CHAPTER 12

Chronic Peritoneal Dialysis Practices

Sunita Bavanandan
Lily Mushahar

SECTION 12.1: PD PRACTICES

12.1.1: Modalities and prescription of PD (Tables 12.1.1 -12.1.4)

The growth of PD practices in Malaysia has been steadily increasing over the past decade. In 2009, there was a 6% increment of PD penetration over a 1 year period with a total number of 2209 patients. However, the use of APD has plateaued at 11% compared to the previous year (Table 12.1.1). This lack of growth is most likely due to APD being a more costly modality of PD.

Majority of patients are on the Baxter disconnect system (92%) and most perform 4 exchanges per day (94%). Majority of patients (88%) are being prescribed a dwell volume of 2 litres compared to lower or larger dwell volumes (Table 12.1.4).

Table 12.1.1: Chronic Peritoneal Dialysis Regimes, 2000-2009

PD Regime	2000		2001		2002		2003		2004	
	No.	%	No.	%	No.	%	No.	%	No.	%
Standard CAPD	641	97	762	98	861	97	1192	97	1266	96
DAPD	16	2	17	2	24	3	34	3	39	3
Automated PD/ CCPD	5	1	2	0	3	0	5	0	12	1
TOTAL	662	100	781	100	888	100	1231	100	1317	100
PD regime	2005		2006		2007		2008		2009	
	No.	%	No.	%	No.	%	No.	%	No.	%
Standard CAPD	1303	93	1397	90	1547	86	1717	82	1844	84
DAPD	45	3	67	4	115	6	121	6	119	5
Automated PD/ CCPD	50	4	88	6	144	8	245	12	246	11
TOTAL	1398	100	1552	100	1806	100	2083	100	2209	100

Table 12.1.2: CAPD Connectology, 2000-2009

CAPD Connectology	2000		2001		2002		2003		2004	
	No.	%	No.	%	No.	%	No.	%	No.	%
Baxter disconnect	237	100	439	100	726	99	1048	87	1147	89
Fresenius disconnect	0	0	0	0	11	1	154	13	145	11
Others	0	0	1	0	0	0	3	0	0	0
TOTAL	237	100	440	100	737	100	1205	100	1292	100
CAPD Connectology	2005		2006		2007		2008		2009	
	No.	%	No.	%	No.	%	No.	%	No.	%
Baxter disconnect	1286	92	1425	92	1675	94	1955	94	2011	92
Fresenius disconnect	111	8	119	8	116	6	124	6	173	8
Others	0	0	5	0	0	0	4	0	0	0
TOTAL	1397	100	1549	100	1791	100	2083	100	2184	100

Table 12.1.3: PD Number of Exchanges per day, 2000-2009

No. of Exchanges/ day	2000		2001		2002		2003		2004	
	No.	%	No.	%	No.	%	No.	%	No.	%
2	2	0	1	0	0	0	4	0	6	0
3	1	0	5	1	11	1	14	1	12	1
4	624	96	735	95	834	96	1136	96	1225	95
5	23	4	31	4	28	3	32	3	52	4
TOTAL	650	100	772	100	873	100	1186	100	1295	100
No. of Exchanges/ day	2005		2006		2007		2008		2009	
	No.	%	No.	%	No.	%	No.	%	No.	%
2	3	0	4	0	2	0	3	0	3	0
3	25	2	55	4	40	2	54	3	87	4
4	1280	94	1359	91	1566	91	1728	86	1788	85
5	48	4	76	5	123	7	216	11	233	11
TOTAL	1356	100	1494	100	1731	100	2001	100	2111	100

Table 12.1.4: PD Volume per Exchange, 2000-2009

Volume per Exchange (L)	2000		2001		2002		2003		2004	
	No.	%	No.	%	No.	%	No.	%	No.	%
<1.5	25	4	32	4	37	4	41	4	42	3
1.5-1.9	0	0	0	0	0	0	0	0	0	0
2.0	595	95	711	95	793	94	1088	94	1154	92
>2.0	5	1	9	1	14	2	31	3	60	5
TOTAL	625	100	752	100	844	100	1160	100	1256	100

Volume per Exchange (L)	2005		2006		2007		2008		2009	
	No.	%	No.	%	No.	%	No.	%	No.	%
<1.5	55	4	50	3	46	2	56	3	60	3
1.5-1.9	0	0	0	0	0	0	0	0	0	0
2.0	1195	89	1315	88	1508	88	1756	88	1803	88
>2.0	92	7	135	9	167	10	189	9	189	9
TOTAL	1342	100	1500	100	1721	100	2001	100	2052	100

SECTION 12.2: ACHIEVEMENT OF SOLUTE CLEARANCE AND PERITONEAL TRANSPORT

Eighty one percent of PD patients achieved the KDOQI target Kt/V of ≥1.7 per week with a median Kt/V of 2.0 (Table 12.2.1). Comparison between PD centres according to the percentage of patients in each centre achieving this target Kt/V has shown a 1.5-fold variation between the highest- and lowest-performing centres (97% vs 63%). The median percentage of patients achieving target Kt/V was 83%. Approximately half of the total 21 PD centres achieved the target Kt/V of ≥1.7 in 83% or more of their patients (Figure 12.2.1 and Table 12.2.2).

Majority of the incident (71%) and prevalent patient (73%) have a low- and high-average peritoneal transport status (Table 12.2.3). Less than 20% of the prevalent PD patient developed high transport peritoneal membrane characteristic over time (Table 12.2.4). There is no apparent association between co-morbidities (cardiovascular disease and diabetes) with patients' peritoneal membrane characteristics (Table 12.2.5).

Table 12.2.1: Distribution of delivered Kt/V, PD patients 2003-2009

Year	No. of Subjects	Mean	SD	Median	LQ	UQ	% patients ≥ 1.7 per week
2003	763	2.1	0.5	2.1	1.8	2.5	83
2004	1038	2.1	0.5	2.1	1.8	2.4	85
2005	1092	2.1	0.5	2.1	1.8	2.4	83
2006	1266	2.1	0.5	2.1	1.8	2.4	84
2007	1412	2.1	0.5	2.1	1.8	2.4	83
2008	1679	2.1	0.5	2	1.8	2.4	82
2009	1836	2.1	0.5	2	1.8	2.4	81

Figure 12.2.1: Cumulative distribution of delivered Kt/V, PD patients 2003-2009

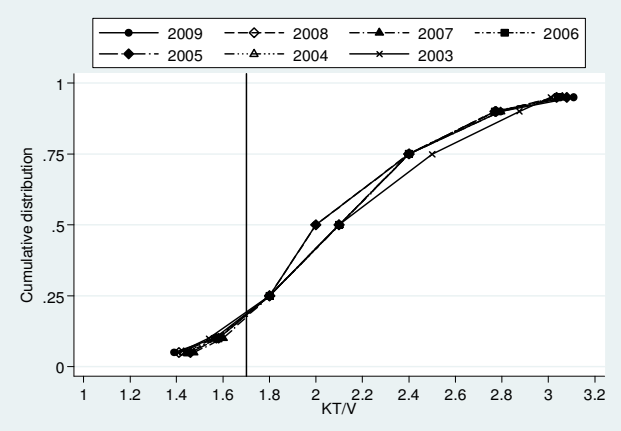

Table 12.2.2: Variation in proportion of patients with Kt/V ≥1.7 per week among PD centres, 2003-2009

Year	No. of centres	Min	5th Centile	LQ	Median	UQ	95th Centile	Max
2003	14	0	0	75	82.5	88	91	91
2004	17	75	75	79	85	88	100	100
2005	18	56	56	75	85	89	96	96
2006	20	66	66	78	82.5	91.5	100	100
2007	21	25	69	78	85	89	93	93
2008	20	33	50.5	76.5	80	89	93.5	96
2009	21	48	63	76	83	89	97	100

Figure 12.2.2: Variation in proportion of patients with Kt/V ≥1.7 per week among PD centres 2009

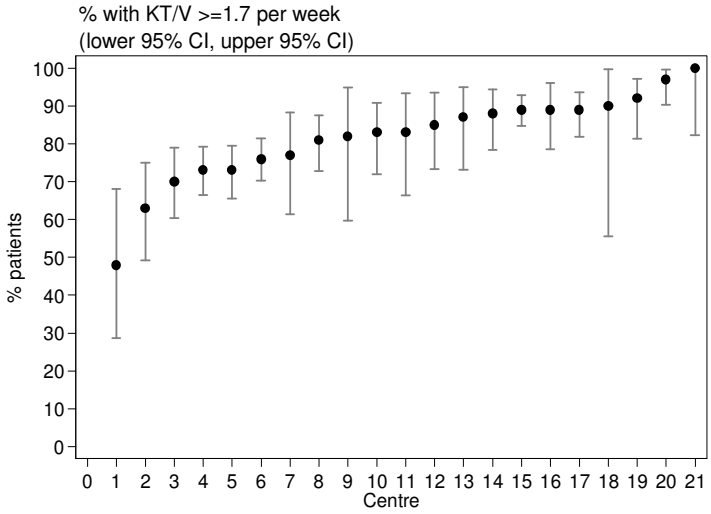

Table 12.2.3: Peritoneal transport status by PET D/P creatinine at 4 hours, new PD patients 2003-2009

Year	2003		2004		2005		2006		2007		2008		2009	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Low	10	6	67	15	69	12	105	12	106	10	151	13	196	14
Low average	85	51	187	41	246	41	359	42	429	42	500	42	557	39
High average	62	37	176	38	223	37	315	37	392	38	415	35	478	34
High	11	7	29	6	62	10	75	9	95	9	114	10	186	13
TOTAL	168	100	459	100	600	100	854	100	1022	100	1180	100	1417	100

Table 12.2.4: Peritoneal transport status by PET D/P creatinine at 4 hours, prevalent PD patients 2003-2009

Year	2003		2004		2005		2006		2007		2008		2009	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Low	10	3	39	9	44	13	23	8	19	10	19	14	10	10
Low average	174	44	180	42	130	39	106	38	65	34	43	31	36	37
High average	171	43	168	39	118	35	106	38	78	41	50	36	33	34
High	39	10	41	10	42	13	41	15	28	15	25	18	18	19
TOTAL	394	100	428	100	334	100	276	100	190	100	137	100	97	100

Table 12.2.5: Association among PET and co-morbidity, 2003-2009

Co morbidity	Low		Low Average		High Average		High	
	No.	%	No.	%	No.	%	No.	%
No CVD	591	13	1902	42	1628	36	430	9
CVD	113	10	461	40	433	38	142	12
No DM	443	14	1355	42	1132	35	288	9
DM	261	11	1008	41	929	37	284	11

SECTION 12.3: TECHNIQUE SURVIVAL ON PD

There was no change in the technique survival in PD compared to HD over the years. PD consistently has poorer technique survival compared to HD beginning as early as 6 months. One-, three-and five-year technique survival for PD was 80%, 48% and 30% respectively as compared to 88%, 70% and 55% for HD (Table and Figure 12.3.1(a)). Median technique survival time was less than 36 months. Overall these trends in technique survival are unchanged by year of entry (Table and Figure 12.3.2).

Analysis of the data according to two different eras (2000-2004 and 2005-2009) shows that there has been no improvement in technique survival in the last part of the decade as compared with the first half. (Table and Figure 12.3.1(b)). However in the diabetic subpopulation, patients with diabetes in the latter era appear to have better technique survival compared to the former era starting from as early as 6 months (Table and Figure 12.3.1(c)). The best technique survival was seen in the age group <14 years while the oldest age group (>65 years) consistently had the worst technique survival (Table and Figure 12.3.3). There was no association of gender with technique survival (Table and Figure 12.3.4).Diabetics consistently have a poorer technique survival than non-diabetics (Table and Figure 12.3.5). After 36 months there was a clear separation in survival curves according to solute clearance. Patients with Kt/V $\geq$1.7 have better technique survival compared to patients with Kt/V $\geq$1.7 (Table and Figure 12.3.6).

Increasing age, diabetes, peritonitis episodes, cardiovascular disease, low serum albumin, low BMI, abnormal lipid profile, serum Hb less than 10g/dL and assisted PD are associated with an increased risk for change of modality (Table 12.3.7). The commonest reason for PD drop-out was peritonitis (42%), followed by patient preference (18%) and membrane failure (17%) (Table 12.3.8).

Table 12.3.1(a): Unadjusted technique survival by Dialysis modality, 2000-2009

Dialysis Modality Interval (month)	PD			HD			All dialysis		
	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE
0	4367	100	-	28723	100	-	33090	100	-
6	3671	90	0	25173	94	0	28844	93	0
12	2948	80	1	21518	88	0	24466	87	0
24	1897	63	1	15766	78	0	17663	76	0
36	1142	48	1	11403	70	0	12545	67	0
48	702	37	1	8009	62	0	8711	59	0
60	452	30	1	5552	55	0	6004	52	0
72	279	24	1	3673	49	0	3950	46	0
84	131	17	1	2285	44	0	2415	40	0
96	62	14	1	1247	39	1	1308	36	0
108	19	10	1	520	35	1	538	32	1
120	-	-	-	-	-	-	-	-	-

Figure 12.3.1(a): Unadjusted technique survival by Dialysis modality, 2000-2009

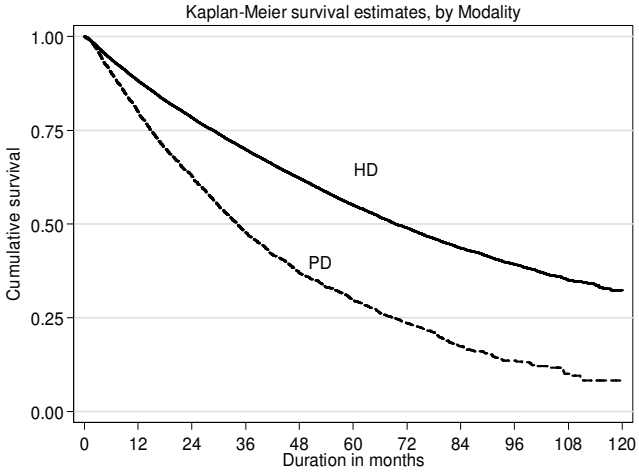

Table 12.3.1(b): Unadjusted technique survival by era 2000–2004 and 2005–2009

Era	2000 – 2004			2005 – 2009		
Interval (month)	No.	% Survival	SE	No.	% Survival	SE
0	1697	100	-	2670	100	-
6	1523	90	1	2150	90	1
12	1344	80	1	1604	79	1
24	1029	63	1	868	62	1
36	762	47	1	380	48	1
48	579	36	1	124	38	2
60	452	29	1	-	-	-
72	279	23	1	-	-	-
84	131	17	1	-	-	-
96	62	13	1	-	-	-
108	19	10	1	-	-	-
120	-	-	-	-	-	-

Figure 12.3.1(b): Unadjusted technique survival by era 2000 – 2004 and 2005 – 2009

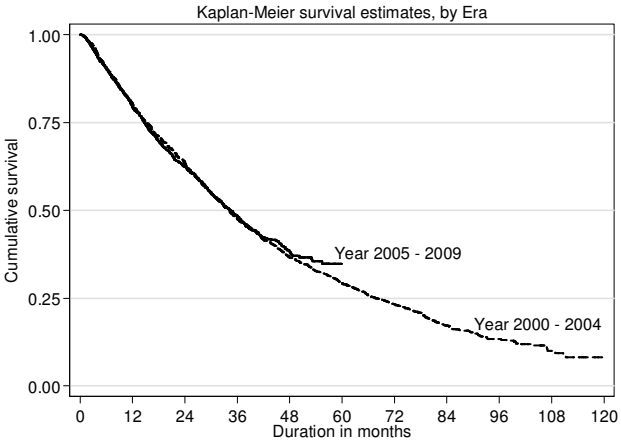

Figure 12.3.1(c): Unadjusted technique survival of by Diabetes Status in era 2000 – 2004 and 2005 – 2009

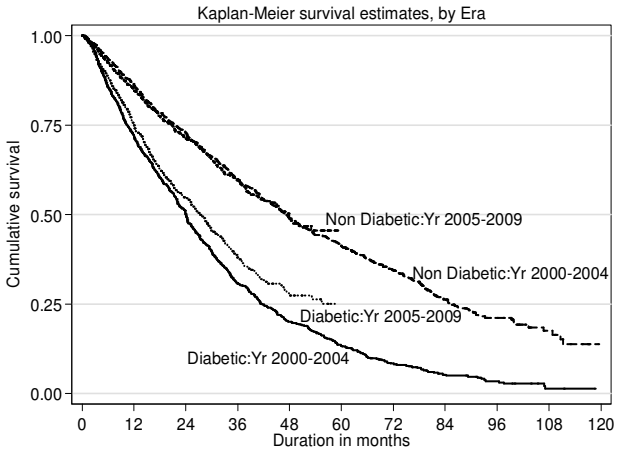

Table 12.3.1(c): Unadjusted technique survival of by Diabetes Status in era 2000 – 2004 and 2005 – 2009

Diabetic Era	Non Diabetic 2000-2004			Diabetic 2000–2004			Non Diabetic 2005–2009			Diabetic 2005–2009		
Interval (month)	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE
0	992	100	-	705	100	-	1255	100	-	1415	100	-
6	921	94	1	603	86	1	1029	92	1	1124	88	1
12	836	86	1	508	72	2	792	85	1	818	75	1
24	679	73	1	351	50	2	458	71	2	411	55	2
36	549	60	2	214	31	2	237	60	2	143	38	2
48	440	49	2	140	20	2	80	50	2	45	27	2
60	362	41	2	92	13	1	-	-	-	-	-	-
72	236	34	2	44	8	1	-	-	-	-	-	-
84	112	26	2	20	5	1	-	-	-	-	-	-
96	52	21	2	11	3	1	-	-	-	-	-	-
108	17	17	2	3	1	1	-	-	-	-	-	-
120	-	-	-	-	-	-	-	-	-	-	-	-

Table 12.3.2: Unadjusted technique survival by year of entry, 2000-2009

Year Interval (month)	2000			2001			2002			2003			2004		
	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE
0	227	100	-	337	100	-	373	100	-	420	100	0	340	100	-
6	206	91	2	303	90	2	343	92	1	371	89	2	303	90	2
12	185	81	3	266	80	2	294	80	2	334	80	2	268	80	2
24	138	63	3	198	61	3	229	64	3	255	63	2	214	66	3
36	101	46	3	152	47	3	167	48	3	183	45	2	163	51	3
48	78	36	3	108	34	3	128	37	3	143	36	2	126	39	3
60	67	31	3	79	26	2	97	29	2	110	28	2	103	33	3
72	47	22	3	65	21	2	79	24	2	90	23	2	-	-	-
84	36	18	3	47	15	2	50	17	2	-	-	-	-	-	-
96	27	14	2	36	12	2	-	-	-	-	-	-	-	-	-
108	19	10	2	-	-	-	-	-	-	-	-	-	-	-	-
120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Year Interval (month)	2005			2006			2007			2008			2009		
	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE
0	362	100	-	463	100	-	591	100	-	643	100	-	611	100	-
6	323	89	2	428	93	1	527	89	1	574	90	1	302	90	1
12	280	79	2	371	81	2	463	80	2	491	77	2	-	-	-
24	220	63	3	280	63	2	369	64	2	-	-	-	-	-	-
36	162	48	3	217	49	2	-	-	-	-	-	-	-	-	-
48	124	37	3	-	-	-	-	-	-	-	-	-	-	-	-
60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Figure 12.3.2: Unadjusted technique survival by year of entry, 2000-2009

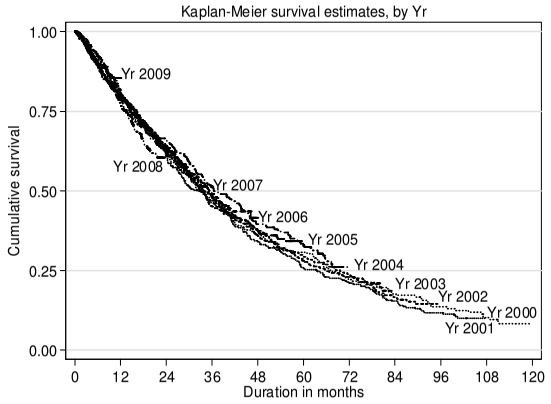

Table 12.3.3: Unadjusted technique survival by age, 2000-2009

Age group (years) Interval (month)	<=14 No.	<=14 % Survival	<=14 SE	15-24 No.	15-24 % Survival	15-24 SE	25-34 No.	25-34 % Survival	25-34 SE	35-44 No.	35-44 % Survival	35-44 SE
0	301	100	-	387	100	-	362	100	-	542	100	-
6	266	96	1	337	93	1	317	93	1	474	93	1
12	231	92	2	283	86	2	255	85	2	398	85	2
24	171	84	2	196	74	2	179	71	3	284	71	2
36	114	69	3	133	62	3	123	62	3	191	58	2
48	83	61	4	95	54	3	77	50	3	124	47	3
60	55	53	4	64	44	3	52	43	4	83	37	3
72	39	44	4	41	38	4	34	35	4	61	32	3
84	23	36	5	21	31	4	13	25	4	37	26	3
96	10	28	5	10	21	5	7	20	5	21	23	3
108	3	24	6	4	21	5	2	10	6	9	21	3
120	-	-	-	-		-	-	-	-	-	-	-

Age group (years) Interval (month)	45-54 No.	45-54 % Survival	45-54 SE	55-64 No.	55-64 % Survival	55-64 SE	>=65 No.	>=65 % Survival	>=65 SE
0	962	100	-	1038	100	-	775	100	-
6	830	91	1	866	89	1	589	83	1
12	676	81	1	689	78	1	420	67	2
24	436	61	2	421	58	2	217	47	2
36	274	45	2	220	40	2	92	30	2
48	168	34	2	119	28	2	42	18	2
60	112	28	2	68	21	2	24	13	2
72	59	20	2	39	15	2	11	10	2
84	27	15	2	13	9	2	4	4	2
96	13	10	2	5	6	2	2	4	2
108	5	9	2	-	-	-	-	-	-
120	-	-	-	-	-	-	-	-	-

Figure 12.3.3: Unadjusted technique survival by age, 2000-2009

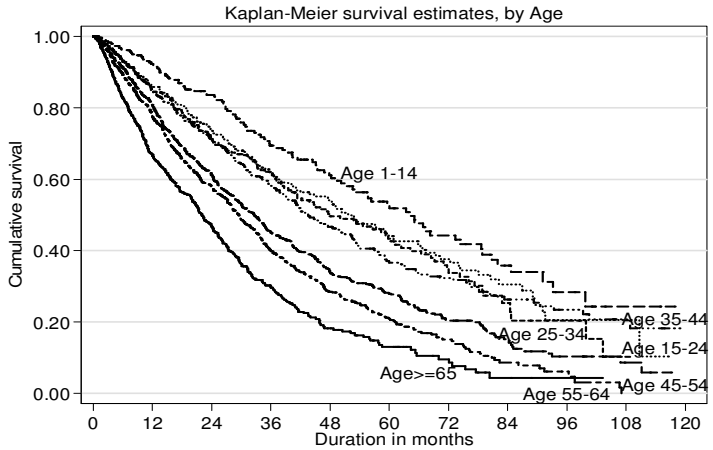

Table 12.3.4: Unadjusted technique survival by Gender, 2000-2009

Gender		Male			Female	
Interval (months)	No.	% survival	SE	No.	% survival	SE
0	2194	100	-	2173	100	-
6	1859	91	1	1815	90	1
12	1484	80	1	1464	80	1
24	936	63	1	961	63	1
36	553	47	1	589	48	1
48	331	34	1	373	39	1
60	195	26	1	259	33	1
72	122	20	1	158	27	1
84	53	14	1	79	21	2
96	22	10	1	41	17	2
108	5	6	2	15	14	2
120	-	-	-	-	-	-

Figure 12.3.4: Unadjusted technique survival by Gender, 2000-2009

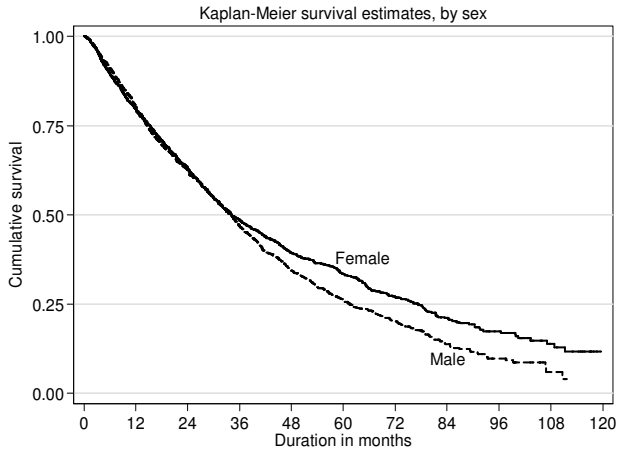

Figure 12.3.5: Unadjusted technique survival by Diabetes status, 2000-2009

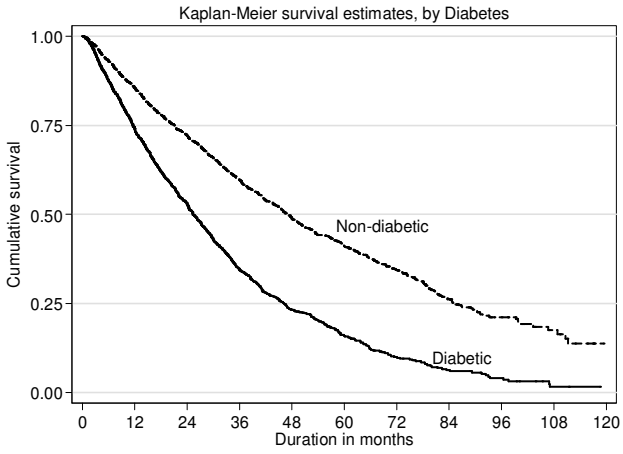

Table 12.3.5: Unadjusted technique survival by Diabetes status, 2000-2009

Diabetes status		Non-Diabetic			Diabetic	
Interval (month)	No.	% survival	SE	No.	% survival	SE
0	2247	100	-	2120	100	-
6	1948	93	1	1726	87	1
12	1622	85	1	1326	74	1
24	1136	72	1	761	53	1
36	786	60	1	356	34	1
48	519	49	1	184	23	1
60	362	41	1	92	16	1
72	236	34	1	44	10	1
84	112	26	2	20	6	1
96	52	21	2	11	4	1
108	17	17	2	3	2	1
120	-	-	-	-	-	-

Table 12.3.6 Unadjusted technique survival by Kt/V, 2000-2009

Kt/V Interval (months)	<1.7			1.7-2.0			>2.0		
	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE
0	1574	100	-	2378	100	-	5078	100	-
6	1519	98	0	2328	99	0	4930	99	0
12	1403	94	1	2197	96	0	4610	96	0
24	1170	86	1	1830	88	1	3825	87	0
36	889	74	1	1452	78	1	2898	76	1
48	689	63	1	1070	68	1	2166	67	1
60	492	51	1	797	59	1	1667	60	1
72	306	40	2	601	51	1	1218	54	1
84	169	30	2	352	41	1	764	45	1
96	102	26	2	209	33	1	497	38	1
108	65	19	2	108	26	2	321	32	1
120	46	17	2	55	19	2	198	26	1

Figure 12.3.6 Unadjusted technique survival by Kt/V, 1999 -2009

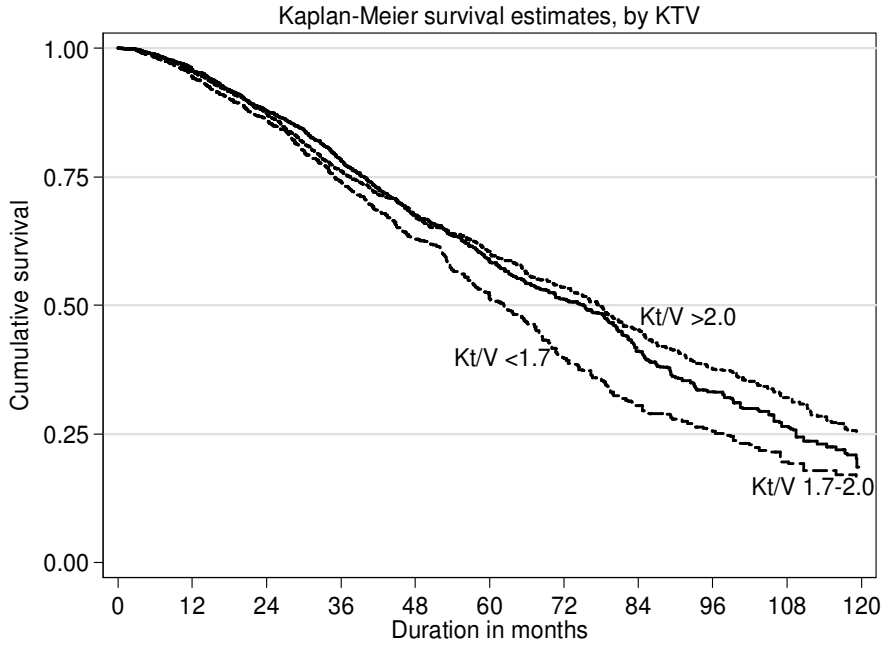

Table 12.3.7: Adjusted hazard ratio for change of modality, 2000-2009

Factors	No.	Hazard Ratio	95% CI	p value
Age (years):				
Age 1-14 (ref*)	301	1.00		
Age 15-24	387	1.60	(1.13; 2.26)	0.009
Age 25-34	362	1.78	(1.23; 2.56)	0.002
Age 35-44	542	2.10	(1.48; 2.98)	0.000
Age 45-54	962	2.58	(1.85; 3.61)	0.000
Age 55-64	1,038	3.10	(2.22; 4.32)	0.000
Age >=65	775	3.91	(2.76; 5.54)	0.000
Peritonitis				
No (ref*)	4,054	1.00		
Yes	313	2.97	(2.52; 3.49)	0.000
Diabetes Mellitus				
Non-diabetic (ref*)	2,247	1.00		
Diabetic	2,120	1.56	(1.36; 1.79)	0.000
Gender				
Maleref	2,194	1.00		
Female	2,173	0.84	(0.75; 0.95)	0.005
Cardiovascular Disease:				
No CVD (ref*)	3,397	1.00		
CVD	970	1.21	(1.06; 1.39)	0.006
BMI:				
<18.5	618	1.44	(1.20; 1.74)	0.000
18.5-<25 (ref*)	2,269	1.00		
>=25	1,480	0.87	(0.77; 0.98)	0.021
Serum Albumin:				
<30	1,172	1.95	(1.68; 2.26)	0.000
30-<35	1,693	1.23	(1.07; 1.41)	0.003
35-<45 (ref*)	1,124			
>=45	378	1.06	(0.39; 2.85)	0.912
Serum Cholesterol:				
<3.2	81	1.78	(1.22; 2.60)	0.003
3.2-<5.2 (ref*)	2,150	1.00		
>=5.2	2,136	1.11	(0.99; 1.24)	0.077
Diastolic BP:				
<70	548	1.07	(0.88; 1.29)	0.509
70-<80	1,484	0.92	(0.81; 1.05)	0.243
80-<90 (ref*)	1,752	1.00		
90-<100	508	1.27	(1.05; 1.53)	0.014
>=100	75	2.19	(1.41; 3.39)	0.000
Hemoglobin:				
<8	214	1.63	(1.21; 2.18)	0.001
8-<9	486	1.85	(1.50; 2.27)	0.000
9-<10	1,012	1.36	(1.15; 1.61)	0.000
10-<11	1,393	1.01	(0.86; 1.19)	0.886
11-<12 (ref*)	821	1.00		
>=12	441	1.01	(0.80; 1.26)	0.964
Serum Calcium:				
<2.2	1,615	0.91	(0.80; 1.04)	0.167
2.2-<2.6 (ref*)	2,614	1.00		
>=2.6	138	2.49	(1.77; 3.51)	0.000
Calcium Phosphate product:				
<3.5	2,417	1.48	(1.21; 1.80)	0.000
3.5-<4.5 (ref*)	1,287	1.00		
4.5-<5.5	480	0.87	(0.68; 1.12)	0.273
>=5.5	183	0.64	(0.39; 1.05)	0.077
Serum Phosphate:				
<1.6 (ref*)	2,563	1.00		
1.6-<2.0	1,189	1.08	(0.88; 1.32)	0.474
2.0-<2.2	272	1.41	(1.00; 1.99)	0.051
2.2-<2.4	145	1.45	(0.95; 2.23)	0.089
2.4-<2.6	110	1.57	(0.90; 2.72)	0.109
>=2.6	88	2.64	(1.38; 5.05)	0.003
Kt/V:				
<=1.7 (ref*)	610	1.00		
>1.7	2,738	0.80	(0.70; 0.92)	0.002
Assisted PD:				
Selfcare (ref*)	2,402	1.00		
Assisted	1,865	1.25	(1.10; 1.42)	0.001

Table 12.3.8 Reasons for change of dialysis modality to HD, 2000-2009

Cause	No.	Percentage
Peritonitis	395	42
Catheter related infection	32	4
Membrane failure	165	17
Technical problem	78	8
Patient preference	175	18
Others	69	7
Unknown	41	4
Total	955	100

SECTION 12.4: PERITONITIS

The median peritonitis rate among the PD centres has dropped to 38.3 pt-months per episode compared to the previous year (Table 12.4.1). There was a wide inter-centre variation with the highest and lowest peritonitis rates of 14 and 247.4 pt-months per episode. Gram-positive organisms accounted for 29% of the peritonitis episodes while 32% were due to gram negative organisms. The commonest organism for gram positive peritonitis was staphylococcus aureus (16%) and Staphyloccal coagulase negative (9%). Meanwhile, pseudomonas aeruginosa (14%) and E.coli was the commonest organism (7%) for gram negative peritonitis. Fungal organisms accounted for 5% of cases. The culture negative rate continues to show a slow but steady reduction over the years, with the present rate at 29% (Table 12.4.2).

Catheter removal rate was highest in fungal infection (61%), followed by pseudomonas aeruginosa (27%) infection (Table 12.4.3). Mortality was highest for mycobacterial infections. There were no statistically significant identifiable risk factors influencing the peritonitis rate apart from an increasing number of years on PD therapy (Table 12.4.4).

Table 12.4.1 Variation in peritonitis rate (pt-month/epi) among PD centres, 2000- 2009

Year	No. of centres	Min	5th Centile	LQ	Median	UQ	95th Centile	Max
2000	12	11.7	11.7	18.7	24.1	32.5	1145.1	1145.1
2001	11	10.7	10.7	19.9	22.8	39.6	60.3	60.3
2002	14	12.6	12.6	20.4	30.5	42.4	219.2	219.2
2003	13	18	18	21.3	32.9	39.6	312.1	312.1
2004	15	0	0	23.6	32.8	36.6	41.5	41.5
2005	15	18	18	26.1	35.6	43	57.7	57.7
2006	21	14.8	18.5	26.8	37.4	49.7	62.2	97.7
2007	23	12	15.3	30.7	42	56.9	68.4	106.7
2008	25	12	13	29.4	40.1	58.9	110.4	123.8
2009	25	14	16.9	29.4	38.3	60.3	132	247.4

Figure 12.4.1 Variation in peritonitis rate among PD centres, 2009

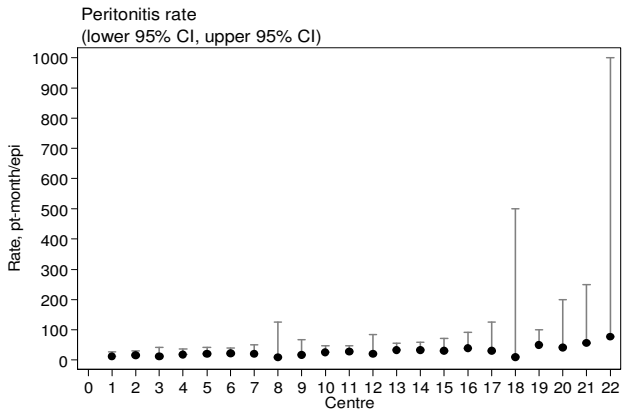

Table 12.4.2: Causative organism in PD peritonitis, 2000-2009

Microorganism	2000		2001		2002		2003		2004		2005		2006		2007		2008		2009	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
(A) Gram Positives																				
Staph. Aureus	35	11	40	13	62	17	45	12	52	14	39	12	51	14	47	13	74	12	118	16
Staph Coagulase Neg.	34	11	30	10	39	11	47	13	41	11	43	13	32	9	29	8	69	11	68	9
Strep	17	6	18	6	12	3	16	4	13	3	10	3	17	5	14	4	19	3	20	3
Others	4	1	10	3	8	2	16	4	4	1	8	2	14	4	11	3	9	1	8	1
(**B) Gram Negatives**																				
Pseudomonas	19	6	14	4	23	6	20	5	28	8	27	8	23	6	30	8	93	15	99	14
Acinetobacter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Klebsiella	10	3	7	2	18	5	27	7	25	7	21	7	8	2	21	6	24	4	21	3
Enterobacter	11	4	16	5	11	3	13	4	19	5	19	6	20	5	17	5	24	4	32	4
E.Coli	15	5	16	5	23	6	20	5	23	6	30	9	15	4	32	9	42	7	47	7
Others	9	3	17	5	15	4	15	4	16	4	17	5	14	4	14	4	22	4	29	4
(C) Polymicrobial	9	3	11	4	8	2	3	1	2	1	0	0	1	0	0	0	0	0	17	2
(D) Others																				
Fungal	19	6	21	7	12	3	12	3	15	4	7	2	16	4	20	5	29	5	33	5
Mycobacterium	6	2	4	1	1	0	3	1	4	1	2	1	4	1	1	0	4	1	1	0
Others	2	1	9	3	11	3	12	3	8	2	3	1	10	3	12	3	30	5	22	3
(E) No growth	119	39	99	32	118	33	115	32	123	33	96	30	142	39	122	33	179	29	201	28
TOTAL	309	100	312	100	361	100	364	100	373	100	322	100	367	100	370	100	618	100	716	100

Table 12.4.3: Outcome of peritonitis by Causative organism, 2000-2009

Causative Organism	Outcome							
	Resolved		Not resolved, catheter removed		Death		Total	
	No.	%	No.	%	No.	%	No.	%
(A) Gram Positives								
Staph. Aureus	285	54	76	14	170	32	531	100
Staph Coagulase Neg.	232	58	33	8	136	34	401	100
Strep	75	51	11	8	60	41	146	100
Others	37	44	8	10	39	46	84	100
(**B) Gram Negatives**								
Pseudomonas	152	45	91	27	98	29	341	100
Acinetobacter	0		0		0		0	100
Klebsiella	72	43	34	20	62	37	168	100
Enterobacter	71	40	42	24	63	36	176	100
E.Coli	109	44	55	22	86	34	250	100
Others	72	48	37	25	41	27	150	100
(C) Polymicrobial	12	24	12	24	25	51	49	100
(D) Others								
Fungal	20	11	109	61	50	28	179	100
Mycobacterium	1	3	12	41	16	55	29	100
Others	49	45	23	21	36	33	108	100
(E) No growth	638	51	171	14	437	35	1246	100

Table 12.4.4: Risk factor influencing peritonitis rate, 2000 -2009

Factors	No.	Risk Ratio	95% CI		P value
Age (years):					
<=14	217	0.93	(0.76;	1.13)	0.45
15-24	289	0.95	(0.79;	1.14)	0.57
25-34 (ref*)	268	1.00			
35-44	410	1.11	(0.94;	1.30)	0.21
45-54	698	1.11	(0.95;	1.30)	0.18
55-64	731	1.07	(0.91;	1.26)	0.43
>=65	463	1.00	(0.83;	1.22)	0.96
Gender:					
Male (ref*)	1,542	1.00			
Female	1,534	1.00	(0.92;	1.08)	0.98
Diabetes:					
No (ref*)	1,712	1.00			
Yes	1,364	1.01	(0.92;	1.11)	0.78
Income:					
RM 0-999 (ref*)	1,277	1.00			
RM 1000-1999	1,052	0.86	(0.79;	0.94)	0.00
RM 2000-2999	439	0.91	(0.80;	1.02)	0.11
>=3000	308	0.81	(0.70;	0.95)	0.01
Education:					
Nil	279	1.08	(0.92;	1.26)	0.34
Primary	1,088	1.11	(1.01;	1.21)	0.02
Secondary (ref*)	1,440	1.00			
Tertiary	269	0.80	(0.68;	0.94)	0.01
Assistance to perform CAPD:					
Self care (ref*)	1,807	1.00			
Partially assisted	428	0.92	(0.82;	1.05)	0.22
Completely assisted	841	0.94	(0.85;	1.05)	0.28
Year vintage:					
1 to < 2 (ref*)	1,853	1.00			
>2 to < 4	746	0.72	(0.66;	0.79)	0.00
> 4	477	0.52	(0.47;	0.57)	0.00