

## **CHAPTER 6**

# **Blood Pressure Control and Dyslipidaemia in Patients on Dialysis**

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## CHAPTER 6: BLOOD PRESSURE CONTROL AND DYSLIPIDAEMIA

### SECTION 6.1: BLOOD PRESSURE CONTROL ON DIALYSIS

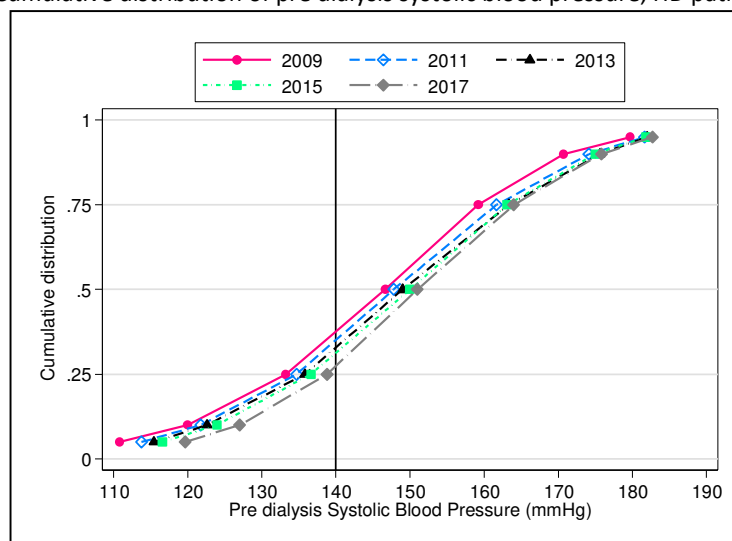
The control of pre dialysis systolic blood pressure (SBP) in haemodialysis (HD) patients has not improved over the last decade, with only 23% of HD patients achieving SBP < 140 mmHg (Table 6.1.1) in 2017. The mean and median pre dialysis SBP in HD patients in 2017 were at a relatively high figure of 153.6 mmHg and 153.7 respectively. Pre dialysis diastolic blood pressure (DBP) in HD patients was better controlled than pre dialysis SBP in 2017, with 84% of such patients achieving pre dialysis DBP < 90 mmHg (Table 6.1.2). The mean and median pre dialysis DBP in HD patients was satisfactory at 78.7 mmHg and 77.3 mmHg respectively in 2017. The mean pre dialysis DBP in HD patients decreased slightly from 79.8 mmHg in 2008 to 78.7 mmHg in 2017.

The fact that SBP is less well controlled compared to DBP is not unexpected given that most patients on dialysis are in the older age group and that the prevalence of systolic hypertension rises with increasing age above 50 years. In addition, DBP may fall with increasing arterial stiffness seen in aging, hypertension, diabetes mellitus and chronic kidney disease, as well as development of left ventricular dysfunction in some HD patients.

**Table 6.1.1:** Distribution of pre dialysis systolic blood pressure, HD patients 2008-2017

Year	Number of patients	Mean	SD	Median	LQ	UQ	% Patients <120 mmHg	% Patients 120-<140 mmHg	% Patients 140-<160 mmHg	% Patients 160-<180 mmHg	% Patients ≥180 mmHg
2017	41043	153.6	18.9	153.7	141.3	166.0	4	19	41	29	8
2016	36875	152.2	18.3	152.3	140.1	164.3	4	21	42	27	6
2015	34259	152.4	18.5	152.4	140.1	164.6	4	21	42	27	6
2014	31635	152.1	18.6	152.0	139.8	164.5	4	21	42	27	7
2013	28520	151.9	18.6	151.9	139.8	163.9	4	21	42	26	7
2012	25087	151.5	18.9	151.3	139.0	164.0	5	22	41	26	7
2011	21797	151.6	18.8	151.5	139.0	164.0	4	22	41	26	6
2010	19219	150.8	18.8	150.4	138.3	163.2	5	23	41	25	6
2009	17491	151.0	18.9	150.6	138.2	163.4	5	24	41	25	6
2008	15103	152.1	19.0	152.0	139.5	164.6	4	21	40	27	7

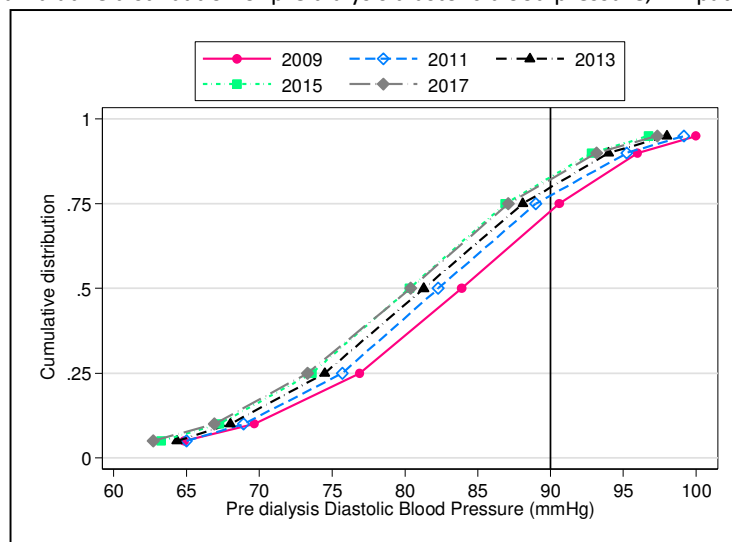
**Figure 6.1.1:** Cumulative distribution of pre dialysis systolic blood pressure, HD patients 2008-2017



**Table 6.1.2:** Distribution of pre dialysis diastolic blood pressure, HD patients 2008-2017

Year	Number of patients	Mean	SD	Median	LQ	UQ	%	%	%	%	%
							Patients <70 mmHg	Patients 70-<80 mmHg	Patients 80-<90 mmHg	Patients 90-<100 mmHg	Patients ≥100 mmHg
2017	41043	78.7	11.8	78.3	70.8	86.0	22	33	29	12	4
2016	36869	78.3	11.8	77.8	70.6	85.3	23	34	28	11	3
2015	34258	78.3	11.7	77.8	70.5	85.3	23	34	28	11	3
2014	31633	78.2	11.7	77.8	70.5	85.3	23	34	28	11	3
2013	28517	78.7	11.9	78.3	70.9	85.8	22	33	29	11	4
2012	25085	78.8	11.8	78.4	71.0	85.8	22	34	30	11	3
2011	21796	79.2	11.8	78.8	71.6	86.0	20	34	30	12	4
2010	19218	79.4	11.8	79.0	71.8	86.1	19	34	31	12	4
2009	17490	79.6	11.8	79.2	72.0	86.3	19	34	31	12	4
2008	15101	79.8	11.1	79.6	72.5	86.7	18	33	33	13	3

**Figure 6.1.2:** Cumulative distribution of pre dialysis diastolic blood pressure, HD patients 2008-2017

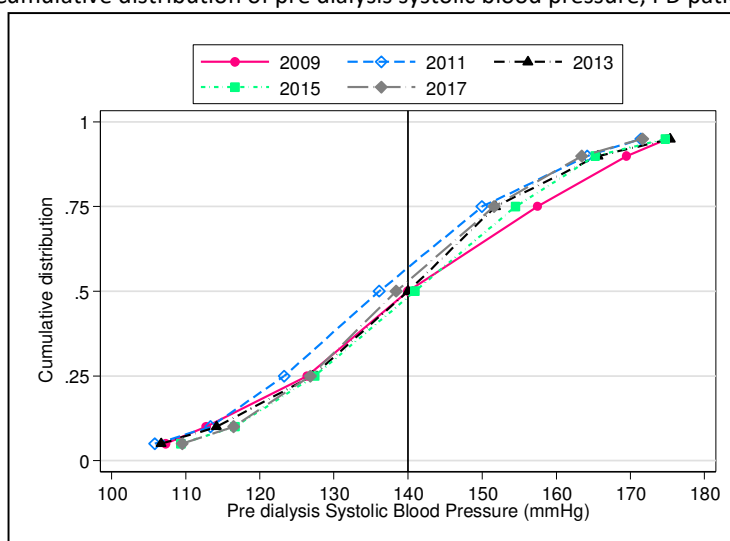


In contrast to HD patients, pre dialysis SBP in PD patients has been better controlled consistently over the last decade. In 2017, 38% of PD patients versus 23% of HD patients had a pre dialysis SBP < 140 mmHg (Table 6.1.3). The mean and median pre dialysis SBP in PD patients were lower than HD patients at 145.4 mmHg and 145.3 mmHg respectively. However, the mean pre dialysis SBP in PD patients over the past 10 years has crept up from 139.4 mmHg in 2008 to 145.4 mmHg in 2017, as illustrated in Table 6.1.3. Pre dialysis DBP is well controlled with 79% of PD patients in 2017 achieving pre dialysis DBP < 90 mmHg (Table 6.1.4).

**Table 6.1.3:** Distribution of pre dialysis systolic blood pressure, PD patients 2008-2017

Year	Number of patients	Mean	SD	Median	LQ	UQ	% Patients <120 mmHg	% Patients 120-<140 mmHg	% Patients 140-<160 mmHg	% Patients 160-<180 mmHg	% Patients ≥180 mmHg
2017	4861	145.4	18.4	145.3	133.1	158.0	8	30	40	19	3
2016	4324	144.4	18.6	144.6	132.0	156.7	10	30	40	18	3
2015	4002	143.6	17.7	143.6	132.1	155.7	9	32	42	16	2
2014	3522	143.9	18.4	144.2	131.7	156.8	10	31	41	17	2
2013	2926	142.0	18.3	141.9	130.1	154.3	11	34	39	14	2
2012	2712	141.1	18.2	141.3	128.7	153.0	12	34	38	14	2
2011	2504	140.0	17.9	140.1	128.2	151.8	13	36	38	11	2
2010	2312	140.0	17.8	140.0	128.4	151.4	12	37	38	11	2
2009	2169	140.6	18.7	140.5	128.1	153.4	13	35	35	14	2
2008	2038	139.4	18.7	139.5	126.7	151.5	15	36	35	12	2

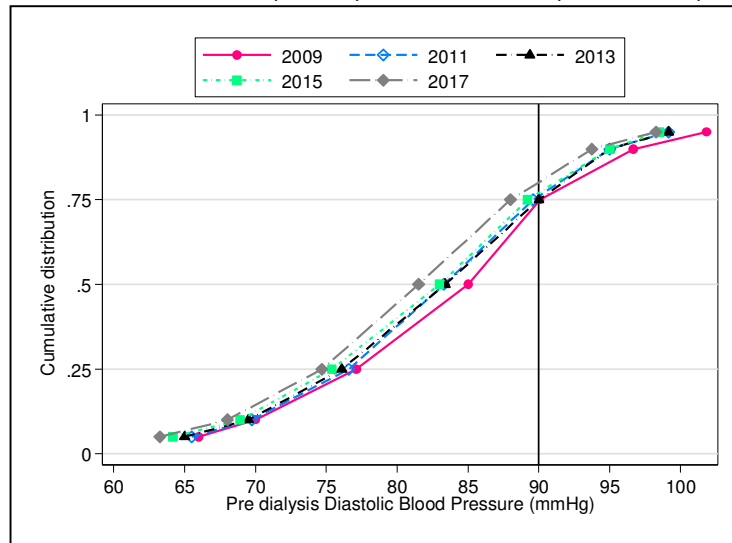
**Figure 6.1.3:** Cumulative distribution of pre dialysis systolic blood pressure, PD patients 2008-2017



**Table 6.1.4:** Distribution of pre dialysis diastolic blood pressure, PD patients 2008-2017

Year	Number of patients	Mean	SD	Median	LQ	UQ	% Patients <70 mmHg	% Patients 70-<80 mmHg	% Patients 80-<90 mmHg	% Patients 90-<100 mmHg	% Patients ≥100 mmHg
2017	4861	81.7	10.5	81.7	75.0	88.3	12	30	37	16	4
2016	4313	81.1	11.2	80.8	74.1	87.8	14	32	35	14	4
2015	3992	80.9	10.8	80.7	74.0	87.0	14	33	36	13	4
2014	3507	81.1	11.6	80.8	74.1	87.5	14	32	35	14	4
2013	2919	80.6	10.9	80.7	73.6	87.6	15	32	35	15	4
2012	2715	81.2	12.1	80.8	73.8	87.8	15	31	35	15	4
2011	2504	79.9	10.3	80.0	73.3	86.7	16	34	36	13	2
2010	2312	79.9	10.3	80.0	72.9	86.8	17	33	34	13	3
2009	2169	80.1	10.4	80.2	73.5	86.9	15	33	34	14	3
2008	2038	79.7	10.1	80.0	73.0	86.3	16	32	36	13	2

**Figure 6.1.4:** Cumulative Distribution of pre dialysis diastolic blood pressure, PD patients 2008-2017

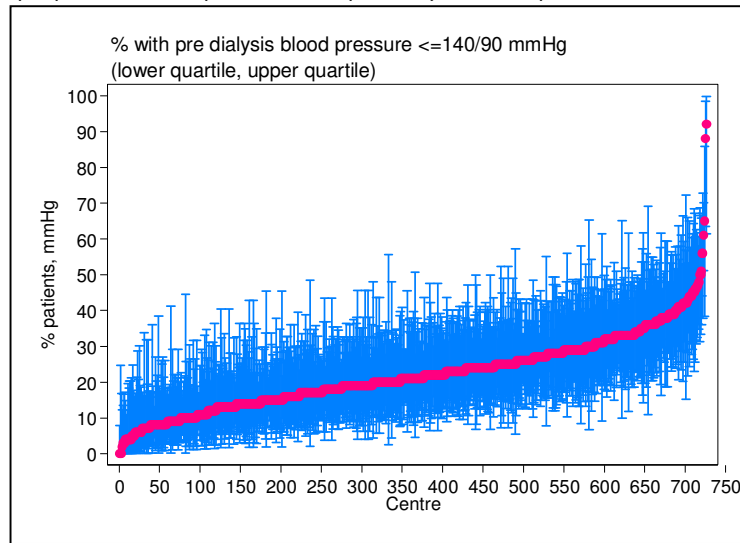


Overall, there is a wide inter-centre variation amongst haemodialysis centres in 2017 in terms of the proportion of patients achieving pre dialysis BP < 140/90 (Table & Figure 6.1.5a).

**Table 6.1.5(a):** Proportion of HD patients with pre dialysis blood pressure  $\leq 140/90$  mmHg, HD centres 2008-2017

Year	Number of centres	Min	5 <sup>th</sup> Centile	LQ	Median	UQ	95 <sup>th</sup> Centile	Max
2017	726	0	7	15.0	21.0	28.0	40	92
2016	696	0	7	16.0	23.0	30.5	44	92
2015	674	0	8	15.0	22.0	31.0	44	88
2014	646	0	8	16.0	23.0	31.0	47	93
2013	610	0	6	16.0	23.0	31.0	46	93
2012	559	0	8	17.0	24.0	33.0	48	86
2011	497	0	7	17.0	24.0	33.0	50	94
2010	443	0	9	17.0	26.0	34.0	50	87
2009	402	0	9	19.0	27.0	35.0	50	82
2008	358	0	8	17.0	24.0	33.0	50	79

**Figure 6.1.5(a):** Variation in proportion of HD patients with pre dialysis blood pressure  $\leq 140/90$  mmHg, HD centres 2017

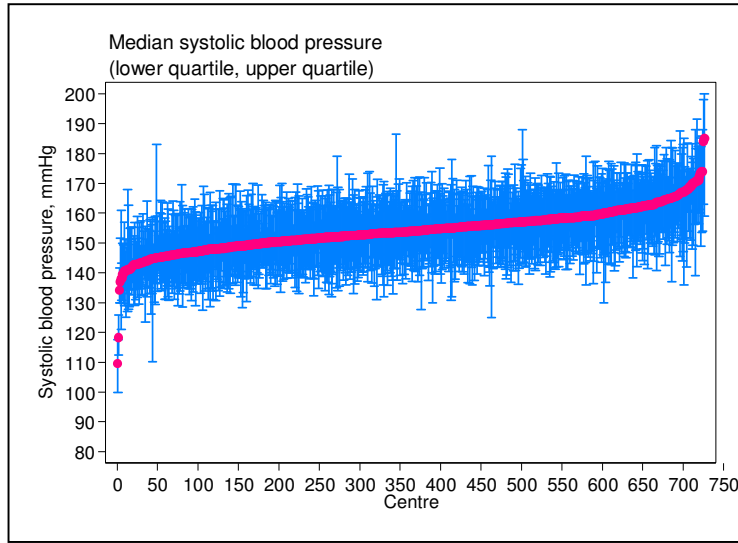


There is also significant inter-centre variation in both median SBP and DBP in HD patients in 2017 (Figures 6.1.5 b and c). In 2017, the difference between the HD centres with the 5<sup>th</sup> percentile and 95<sup>th</sup> percentile median BP was 21.5 mmHg for SBP (Table 6.1.5b) and 15.8 mmHg for DBP (Table 6.1.5c) respectively.

**Table 6.1.5(b):** Median systolic blood pressure among HD patients, HD centres 2008-2017

Year	Number of centres	Min	5 <sup>th</sup> Centile	LQ	Median	UQ	95 <sup>th</sup> Centile	Max
2017	726	109.5	143.9	150.0	153.9	158.2	165.4	185.0
2016	697	118.1	141.8	148.6	152.5	157.0	163.3	171.4
2015	674	118.3	142.0	148.5	153.1	157.5	164.3	175.8
2014	646	116.5	140.6	147.7	152.1	157.1	164.1	172.1
2013	610	125.6	141.7	148.3	152.6	157.1	164.6	177.0
2012	559	125.8	140.5	147.8	151.8	156.3	163.3	172.2
2011	497	123.1	139.5	147.3	151.5	156.7	163.9	176.0
2010	443	123.7	140.4	146.5	150.7	155.6	161.5	172.1
2009	402	121.7	139.9	146.4	151.1	155.5	162.3	170.5
2008	358	129.3	140.7	147.6	152.4	156.9	164.5	172.5

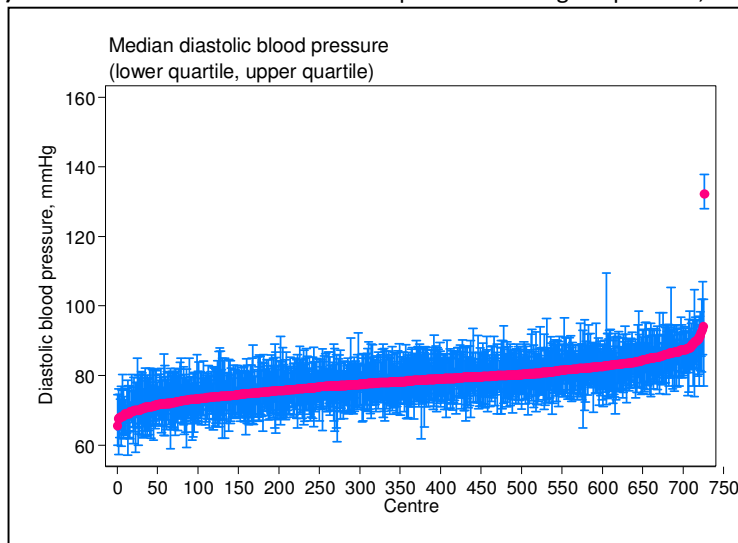
**Figure 6.1.5(b):** Variation in median systolic blood pressure among HD patients, HD centres 2017



**Table 6.1.5(c):** Median diastolic blood pressure among HD patients, HD centres 2008-2017

Year	Number of centres	Min	5 <sup>th</sup> Centile	LQ	Median	UQ	95 <sup>th</sup> Centile	Max
2017	726	65.5	70.9	75.2	78.5	81.3	86.7	132.2
2016	696	63.8	71.0	75.0	77.9	81.0	85.8	135.4
2015	674	64.7	70.6	75.1	78.1	81.0	85.9	97.0
2014	646	64.7	70.5	74.7	77.9	80.8	85.4	122.7
2013	610	61.8	70.7	75.4	78.3	81.6	86.3	129.8
2012	559	66.3	71.3	75.7	78.5	81.3	86.8	124.2
2011	497	62.5	72.8	76.2	78.6	81.6	85.8	143.3
2010	443	67.8	72.8	76.4	79.1	82.0	86.3	142.8
2009	402	68.5	73.1	76.8	79.2	82.0	85.9	135.0
2008	358	66.3	73.2	76.9	79.8	82.4	87.1	96.7

**Figure 6.1.5(c):** Variation in median diastolic blood pressure among HD patients, HD centres 2017

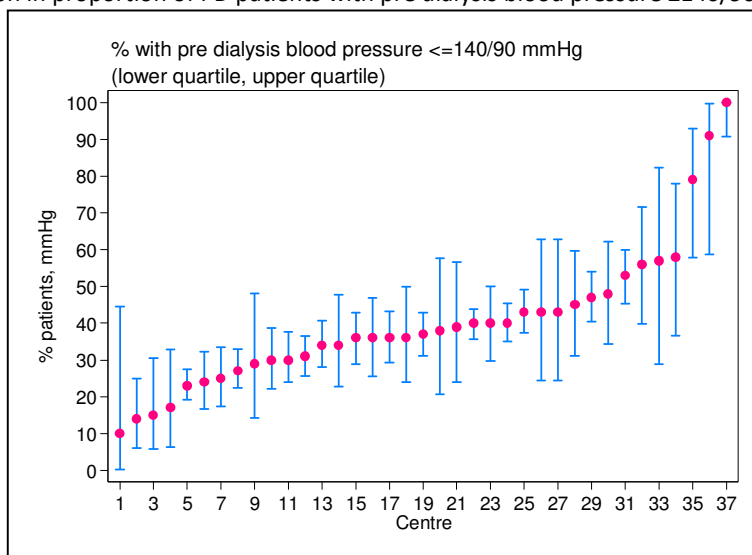


Similar to haemodialysis centres, there was also a wide variation amongst PD centres in the proportion of patients achieving BP < 140/90 in 2017 (Table & Figure 6.1.6a).

**Table 6.1.6(a):** Proportion of PD patients with pre dialysis blood pressure ≤140/90 mmHg, PD centres 2008-2017

Year	Number of centres	Min	5 <sup>th</sup> Centile	LQ	Median	UQ	95 <sup>th</sup> Centile	Max
2017	37	10	14	30.0	37.0	45.0	91	100
2016	37	18	19	33.0	39.0	47.0	100	100
2015	35	24	27	33.0	40.0	45.0	96	98
2014	31	0	20	29.0	38.0	50.0	97	100
2013	26	17	22	35.0	39.5	52.0	93	100
2012	27	5	24	39.0	45.0	64.0	90	91
2011	26	31	31	43.0	46.0	71.0	94	100
2010	25	34	34	40.0	51.0	64.0	90	100
2009	23	10	29	40.0	51.0	59.0	89	93
2008	22	28	29	43.0	52.5	59.0	88	96

**Figure 6.1.6(a):** Variation in proportion of PD patients with pre dialysis blood pressure ≤140/90 mmHg, PD centres 2017



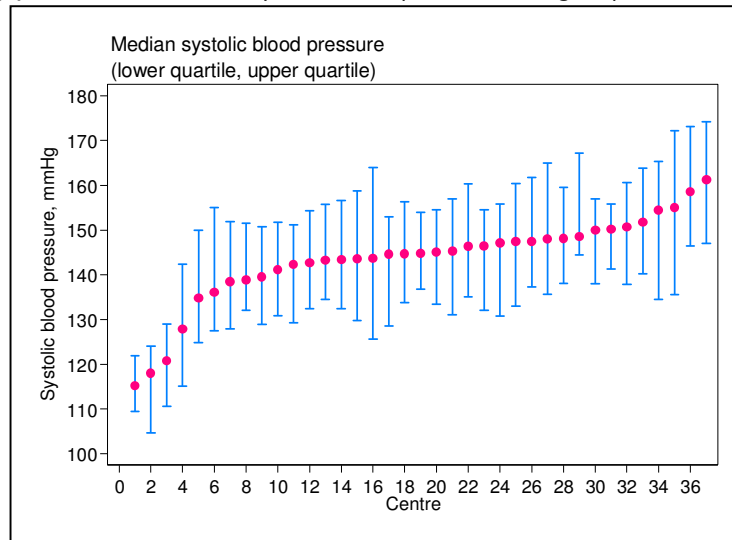
As expected, there was some inter-centre variation in median SBP in PD patients in 2017 (Figure 6.1.6b). The same observation is also seen in inter-centre variation in median diastolic blood pressure among PD patients in 2017 (Figure 6.1.6c).

**Table 6.1.6(b):** Median systolic blood pressure among PD patients, PD centres 2008-2017

Year	Number of centres	Min	5 <sup>th</sup> Centile	LQ	Median	UQ	95 <sup>th</sup> Centile	Max
2017	37	115.2	118.0	141.1	144.8	148.1	158.5	161.3
2016	37	112.2	117.0	139.0	143.0	148.2	153.8	161.0
2015	35	114.6	114.7	140.1	142.6	145.6	150.5	153.3
2014	31	114.8	115.3	138.6	145.3	147.5	153.7	158.3
2013	26	112.3	115.1	138.5	142.0	145.4	158.7	161.5
2012	27	114.2	116.0	134.3	140.6	144.5	151.5	156.7
2011	26	113.1	115.6	130.3	140.1	141.6	146.1	147.8
2010	25	115.0	116.9	131.5	138.6	142.6	146.0	146.3
2009	23	113.8	117.0	133.3	138.5	144.9	151.3	161.5
2008	22	115.6	118.1	136.0	137.6	141.9	147.9	149.0



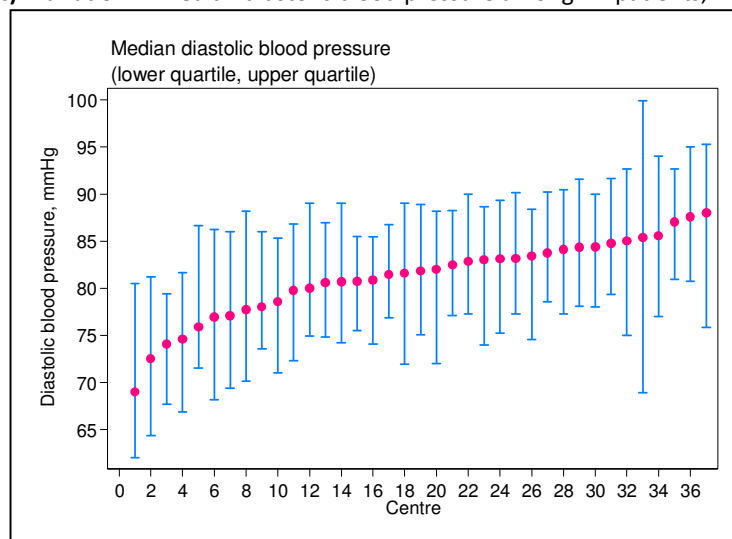
**Figure 6.1.6(b):** Variation in median systolic blood pressure among PD patients, PD centres 2017



**Table 6.1.6(c):** Median diastolic blood pressure among PD patients, PD centres 2008-2017

Year	Number of centres	Min	5 <sup>th</sup> Centile	LQ	Median	UQ	95 <sup>th</sup> Centile	Max
2017	37	69.0	72.5	78.6	81.8	84.1	87.6	88.0
2016	37	72.8	74.0	79.6	81.4	83.3	87.5	87.6
2015	35	70.5	71.7	78.7	81.7	85.2	90.0	94.1
2014	31	73.8	75.0	79.6	81.3	83.9	89.9	91.0
2013	26	70.7	75.0	77.6	81.4	82.7	86.8	90.4
2012	27	75.4	75.4	79.2	80.0	83.5	87.2	91.0
2011	26	74.0	74.5	78.4	79.9	81.9	84.3	85.1
2010	25	73.9	74.2	77.5	79.5	81.9	86.0	86.7
2009	23	73.3	73.5	78.3	79.1	82.0	83.3	87.9
2008	22	73.9	76.8	78.1	79.7	82.0	84.5	86.8

**Figure 6.1.6(c):** Variation in median diastolic blood pressure among PD patients, PD centres 2017



## SECTION 6.2: DYSLIPIDAEMIA IN DIALYSIS PATIENTS

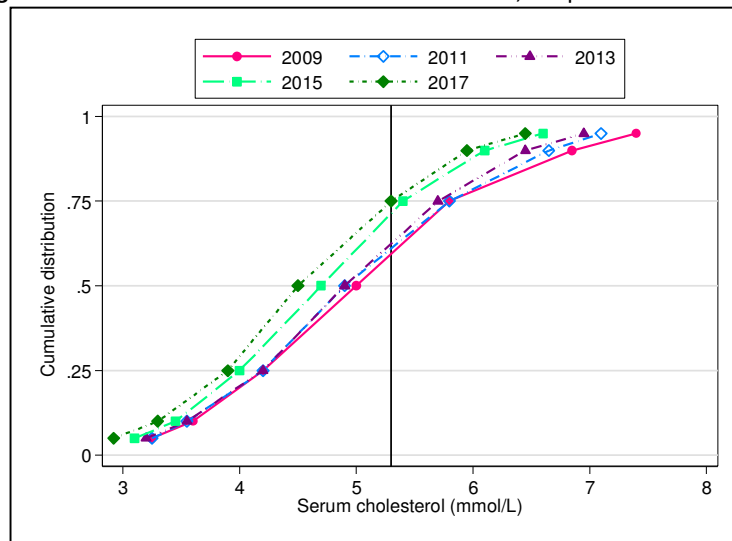
Individuals with end stage renal disease (ESRD) are at high risk for CV morbidity and mortality. CVD is the most common cause of death in dialysis patients. Hence, dialysis patients should be screened for the traditional CV risk factors and treated appropriately. However, dialysis patients may not have the same degree of benefits of lipid lowering therapy as compared to patients with earlier stages of CKD and the general population

In 2017, the majority of haemodialysis patients (82%) had a total serum cholesterol < 5.3 mmol/L. This was 77% 10 years ago in 2008 (Table 6.2.1). The mean and median serum cholesterol levels in HD patients in 2017 were 4.4 mmol/L and 4.3 mmol/L respectively.

**Table 6.2.1:** Distribution of serum cholesterol, HD patients 2008-2017

Year	Number of patients	Mean	SD	Median	LQ	UQ	% patients <3.5 mmol/L	% patients 3.5-<5.3 mmol/L	% patients 5.3-<6.2 mmol/L	% patients ≥6.2 mmol/L
2017	38620	4.4	1.0	4.3	3.7	5.0	20	62	14	5
2016	34373	4.4	1.1	4.3	3.7	5.0	19	62	14	5
2015	31997	4.4	1.1	4.3	3.7	5.0	19	62	14	5
2014	29507	4.4	1.0	4.3	3.7	5.1	17	63	15	5
2013	26202	4.5	1.0	4.4	3.8	5.1	16	63	15	5
2012	23056	4.5	1.1	4.4	3.8	5.1	16	63	15	5
2011	20099	4.5	1.1	4.4	3.8	5.1	16	63	15	6
2010	17532	4.6	1.1	4.5	3.8	5.2	14	62	18	7
2009	15677	4.6	1.1	4.5	3.8	5.2	14	62	17	6
2008	13688	4.5	1.1	4.4	3.8	5.2	15	62	17	6

**Figure 6.2.1:** Cumulative distribution of cholesterol, HD patients 2008-2017

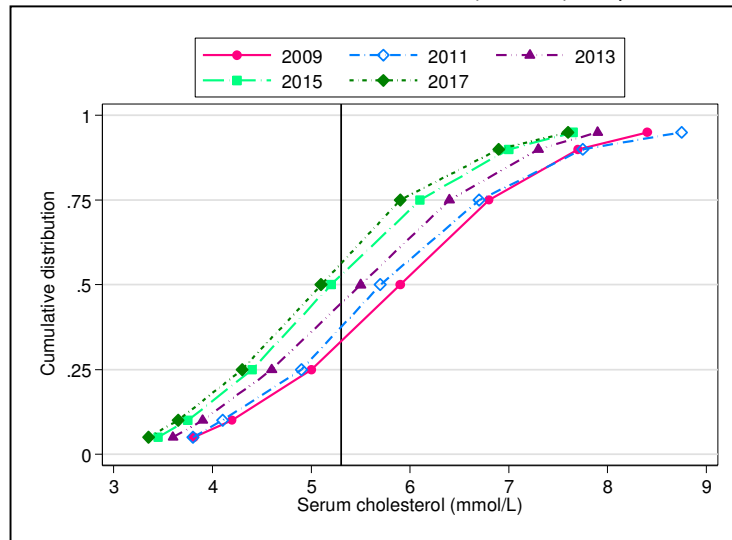


Total cholesterol levels in peritoneal dialysis patients were higher in comparison haemodialysis patients, with 66% of PD patients achieving total cholesterol < 5.3 mmol/L in 2017 (Table & Figure 6.2.2). The mean and median serum cholesterol levels in PD patients in 2017 were 4.9 mmol/L and 4.7 mmol/L respectively. These figures were slightly decreased compared to the levels in 2008 (mean 5.2 mmol/L and median 5.0 mmol/L).

**Table 6.2.2:** Distribution of serum cholesterol, PD patients 2008-2017

Year	Number of patients	Mean	SD	Median	LQ	UQ	% patients <3.5 mmol/L	% patients 3.5-<5.3 mmol/L	% patients 5.3-<6.2 mmol/L	% patients ≥6.2 mmol/L
2017	4373	4.9	1.3	4.7	4.0	5.6	11	55	21	13
2016	4188	4.9	1.3	4.8	4.1	5.6	11	54	21	14
2015	3952	4.9	1.3	4.8	4.0	5.6	11	55	21	14
2014	3371	5.0	1.3	4.8	4.1	5.7	10	54	21	15
2013	2934	5.0	1.4	4.8	4.1	5.7	9	55	22	15
2012	2613	5.1	1.4	4.9	4.3	5.8	7	52	24	17
2011	2278	5.1	1.3	5.0	4.2	5.8	8	50	25	17
2010	2172	5.2	1.4	5.1	4.3	6.0	7	48	25	20
2009	2009	5.3	1.5	5.1	4.3	6.0	6	49	26	20
2008	1895	5.2	1.4	5.0	4.3	5.9	7	50	24	18

**Figure 6.2.2:** Cumulative distribution of cholesterol (mmol/L), PD patients 2008-2017

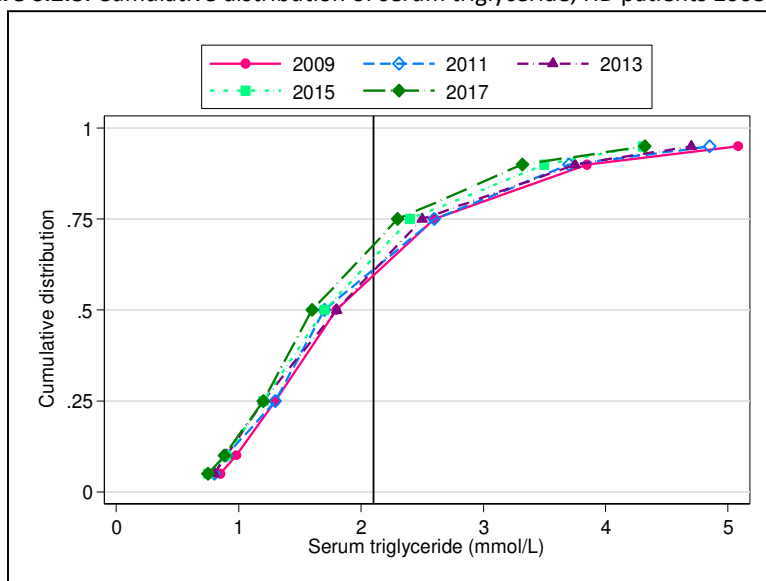


With regards to triglyceride levels, 78% of HD patients had triglyceride levels of <2.3 mmol/L in 2017 (Table 6.2.3). The mean and median serum triglyceride in HD patients in 2017 were 1.8 mmol/L and 1.5 mmol/L which is similar to a decade ago when the levels were 1.9 and 1.6 mmol/L respectively.

**Table 6.2.3:** Distribution of serum triglyceride, HD patients 2008-2017

Year	Number of patients	Mean	SD	Median	LQ	UQ	% patients <1.7 mmol/L	% patients 1.7-<2.3 mmol/L	% patients 2.3-<3.5 mmol/L	% patients ≥3.5 mmol/L
2017	37923	1.8	1.1	1.5	1.1	2.2	58	20	15	6
2016	33973	1.8	1.2	1.5	1.1	2.2	57	20	15	8
2015	31477	1.8	1.2	1.5	1.1	2.2	57	20	15	7
2014	28961	1.8	1.2	1.5	1.1	2.2	58	20	15	7
2013	25605	1.9	1.2	1.6	1.1	2.3	56	20	16	8
2012	22533	1.9	1.2	1.6	1.1	2.3	54	21	17	8
2011	19291	1.9	1.2	1.6	1.1	2.3	55	21	16	8
2010	16859	1.9	1.3	1.6	1.1	2.3	54	21	16	9
2009	14961	1.9	1.3	1.6	1.1	2.3	54	21	16	9
2008	12807	1.9	1.2	1.6	1.1	2.3	56	20	15	8

**Figure 6.2.3:** Cumulative distribution of serum triglyceride, HD patients 2008-2017

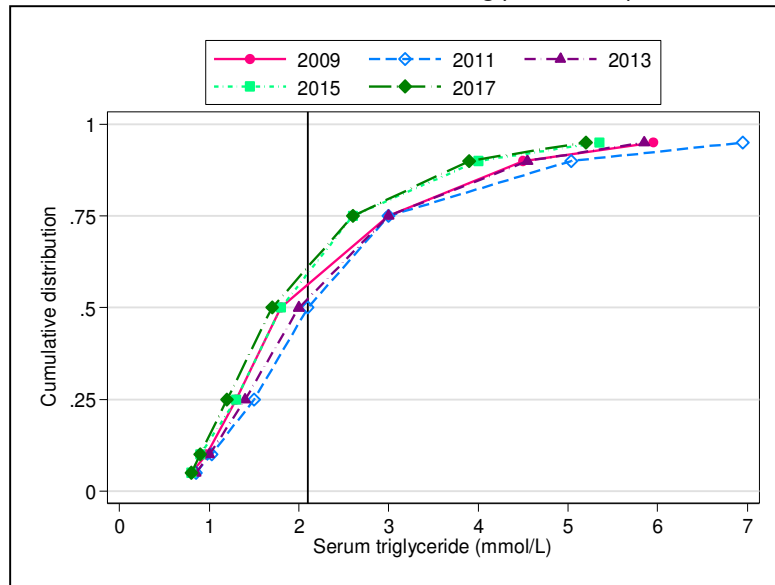


Peritoneal dialysis patients (when compared to HD patients) have a similar level of triglyceride control - 77% have triglyceride levels < 2.3 mmol/L (Table 6.2.4). The mean and median serum triglyceride levels in PD patients have also decreased slightly over the past 10 years from 2.2 mmol/L and 1.8 mmol/L in 2008 to 1.9 mmol/L and 1.6 mmol/L in 2017 respectively.

**Table 6.2.4:** Distribution of serum triglyceride, PD patients 2008-2017

Year	Number of patients	Mean	SD	Median	LQ	UQ	% patients	% patients	% patients	% patients
							<1.7 mmol/L	1.7-<2.3 mmol/L	2.3-<3.5 mmol/L	≥3.5 mmol/L
2017	4358	1.9	1.2	1.6	1.1	2.3	54	23	16	8
2016	4215	2.0	1.3	1.6	1.2	2.3	52	22	17	9
2015	3947	1.9	1.2	1.6	1.1	2.2	55	21	16	7
2014	3386	1.9	1.4	1.6	1.1	2.3	55	21	15	9
2013	2952	2.0	1.3	1.6	1.2	2.3	52	23	17	9
2012	2610	2.0	1.3	1.7	1.2	2.5	48	23	19	10
2011	2296	2.0	1.3	1.7	1.2	2.3	51	23	17	9
2010	2163	2.1	1.4	1.8	1.3	2.5	47	23	18	11
2009	2010	2.2	1.6	1.8	1.3	2.7	46	21	20	14
2008	1900	2.2	1.5	1.8	1.3	2.7	45	21	20	14

**Figure 6.2.4:** Cumulative distribution of serum triglyceride, PD patients 2008-2017

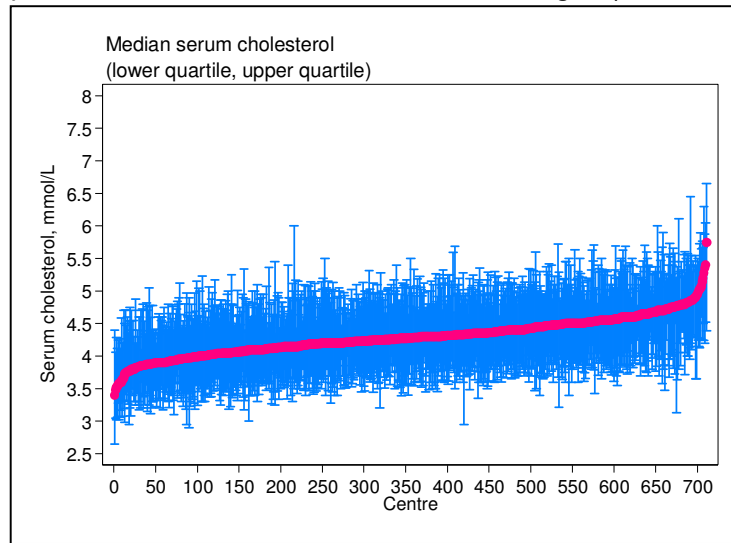


There was slight inter-centre variation in median serum cholesterol levels and the proportion of HD patients with serum cholesterol < 5.3mmol/L varied by 11% between the LQ and UQ in HD centers in 2017 (Table 6.2.5a & b).

**Table 6.2.5(a):** Median serum cholesterol level among HD patients, HD centres 2008-2017

Year	Number of centres	Min	5 <sup>th</sup> Centile	LQ	Median	UQ	95 <sup>th</sup> Centile	Max
2017	711	3.4	3.9	4.1	4.3	4.5	4.8	5.7
2016	682	3.3	3.9	4.2	4.3	4.5	4.9	5.5
2015	666	3.3	3.8	4.1	4.3	4.5	4.8	5.3
2014	632	3.3	3.9	4.2	4.3	4.6	4.9	5.3
2013	582	3.5	3.9	4.2	4.4	4.6	4.9	5.5
2012	540	3.5	3.9	4.2	4.4	4.6	4.9	5.7
2011	479	3.6	4.0	4.2	4.4	4.6	5.0	5.8
2010	415	3.5	4.0	4.3	4.5	4.7	5.1	5.7
2009	365	3.6	4.0	4.3	4.5	4.8	5.1	5.8
2008	335	3.4	3.9	4.2	4.5	4.7	5.1	5.7

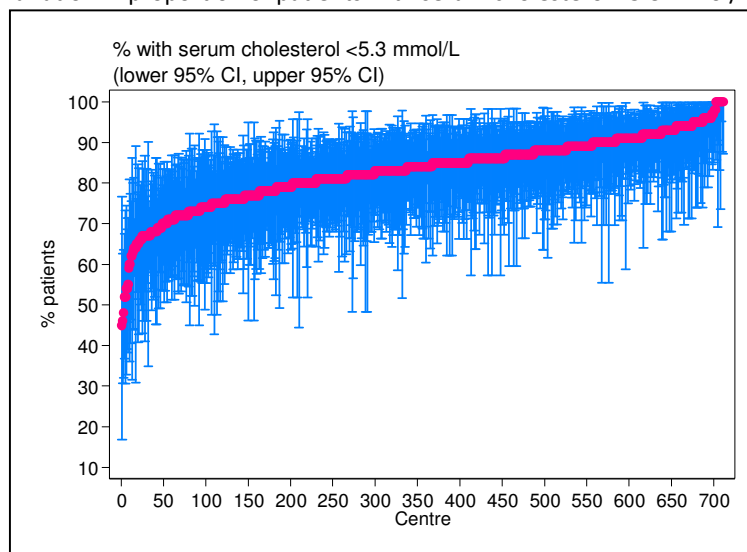
**Figure 6.2.5(a):** Variation in median serum cholesterol level among HD patients, HD centres 2017



**Table 6.2.5(b):** Proportion of HD patients with serum cholesterol <5.3 mmol/L, HD centres 2008-2017

Year	Number of centres	Min	5 <sup>th</sup> Centile	LQ	Median	UQ	95 <sup>th</sup> Centile	Max
2017	711	45	68.0	78.0	84.0	89.0	95.0	100
2016	682	46	67.0	77.0	83.0	88.0	95.0	100
2015	666	45	65.0	76.0	83.0	88.0	95.0	100
2014	632	47	66.0	75.0	82.0	88.0	95.0	100
2013	582	45	63.0	74.0	81.5	87.0	94.0	100
2012	540	40	64.0	74.0	81.0	87.0	93.5	100
2011	479	27	59.0	73.0	80.0	88.0	95.0	100
2010	415	33	57.0	70.0	78.0	86.0	93.0	100
2009	365	36	57.0	70.0	77.0	85.0	93.0	100
2008	335	36	59.0	71.0	79.0	86.0	94.0	100

**Figure 6.2.5(b):** Variation in proportion of patients with serum cholesterol <5.3 mmol/L, HD centres 2017

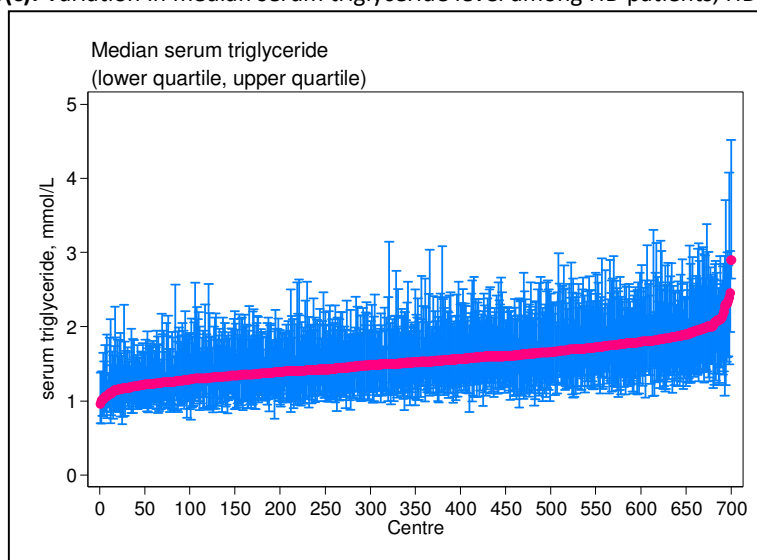


For median serum triglyceride levels amongst HD centres, the difference between the 5<sup>th</sup> percentile and 95<sup>th</sup> percentile was only 0.8 mmol/L (Table & Figure 6.2.5c). There is a 14.5% difference between the LQ and UQ in terms of the proportion of patients with serum triglyceride < 2.1 mmol/L in HD centres in 2017. This is relatively unchanged from a decade ago (Table & Figure 6.2.5d).

**Table 6.2.5(c):** Median serum triglyceride level among HD patients, HD centres 2008-2017

Year	Number of centres	Min	5 <sup>th</sup> Centile	LQ	Median	UQ	95 <sup>th</sup> Centile	Max
2017	700	1.0	1.2	1.4	1.5	1.7	2.0	2.9
2016	676	0.8	1.2	1.4	1.5	1.7	2.0	2.6
2015	657	1.0	1.2	1.4	1.5	1.7	2.0	2.4
2014	622	1.0	1.2	1.4	1.5	1.7	2.0	3.1
2013	570	0.9	1.2	1.4	1.6	1.8	2.1	2.8
2012	524	0.8	1.2	1.4	1.6	1.8	2.1	3.0
2011	454	1.1	1.2	1.4	1.6	1.8	2.0	6.3
2010	397	0.9	1.2	1.5	1.6	1.8	2.1	3.6
2009	343	1.0	1.2	1.4	1.6	1.8	2.1	2.6
2008	312	1.0	1.2	1.4	1.6	1.7	2.1	2.3

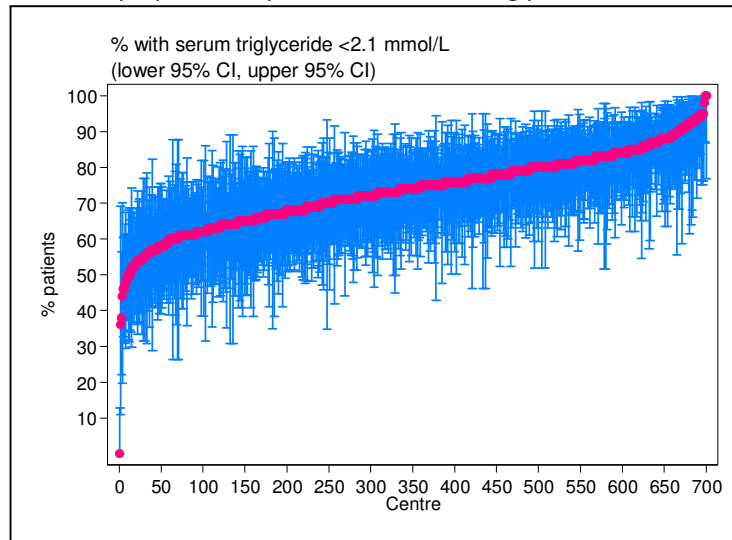
**Figure 6.2.5(c):** Variation in median serum triglyceride level among HD patients, HD centers 2017



**Table 6.2.5(d):** Proportion of HD patients with serum triglyceride <2.1 mmol/L, HD centres 2008-2017

Year	Number of centres	Min	5 <sup>th</sup> Centile	LQ	Median	UQ	95 <sup>th</sup> Centile	Max
2017	700	0	56.0	66.5	74.0	81.0	90.0	100
2016	676	36	54.0	65.0	72.0	79.0	88.0	100
2015	657	39	55.0	66.0	73.0	80.0	89.0	100
2014	622	31	53.0	65.0	72.0	80.0	89.0	100
2013	570	39	52.0	64.0	71.5	78.0	89.0	100
2012	524	28	50.0	63.0	70.0	78.5	88.0	100
2011	454	0	52.0	64.0	72.0	79.0	89.0	100
2010	397	9	50.0	63.0	70.0	77.0	89.0	100
2009	343	35	51.0	63.0	70.0	77.0	88.0	100
2008	312	36	53.0	64.0	72.0	79.0	87.0	100

**Figure 6.2.5(d):** Variation in proportion of patients with serum triglyceride <2.1 mmol/L, HD centers 2017



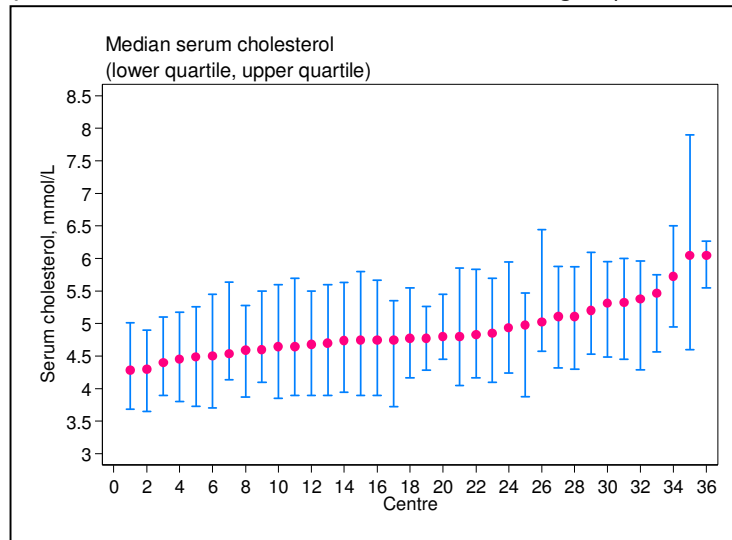
There was some inter-centre variation in median cholesterol levels among PD patients in 2017 with the difference between the 5<sup>th</sup> percentile and 95<sup>th</sup> percentile median cholesterol level being 1.8 mmol/L (Table & Figure 6.2.6a). There was 12% inter-centre variation between the LQ and UQ in terms of the proportion of patients with serum cholesterol < 5.3 mmol/L (Figure 6.2.6b). This was lower compared to a decade ago when it was 21%.

**Table 6.2.6(a):** Median serum cholesterol level among PD patients, PD centres 2008-2017

Year	Number of centres	Min	5 <sup>th</sup> Centile	LQ	Median	UQ	95 <sup>th</sup> Centile	Max
2017	36	4.3	4.3	4.6	4.8	5.1	6.1	6.1
2016	36	4.2	4.2	4.6	4.8	5.1	5.5	5.7
2015	34	4.2	4.3	4.6	4.9	5.2	6.1	6.2
2014	30	4.3	4.3	4.6	5.0	5.3	5.9	6.7
2013	27	4.4	4.4	4.7	4.9	5.2	5.7	7.3
2012	27	4.4	4.4	4.8	5.0	5.3	6.1	7.8
2011	25	4.3	4.4	4.9	5.1	5.3	6.0	7.4
2010	25	4.6	4.6	4.9	5.2	5.5	6.0	7.5
2009	21	4.6	4.7	4.8	5.1	5.3	5.9	6.7
2008	22	4.3	4.5	4.8	5.1	5.4	5.8	6.2



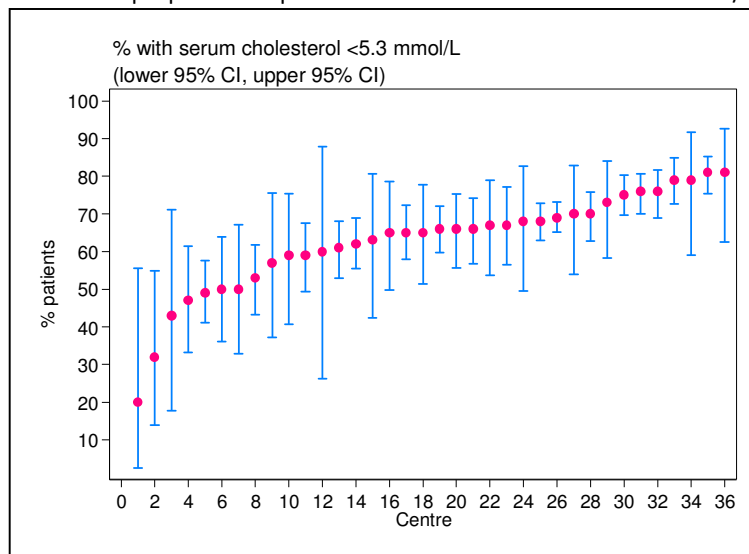
**Figure 6.2.6(a):** Variation in median serum cholesterol level among PD patients, PD centres 2017



**Table 6.2.6(b):** Proportion of PD patients with serum cholesterol <5.3 mmol/L, PD centres 2008-2017

Year	Number of centres	Min	5 <sup>th</sup> Centile	LQ	Median	UQ	95 <sup>th</sup> Centile	Max
2017	36	20	32.0	58.0	65.5	70.0	81.0	81
2016	36	37	38.0	56.0	65.0	69.5	86.0	88
2015	34	27	27.0	52.0	62.0	72.0	84.0	88
2014	30	29	35.0	49.0	61.0	70.0	79.0	82
2013	27	12	41.0	52.0	64.0	69.0	78.0	82
2012	27	11	21.0	50.0	58.0	68.0	78.0	81
2011	25	0	29.0	49.0	56.0	65.0	77.0	88
2010	25	8	22.0	45.0	54.0	61.0	73.0	76
2009	21	23	34.0	49.0	53.0	63.0	75.0	76
2008	22	37	41.0	46.0	57.5	67.0	75.0	76

**Figure 6.2.6(b):** Variation in proportion of patients with serum cholesterol <5.3 mmol/L, PD centres 2017

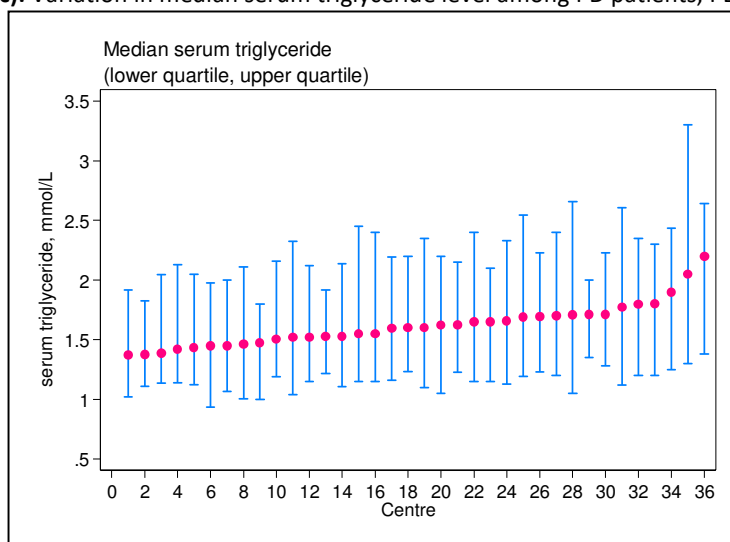


There was only a small inter-centre variation in median triglyceride levels and in the proportion of patients with serum triglyceride levels < 2.1 mmol/L among PD centres (Figure 6.2.6c, Table & Figure 6.2.6d).

**Table 6.2.6(c):** Median serum triglyceride level among PD patients, PD centres 2008-2017

Year	Number of centres	Min	5 <sup>th</sup> Centile	LQ	Median	UQ	95 <sup>th</sup> Centile	Max
2017	36	1.4	1.4	1.5	1.6	1.7	2.0	2.2
2016	36	1.3	1.4	1.5	1.7	1.8	2.1	2.1
2015	34	1.3	1.3	1.5	1.5	1.6	1.8	2.5
2014	30	1.3	1.4	1.5	1.6	1.7	1.9	2.3
2013	27	1.4	1.4	1.6	1.7	1.8	2.2	2.6
2012	26	1.4	1.4	1.6	1.7	1.9	2.4	2.7
2011	25	1.2	1.4	1.6	1.6	1.8	2.1	2.2
2010	24	1.4	1.5	1.6	1.8	1.9	2.2	2.3
2009	22	1.4	1.5	1.7	1.8	1.9	2.2	2.5
2008	22	1.3	1.5	1.6	1.8	2.0	2.2	2.3

**Figure 6.2.6(c):** Variation in median serum triglyceride level among PD patients, PD centres 2017



**Table 6.2.6(d):** Proportion of PD patients with serum triglyceride <2.1 mmol/L, PD centres 2008-2017

Year	Number of centres	Min	5 <sup>th</sup> Centile	LQ	Median	UQ	95 <sup>th</sup> Centile	Max
2017	36	45	53.0	67.0	72.5	75.5	81.0	83
2016	36	53	58.0	65.0	68.5	75.0	84.0	90
2015	34	45	56.0	69.0	73.0	77.0	88.0	90
2014	30	45	57.0	64.0	73.0	76.0	79.0	81
2013	27	38	49.0	63.0	69.0	73.0	86.0	90
2012	26	44	44.0	61.0	64.5	71.0	81.0	86
2011	25	50	50.0	64.0	68.0	73.0	82.0	93
2010	24	45	48.0	58.5	62.0	69.5	77.0	82
2009	22	31	47.0	57.0	61.0	67.0	72.0	76
2008	22	45	48.0	56.0	61.5	65.0	82.0	85

**Figure 6.2.6(d):** Variation in proportion of patients with serum triglyceride <2.1 mmol/L, PD centres 2017

