

CHAPTER 7

BONE AND TISSUE TRANSPLANTATION

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INTRODUCTION

The initial part of this Bone and Tissue section presents data on bone and tissue allografts supplied in 2006. The chapter also presents data obtained from the Bone and Tissue Transplant Notification Form collected from the year 2004 until 2006.

Data on bone and tissue allograft transplantation is still lacking. Although the number of these transplantations is increasing over the years, many surgeons have not submitted the forms. Some surgeons chose to provide incomplete and minimal data. Most of the surgeons have not completed the Post Transplant Data form.

7.1 STOCK OF BONE AND AMNIOTIC MEMBRANE ALLOGRAFTS AND HOSPITALS WHERE TISSUES ARE UTILISED IN 2006

In 2006 data was only provided by National Tissue Bank, Universiti Sains Malaysia (USM) as a centre that supplied tissues (Table 7.1.2, Table 7.1.2 and Table 7.1.3). The National Transplant Registry did not receive data from the other bone banks.

Table 7.1.1: Types Of Tissue/Bone Allografts Supplied by National Tissue Bank, USM in 2006

Types of Tissue/Bone Allograft	Tissue/Bone Bank
	(National Tissue Bank, USM)
	No. (pieces)
DF Knee slices	0
DF Femur	5
DF Femoral head	75
DF Humerus	0
DF Tibia	4
DF Radius	1
DF Ulna	0
FD Cancellous	37
FD Cortical	0
FD Cortico-cancellous	0
Patella	4
Other tendon / fascia / cartilage	1
Amniotic membranes	379
TOTAL	506

DF – Deep-frozen

FD – Freeze-dried

Table 7.1.2: Hospitals/Other Sectors Using Bone Allografts in 2006

	Tissue/Bone Bank (National Tissue Bank, USM) No. (pieces)
MOH	
Hospital Selayang	3
Hospital Seremban	1
Hospital Sultanah Aminah, Johor Bahru	11
Hospital Pantai Air Keroh, Melaka	4
Hospital Pulau Pinang	7
Hospital Ipoh	9
Hospital Alor Setar	6
Hospital Umum Sarawak	10
Hospital Kuala Terengganu	2
Hospital Kemaman	10
Hospital Tengku Ampuan Afzan, Kuantan	2
Hospital Raja Perempuan Zainab II, Kota Bharu	1
Queen Elizabeth Hospital, Sabah	12
TOTAL	78
University	
HUKM	3
HUSM	29
TOTAL	32
Private and other sectors	
Antal Rastu Sdn Bhd	2
Kota Bharu Medical Centre	2
Kota Medical Centre, Melaka	1
Lam Wah Ee Penang	3
Pantai Medical Centre, Air Keroh	1
Stryker	6
Sunway Medical Centre	1
TOTAL	16

Table 7.1.3: Hospitals/Other Sectors Using Amniotic Membranes in 2006

	Tissue/Bone Bank
	(National Tissue Bank, USM)
	No. (pieces)
MOH	
Hospital Kuala Lumpur	13
Hospital Selayang	1
Hospital Sultanah Aminah, Johor Bahru	200
Hospital Melaka	10
Hospital Alor Setar	2
Hospital Teluk Intan	1
Hospital Tengku Ampuan Afzan, Kuantan	7
Hospital Queen Elizabeth	4
TOTAL	238
University	
HUSM	8
UMMC	4
HUKM	2
TOTAL	14
Private and other sectors	
Gleneagles Medical Centre, Penang	8
Hospital Pakar Johor	100
Sri Kota Medical Centre, Klang	4
Pusat Rawatan Islam Al-Zahirah, Bangi Selangor	10
Hospital Tawakal, Kuala Lumpur	4
Putra Medical Centre	1
TOTAL	127

7.2 REPORTING CENTRES

The recipient centres that reported to the National Transplant Registry using the Bone and Tissue Transplant Notification Form are shown on Table 7.2.1.

Table 7.2.1: Distribution of Reporting Centre by Year

Centre	2004	2005	2006	TOTAL
	No.	No.	No.	
Orthopaedics Department				
Orthopaedics Department, HUSM	1	7	2	10
Department of Orthopaedics Surgery, UMMC	1	0	0	1
Institute of Orthopaedic & Traumatology, HKL	2	0	0	2
Department of Orthopaedics, Hospital Ipoh	0	1	0	1
Department of Orthopaedics, Hospital Kota Bharu	9	3	0	12
Orthopaedic Department, Hospital Umum Sarawak	1	0	1	2
Orthopaedics Department, Hospital Sultanah Aminah, Johor Bahru	0	1	0	1
Wan Orthopaedic, Trauma & Sports Injury Centre (WOTSIC), Seremban Specialist Hospital	0	0	2	2
Orthopaedics Department, Hospital Island, Penang	0	1	0	1
Orthopaedics Department, Hospital Fatimah, Ipoh	0	3	0	3
Orthopaedics Department, Kota Bharu Medical Centre	0	0	2	2
Normah Medical Specialist Centre, Kuching	0	1	0	1
Spine Unit, HUSM	0	0	1	1
Ophthalmology Department				
Ophthalmology Department, Hospital Tengku Ampuan Rahimah, Klang	1	1	0	2
Ophthalmology Department, Hospital Tengku Ampuan Afzan, Kuantan	1	1	0	2
Ophthalmology Department, Hospital Teluk Intan	0	0	1	1
Ophthalmology Department, HKL	0	0	23	23
Ophthalmology Department, Hospital Alor Setar	0	0	1	1
Ophthalmology Department, Sri Kota Medical Centre, Klang	0	1	0	1
Ophthalmology Department, HUSM	0	0	1	1
Others Department				
Maxillofacial Surgery, HUSM	1	1	0	2
Timberland Medical Centre	0	1	0	1
Sri Kota Medical Centre, Klang	0	0	1	1
TOTAL	17	22	35	74

7.3 RECIPIENT DETAILS

The bone and tissue allografts recipients' gender (Table 7.3.1), ethnicity (Table 7.3.1), age (Table 7.3.3) and diagnosis (Table 7.3.4) are presented in this section.

Table 7.3.1: Distribution of Patients by Gender

Gender	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Male	9	53	10	45	27	77	46	62
Female	8	47	12	55	8	23	28	38
TOTAL	17	100	22	100	35	100	74	100

Table 7.3.2: Distribution of Patients by Ethnic Group

Ethnic Group	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Malay	11	65	14	64	26	74	51	69
Chinese	3	18	5	23	7	20	15	20
Indian	1	6	1	5	1	3	3	4
Bumiputra Sabah	0	0	0	0	0	0	0	0
Bumiputra Sarawak	1	6	0	0	0	0	1	1
Others	1	6	2	9	1	3	4	5
TOTAL	17	100	22	100	35	100	74	100

Table 7.3.3: Distribution of Patients by Age Group

Age Group	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
0-9	0	0	1	5	4	11	5	7
10-19	1	6	6	27	2	6	9	12
20-39	9	53	6	27	16	46	31	42
40-59	5	29	3	14	8	23	16	22
≥60	1	6	5	23	4	11	10	14
Missing	1	6	1	5	1	3	3	4
TOTAL	17	100	22	100	35	100	74	100
Mean	35		34		36		35	
SD	13		22		19		19	
Median	33		26		35		33	
Min	15		7		0		0	
Max	60		75		75		75	

Table 7.3.4: Distribution of Patients by Diagnosis Warranting Tissue Graft Transplantation

Diagnosis	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Congenital deformity	1	6	0	0	1	3	2	3
Infection	0	0	0	0	3	9	3	4
Trauma	5	29	1	5	6	17	12	16
Degenerative disease	1	6	2	9	0	0	3	4
Tumour-benign	5	29	4	18	1	3	10	14
Tumour-malignant	0	0	6	27	1	3	7	9
Burn	0	0	1	5	2	6	3	4
Scald	0	0	0	0	1	3	1	1
Sports injury	0	0	1	5	0	0	1	1
Failed primary surgery	1	6	2	9	1	3	4	5
Ophthalmological	0	0	0	0	16	46	16	22
Others	5	29	3	14	6	17	14	19
TOTAL	17	100	22	100	35	100	74	100

7.4 PRE TRANSPLANT DATA

This section presents data on the tissue provider (Table 7.4.1), origin of tissue graft (Table 7.4.2), tissue graft type (Table 7.4.3), type of sterilisation of the graft (Table 7.4.4), mode of transport storage of tissue graft to recipient hospital (Table 7.4.5) and temperature of storage tissue graft during transportation (Table 7.4.6).

Table 7.4.1: Distribution of Patients According to Tissue Provider

Name Tissue Bank	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Tissue Bank, USM	13	76	18	82	31	89	62	84
Bone Bank, UMMC	1	6	0	0	0	0	1	1
Bone Bank, HKL	3	18	0	0	0	0	3	4
Eucara Pharmaceutical	0	0	0	0	2	6	2	3
Osteo Tech Inc	0	0	1	5	0	0	1	1
Missing	0	0	3	14	2	6	5	7
TOTAL	17	100	22	100	35	100	74	100

Table 7.4.2: Distribution of Patients by Origin of Tissue Graft

Origin of Tissue Graft	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Local	17	100	15	68	31	89	63	85
Imported	0	0	3	14	2	6	5	7
Missing	0	0	4	18	2	6	6	8
TOTAL	17	100	22	100	35	100	74	100

Table 7.4.3: Distribution of Patients by Tissue Graft Type

Tissue Graft Type	Tissue Graft Types	2004		2005		2006		TOTAL	
		No.	%	No.	%	No.	%	No.	%
Deep-frozen tissues		9	53	14	64	5	14	28	38
	Femur	3	33	3	21	0	0	6	21
	Femoral Head	2	22	12	86	2	40	16	57
	Humerus	0	0	1	7	3	60	4	14
	Tibia	1	11	1	7	1	20	3	11
	Radius	2	22	5	36	0	0	7	25
Freeze-dried (Lyophilised)		6	35	4	18	29	83	39	53
	Amniotic membranes	2	33	3	75	25	86	30	77
Not Available		2	12	2	9	0	0	4	5
Missing		0	0	2	9	1	3	3	4
TOTAL		17	100	22	100	35	100	74	100

Table 7.4.4: Distribution of Type of Sterilisation of the Graft

Type Graft Sterilisation	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Gamma Irradiation	16	94	8	36	0	0	24	32
Glycerol	0	0	0	0	2	6	2	3
Sterile Freeze Dried Bone	0	0	1	5	0	0	1	1
Missing	1	6	13	59	33	94	47	64
TOTAL	17	100	22	100	35	100	74	100

Table 7.4.5: Distribution of Mode of Transport Storage to Recipient Hospital during Transportation

Mode of Transport Storage to recipient hospital	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
By Flight	1	6	1	5	2	6	4	5
By Courier	2	12	3	14	24	69	29	39
By Hand	4	24	8	36	1	3	13	18
Dry Ice Box	5	29	4	18	0	0	9	12
Sterile package	0	0	0	0	2	6	2	3
Missing	5	29	6	27	6	17	17	23
TOTAL	17	100	22	100	35	100	74	100

Table 7.4.6: Distribution of Temperature of Storage during Transportation

Temperature of storage during transportation (°C)	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
-80	2	12	0	0	0	0	2	3
-40	0	0	1	5	0	0	1	1
-20	4	24	4	18	0	0	8	11
-10	0	0	6	27	2	6	8	11
0	2	12	0	0	0	0	2	3
37	0	0	0	0	2	6	2	3
Missing	9	53	11	50	31	89	51	69
TOTAL	17	100	22	100	35	100	74	100

7.5 TRANSPLANT SURGERY DATA

The data on mode of storage of tissues in recipient hospitals are presented in Table 7.5.1. This section also presents the data on the use of composite graft (Tables 7.5.2 and 7.5.3), presence of pre operative infection at implant site (Table 7.5.4), presence of infection of pre implanted grafts (Tables 7.5.5 and 7.5.6) and the usage of antibiotics (Tables 7.5.7, 7.5.8, 7.5.9, and 7.5.10).

Table 7.5.1: Distribution of Mode of Storage in Recipient Hospitals

Mode of storage in recipient hospital	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Refrigerator	0	0	1	5	25	71	26	35
Deep freezer-20 degree Celsius	0	0	3	14	2	6	5	7
Deep freezer-40 degree Celsius	1	6	2	9	0	0	3	4
Deep freezer-80 degree Celsius	3	18	4	18	1	3	8	11
Glycerol	0	0	1	5	3	9	4	5
Room temperature	0	0	1	5	1	3	2	3
Others	12	71	5	23	2	6	19	26
Not available	1	6	0	0	0	0	1	1
Missing	0	0	5	23	1	3	6	8
TOTAL	17	100	22	100	35	100	74	100

Table 7.5.2: Distribution of Additional Tissue Usage (Composite Graft)

Additional tissue usage (composite graft)	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
No	6	35	12	55	32	91	50	68
Yes	9	53	7	32	1	3	17	23
Not available	2	12	1	5	0	0	3	4
Missing	0	0	2	9	2	6	4	5
TOTAL	17	100	22	100	35	100	74	100

Table 7.5.3: Distribution of Type of Additional Tissue Used (Composite Graft)

Type of additional tissue used (composite graft)	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Autografts	7	78	3	43	0	0	10	59
Allografts	1	11	2	29	1	100	4	24
Others	1	11	1	14	0	0	2	12
Missing	0	0	1	14	0	0	1	6
TOTAL	9	100	7	100	1	100	17	100

Table 7.5.4: Distribution of Presence of Pre Operative Infection at Implant Site

Presence of pre operative infection at implant site	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
No	15	88	21	95	31	89	67	91
Yes	0	0	0	0	4	11	4	5
Not Available	2	12	0	0	0	0	2	3
Missing	0	0	1	5	0	0	1	1
TOTAL	17	100	22	100	35	100	74	100

Table 7.5.5: Distribution of Pre Implant Graft Culture Swab

Pre implant graft culture swab	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
No	15	88	16	73	17	49	48	65
Yes	0	0	1	5	0	0	1	1
Not Available	2	12	0	0	6	17	8	11
Missing	0	0	5	23	12	34	17	23
TOTAL	17	100	22	100	35	100	74	100

Table 7.5.6: Distribution of Type of Infection of Pre Implant Graft

Type of infection of pre implant graft	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Cytomegalovirus	0	0	1	100	0	0	1	100
Proteus	0	0	0	0	0	0	0	0
TOTAL	0	0	1	100	0	0	1	100

Table 7.5.7: Distribution of Grafts Soaked in Antibiotics Prior to Transplantation

Grafts soaked in antibiotics prior to transplantation	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
No	8	47	5	23	28	80	41	55
Yes	7	41	16	73	6	17	29	39
Not Available	2	12	0	0	1	3	3	4
Missing	0	0	1	5	0	0	1	1
TOTAL	17	100	22	100	35	100	74	100

Table 7.5.8: Distribution of Antibiotics Used to Soak the Grafts in Prior to Transplantation

Antibiotics used to soak the grafts in prior to transplantation	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Ceftriazone	4	57	9	56	3	50	16	55
Gentamycin	3	43	4	25	3	50	10	34
Ceftriazone and Gentamycin	0	0	0	0	0	0	0	0
Vancomycin, Postome iodine	0	0	1	6	0	0	1	3
Povidone iodine, Ceftriazone	0	0	1	6	0	0	1	3
Missing	0	0	1	6	0	0	1	3
TOTAL	7	100	16	100	6	100	29	100

Table 7.5.9: Distribution of Patients by Systemic Antibiotics Given Prior to Transplantation

Systemic antibiotics prior to transplantation	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
No	4	24	3	14	26	74	33	45
Yes	12	71	17	77	9	26	38	51
Not Available	1	6	0	0	0	0	1	1
Missing	0	0	2	9	0	0	2	3
TOTAL	17	100	22	100	35	100	74	100

Table 7.5.10: Distribution of Patients by Type of Systemic Antibiotics Given Prior to Transplantation

Type of systemic antibiotics given to patient prior to transplantation	2004		2005		2006		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Cefepirazole	2	17	2	12	0	0	4	11
Ceftriazone	0	0	0	0	1	11	1	3
Cefuroxime	7	58	7	41	4	44	18	47
Ciproflaxacin	0	0	2	12	0	0	2	5
Chloramphenicol	0	0	0	0	1	11	1	3
Metronidazole	1	8	1	6	0	0	2	5
Ceftazidime	0	0	0	0	1	11	1	3
Ceftriazone/Imipenam	2	17	2	12	2	22	6	16
Ampicillin/Sulbactam	0	0	2	12	0	0	2	5
Missing	0	0	1	6	0	0	1	3
TOTAL	12	100	17	100	9	100	38	100

7.6 POST TRANSPLANT DATA

Post transplant data such as early post operative complications (≤ 3 weeks) and post operative systemic antibiotics given to patients were not available.