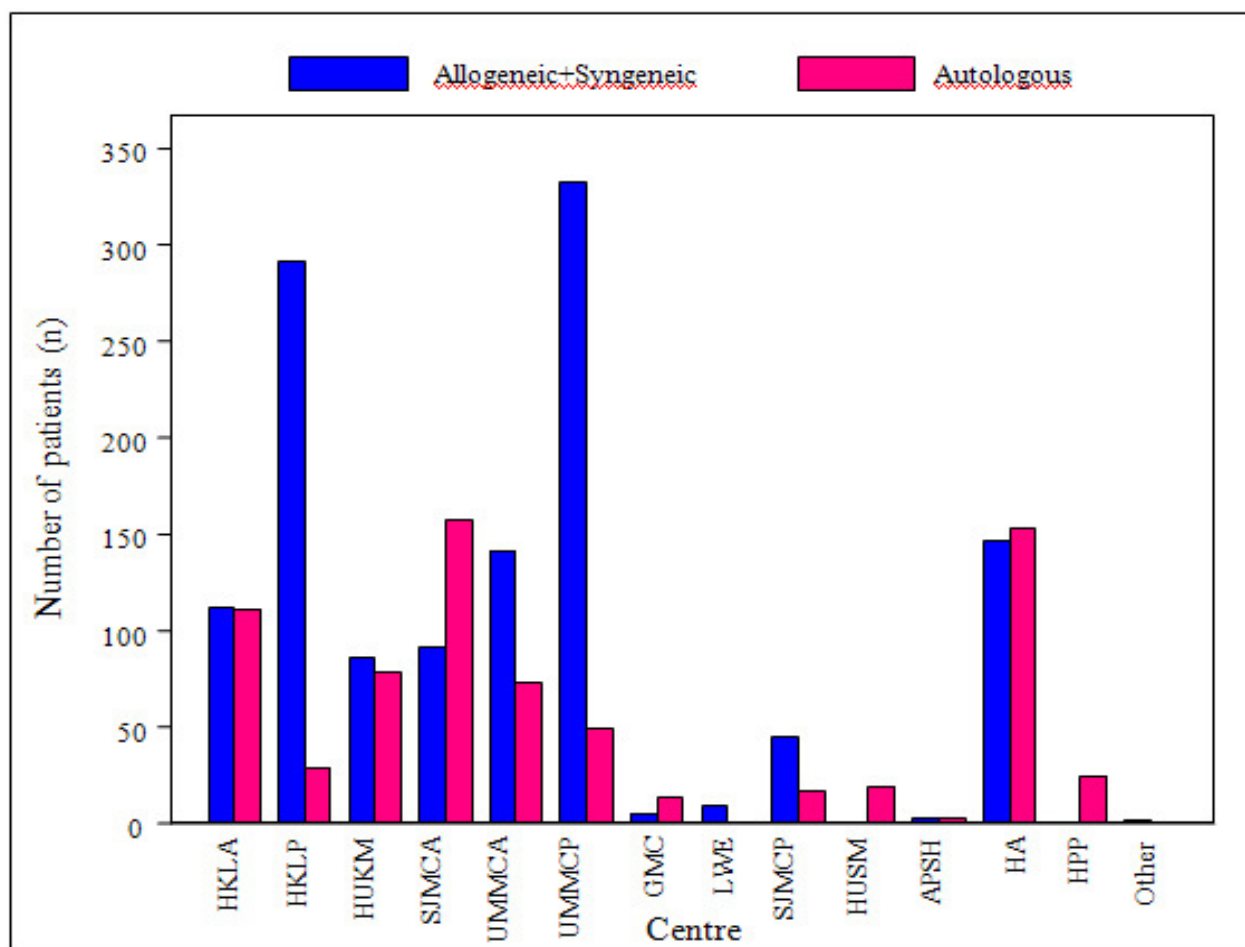


Figure 1.3.2: Type of Transplant by Centre, 1987-2010

Table 1.3.3: Source of Stem Cells, 1987-2010

Year	1987		1988		1989		1990		1991		1992		1993		1994	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Transplant source	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Marrow	8	100	6	100	22	100	5	100	12	100	21	100	19	100	25	100
PBSC/Marrow + PBSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cord blood/Marrow + cord	0	0	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	25	100

Year	1995		1996		1997		1998		1999		2000		2001		2002	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Transplant source	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Marrow	30	100	28	100	24	73	25	51	37	60	31	33	30	28	31	27
PBSC/Marrow + PBSC	0	0	0	0	7	21	23	47	23	37	57	61	74	68	79	69
Cord blood/Marrow + cord	0	0	0	0	2	6	1	2	2	3	6	6	4	4	4	4
TOTAL	30	100	28	100	33	100	49	100	62	100	94	100	108	100	114	100

Year	2003		2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Transplant source	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Marrow	44	34	30	21	25	17	17	13	23	15	20	11	23	11	31	12	567	29
PBSC / Marrow + PBSC	79	62	101	72	116	78	109	80	119	80	152	84	181	85	222	85	1342	67
Cord blood/Marrow + cord	5	4	9	7	7	5	10	7	7	5	9	5	9	4	9	3	84	4
TOTAL	128	100	140	100	148	100	136	100	149	100	181	100	213	100	262	100	1993	100

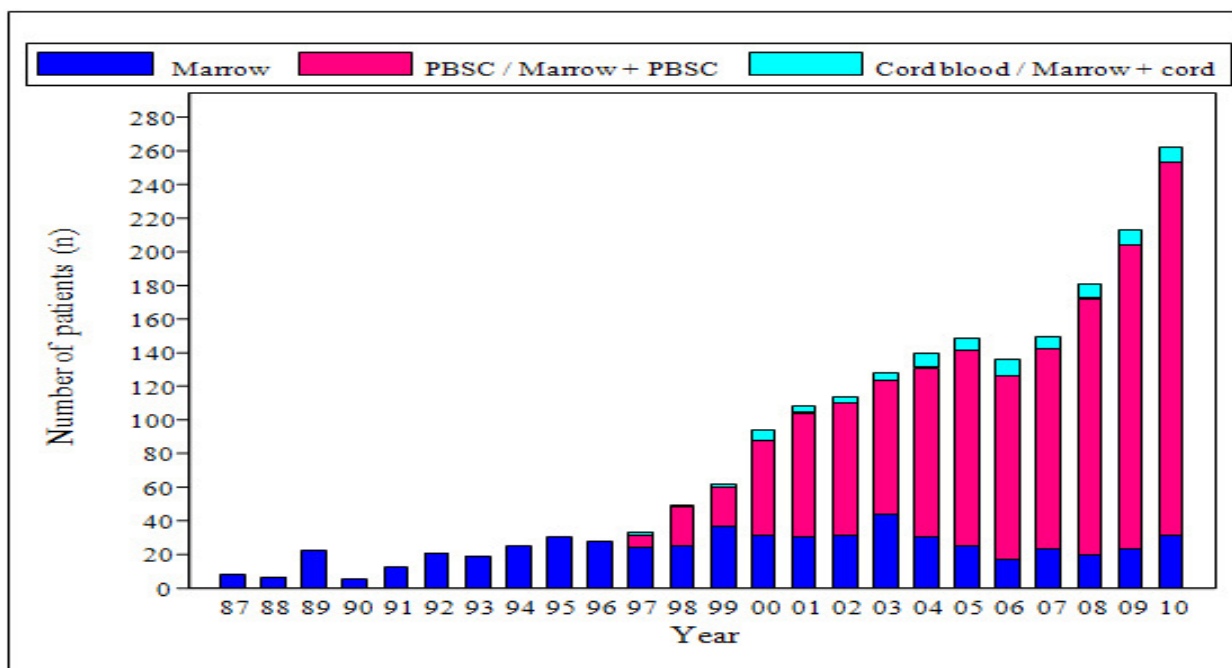


Figure 1.3.3: Source of Stem Cells, 1987-2010

Table 1.3.4: Distribution of Patients by HLA Match, 1987-2010

Year		1987		1988		1989		1990		1991	
Donor Relationship	HLA Match	No.	%	No.	%	No.	%	No.	%	No.	%
Twin (Syngeneic)	Identical	0	0	0	0	0	0	0	0	0	0
Sibling	Identical	8	100	6	100	21	100	5	100	11	92
Related	Identical	0	0	0	0	0	0	0	0	1	8
Related	1 HLA antigen mismatch	0	0	0	0	0	0	0	0	0	0
Related	=> 2 HLA antigen mismatch	0	0	0	0	0	0	0	0	0	0
Unrelated Donor	Identical	0	0	0	0	0	0	0	0	0	0
Unrelated Donor	1 HLA antigen mismatch	0	0	0	0	0	0	0	0	0	0
Unrelated Donor	=> 2 HLA antigen mismatch	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	
Donor Relationship	HLA Match	No.	%	No.	%	No.	%	No.	%	No.	%
Twin (Syngeneic)	Identical	0	0	1	6	0	0	0	0	1	4
Sibling	Identical	20	100	17	94	22	92	29	100	25	96
Related	Identical	0	0	0	0	1	4	0	0	0	0
Related	1 HLA antigen mismatch	0	0	0	0	1	4	0	0	0	0
Related	=> 2 HLA antigen mismatch	0	0	0	0	0	0	0	0	0	0
Unrelated Donor	Identical	0	0	0	0	0	0	0	0	0	0
Unrelated Donor	1 HLA antigen mismatch	0	0	0	0	0	0	0	0	0	0
Unrelated Donor	=> 2 HLA antigen mismatch	0	0	0	0	0	0	0	0	0	0
TOTAL		20	100	18	100	24	100	29	100	26	100

Table 1.3.4: Distribution of Patients by HLA Match, 1987-2010 (cont'.)

Year		1997		1998		1999		2000		2001	
Donor Relationship	HLA Match	No.	%	No.	%	No.	%	No.	%	No.	%
Twin (Syngeneic)	Identical	0	0	0	0	0	0	0	0	4	5
Sibling	Identical	25	93	31	97	40	91	52	93	65	87
Related	Identical	0	0	0	0	0	0	0	0	0	0
Related	1 HLA antigen mismatch	1	4	0	0	3	7	0	0	3	4
Related	=> 2 HLA antigen mismatch	0	0	1	3	1	2	3	5	0	0
Unrelated Donor	Identical	0	0	0	0	0	0	0	0	0	0
Unrelated Donor	1 HLA antigen mismatch	1	4	0	0	0	0	0	0	1	1
Unrelated Donor	=> 2 HLA antigen mismatch	0	0	0	0	0	0	1	2	2	3
TOTAL		27	100	32	100	44	100	56	100	75	100

Year		2002		2003		2004		2005		2006	
Donor Relationship	HLA Match	No.	%	No.	%	No.	%	No.	%	No.	%
Twin (Syngeneic)	Identical	0	0	0	0	0	0	0	0	0	0
Sibling	Identical	70	93	78	94	78	87	80	88	74	85
Related	Identical	0	0	0	0	0	0	0	0	0	0
Related	1 HLA antigen mismatch	1	1	2	2	3	3	3	3	2	2
Related	=> 2 HLA antigen mismatch	0	0	0	0	0	0	0	0	0	0
Unrelated Donor	Identical	0	0	0	0	5	6	6	7	7	8
Unrelated Donor	1 HLA antigen mismatch	2	3	1	1	0	0	1	1	2	2
Unrelated Donor	=> 2 HLA antigen mismatch	2	3	2	2	4	4	1	1	2	2
TOTAL		75	100	83	100	90	100	91	100	87	100

Year		2007		2008		2009		2010		Total	
Donor Relationship	HLA Match	No.	%	No.	%	No.	%	No.	%	No.	%
Twin (Syngeneic)	Identical	2	3	1	1	2	2	0	0	11	1
Sibling	Identical	61	81	96	83	95	86	122	90	1131	89
Related	Identical	0	0	0	0	0	0	0	0	2	0
Related	1 HLA antigen mismatch	2	3	5	4	1	1	2	1	29	2
Related	=> 2 HLA antigen mismatch	0	0	0	0	1	1	1	1	7	1
Unrelated Donor	Identical	5	7	5	4	7	6	6	4	41	3
Unrelated Donor	1 HLA antigen mismatch	2	3	2	2	1	1	0	0	13	1
Unrelated Donor	=> 2 HLA antigen mismatch	3	4	6	5	3	3	5	4	31	2
TOTAL		75	100	115	100	110	100	136	100	1265	100

Table 1.3.5: Distribution of Patients by Allogeneic Donor Relationship, 1987-2010

Year	1987		1988		1989		1990		1991	
Allogeneic Donor Relationship	No.	%	No.	%	No.	%	No.	%	No.	%
Twin (Syngeneic)	0	0	0	0	0	0	0	0	0	0
Sibling	8	100	6	100	21	100	5	100	11	92
Related	0	0	0	0	0	0	0	0	1	8
Unrelated	0	0	0	0	0	0	0	0	0	0
• Marrow	0	0	0	0	0	0	0	0	0	0
• 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	21	100	5	100	12	100

Year	1992		1993		1994		1995		1996	
Allogeneic Donor Relationship	No.	%	No.	%	No.	%	No.	%	No.	%
Twin (Syngeneic)	0	0	1	6	0	0	0	0	1	4
Sibling	20	100	17	94	22	92	29	100	25	96
Related	0	0	0	0	2	8	0	0	0	0
Unrelated	0	0	0	0	0	0	0	0	0	0
• Marrow	0	0	0	0	0	0	0	0	0	0
• 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	20	100	18	100	24	100	29	100	26	100

Year	1997		1998		1999		2000		2001	
Allogeneic Donor Relationship	No.	%	No.	%	No.	%	No.	%	No.	%
Twin (Syngeneic)	0	0	0	0	0	0	0	0	4	5
Sibling	25	93	31	97	40	91	52	93	65	87
Related	1	4	1	3	4	9	3	5	3	4
Unrelated	1	4	0	0	0	0	1	2	3	4
• Marrow	0	0	0	0	0	0	0	0	0	0
• PBSC / Marrow + PBSC	0	0	0	0	0	0	0	0	0	0
• Cord blood / Marrow + cord	1	100	0	0	0	0	1	100	3	100
TOTAL	27	100	32	100	44	100	56	100	75	100

Table 1.3.5: Distribution of Patients by Allogeneic Donor Relationship, 1987-2010 (cont'.)

Year	2002		2003		2004		2005		2006	
Allogeneic Donor Relationship	No.	%	No.	%	No.	%	No.	%	No.	%
Twin (Syngeneic)	0	0	0	0	0	0	0	0	0	0
Sibling	70	93	78	94	78	87	80	88	74	85
Related	1	1	2	2	3	3	3	3	2	2
Unrelated	4	5	3	4	9	10	8	9	11	13
• Marrow	0	0	0	0	1	11	2	25	2	18
• PBSC / Marrow + PBSC	0	0	0	0	2	22	1	13	1	9
• Cord blood / Marrow + cord	4	100	3	100	6	67	5	63	8	73
TOTAL	75	100	83	100	90	100	91	100	87	100

Year	2007		2008		2009		2010		Total	
Allogeneic Donor Relationship	No.	%	No.	%	No.	%	No.	%	No.	%
Twin (Syngeneic)	2	3	1	1	2	2	0	0	11	1
Sibling	61	81	96	83	95	86	122	90	1131	89
Related	2	3	5	4	2	2	3	2	38	3
Unrelated	10	13	13	11	11	10	11	8	85	7
• Marrow	1	10	0	0	0	0	2	18	8	9
• PBSC / Marrow + PBSC	2	20	5	38	2	18	4	36	17	20
• Cord blood / Marrow + cord	7	70	8	62	9	82	5	45	60	71
TOTAL	75	100	115	100	110	100	136	100	1265	100

*excluding autologous, including syngeneic

1.4 TRANSPLANT OUTCOMES

The commonest causes of death for 2010 transplants were underlying disease, sepsis and graft-versus-host disease. A total of 58 deaths were reported out of the 262 transplants performed (mortality 22% thus far). Up to the year 2011, transplant centres have not been required to report annual status for each transplanted patient and so the actual survival/death outcome for patients may not be an accurate reflection on outcome. As mentioned in previous annual reports, transplants done in 1999-2010 fared worse compared with previous years probably because more complicated and high risk transplants were performed involving mismatched unrelated stem cell sources and the average recipient age had increased as well. Overall survival of younger patients was better compared with patients aged >40 years. The only exception where poorer outcome occurred in younger recipients was for the disease Acute Lymphoblastic Leukaemia (ALL). This is due to the fact that paediatric patients are seldom offered HSCT in first remission in ALL whereas adult patients are.

Table 1.4.1: Distribution of Patients by Cause of Death, 1987-2009

Year	1987		1988		1989		1990		1991	
	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
Pulmonary	0	0	0	0	0	0	0	0	0	0
Cardiac	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	
	No.	%	No.	%	No.	%	No.	%	No.	%
Sepsis	1	50	2	22	1	20	4	24	6	55
GVHD	0	0	0	0	0	0	4	24	0	0
Underlying disease	0	0	6	67	3	60	3	18	3	27
Haemorrhage	0	0	1	11	0	0	2	12	1	9
VOD	0	0	0	0	0	0	1	6	1	9
Organ Failure	1	50	0	0	1	20	2	12	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
Pulmonary	0	0	0	0	0	0	0	0	0	0
Cardiac	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	2	100	9	100	5	100	17	100	11	100

Table 1.4.1: Distribution of Patients by Cause of Death, 1987-2009 (cont'.)

Year	1997		1998		1999		2000		2001	
	No.	%	No.	%	No.	%	No.	%	No.	%
Sepsis	5	33	0	0	5	31	2	6	4	9
GVHD	0	0	2	12	1	6	2	6	4	9
Underlying disease	9	60	12	71	8	50	22	71	33	70
Haemorrhage	0	0	1	6	0	0	3	10	2	4
VOD	0	0	0	0	0	0	1	3	2	4
Organ Failure	1	7	0	0	1	6	0	0	0	0
Interstitial pneumonitis	0	0	1	6	0	0	1	3	2	4
Secondary malignancy	0	0	0	0	0	0	0	0	0	0
Pulmonary	0	0	0	0	0	0	0	0	0	0
Cardiac	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	1	6	1	6	0	0	0	0
TOTAL	15	100	17	100	16	100	31	100	47	100

Year	2002		2003		2004		2005		2006	
	No.	%	No.	%	No.	%	No.	%	No.	%
Sepsis	5	14	12	21	10	19	10	16	7	17
GVHD	3	9	5	9	10	19	7	11	1	2
Underlying disease	23	66	34	61	29	56	38	61	30	71
Haemorrhage	0	0	0	0	1	2	2	3	1	2
VOD	0	0	0	0	0	0	0	0	3	7
Organ Failure	3	9	2	4	0	0	2	3	0	0
Interstitial pneumonitis	0	0	1	2	0	0	2	3	0	0
Secondary malignancy	0	0	0	0	0	0	0	0	0	0
Pulmonary	0	0	0	0	0	0	0	0	0	0
Cardiac	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	0	0	0
Unknown	1	3	2	4	2	4	1	2	0	0
TOTAL	35	100	56	100	52	100	62	100	42	100

Year	2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Sepsis	7	14	13	18	12	24	10	17	118	18
GVHD	3	6	7	10	1	2	4	7	55	8
Underlying disease	32	64	40	56	33	66	30	52	399	60
Haemorrhage	1	2	4	6	1	2	0	0	21	3
VOD	0	0	3	4	0	0	3	5	14	2
Organ Failure	0	0	0	0	1	2	1	2	15	2
Interstitial pneumonitis	0	0	2	3	1	2	0	0	10	2
Secondary malignancy	0	0	0	0	0	0	0	0	1	0
Pulmonary	0	0	0	0	0	0	0	0	0	0
Cardiac	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	1	2	0	0	1	0
Unknown	7	14	2	3	0	0	10	17	27	4
TOTAL	50	100	71	100	50	100	58	100	661	100

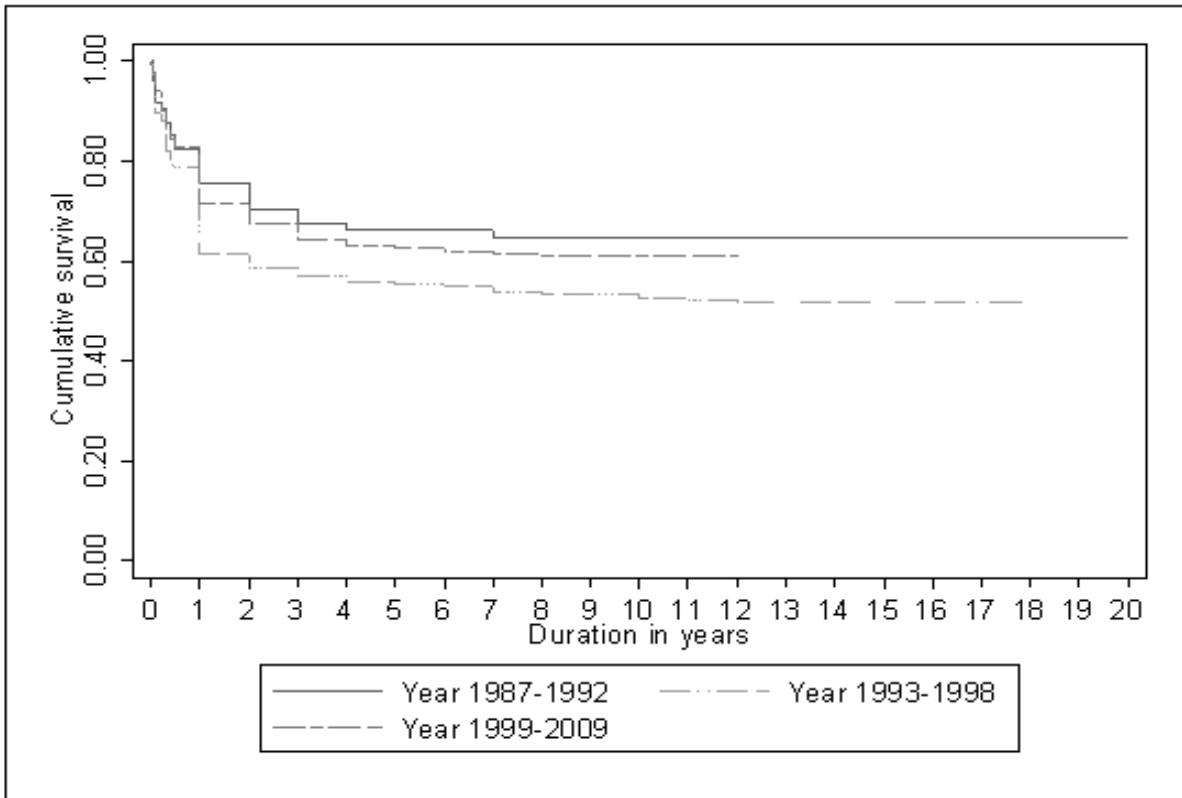


Figure 1.4.1: Patient Survival by Year of Transplant, 1987-2010

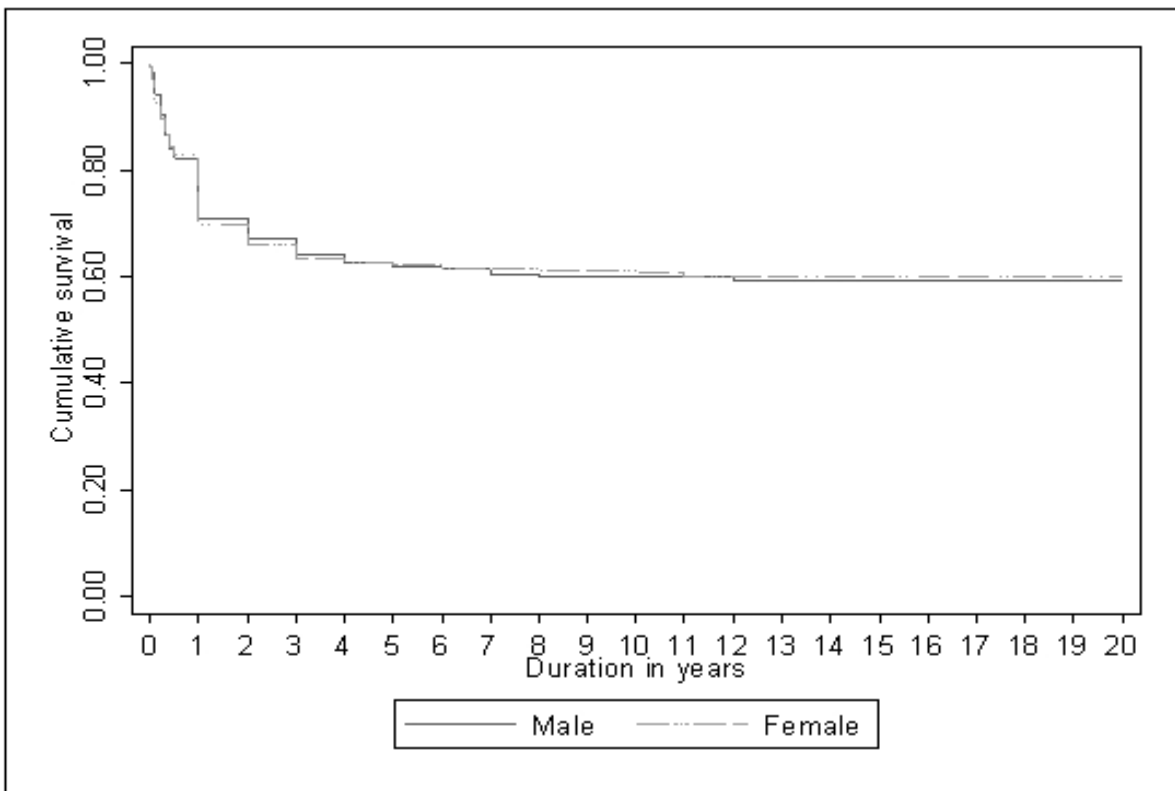


Figure 1.4.2: Patient Survival by Gender, 1987-2010

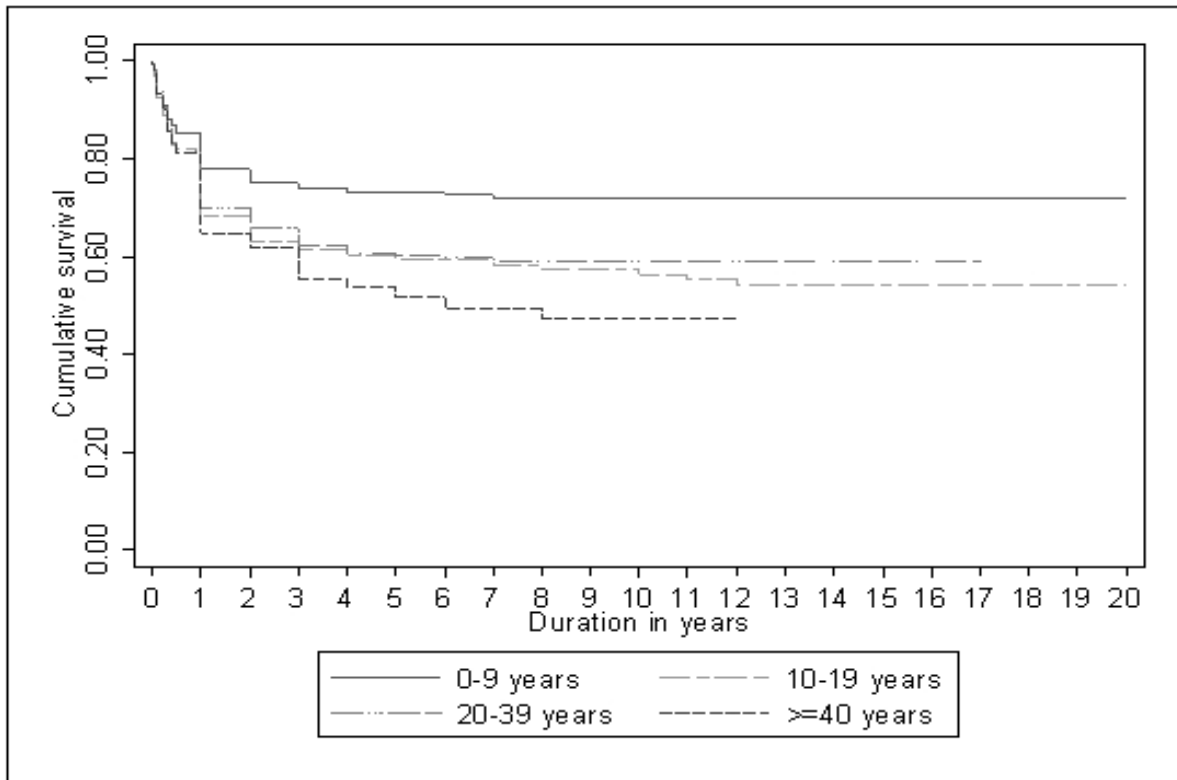


Figure 1.4.3: Patient Survival by Age Group, 1987-2010

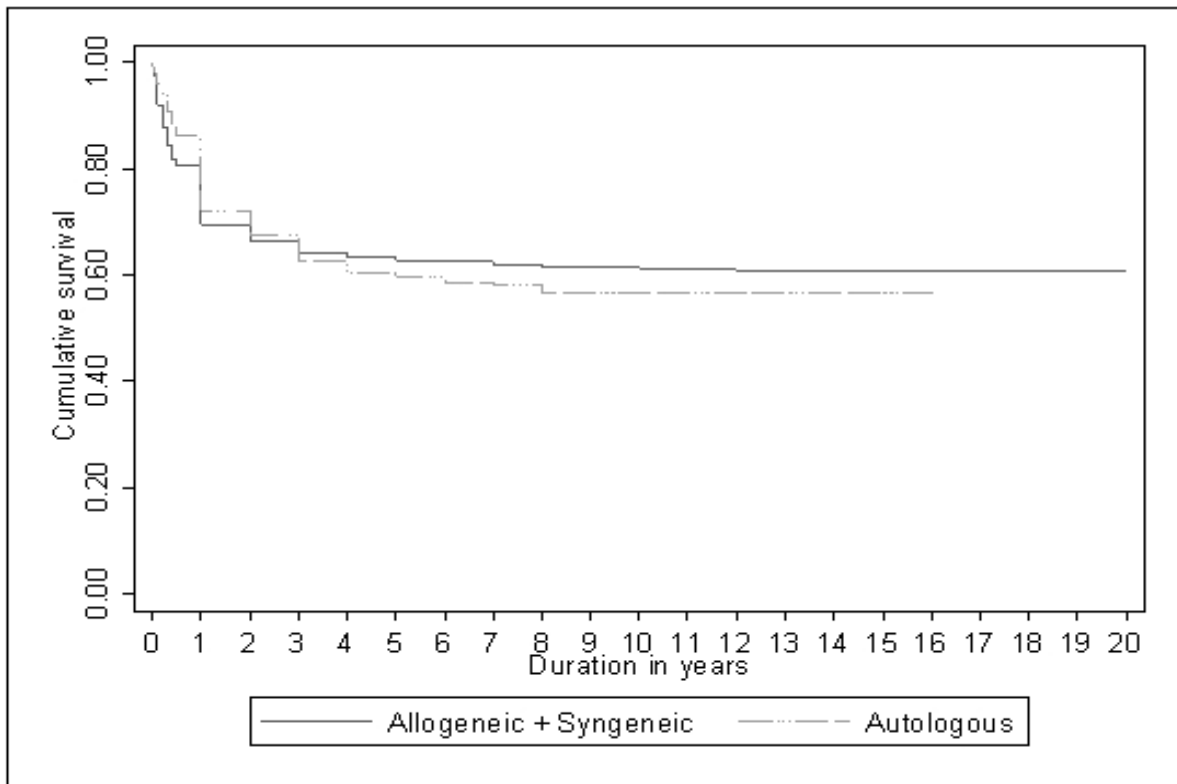


Figure 1.4.4: Patient Survival by Type of Transplant, 1987-2010

1.5 DISEASE-FREE SURVIVAL

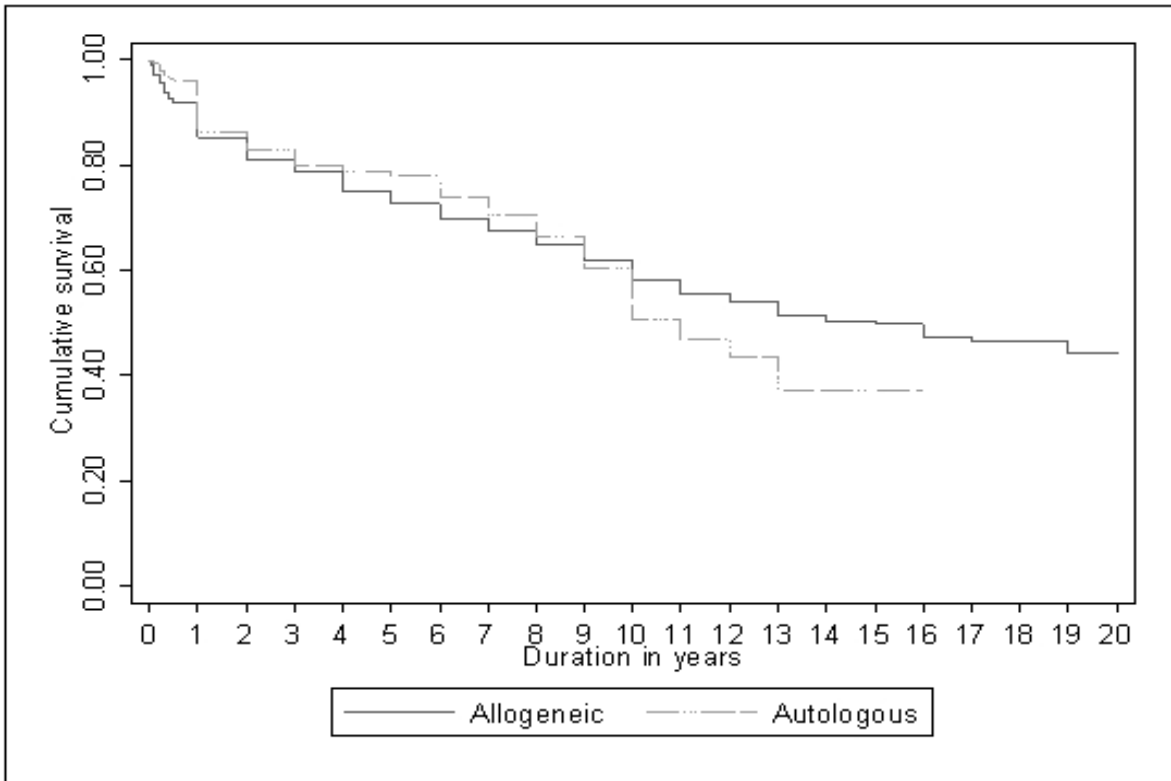


Figure 1.5.1: Disease-free Survival for Acute Myeloid Leukaemia, 1987-2010 (Allogeneic vs. Autologous)

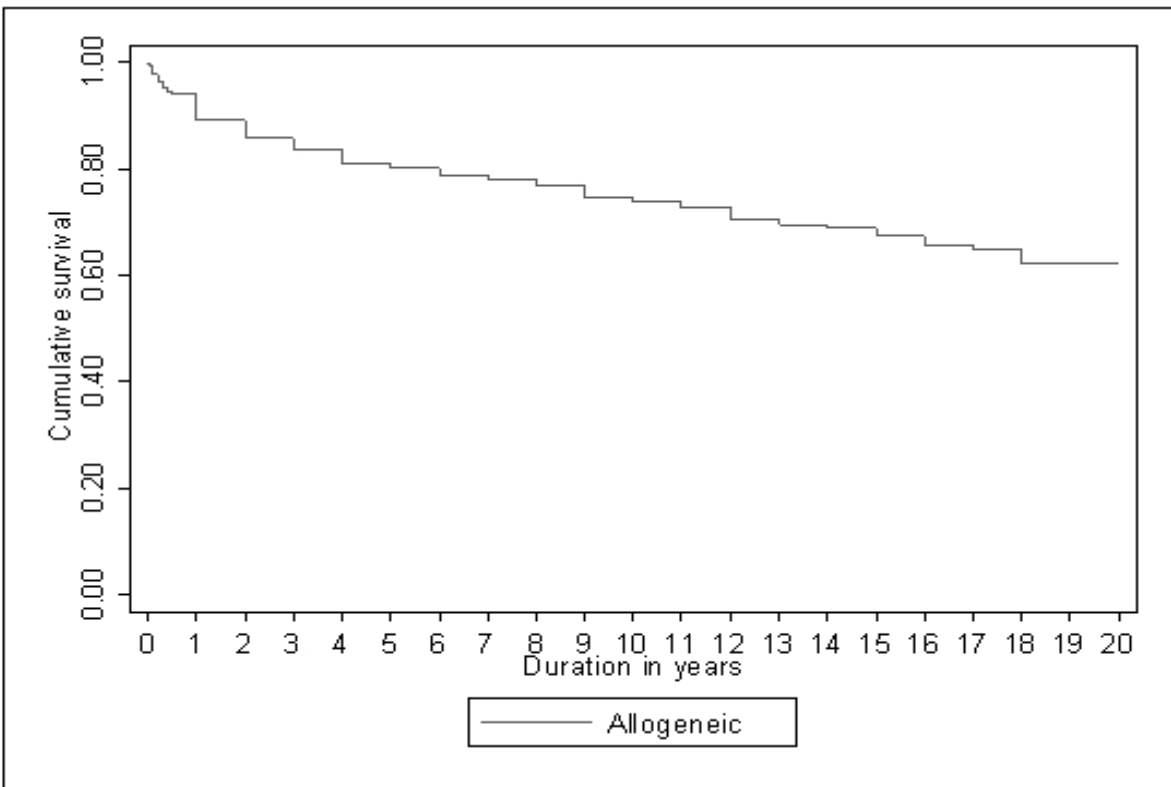


Figure 1.5.2: Disease-free Survival for Acute Lymphoblastic Leukaemia, 1987-2010 (Allogeneic)

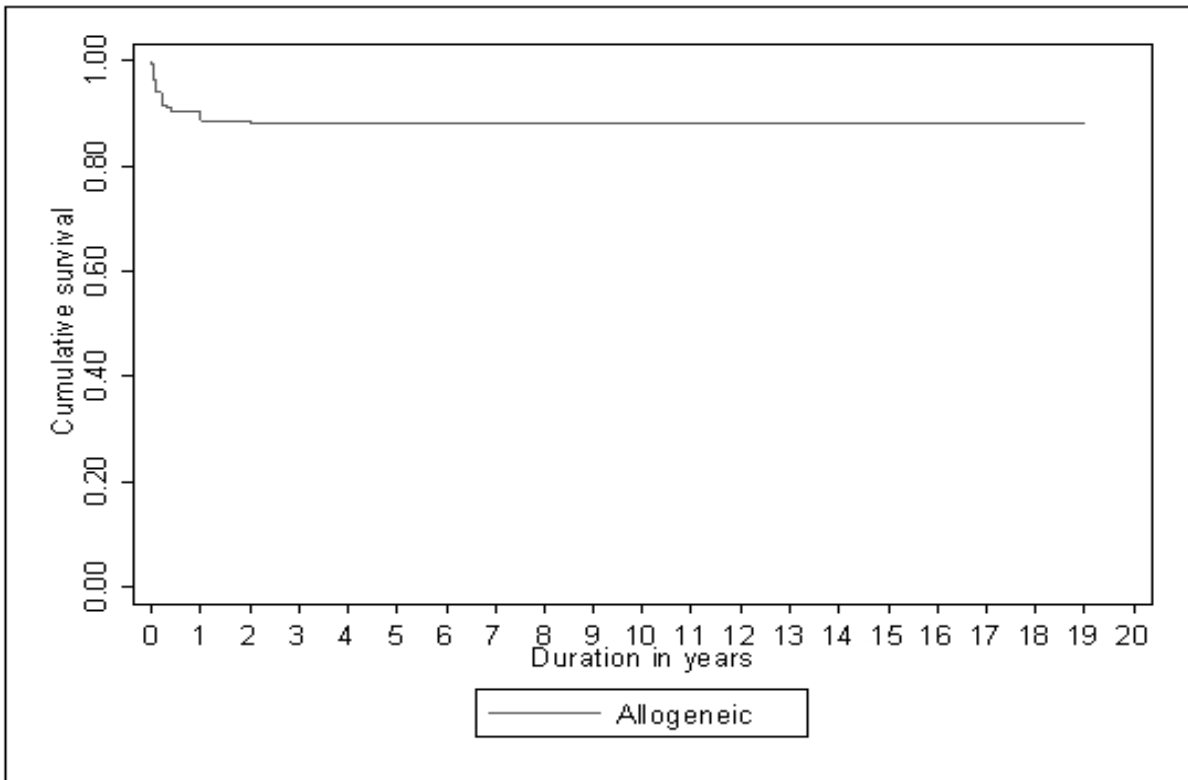


Figure 1.5.3: Disease-free Survival for Thalassemia, 1987-2010 (Allogeneic)

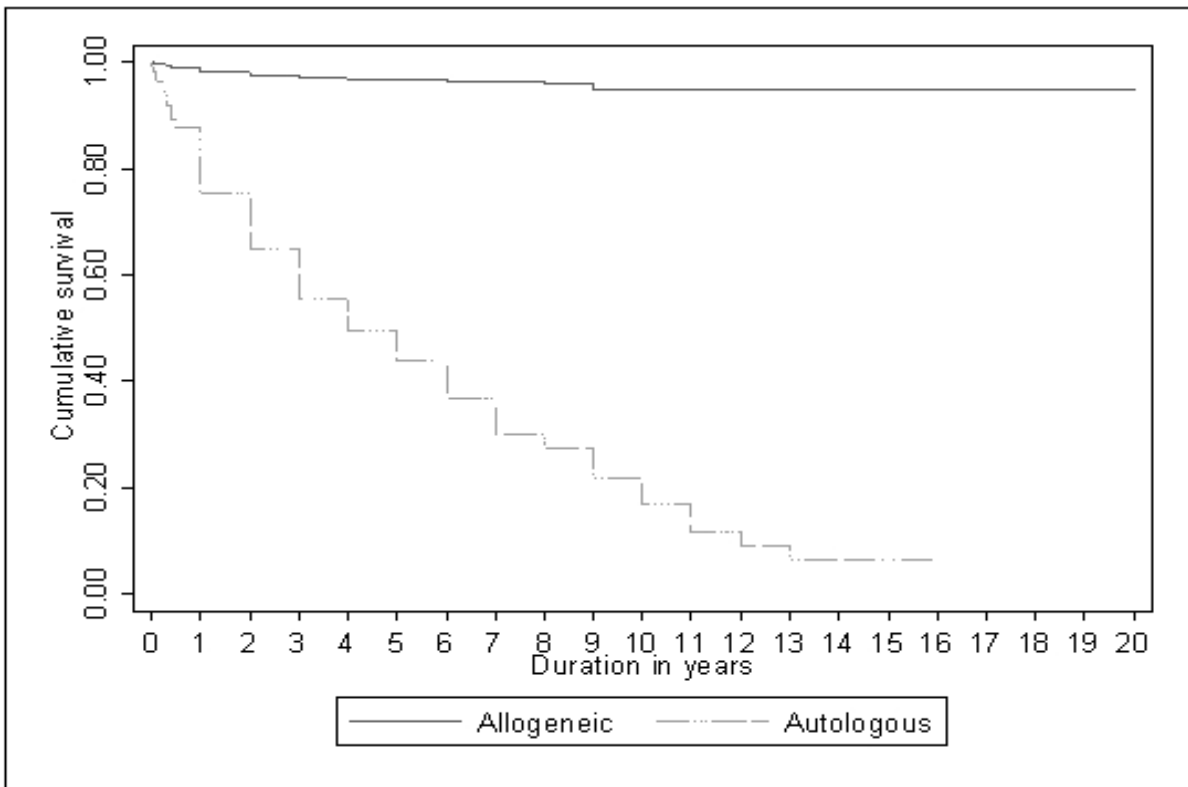


Figure 1.5.4: Disease-free Survival for Lymphoma, 1987-2010 (Allogeneic vs. Autologous)

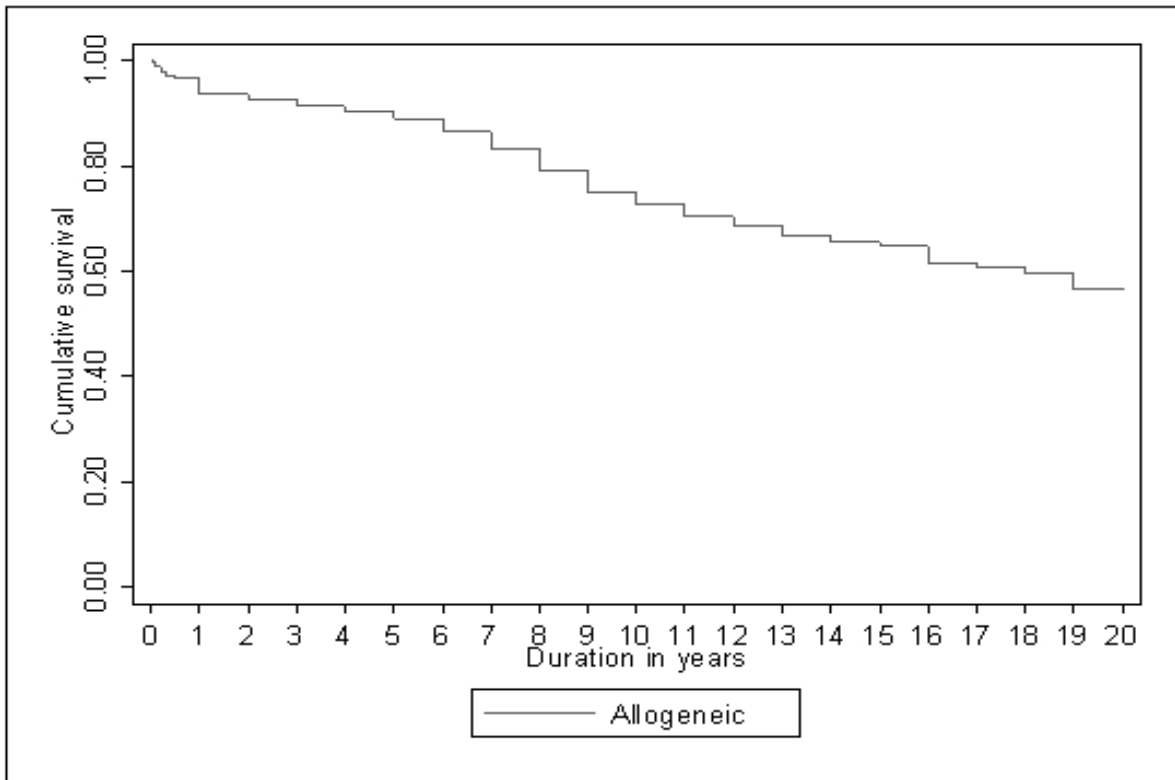


Figure 1.5.5: Disease-free Survival for Chronic Myeloid Leukaemia, 1987-2010 (Allogeneic)

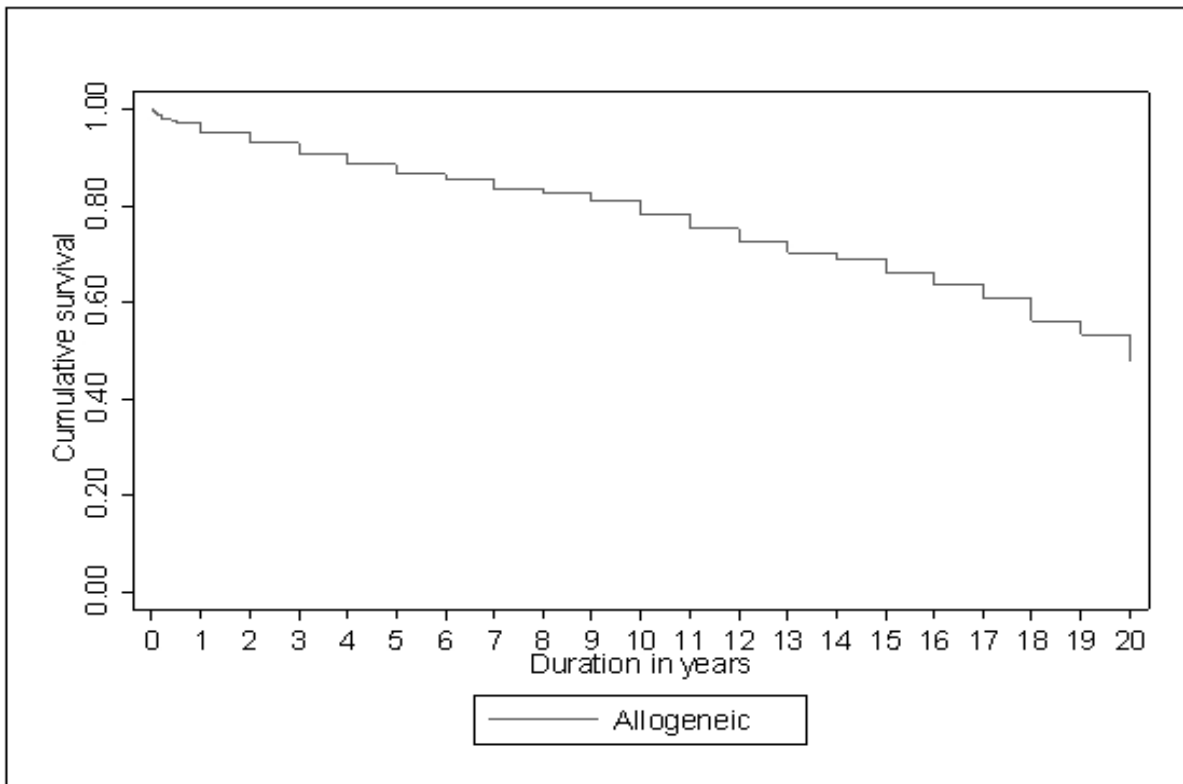
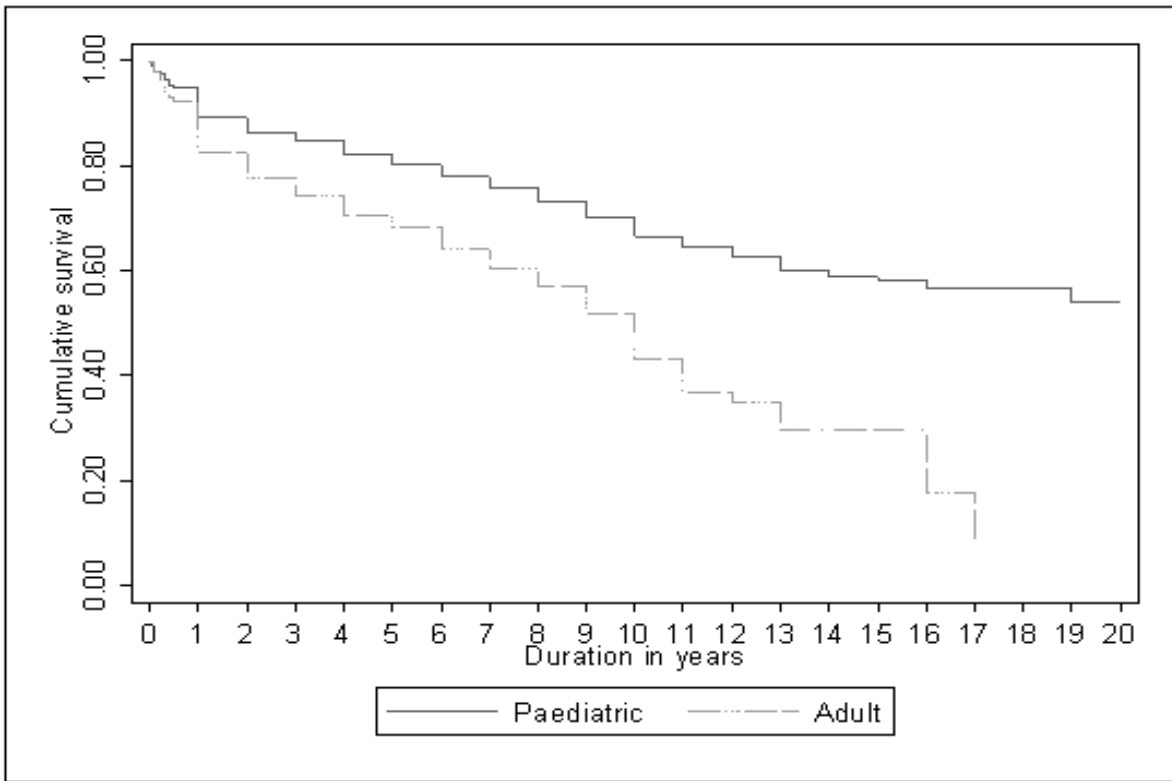
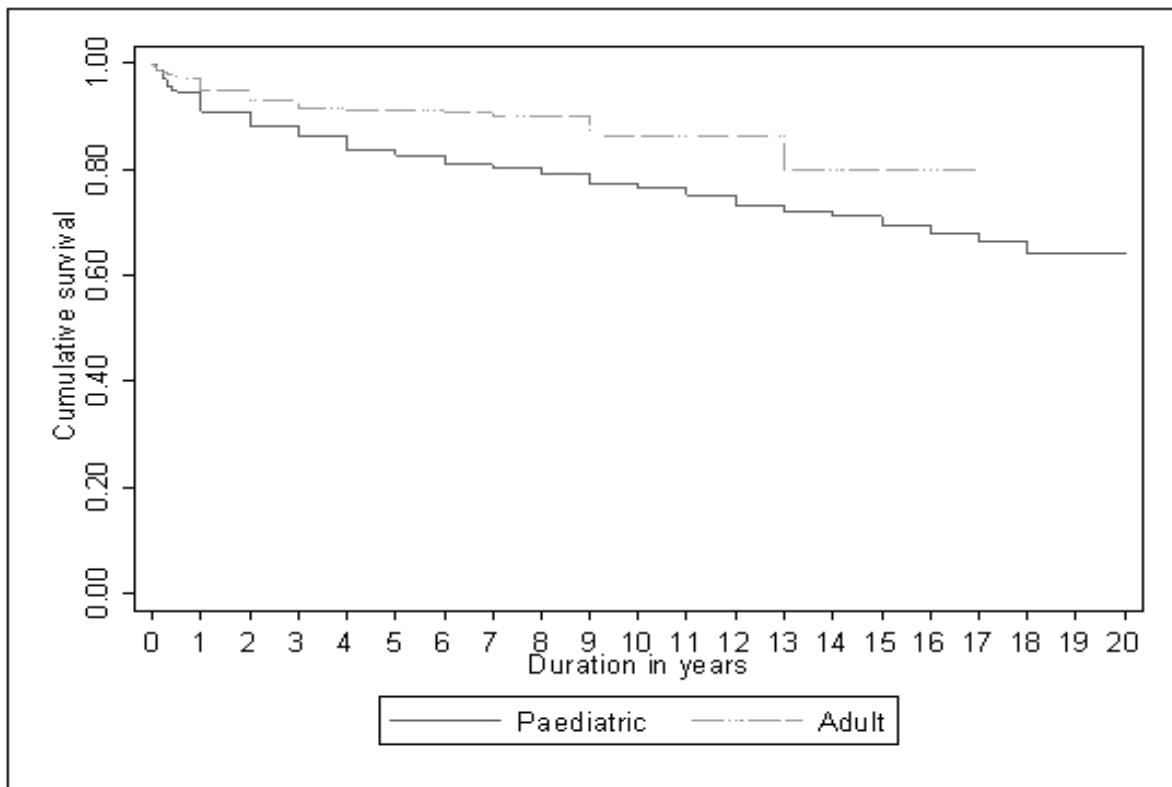


Figure 1.5.6: Disease-free Survival for Hypoplastic Anaemia, 1987-2010 (Allogeneic)



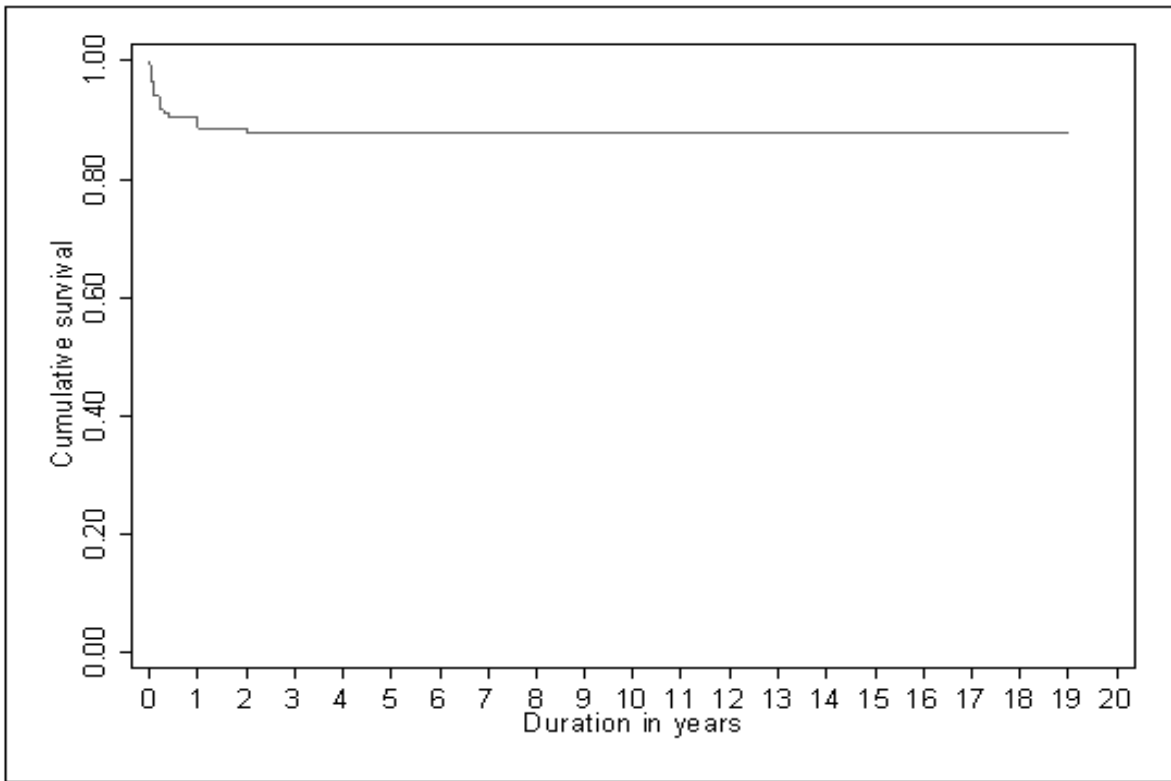
*Paediatric is defined as age ≤18 years and adult age >18 years

Figure 1.5.7: Disease-free Survival by Age Group for Acute Myeloid Leukaemia, 1987-2010



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

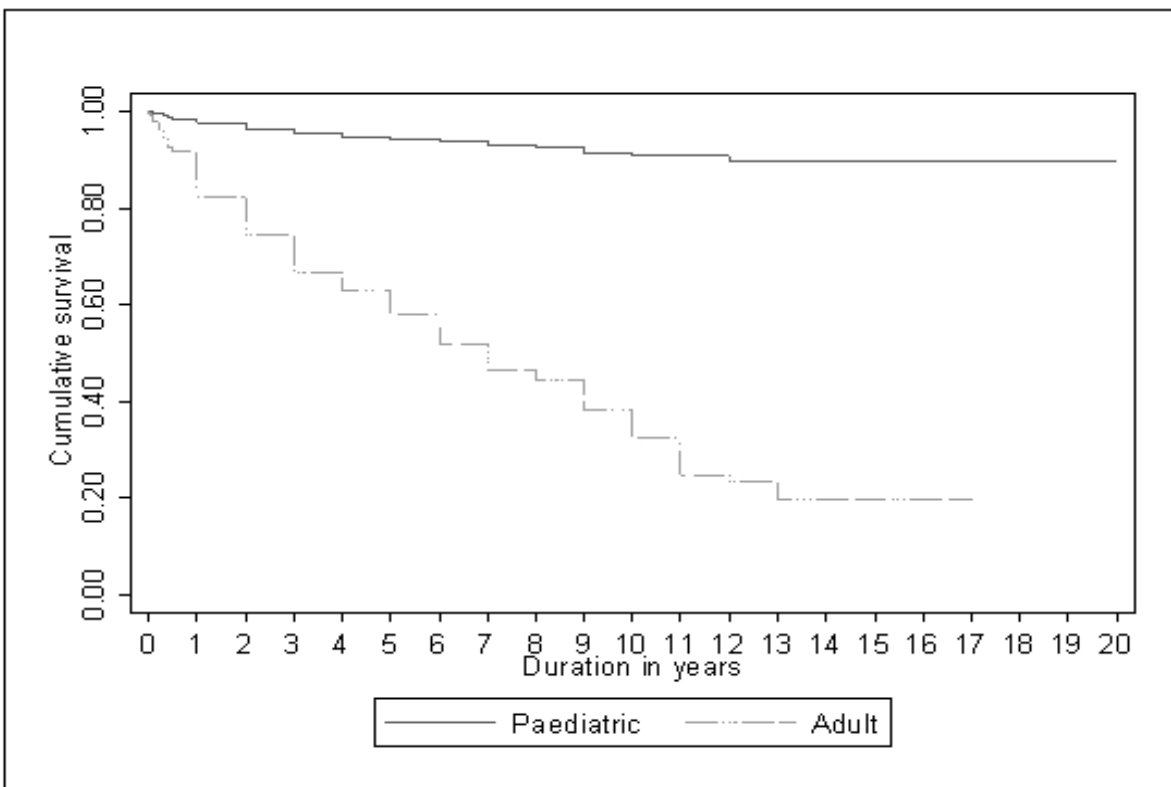
Figure 1.5.8: Disease-free Survival by Age Group for Acute Lymphoblastic Leukaemia, 1987-2010



*No adult cases reported for Thalassaemia

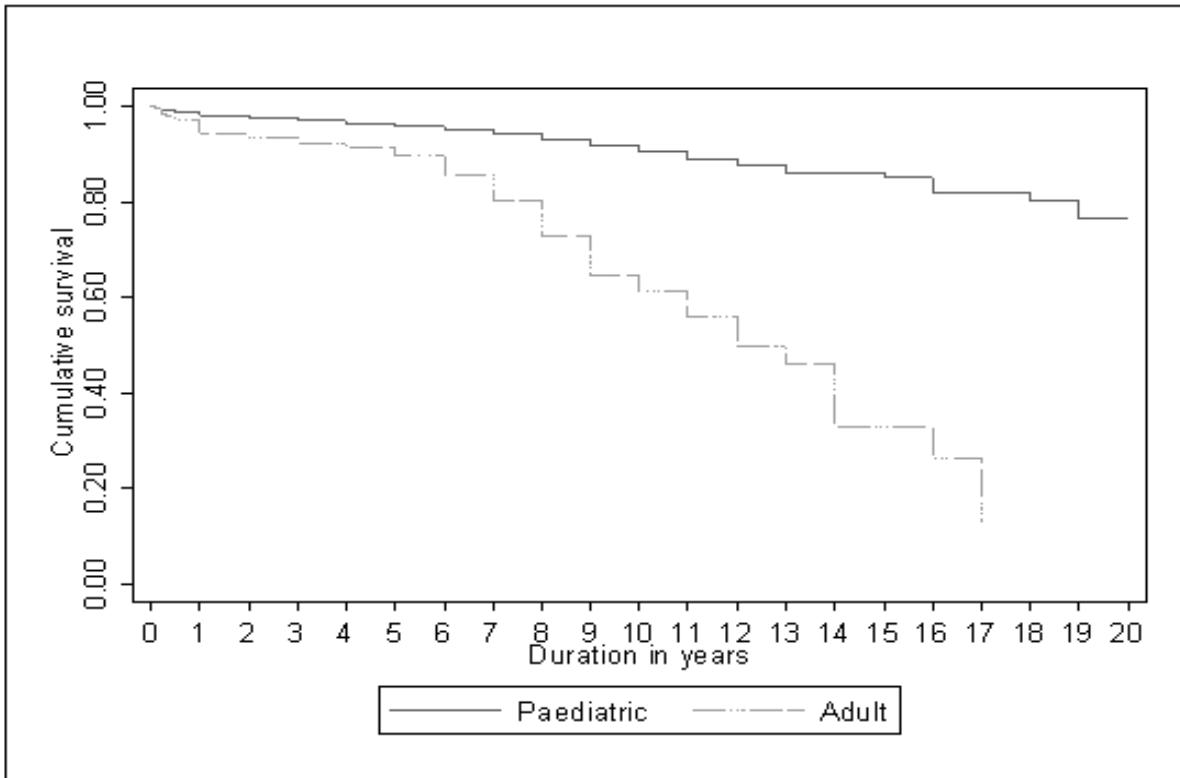
*Paediatric is defined as age ≤ 18 years and adult age >18 years

Figure 1.5.9: Disease-free Survival by Age Group for Thalassaemia, 1987-2010



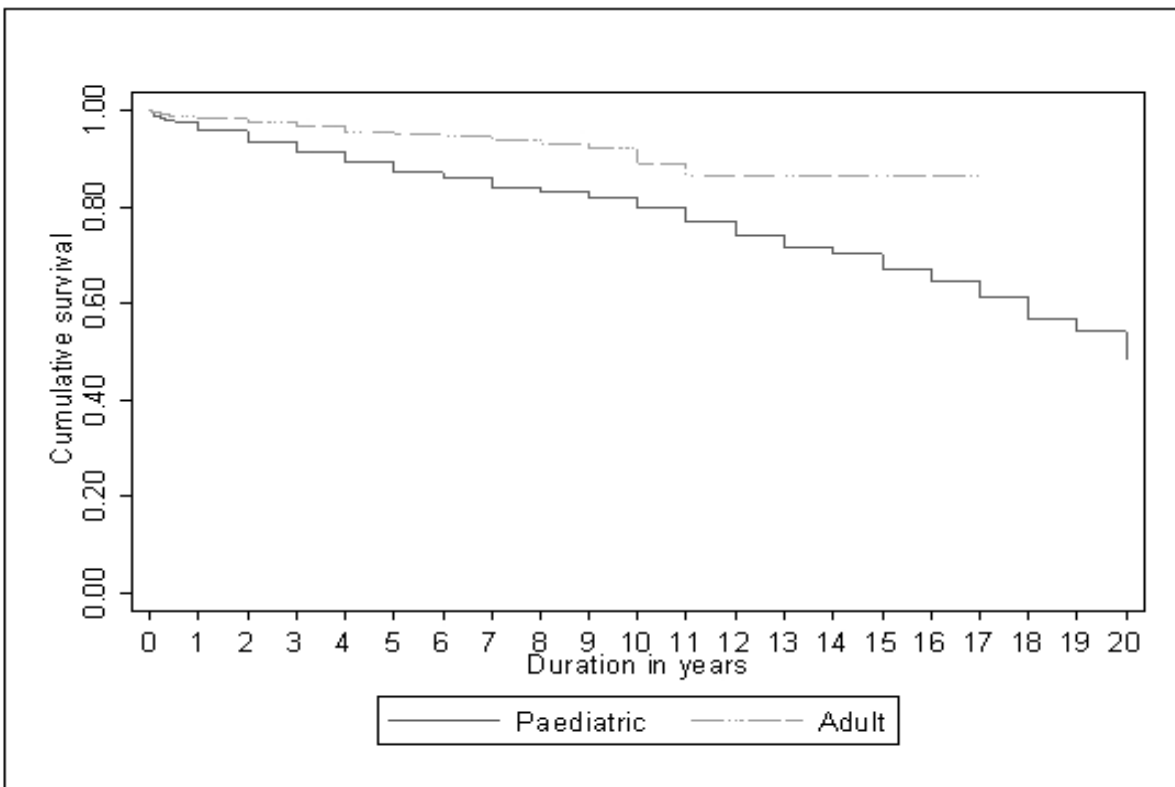
*Paediatric is defined as age ≤ 18 years and adult age >18 years

Figure 1.5.10: Disease-free Survival by Age Group for Lymphoma, 1987-2010



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

Figure 1.5.11: Disease-free Survival by Age Group for Chronic Myeloid Leukaemia, 1987-2010



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

Figure 1.5.12: Disease-free Survival by Age Group for Hypoplastic Anaemia, 1987-2010