

CHAPTER 7

BONE AND TISSUE TRANSPLANTATION

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7.0 INTRODUCTION

The first part of this chapter presents data on tissue allografts that have been distributed and data about recipient centres. The second part presents data obtained from the Bone and Tissue Transplant Notification Form. It is noticeable that bone and tissue transplantation notification is poor.

Besides USM Tissue Bank there are other centres and hospitals that are involved in human tissue procurement, processing, storage and distribution. Some had failed to provide data when requested by NTR and many might not aware that they have to report their data. It is unfortunate that the Ministry of Health does not have the database on human tissue providers.

Limited outcome data was collected as very few surgeons submitted the Bone and Tissue Transplant Notification Form to NTR. These deficiencies are due to poor participation of human tissue providers and health professionals who perform bone and tissue transplantation (Source Data Provider, SDP), ineffective enforcement of notification and networking. Efforts have been initiated to identify human tissue providers in this country and to improve SDP involvement.

7.1 STOCK OF TISSUE ALLOGRAFTS AND HOSPITALS WHERE TISSUES ARE UTILISED FROM 2004 TO 2010

Table 7.1.1 presents the various types of tissue allografts supplied by USM Tissue Bank from 2004 until 2010. The main tissue allografts that were distributed were amniotic membranes, deep frozen femoral heads, femur & tibia and freeze dried cancellous bone. The total number of deep frozen bones was markedly reduced in 2009 and 2010 compared to the previous years. The reason for this is unknown. It may be due to limited stock attributable to reduced number of donors, there may be other centres and hospitals providing tissue allografts or tissue allografts were imported by the surgeons.

Table 7.1.1 Types of Tissue Allografts Supplied by USM Tissue Bank, 2004-2010

Types of Tissue Allograft	No. of pieces							
	2004	2005	2006	2007	2008	2009	2010	Total
Deep Frozen Bone								
Knee Slices	1	0	0	0	0	0	0	1
Femur	10	7	5	2	8	7	8	47
Femoral Head	50	88	80	65	54	24	26	387
Humerus	1	3	0	2	2	1	4	13
Tibia	9	1	4	4	9	2	9	38
Radius	1	2	1	0	4	0	1	9
Ulna	0	3	0	0	0	0	0	3
Patella/ Bone-Patella-Bone	2	1	4	2	1	0	0	10
Others (Type not stated)	4	0	0	0	5	0	1	10
Deep Frozen Tendon								
Achilles Tendon	0	0	0	2	1	1	4	8
Quadriceps Tendon	0	0	0	0	0	0	0	0
Others (Type not stated)	0	0	1	3	6	2	4	16
Freeze Dried Bone								
Cancellous chip	17	19	37	2	27	5	44	151
Cortical	2	0	0	0	0	0	0	2
Cortico-cancellous	5	2	0	0	0	3	0	10
Others (Type not stated)	0	0	0	8	0	0	3	11
Skin								
Deep Frozen Skin	0	0	0	0	72	0	0	72
Amniotic membrane								
Air-dried & Glycerol Preserved	1128	64	379	175	2082	932	972	5732
Others	0	0	0	0	0	0	0	0
Total	1230	190	511	265	2271	977	1076	6520

USM Tissue Bank continues to provide tissue allografts to Ministry of Health hospitals, private hospitals and other sectors (Table 7.1.2 and 7.1.3).

Table 7.1.2 Hospitals/Other Sectors Using Bone, Tendon and Skin Allografts Provided by USM Tissue Bank, 2004-2010

Recipients	No. of pieces							Total
	2004	2005	2006	2007	2008	2009	2010	
MOH								
Hospital Sultanah Bahiyah, Alor Setar	1	10	6	2	0	0	0	19
Hospital Umum Sarawak, Kuching	3	13	10	6	3	0	0	35
Hospital Ipoh	0	4	9	3	0	0	0	16
Hospital Kemaman	0	0	10	0	0	0	0	10
Hospital Sultanah Nurzahirah, Kuala Terengganu	0	0	2	0	0	3	0	5
Hospital Melaka	1	0	0	3	0	0	0	4
Hospital Pulau Pinang	5	1	7	7	0	0	0	20
Queen Elizabeth Hospital, Kota Kinabalu	0	0	12	2	0	0	0	14
Hospital Raja Perempuan Zainab II, Kota Bharu	5	2	1	0	8	2	2	20
Hospital Seberang Jaya, Pulau Pinang	0	2	0	3	0	0	0	5
Hospital Selayang	0	0	3	0	0	0	0	3
Hospital Seremban	2	2	1	0	0	2	0	7
Hospital Sultanah Aminah, Johor Bahru	9	19	11	1	0	0	0	40
Hospital Sultan Ismail, Johor Bahru	0	0	0	2	73	1	1	77
Hospital Tengku Ampuan Afzan, Kuantan	0	1	2	0	0	0	0	3
Hospital Tengku Ampuan Rahimah, Klang	0	5	0	0	0	0	0	5
Hospital Muar	0	0	0	0	2	0	0	2
Total	26	59	74	29	86	8	3	285
University Hospitals								
HUSM	39	23	30	3	20	14	6	135
HUKM	3	2	3	5	0	0	0	13
UMMC	9	3	0	0	0	1	0	13
Total	51	28	33	8	20	15	6	161
Private and other sectors								
Amin Dental Surgery, Johor Bahru	0	0	0	5	0	0	0	5
Antal Rastu Sdn Bhd	0	0	2	0	0	0	0	2
Borneo Indah Sdn. Bhd.	0	0	0	0	4	0	0	4
Chong Dental Surgery, Seri Kembangan Selangor	0	0	0	1	0	0	0	1
Hospital Fatimah, Ipoh	1	12	0	2	11	4	0	30
Pantai Medical Centre, Air Keroh	0	0	5	0	0	0	0	5
Mahkota Medical Centre, Melaka	0	2	1	0	0	0	0	3
Hospital Tawakal, KL	0	0	0	3	9	0	0	12
Hospital Tung Shin, Kuala Lumpur	0	2	0	0	0	0	0	2
Jasa Dental Surgery, Kuala Lumpur	5	0	0	0	0	0	0	5
Johnson & Johnson Medical	0	0	0	2	16	3	8	29
Kemajuan Abadi Sdn. Bhd.	0	5	0	2	0	0	0	7
Klinik Pergigian Chong, Tangkak, Johor	0	0	0	1	0	0	0	1
Kota Bahru Medical Centre, Kota Bharu	0	0	2	0	0	1	0	3
Lam Wah Ee Hospital, Pulau Pinang	0	0	3	0	0	0	0	3
Normah Medical Center, Kuching	0	0	0	3	3	0	0	6
Pantai Medical Center, Bangsar	0	0	0	1	0	0	0	1
Island Hospital, Pulau Pinang	0	0	0	0	1	0	0	1
Sentosa Medical Centre, Kuala Lumpur	0	1	0	0	0	0	0	1
Sri Kota Medical Centre, Klang	2	0	0	0	0	0	0	2
Stryker	2	4	6	12	20	9	0	53
Sunway Medical Centre, Selangor	0	0	1	0	0	0	0	1
Teo Orthopaedic, Kuala Lumpur	0	10	0	0	0	0	0	10
Zimmer	9	3	5	21	18	5	4	65
Kuching Specialist Hospital, Sarawak	0	0	0	0	1	0	0	1
Total	19	39	25	53	83	22	12	253
Grand Total	96	126	132	90	189	45	104	782

Table 7.1.3 Hospitals/Other Sectors Using Amniotic Membranes provided by USM Tissue Bank, 2004-2010

Recipients	No. of pieces							Total
	2004	2005	2006	2007	2008	2009	2010	
Ministry of Health								
Hospital Miri, Sabah	0	0	0	5	10	0	0	15
Hospital Kuala Lumpur	22	15	13	40	0	0	0	90
Hospital Sultanah Bahiyah, Alor Setar	0	0	2	7	0	0	0	9
Hospital Umum Sarawak, Kuching	6	10	0	6	1	0	0	23
Hospital Sultanah Nurzahirah, Kuala Terengganu	0	1	0	5	0	0	0	6
Hospital Melaka	5	5	10	0	5	0	0	25
Hospital Pakar Sultanah Fatimah, Johor Bahru	0	0	100	0	0	0	0	100
Hospital Pulau Pinang	0	0	0	3	0	0	0	3
Queen Elizabeth Hospital, Kota Kinabalu	0	0	4	1	0	0	0	5
Hospital Raja Perempuan Zainab II, Kota Bharu	0	5	0	2	1	0	0	8
Hospital Selayang	0	0	1	0	0	0	0	1
Hospital Sultanah Aminah, Johor Bahru	73	0	200	0	0	0	0	273
Hospital Sultan Ismail, Johor Bahru	0	0	0	50	0	0	0	50
Hospital Teluk Intan	0	0	1	4	0	0	0	5
Hospital Tengku Ampuan Afzan, Kuantan	6	6	7	0	0	0	0	19
Hospital Tengku Ampuan Rahimah, Klang	4	5	0	0	0	0	0	9
Hospital Kuala Krai	0	0	0	0	1	0	0	1
Hospital Sungai Buloh	0	0	0	21	40	0	0	61
Total	116	47	338	144	58	0	0	703
University Hospitals								
HUSM	1001	1	8	7	4	0	0	1021
HUKM	4	0	0	7	32	0	0	43
UMMC	5	0	6	0	5	0	0	16
IIUM	0	0	0	6	0	0	0	6
Total	1010	1	14	20	41	0	0	1086
Private and other sectors								
Gleneagles Medical Centre, Pulau Pinang	2	4	8	0	6	0	0	20
Hospita Mata Tun Hussein Onn	0	4	0	0	5	0	0	9
Hospital Tawakal, KL	0	0	4	0	0	0	0	4
ISEC Sdn. Bhd.	0	0	0	2	0	0	0	2
Klinik Iman, Seremban	0	1	0	0	0	0	0	1
Kuala Terengganu Specialist Center, Kuala Terengganu	0	0	0	3	0	0	0	3
Peter Kong Eye Clinic, Kota Kinabalu	0	0	0	0	2	0	0	2
Pusat Rawatan Islam Al-Zahirah, Bangi, Selangor	0	0	10	0	0	0	0	10
Puteri Specialist Hospital, Johor Bahru	0	5	0	5	0	0	0	10
Putra Medical Centre, Alor Setar	0	0	1	1	0	0	0	2
Sri Kota Medical Centre, Klang	0	2	4	0	2	0	0	8
CryoCord Sdn. Bhd.	0	0	0	0	1968	932	972	3872
Total	2	16	27	11	1983	932	972	3943
Grand Total	1128	64	379	175	2082	932	972	5732

7.2 Reporting Centre

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. The total number of reporting centres between 2004 and 2010 show a decreasing trend.

Table 7.2.1 Distribution of Reporting Centre, 2004-2010

Reporting centre	2004	2005	2006	2007	2008	2009	2010	Total
Orthopaedics Department								
Department of Orthopaedics, HUSM	1	7	2	1	1	0	3	15
Institute of Orthopaedic & Traumatology, Hospital Kuala Lumpur	2	0	0	0	0	0	0	2
Department of Orthopaedics Surgery, UMMC	1	0	0	0	0	0	0	1
Department of Orthopaedics, Hospital Pulau Pinang	0	0	0	1	0	0	0	1
Department of Orthopaedics, Hospital Ipoh	0	1	0	0	0	0	0	1
Department of Orthopaedics, Hospital Raja Perempuan Zainab II	9	3	0	0	0	0	0	12
Department of Orthopaedics, Hospital Umum Sarawak	1	0	1	0	0	0	0	2
Department of Orthopaedics, Hospital Tengku Ampuan Afzan	0	0	0	1	0	0	0	1
Department of Orthopaedics, Hospital Sultanah Aminah	0	1	0	0	0	0	0	1
Wan Orthopaedic, Trauma & Sports Injury Centre (WOTSIC), Seremban Specialist Hospital	0	0	2	0	0	0	0	2
Department of Orthopaedics, Island Hospital, Pulau Pinang	0	1	0	0	0	0	0	1
Department of Orthopaedics, Normah Medical Specialist Centre, Kuching	0	1	0	0	0	0	0	1
Department of Orthopaedics, Hospital Fatimah, Ipoh	0	3	0	1	0	1	0	5
Department of Orthopaedics, Kota Bharu Medical Centre	0	0	2	0	0	0	0	2
Department of Orthopaedics, Pantai Medical Centre, Kuala Lumpur	0	0	0	1	0	0	0	1
Department of Orthopaedics, Gleneagles Medical Centre, Pulau Pinang	0	0	0	0	1	0	0	1
Department of Orthopaedics, Penang Adventis Hospital, Pulau Pinang	0	0	0	0	1	0	0	1
Spine Unit, HUSM	0	0	1	0	1	0	0	2
Department of Orthopaedics & Traumatology, Hospital Kangar	0	0	0	0	0	0	1	1
Orthopaedics Unit, Hospital Kemaman	0	0	0	0	0	0	1	1
Total	14	17	8	5	4	1	5	54
Ophthalmology Department								
Department of Ophthalmology, Hospital Tengku Ampuan Rahimah, Klang	1	1	0	0	0	0	0	2
Department of Ophthalmology, Hospital Tengku Ampuan Afzan, Kuantan	1	1	0	0	0	0	0	2
Department of Ophthalmology, Hospital Teluk Intan	0	0	1	0	0	0	0	1
Department of Ophthalmology, Hospital Kuala Lumpur	0	0	23	20	15	10	1	69
Department of Ophthalmology, Hospital Sultanah Bahiyah, Alor Setar	0	0	1	0	0	0	0	1
Department of Ophthalmology, Hospital Sungai Buloh	0	0	0	9	0	5	0	14
Department of Ophthalmology, Hospital Umum Sarawak	0	0	0	0	1	0	0	1
Department of Ophthalmology, Sri Kota Medical Centre, Klang	0	1	0	0	0	0	0	1
Department of Ophthalmology, HUSM	0	0	1	2	2	0	0	5
Pusat Pakar Mata Centre For Sight	0	0	0	0	1	0	0	1
Total	2	3	26	31	19	15	1	97
Others								
Maxillofacial Surgery, HUSM	1	1	0	0	0	0	0	2
Timberland Medical Centre, Kuching	0	1	0	0	0	0	0	1
Sri Kota Medical Centre, Klang	0	0	1	0	0	0	0	1
Total	1	2	1	0	0	0	0	4
Grand Total	17	22	35	36	23	16	6	155

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 Number of Transplant by Gender, 2004-2010

Gender	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	9	53	10	45	27	77	21	58	10	43	12	75	5	83	94	61
Female	8	47	12	55	8	23	15	42	13	57	4	25	1	17	61	39
Total	17	100	22	100	35	100	36	100	23	100	16	100	6	100	155	100

**1 patient can undergo more than 1 transplant*

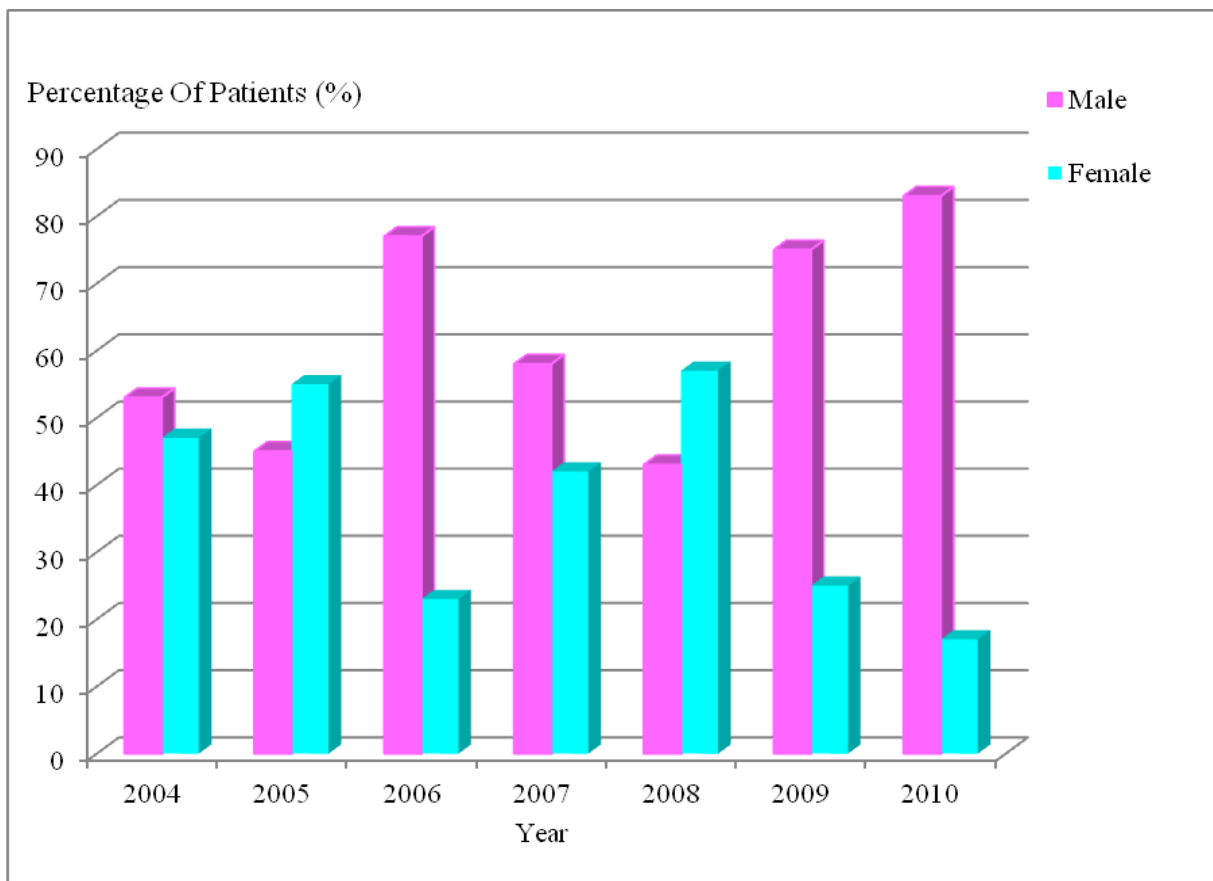


Figure 7.3.1 Distribution of Number of Transplant by Gender, 2004-2010

Table 7.3.2 Distribution of Number of Transplant by Ethnic Group, 2004-2010

Race	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Malay	11	65	14	64	26	74	18	50	13	57	8	50	5	83	95	61
Chinese	3	18	5	23	7	20	12	33	6	26	0	0	1	17	34	22
Indian	1	6	1	5	1	3	4	11	1	4	3	19	0	0	11	7
Bumiputra Sabah	0	0	0	0	0	0	0	0	1	4	0	0	0	0	1	1
Bumiputra Sarawak	1	6	0	0	0	0	1	3	0	0	0	0	0	0	2	1
Others	1	6	2	9	1	3	1	3	2	9	5	31	0	0	12	8
Total	17	100	22	100	35	100	36	100	23	100	16	100	6	100	155	100

**1 patient can undergo more than 1 transplant*

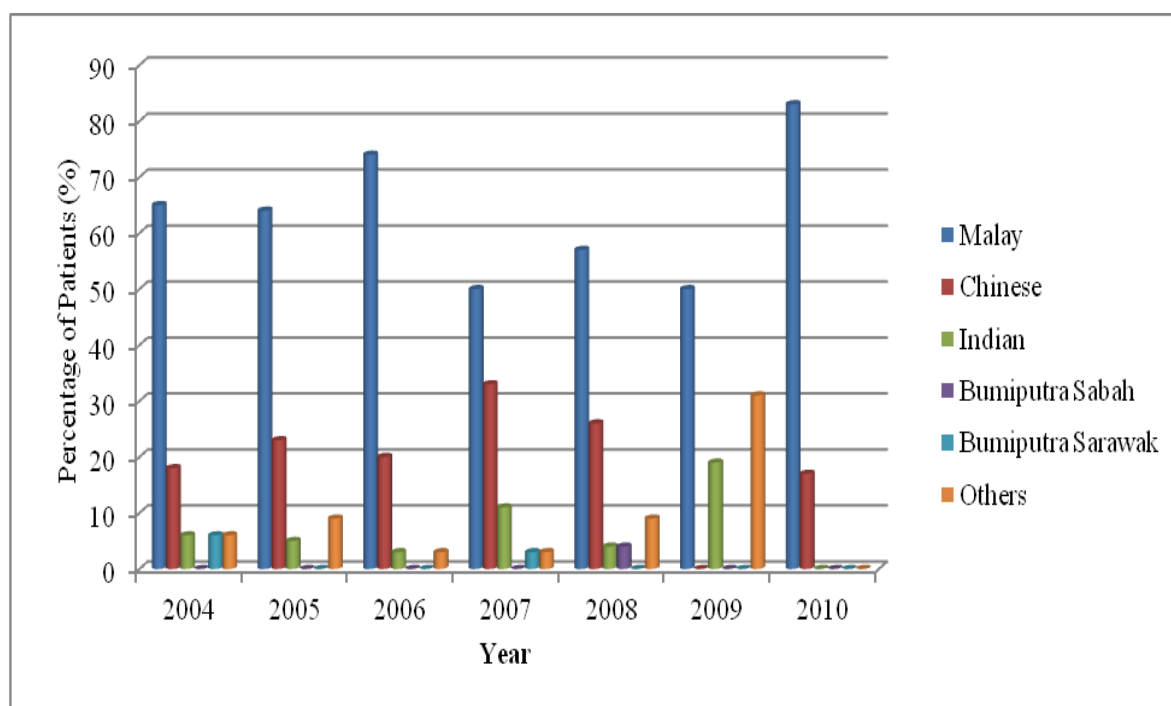


Figure 7.3.2 Distribution of Number of Transplant by Ethnic Group, 2004-2010

Table 7.3.3 Distribution of Number of Transplant by Age Group, 2004-2010

Age group	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0-9	0	0	1	5	4	11	5	14	4	17	4	25	2	33	20	13
10-19	1	6	6	27	2	6	1	3	5	22	1	6	0	0	16	10
20-39	9	53	6	27	16	46	8	22	6	26	6	38	1	17	52	34
40-59	5	29	3	13	8	23	11	30	5	22	4	25	2	33	38	25
>=60	2	12	5	23	5	14	10	28	3	13	1	6	1	17	27	17
Missing	0	0	1	5	0	0	1	3	0	0	0	0	0	0	2	1
Total	17	100	22	100	35	100	36	100	23	100	16	100	6	100	155	100
Mean	37		36		37		42		30		28		35		36	
SD	16		23		20		23		22		18		24		21	
Median	35		27		36		49		27		31		42		35	
Min	15		7		0		0		1		0		3		0	
Max	75		80		77		80		69		61		60		80	

**1 patient can undergo more than 1 transplant*

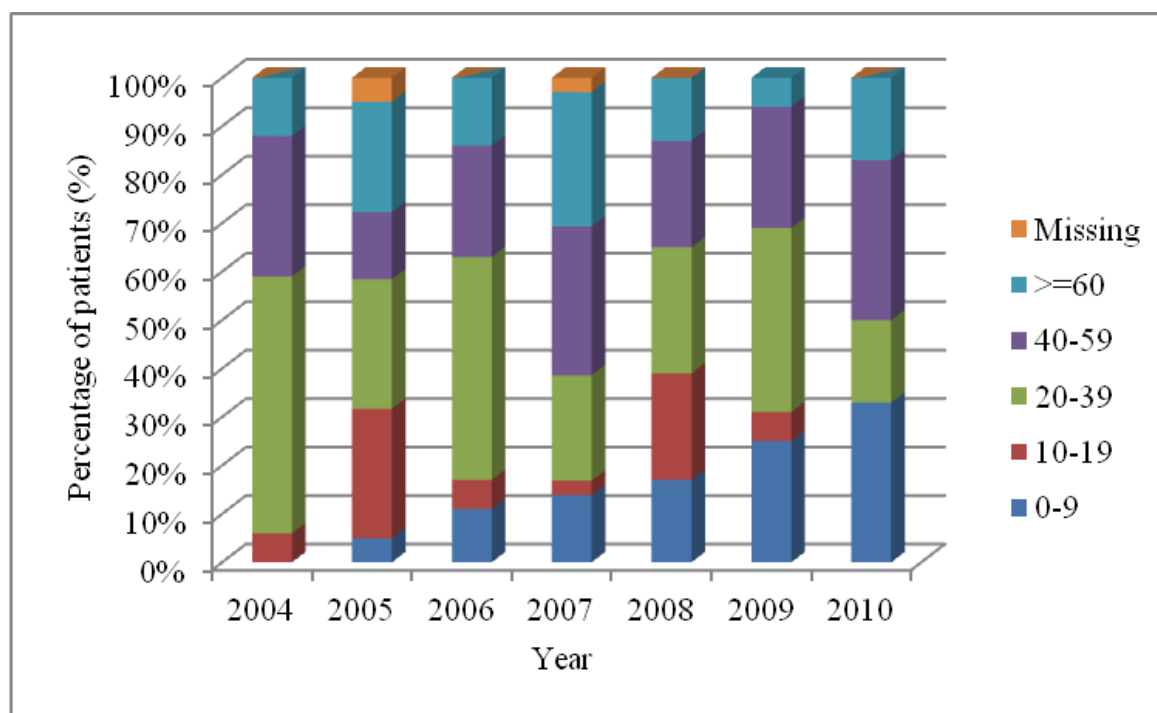


Figure 7.3.3 Distribution of Number of Transplant by Age Group, 2004-2010

Table 7.3.4 Distribution of Number of Transplant by Diagnosis Warranting Tissue Graft, 2004-2010

Diagnosis	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Congenital deformity	1	6	0	0	1	3	1	3	1	4	0	0	0	0	4	3
Infection	0	0	0	0	3	8	3	8	4	17	0	0	0	0	10	6
Trauma	5	28	1	5	6	16	1	3	2	9	2	13	3	50	20	13
Degenerative disease	1	6	2	9	0	0	1	3	1	4	0	0	0	0	5	3
Tumour - benign	5	28	4	18	1	3	1	3	0	0	0	0	0	0	11	7
Tumour - malignant	0	0	6	27	1	3	0	0	0	0	1	6	2	33	10	6
Burn	0	0	1	5	2	5	0	0	0	0	0	0	0	0	3	2
Scald	0	0	0	0	1	3	0	0	0	0	0	0	0	0	1	1
Sports injury	0	0	1	5	0	0	1	3	0	0	0	0	0	0	2	1
Failed primary surgery	1	6	2	9	1	3	2	5	0	0	0	0	0	0	6	4
Ophtalmological disease	0	0	0	0	16	42	7	19	4	17	8	50	1	17	36	23
Others	5	28	3	14	6	16	20	54	11	48	5	31	0	0	50	31
Missing	0	0	2	9	0	0	0	0	0	0	0	0	0	0	2	1
Total	18	100	22	100	38	100	37	100	23	100	16	100	6	100	160	100

*1 transplantation performed in 2004 and 2007 showed signs of 2 different types of diagnosis

*3 transplantation performed in 2006 showed signs of 2 different diagnosis

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 Number of Transplantation According to Tissue Provider, 2004-2010

Name of Tissue Bank	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Amniocord	0	0	0	0	0	0	0	0	0	0	1	6	0	0	1	1
USM Tissue Bank	13	76	18	82	31	88	34	94	23	100	13	81	5	83	137	88
Bone Bank, UMMC	1	6	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Bone Bank, Hospital Kuala Lumpur	3	18	0	0	0	0	0	0	0	0	0	0	0	0	3	2
Eucara Pharmaceutical (P) Ltd., India	0	0	0	0	2	6	0	0	0	0	0	0	0	0	2	1
Osteo Tech Inc., USA	0	0	1	5	0	0	0	0	0	0	0	0	0	0	1	1
Missing	0	0	3	13	2	6	2	6	0	0	2	13	0	0	9	6
Total	17	100	22	100	35	100	36	100	23	100	16	100	6	100	155	100

**1 patient can undergo more than 1 transplant*

Table 7.4.2 Distribution of Number of Transplantation by Origin of Tissue Graft, 2004-2010

Origin of Tissue Graft	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Local	17	100	15	68	31	89	34	94	22	96	15	94	6	100	140	90
Imported	0	0	3	14	2	6	0	0	0	0	0	0	0	0	5	3
Not Available	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Missing	0	0	4	18	2	6	2	6	1	4	1	6	0	0	10	6
Total	17	100	22	100	35	100	36	100	23	100	16	100	6	100	155	100

**1 patient can undergo more than 1 transplant*

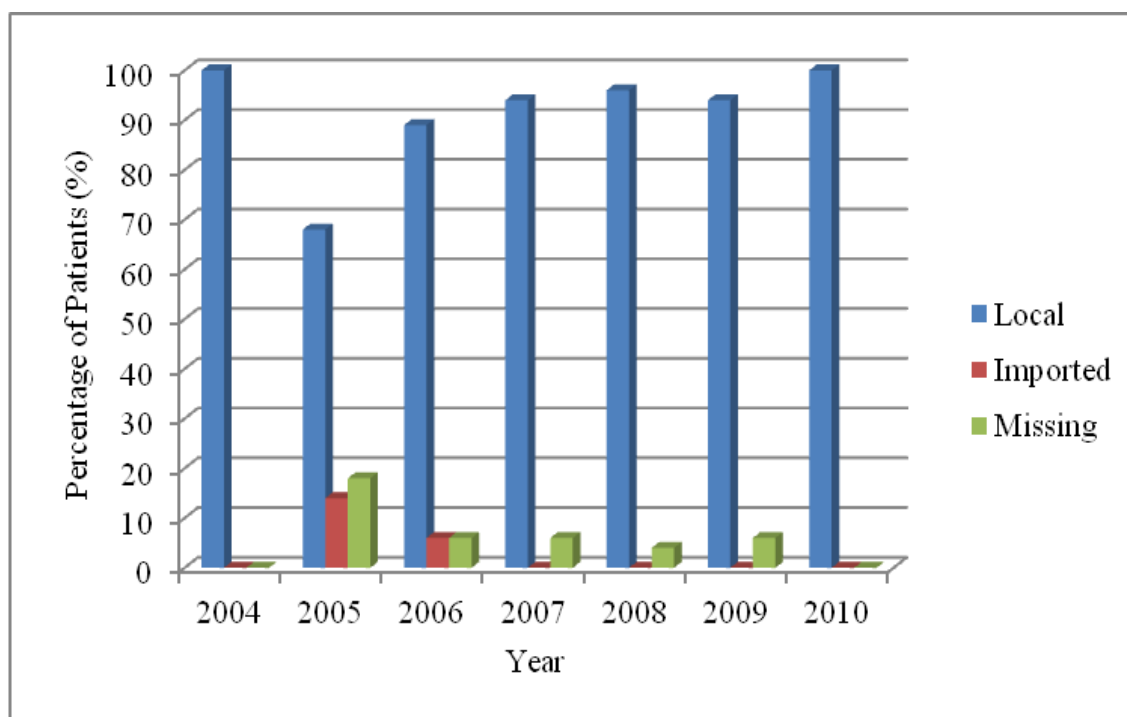


Figure 7.4.2 Distribution of Number of Transplantation by Origin of Tissue Graft, 2004-2010

Table 7.4.3 Distribution of Number of Transplantation by Tissue Graft Types, 2004-2010

Tissue graft types	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Deep frozen tissues	9	53	15	68	5	14	5	14	3	13	1	6	4	66	42	27
Freeze dried (Lyophilised)	6	35	2	9	3	9	0	0	1	4	0	0	1	17	13	8
Others	2	12	3	14	26	74	31	86	19	83	15	94	1	17	97	63
Missing	0	0	2	9	1	3	0	0	0	0	0	0	0	0	3	2
Total	17	100	22	100	35	100	36	100	23	100	16	100	6	100	155	100

**1 patient can undergo more than 1 transplant*

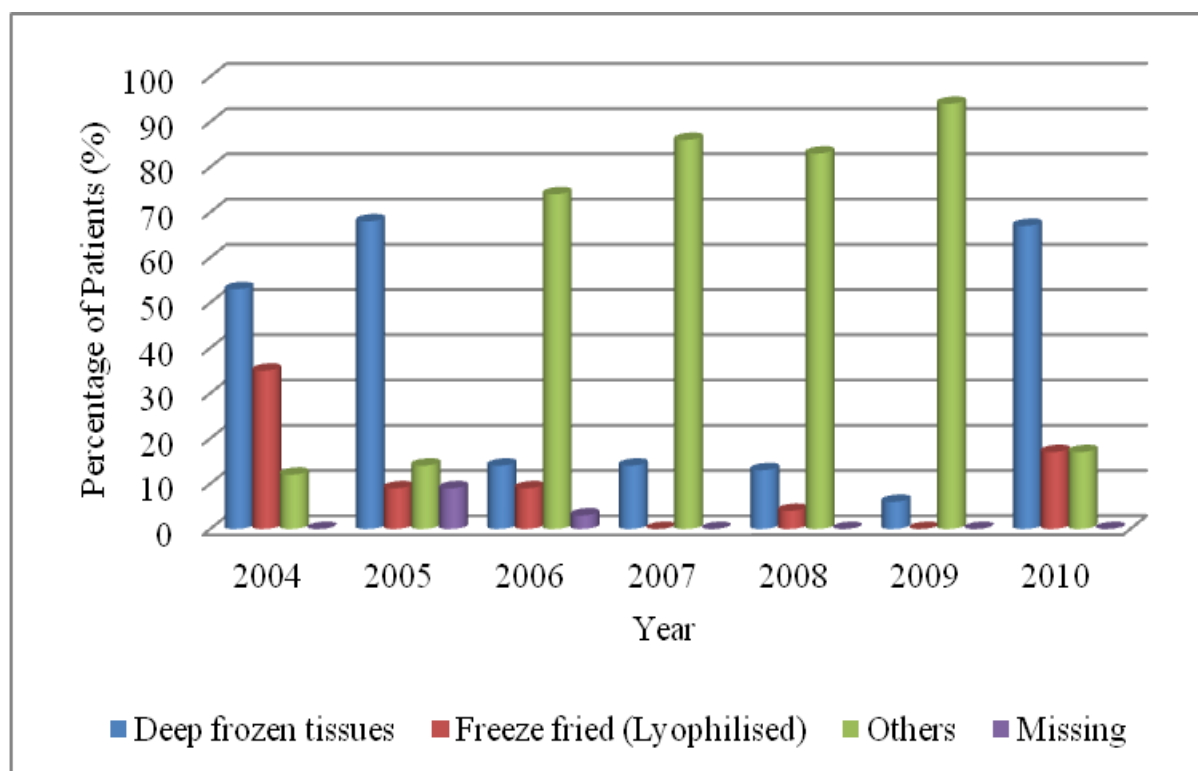


Figure 7.4.3 Distribution of Number of Transplantation by Tissue Graft Types, 2004-2010

Table 7.4.3(a) Distribution of Tissue Graft Types (breakdowns), 2004-2010

Tissue graft types (breakdowns)	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Femur	3	11	3	6	0	0	0	0	2	8	0	0	1	7	9	4
Femoral head	2	7	12	26	5	11	7	18	2	8	3	17	1	7	32	15
Humerus	0	0	1	2	0	0	0	0	0	0	0	0	1	7	2	1
Tibia	1	4	1	2	1	2	0	0	0	0	0	0	0	0	3	1
Radius	2	7	5	11	0	0	0	0	0	0	0	0	1	7	8	4
Patella	1	4	1	2	2	4	0	0	0	0	0	0	0	0	4	2
Other tendon fascia cartilage	0	0	1	2	0	0	1	3	0	0	0	0	0	0	2	1
Skin	0	0	0	0	0	0	0	0	1	4	0	0	0	0	1	0
Air-dried Amnion	1	4	1	2	0	0	0	0	1	4	0	0	0	0	3	1
Glycerolized Amnion	0	0	2	4	26	57	31	79	18	76	15	83	1	7	93	44
Glycerol Cryopreserved Amnion	1	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Cancellous	15	55	19	41	2	4	0	0	0	0	0	0	10	65	46	22
Cortical	0	0	0	0	6	13	0	0	0	0	0	0	0	0	6	3
Cortical_cancellous	1	4	1	2	0	0	0	0	0	0	0	0	0	0	2	1
Bone granule	0	0	0	0	1	2	0	0	0	0	0	0	0	0	1	0
Bone powder	0	0	0	0	3	7	0	0	0	0	0	0	0	0	3	1
Total	27	100	47	100	46	100	39	100	24	100	18	100	15	100	216	100

Table 7.4.4 Distribution of Graft Sterilization Types, 2004-2010

Graft sterilization types	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Irradiation	16	94	15	68	30	86	27	75	19	83	10	63	6	100	123	79
Peracetic Acid-Ethanol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethylene Oxide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	1	3	0	0	0	0	0	0	0	0	1	1
Not Sterilized	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Missing	1	6	7	32	4	11	9	25	4	17	6	37	0	0	31	20
Total	17	100	22	100	35	100	36	100	23	100	16	100	6	100	155	100

*1 patient can undergo more than 1 transplant

Table 7.4.5 Distribution of Mode of Transport Storage to Recipient Hospital during
Transportation, 2004-2010

Mode of transport storage to recipient hospital	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
By flight and/or land vehicle	1	6	2	8	2	6	3	8	1	4	1	6	2	33	12	8
By courier service	2	12	3	14	22	63	23	64	17	74	10	63	1	17	78	50
By hand directly from bank	4	24	7	32	1	3	0	0	0	0	0	0	3	50	15	10
Dry ice box	5	29	3	14	0	0	0	0	0	0	0	0	0	0	8	5
Sterile package	0	0	0	0	2	6	0	0	0	0	0	0	0	0	2	1
Missing	5	29	7	32	8	22	10	28	5	22	5	31	0	0	40	26
Total	17	100	22	100	35	100	36	100	23	100	16	100	6	100	155	100

*1 patient can undergo more than 1 transplant

Table 7.4.6 Distribution of Temperature of Storage During Transportation, 2004-2010

Temperature of storage during transportation (°C)	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
-80 to -50	2	12	0	0	0	0	0	0	1	4	0	0	1	17	4	3
-49 to 0	6	35	10	45	2	6	2	6	1	4	0	0	3	49	24	15
Room temperature	3	18	4	18	27	77	22	61	17	74	11	69	1	17	85	55
Others	0	0	1	5	0	0	0	0	0	0	0	0	0	0	1	1
Missing	6	35	7	32	6	17	12	33	4	18	5	31	1	17	41	26
Total	17	100	22	100	35	100	36	100	23	100	16	100	6	100	155	100

**1 patient can undergo more than 1 transplant*

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), presence of pre operative infection at implant site (Table 7.5.3), presence of infection of pre implanted grafts (Table 7.5.4) and the usage of antibiotics (Tables 7.5.5 and 7.5.6).

Table 7.5.1 Distribution of Mode of Storage in Recipient Hospital, 2004-2010

Mode of storage in recipient hospital	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Refrigerator	0	0	1	5	25	71	28	78	18	79	13	81	2	33	87	56
Deep Freezer -20 °C	0	0	3	14	2	6	3	8	0	0	0	0	1	17	9	6
Deep Freezer -40 °C	1	6	2	8	0	0	0	0	1	4	1	6	0	0	5	3
Deep Freezer -80 °C	3	18	5	23	1	3	1	3	1	4	0	0	2	33	13	8
Liquid Nitrogen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glycerol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Room Temperature	0	0	0	0	2	6	0	0	2	9	0	0	1	17	5	3
Others	12	70	6	27	1	3	0	0	0	0	0	0	0	0	19	13
Not Available	1	6	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Missing	0	0	5	23	4	11	4	11	1	4	2	13	0	0	16	10
Total	17	100	22	100	35	100	36	100	23	100	16	100	6	100	155	100

*1 patient can undergo more than 1 transplant

Table 7.5.2 Distribution of Additional Tissue Usage (Composite Graft), 2004-2010

Additional Tissue Used	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	9	53	7	32	1	3	2	6	2	9	0	0	0	0	21	14
• Autografts	7	41	3	14	0	0	0	0	2	9	0	0	0	0	12	8
• Allografts	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
• Xenografts	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
• Aloprosthesis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
• Others	1	6	1	5	0	0	0	0	0	0	0	0	0	0	2	1
• Not Available	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
• Missing	1	6	3	14	1	3	2	6	0	0	0	0	0	0	7	5
No	6	35	12	55	32	91	33	92	20	87	16	100	6	100	125	81
Not Available	2	12	1	5	0	0	0	0	0	0	0	0	0	0	3	2
Missing	0	0	2	9	2	6	1	3	1	4	0	0	0	0	6	4
Total	17	100	22	100	35	100	36	100	23	100	16	100	6	100	155	100

*1 patient can undergo more than 1 transplant

Table 7.5.3 Distribution of Presence of Pre Operative Infection at Implant Site, 2004-2010

Presence of pre operative infection at implant site	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	0	0	0	0	4	11	9	25	3	13	0	0	0	0	16	10
No	15	88	21	95	31	89	27	75	20	87	16	100	6	100	136	88
Not Available	2	12	0	0	0	0	0	0	0	0	0	0	0	0	2	1
Missing	0	0	1	5	0	0	0	0	0	0	0	0	0	0	1	1
Total	17	100	22	100	35	100	36	100	23	100	16	100	6	100	155	100

*1 patient can undergo more than 1 transplant

Table 7.5.4 Distribution of Pre Implant Graft Cultural Swab, 2004-2010

Pre implant graft cultural swab	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	0	0	1	5	0	0	1	3	0	0	0	0	0	0	2	1
• Cytomegalovirus	0	0	1	5	0	0	0	0	0	0	0	0	0	0	1	1
• Proteus	0	0	0	0	0	0	1	3	0	0	0	0	0	0	1	1
No	15	88	16	73	17	49	22	61	19	83	9	56	3	50	101	65
Not Available	2	12	0	0	6	17	5	14	1	4	3	19	1	17	18	12
Missing	0	0	5	23	12	34	8	22	3	13	4	25	2	33	34	22
Total	17	100	22	100	35	100	36	100	23	100	16	100	6	100	155	100

**1 patient can undergo more than 1 transplant*

Table 7.5.5 Distribution of Grafts Soaked in Antibiotics Prior to Transplantation, 2004-2010

Grafts soaked in antibiotics prior to transplantation	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	7	41	16	73	6	17	6	17	1	4	1	6	2	33	39	25
• Ceftriazone	4	24	9	41	3	9	0	0	0	0	0	0	0	0	16	10
• Gentamicin	3	18	4	18	3	9	4	11	1	4	1	6	0	0	16	10
• Povidone iodine, Ceftriazone	0	0	1	5	0	0	0	0	0	0	0	0	0	0	1	1
• Ceftriazone and Gentamicin	0	0	0	0	0	0	1	3	0	0	0	0	0	0	1	1
• Vancomycin, Postome iodine	0	0	1	5	0	0	0	0	0	0	0	0	0	0	1	1
• Missing	0	0	1	5	0	0	1	3	0	0	0	0	1	17	3	2
No	8	47	5	23	28	80	28	78	22	96	15	94	4	67	110	71
Not Available	2	12	0	0	1	3	0	0	0	0	0	0	0	0	3	2
Missing	0	0	1	5	0	0	2	6	0	0	0	0	0	0	3	2
Total	17	100	22	100	35	100	36	100	23	100	16	100	6	100	155	100

**1 patient can undergo more than 1 transplant*

Table 7.5.6 Distribution of Number of Transplant by Systemic Antibiotics Given Prior to Transplantation, 2004-2010

Systemic antibiotics given prior to transplantation	2004		2005		2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	12	71	17	77	9	26	10	28	4	17	2	13	4	67	58	37
• Cefeperazone	2	12	2	9	0	0	0	0	1	4	0	0	0	0	5	3
• Ceftriazone/ Imipenam	2	12	2	9	3	9	3	8	0	0	0	0	0	0	10	6
• Cefuroxime	7	41	7	32	4	11	2	6	1	4	0	0	0	0	21	14
• Ciproflaxacin	0	0	2	9	0	0	2	6	1	4	1	6	0	0	6	4
• Chloramphenicol	0	0	0	0	1	3	0	0	0	0	0	0	0	0	1	1
• Gentamicin	0	0	0	0	0	0	0	0	1	4	0	0	0	0	1	1
• Metronidazole	1	6	1	5	0	0	0	0	0	0	0	0	0	0	2	1
• Ceftazidime	0	0	0	0	1	3	0	0	0	0	0	0	0	0	1	1
• T. Augmentin	0	0	0	0	0	0	1	3	0	0	0	0	0	0	1	1
• T.Fluriazole	0	0	0	0	0	0	2	6	0	0	0	0	0	0	2	1
• Ampicillin / Sulbactam	0	0	2	9	0	0	0	0	0	0	0	0	0	0	2	1
• Vancomycin	0	0	0	0	0	0	0	0	0	0	1	6	0	0	1	1
• Missing	0	0	1	5	0	0	0	0	0	0	0	0	0	0	1	1
No	4	24	3	14	26	74	26	72	18	78	14	88	2	33	93	60
Not Available	1	6	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Missing	0	0	2	9	0	0	0	0	1	4	0	0	0	0	3	2
Total	17	100	22	100	35	100	36	100	23	100	16	100	6	100	155	100

**1 patient can undergo more than 1 transplant*