CHAPTER 5

Peritoneal Dialysis

Reporting the incidence, prevalence and survival of peritoneal dialysis patients in Australia and New Zealand; summarising dialysis fluids, laboratory results, rates of technique and peritonitis

Contents

Executive Summary

There were 2,387 people in Australia and 868 people in New Zealand receiving peritoneal dialysis at the time of the 31 December 2019 survey. The number of people commencing peritoneal dialysis during this survey period was 1,066 in Australia and 333 in New Zealand. The proportion of people receiving home dialysis on peritoneal dialysis was 69% in Australia and 68% in New Zealand and the total percentage of the dialysis population receiving peritoneal dialysis remained higher in New Zealand with 30% compared with Australia with 17%.

When considering all people who started peritoneal dialysis within a year of commencing renal replacement therapy, the proportion of people surviving at 3 years was 73% in Australia and 68% in New Zealand. No improvement in technique survival was observed with 3-year rates remaining low at only 38% in Australia and 41% in New Zealand. The primary cause of technique failure in both countries was patient death (34% in Australia and 48% in New Zealand), followed by inadequate dialysis in Australia (19%) and infective complications in New Zealand (20%).

ANZDATA only reports on Australian peritoneal dialysis episodes of peritonitis, as New Zealand has a separate registry that is not currently linked to ANZDATA. In Australia, the overall peritonitis rate has dropped considerably, however there remains significant variation between individual states and treating hospitals. The proportion of infections that are culture negative was higher in 2019 than any of the preceding five years.

Of the patients for whom peritoneal dialysis fluid usage was reported in 2019, 54% of Australian patients were using icodextrin compared to 66% of patients in New Zealand, and 23% of Australian patients were using low GDP solutions compared with 9.3% in New Zealand.

Peritoneal dialysis modalities varied between Australia and New Zealand with automated peritoneal dialysis utilisation rates at 69% in Australia and 59% in New Zealand. The remainder received continuous ambulatory peritoneal dialysis.

Suggested Citation

ANZDATA Registry. 43rd Report, Chapter 5: Peritoneal dialysis. Australia and New Zealand Dialysis and Transplant Registry, Adelaide, Australia. 2020. Available at: http://www.anzdata.org.au

Incidence, Prevalence and Usage

Table 5.1 shows the proportion of all dialysis patients undergoing peritoneal dialysis (PD) in each state/territory and country over 2015-2019. Table 5.2 shows the same data as a proportion of home dialysis patients. Overall, around two-thirds of home dialysis patients undergo PD, although there is some variation between states/territories.

The duration of time spent on PD by prevalent patients is shown in figure 5.1.

Table 5.1 Proportion (%) PD of all Dialysis Patients

State	2015	2016	2017	2018	2019
Queensland	20%	18%	18%	18%	17%
New South Wales	25%	24%	24%	23%	22%
Australian Capital Territory	8%	10%	9%	9%	12%
Victoria	20%	20%	19%	18%	17%
Tasmania	20%	22%	19%	12%	14%
South Australia	15%	16%	14%	15%	14%
Northern Territory	4%	4%	3%	4%	6%
Western Australia	17%	15%	15%	15%	14%
Australia	**20%**	**19%**	**19%**	**18%**	**17%**
New Zealand	**29%**	**30%**	**31%**	**30%**	**30%**

Table 5.2 Proportion (%) PD of all Home Dialysis Patients

State	2015	2016	2017	2018	2019
Queensland	64%	62%	64%	64%	64%
New South Wales	68%	68%	70%	69%	69%
Australian Capital Territory	41%	52%	55%	52%	56%
Victoria	74%	75%	76%	77%	75%
Tasmania	66%	70%	79%	67%	72%
South Australia	78%	81%	81%	80%	78%
Northern Territory	40%	38%	38%	48%	56%
Western Australia	71%	68%	69%	70%	69%
Australia	**68%**	**68%**	**70%**	**70%**	**69%**
New Zealand	**62%**	**64%**	**66%**	**67%**	**68%**

Figure 5.1.1 - Time on Peritoneal Dialysis - Prevalent PD Patients Australia 31 Dec 2019

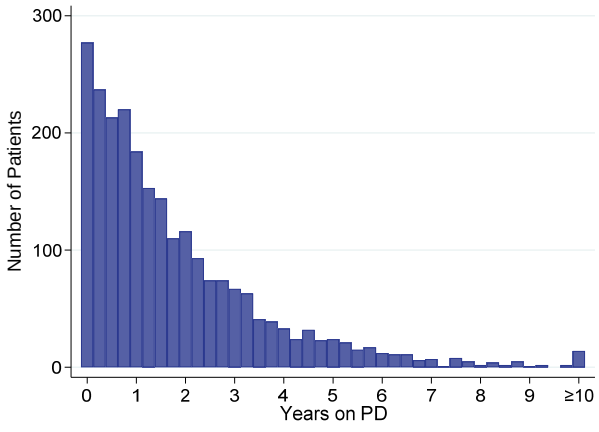


Figure 5.1.2 - Time on Peritoneal Dialysis - Prevalent PD Patients New Zealand 31 Dec 2019

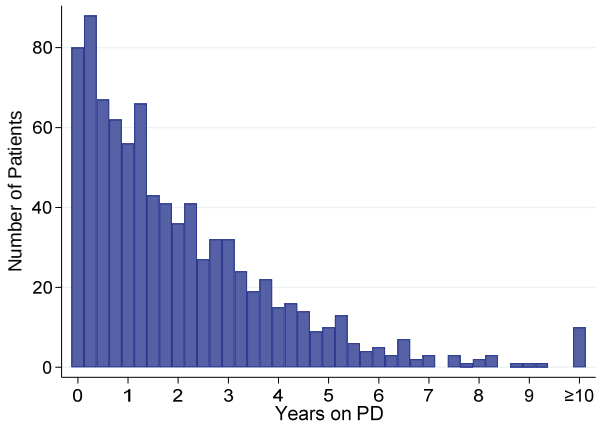


Table 5.3 shows the overall incidence, cessation and annual prevalence of PD in Australia and New Zealand over the last 5 years. Note that dialysis modality changes lasting less than 30 days are not included. The number of prevalent patients fell in 2019 in Australia but grew marginally in New Zealand. Figure 5.2 presents some of these data graphically.

Table 5.3 Incidence, Cessation and Annual Prevalence of Peritoneal Dialysis Patients 2015 - 2019

Country		2015	2016	2017	2018	2019
Australia	**All patients who commenced PD**					
	First dialysis treatment or returning after renal recovery	780	823	819	800	749
	Transfer from HD (no prior PD)	248	242	252	244	260
	Transfer from HD (prior PD)	48	33	44	42	33
	Failed Transplant (no prior PD)	25	17	22	21	13
	Failed Transplant (prior PD)	14	17	21	19	11
	Total	**1115**	**1132**	**1158**	**1126**	**1066**
	All patients who ceased PD					
	Received kidney transplant	272	322	321	326	326
	Transfer to HD	502	517	545	519	484
	Renal recovery	18	23	18	10	15
	Deaths	309	325	301	268	281
	Total	**1101**	**1187**	**1185**	**1123**	**1106**
	Total patients on PD at 31 December	**2516**	**2452**	**2424**	**2427**	**2387**
New Zealand	**All patients who commenced PD**					
	First dialysis treatment or returning after renal recovery	222	217	226	231	239
	Transfer from HD (no prior PD)	85	96	96	84	76
	Transfer from HD (prior PD)	12	15	18	21	10
	Failed Transplant (no prior PD)	4	4	1	8	4
	Failed Transplant (prior PD)	3	8	1	7	4
	Total	**326**	**340**	**342**	**351**	**333**
	All patients who ceased PD					
	Received kidney transplant	46	47	66	65	72
	Transfer to HD	160	139	109	136	119
	Renal recovery	10	7	5	6	2
	Deaths	134	115	126	139	135
	Total	**350**	**308**	**306**	**346**	**328**
	Total patients on PD at 31 December	**797**	**830**	**864**	**867**	**868**

Figure 5.2.1 - Incidence, Cessation and Annual Prevalence of Peritoneal Dialysis Patients - Australia 2015-2019

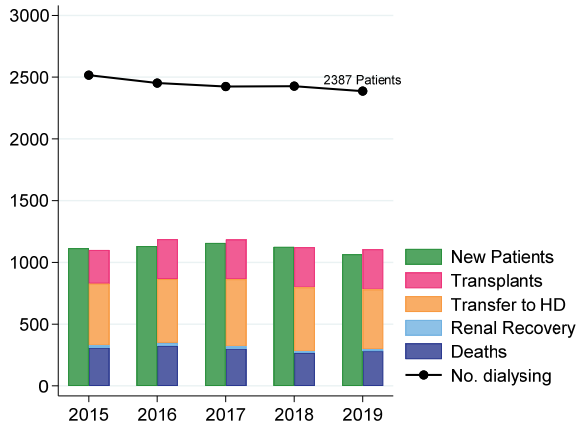
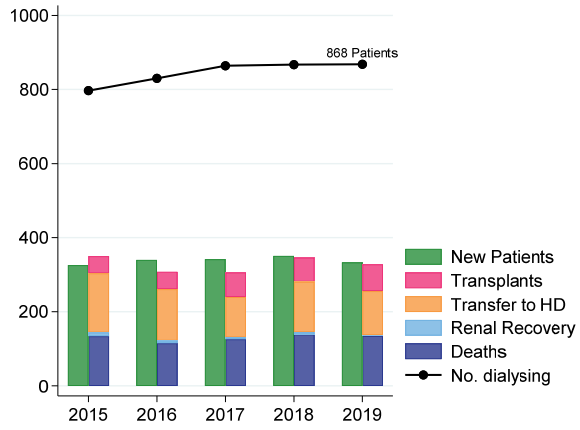


Figure 5.2.2 - Incidence, Cessation and Annual Prevalence of Peritoneal Dialysis Patients - New Zealand 2015-2019



The age distributions of incident and prevalent PD patients are shown in figures 5.3 and 5.4 respectively.

Figure 5.3.1 - Age (%) of New Peritoneal Dialysis Patients - Australia 2019

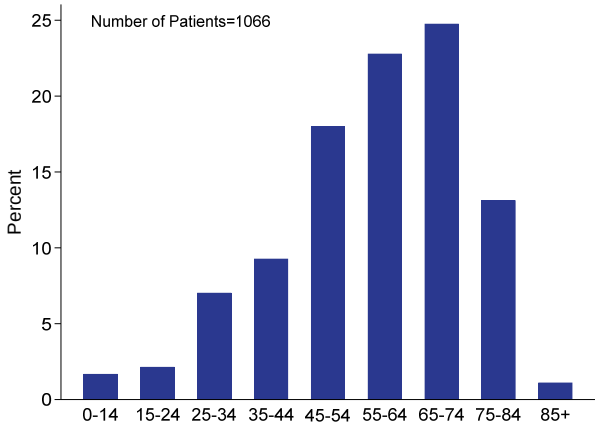


Figure 5.3.2 - Age (%) of New Peritoneal Dialysis Patients - New Zealand 20196

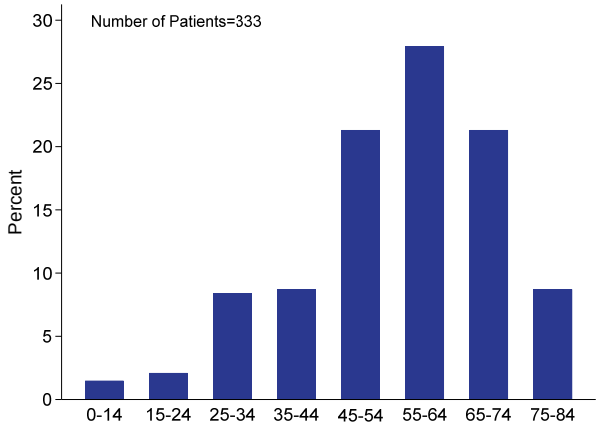


Figure 5.4.1 - Age (%) of Current Peritoneal Dialysis Patients - Australia 2019

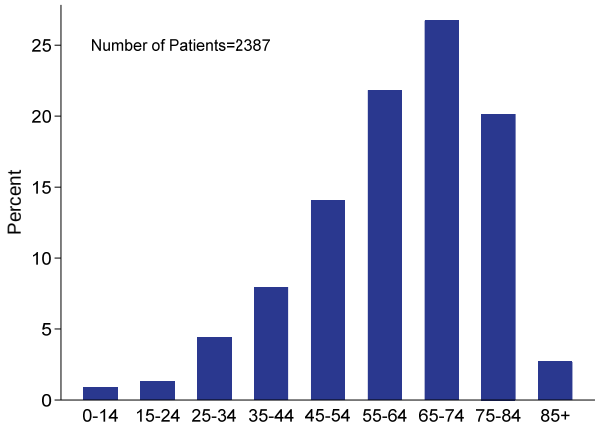


Figure 5.4.2 - Age (%) of Current Peritoneal Dialysis Patients - New Zealand 2019

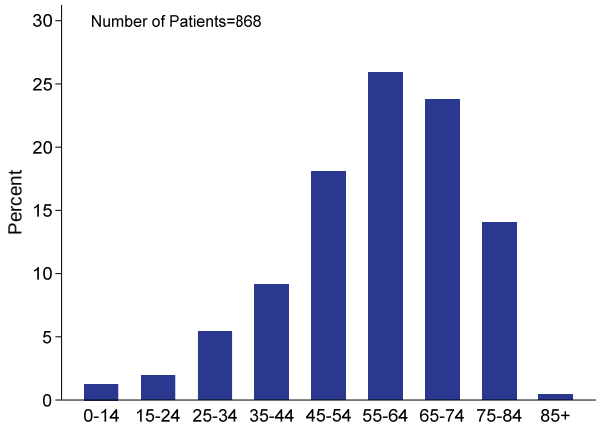


Table 5.4 presents the number and proportion of incident and prevalent peritoneal dialysis patients by age group.

Table 5.4.1 Incident and Prevalent PD patients by Age Group - Australia

Category	Age group	2015	2016	2017	2018	2019
Incident Patients	0-14	21 (2%)	22 (2%)	29 (3%)	19 (2%)	18 (2%)
	15-24	30 (3%)	42 (4%)	31 (3%)	33 (3%)	23 (2%)
	25-34	76 (7%)	58 (5%)	73 (6%)	65 (6%)	75 (7%)
	35-44	94 (8%)	123 (11%)	126 (11%)	128 (11%)	99 (9%)
	45-54	181 (16%)	203 (18%)	194 (17%)	170 (15%)	192 (18%)
	55-64	244 (22%)	246 (22%)	267 (23%)	230 (20%)	243 (23%)
	65-74	292 (26%)	276 (24%)	275 (24%)	315 (28%)	264 (25%)
	75-84	169 (15%)	150 (13%)	150 (13%)	149 (13%)	140 (13%)
	85+	8 (1%)	12 (1%)	13 (1%)	17 (2%)	12 (1%)
	Total	**1115**	**1132**	**1158**	**1126**	**1066**
Prevalent Patients	0-14	28 (1%)	30 (1%)	32 (1%)	23 (1%)	21 (1%)
	15-24	42 (2%)	47 (2%)	42 (2%)	40 (2%)	31 (1%)
	25-34	110 (4%)	103 (4%)	108 (4%)	95 (4%)	105 (4%)
	35-44	199 (8%)	185 (8%)	202 (8%)	204 (8%)	190 (8%)
	45-54	333 (13%)	340 (14%)	352 (15%)	341 (14%)	336 (14%)
	55-64	541 (22%)	520 (21%)	524 (22%)	518 (21%)	521 (22%)
	65-74	723 (29%)	684 (28%)	624 (26%)	651 (27%)	638 (27%)
	75-84	473 (19%)	477 (19%)	471 (19%)	487 (20%)	481 (20%)
	85+	67 (3%)	66 (3%)	69 (3%)	68 (3%)	64 (3%)
	Total	**2516**	**2452**	**2424**	**2427**	**2387**

Table 5.4.2 Incident and Prevalent PD patients by Age Group - New Zealand

Category	Age group	2015	2016	2017	2018	2019
Incident Patients	0-14	3 (1%)	9 (3%)	7 (2%)	7 (2%)	5 (2%)
	15-24	10 (3%)	11 (3%)	9 (3%)	3 (1%)	7 (2%)
	25-34	17 (5%)	18 (5%)	25 (7%)	31 (9%)	28 (8%)
	35-44	40 (12%)	39 (11%)	31 (9%)	30 (9%)	29 (9%)
	45-54	59 (18%)	63 (19%)	63 (18%)	70 (20%)	71 (21%)
	55-64	88 (27%)	82 (24%)	81 (24%)	81 (23%)	93 (28%)
	65-74	75 (23%)	77 (23%)	97 (28%)	93 (26%)	71 (21%)
	75-84	34 (10%)	39 (11%)	29 (8%)	35 (10%)	29 (9%)
	85+	0 (0%)	2 (1%)	0 (0%)	1 (0%)	0 (0%)
	Total	**326**	**340**	**342**	**351**	**333**
Prevalent Patients	0-14	4 (1%)	10 (1%)	13 (2%)	15 (2%)	11 (1%)
	15-24	15 (2%)	19 (2%)	19 (2%)	14 (2%)	17 (2%)
	25-34	36 (5%)	37 (4%)	48 (6%)	46 (5%)	47 (5%)
	35-44	71 (9%)	84 (10%)	85 (10%)	78 (9%)	79 (9%)
	45-54	129 (16%)	142 (17%)	141 (16%)	150 (17%)	157 (18%)
	55-64	219 (27%)	204 (25%)	207 (24%)	204 (24%)	225 (26%)
	65-74	212 (27%)	220 (27%)	234 (27%)	230 (27%)	206 (24%)
	75-84	103 (13%)	106 (13%)	111 (13%)	125 (14%)	122 (14%)
	85+	8 (1%)	8 (1%)	6 (1%)	5 (1%)	4 (0%)
	Total	**797**	**830**	**864**	**867**	**868**

Table 5.5 presents the number and proportion of incident peritoneal dialysis patients by primary renal disease.

Table 5.5.1 Incident PD Patients by Primary Disease - Australia

Primary Renal Disease	2015	2016	2017	2018	2019
Diabetic Nephropathy	366 (33%)	369 (33%)	403 (35%)	367 (33%)	370 (35%)
Glomerulonephritis	261 (23%)	281 (25%)	255 (22%)	285 (25%)	251 (24%)
Hypertension	164 (15%)	162 (14%)	144 (12%)	145 (13%)	136 (13%)
Polycystic Disease	68 (6%)	63 (6%)	80 (7%)	74 (7%)	62 (6%)
Reflux Nephropathy	25 (2%)	36 (3%)	46 (4%)	25 (2%)	27 (3%)
Other	156 (14%)	144 (13%)	136 (12%)	161 (14%)	161 (15%)
Uncertain	57 (5%)	59 (5%)	79 (7%)	54 (5%)	47 (4%)
Not reported	18 (2%)	18 (2%)	15 (1%)	15 (1%)	12 (1%)
Total	**1115**	**1132**	**1158**	**1126**	**1066**

Table 5.5.2 Incident PD Patients by Primary Disease - New Zealand

Primary Renal Disease	2015	2016	2017	2018	2019
Diabetic Nephropathy	154 (47%)	146 (43%)	165 (48%)	161 (46%)	152 (46%)
Glomerulonephritis	74 (23%)	83 (24%)	74 (22%)	80 (23%)	80 (24%)
Hypertension	29 (9%)	38 (11%)	34 (10%)	36 (10%)	34 (10%)
Polycystic Disease	12 (4%)	15 (4%)	13 (4%)	13 (4%)	10 (3%)
Reflux Nephropathy	10 (3%)	10 (3%)	4 (1%)	7 (2%)	8 (2%)
Other	34 (10%)	38 (11%)	36 (11%)	34 (10%)	36 (11%)
Uncertain	12 (4%)	10 (3%)	13 (4%)	17 (5%)	13 (4%)
Not reported	1 (0%)	0 (0%)	3 (1%)	3 (1%)	0 (0%)
Total	**326**	**340**	**342**	**351**	**333**

Figure 5.5 shows the proportion of dialysis patients using PD as their treatment modality by age. In both Australia and New Zealand PD is the predominant modality for paediatric patients, but HD is the predominant modality for adult patients.

Figure 5.5.1 - PD Patients (%) of all Prevalent Dialysis - Australia 2019

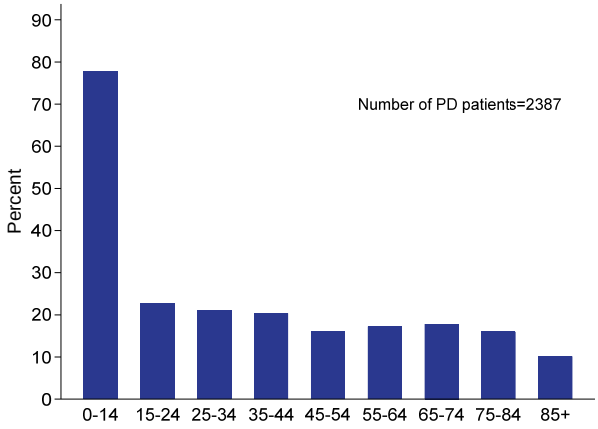


Figure 5.5.2 - PD Patients (%) of all Prevalent Dialysis - New Zealand 2019

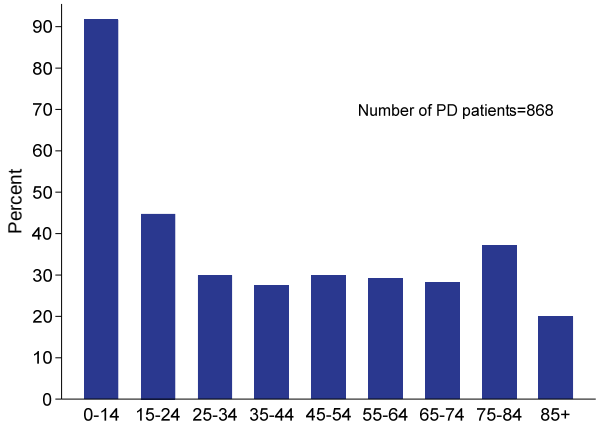


Table 5.6 shows the number of prevalent PD patients, and number per million population, according to PD type.

Population estimates for Australia and New Zealand used for the calculation of prevalence per million population were sourced from the Australian Bureau of Statistics (2019)[1] and Stats NZ (2019)[2].

Table 5.6.1 Number (per Million) of Prevalent PD Patients, Australia 2015-2019

	2015	2016	2017	2018	2019
Total	**2516 (106)**	**2452 (101)**	**2424 (99)**	**2427 (97)**	**2387 (94)**
APD	1688 (71)	1669 (69)	1635 (66)	1667 (67)	1645 (65)
CAPD	828 (35)	783 (32)	789 (32)	760 (30)	742 (29)

Table 5.6.2 Number (per Million) of Prevalent PD Patients, New Zealand 2015-2019

	2015	2016	2017	2018	2019
Total	**797 (174)**	**830 (177)**	**864 (181)**	**867 (179)**	**868 (176)**
APD	418 (91)	432 (92)	453 (95)	474 (98)	508 (103)
CAPD	379 (83)	398 (85)	411 (86)	393 (81)	360 (73)

Peritoneal Dialysis Fluids

Table 5.7 shows the use of icodextrin by country and PD type for prevalent patients at the end of 2019. Figure 5.6 shows the trends in icodextrin use over the last three years. Figure 5.7 shows icodextrin use by state/territory and PD type for prevalent patients at the end of 2019.

Table 5.7 Icodextrin Usage by Modality Type - December 2019

PD Type		Australia				New Zealand			
		No	Yes	Not Reported	Total	No	Yes	Not Reported	Total
CAPD	**n**	284	288	170	742	130	204	26	360
	%	**38%**	**39%**	**23%**		**36%**	**57%**	**7%**	
APD	**n**	666	844	135	1645	152	335	21	508
	%	**40%**	**51%**	**8%**		**30%**	**66%**	**4%**	
Total	**n**	950	1132	305	2387	282	539	47	868
	%	**40%**	**47%**	**13%**		**32%**	**62%**	**5%**	

Figure 5.6.1 - Icodextrin Use by Modality - Prevalent Patients December 2017 - 2019 Australia

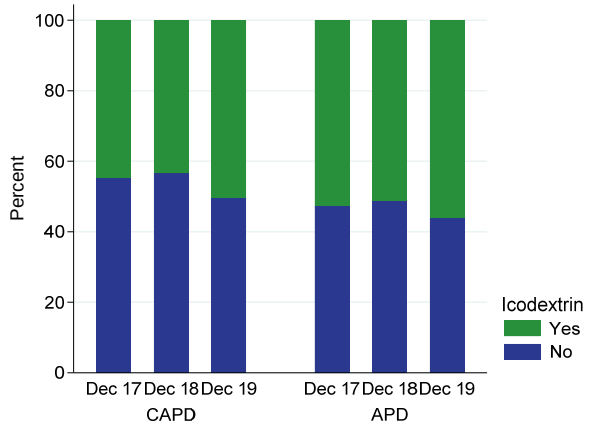


Figure 5.6.2 - Icodextrin Use by Modality - Prevalent Patients December 2017 - 2019 New Zealand

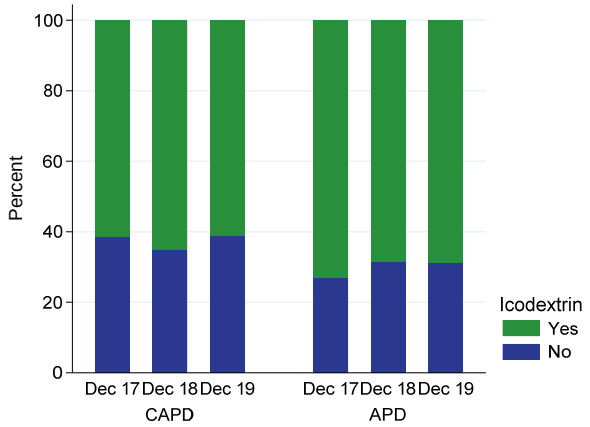


Figure 5.7 - Icodextrin Use by State/Territory and Country - Prevalent Patients December 201

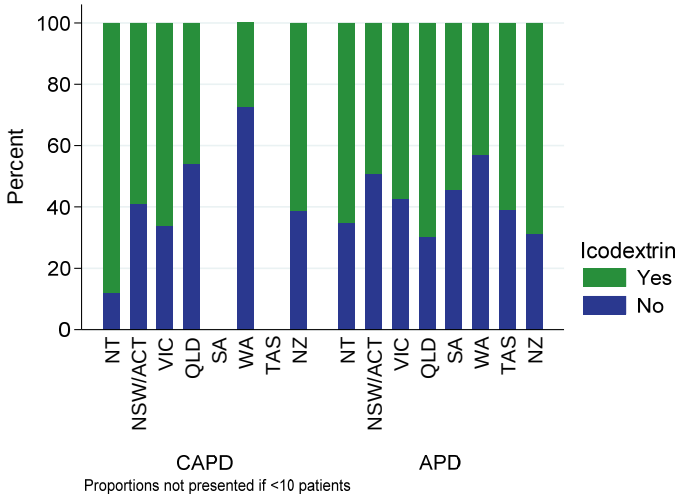


Table 5.8 and figures 5.8 and 5.9 present the same reporting for low GDP PD solutions. The use of these PD solutions is more common in Australia than in New Zealand and varies considerably by Australian state/territory.

Table 5.8 Low GDP Usage by Modality Type - December 2019

PD Type		Australia				New Zealand			
		No	Yes	Not Reported	Total	No	Yes	Not Reported	Total
CAPD	n	357	218	167	742	308	30	22	360
	%	**48%**	**29%**	**23%**		**86%**	**8%**	**6%**	
APD	n	1254	255	136	1645	446	47	15	508
	%	**76%**	**16%**	**8%**		**88%**	**9%**	**3%**	
Total	n	1611	473	303	2387	754	77	37	868
	%	**67%**	**20%**	**13%**		**87%**	**9%**	**4%**	

Figure 5.8.1 - Low GDP Use by Modality - Prevalent Patients December 2017 - 2019 Australia

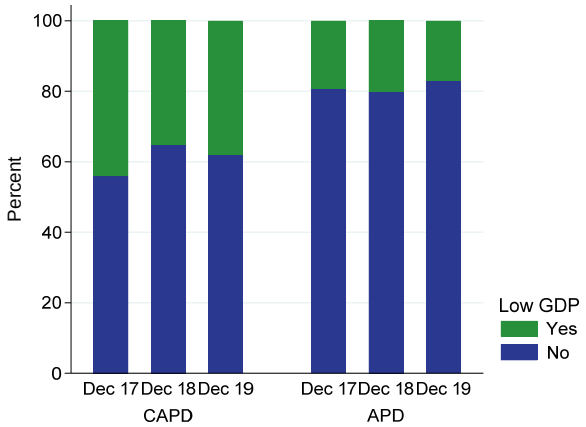


Figure 5.8.2 - Low GDP Use by Modality - Prevalent Patients December 2017 - 2019 New Zealand

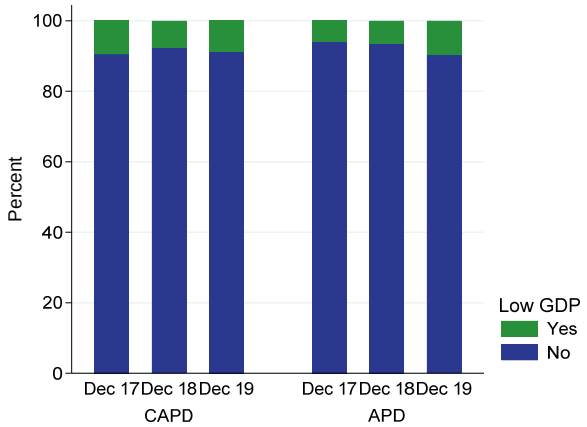
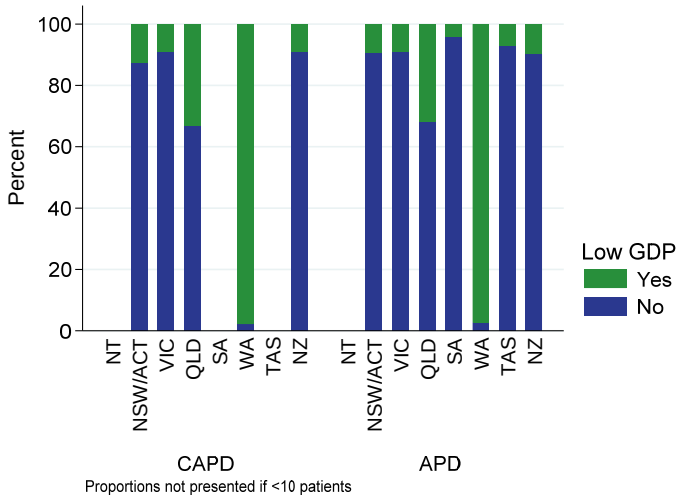


Figure 5.9 - Low GDP Use by State/Territory and Country - Prevalent Patients December 2019



Patient Survival

The next section examines PD patient survival. Survival time is presented for those commencing PD for the first time within 365 days of RRT start, from the date of PD start, and censored at transplantation. Patients commencing PD after a transplant are excluded.

Table 5.9 and figure 5.10 show patient survival by era.

Table 5.9 Patient Survival by Era - Peritoneal Dialysis within 365 days of RRT start - Censored for Transplant 2008-2019; % [95% Confidence Interval]

Country	Era	Number of Patients	Survival			
			6 months	1 year	3 years	5 years
Australia	**2008 - 2010**	2483	96[95,97]	91[90,92]	71[69,73]	51[49,53]
	2011 - 2013	2681	97[96,98]	94[93,94]	73[72,75]	53[50,55]
	2014 - 2016	3070	97[96,98]	93[92,94]	73[71,75]	53[50,55]
	2017 - 2019	3012	97[97,98]	94[93,95]	-	-
New Zealand	**2008 - 2010**	793	96[95,97]	90[88,92]	67[63,70]	42[38,46]
	2011 - 2013	760	97[95,98]	93[91,94]	66[63,70]	44[40,48]
	2014 - 2016	841	96[95,97]	93[91,94]	68[64,71]	45[40,49]
	2017 - 2019	927	96[95,97]	91[89,93]	-	-

Figure 5.10.1 - Patient Survival by Era Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Transplant – Australia

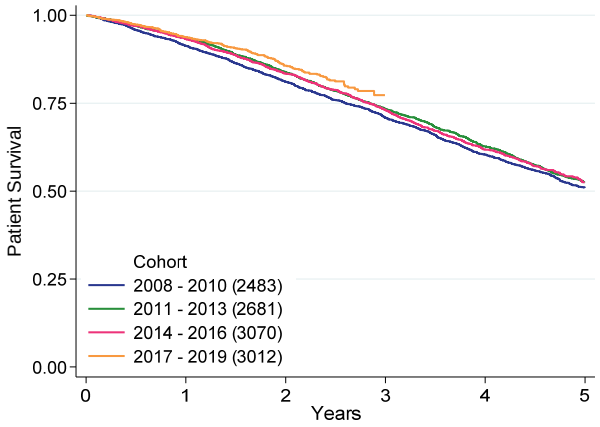


Figure 5.10.2 - Patient Survival by Era Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Transplant - New Zealand

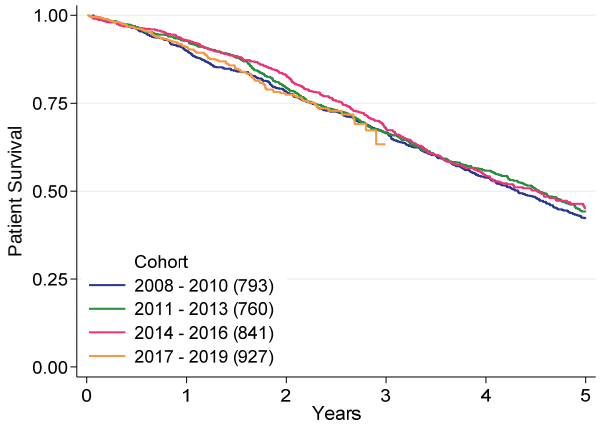


Table 5.10 and figure 5.11 demonstrate the strong association between patient age and survival.

Table 5.10 Patient Survival by Age Group - Peritoneal Dialysis within 365 days of RRT start - Censored for Transplant 2008-2019; % [95% Confidence Interval]

Country	Age Group	Number of Patients	Survival			
			6 months	1 year	3 year	5 year
Australia	**<40**	1692	99[98,99]	98[97,98]	92[90,94]	84[80,87]
	40-59	3568	98[98,99]	95[95,96]	81[80,83]	64[62,67]
	60-74	4184	96[95,97]	92[91,93]	70[69,72]	50[48,52]
	≥75	1802	94[93,95]	87[85,89]	55[53,58]	30[27,32]
New Zealand	**<40**	458	99[98,100]	98[96,99]	90[85,93]	75[68,81]
	40-59	1239	97[96,98]	95[93,96]	74[71,77]	52[48,56]
	60-74	1310	95[94,96]	88[87,90]	59[56,62]	35[32,38]
	≥75	314	92[89,95]	85[81,89]	48[42,54]	19[14,24]

Figure 5.11.1 - Patient Survival by Age Group Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Transplant - Australia

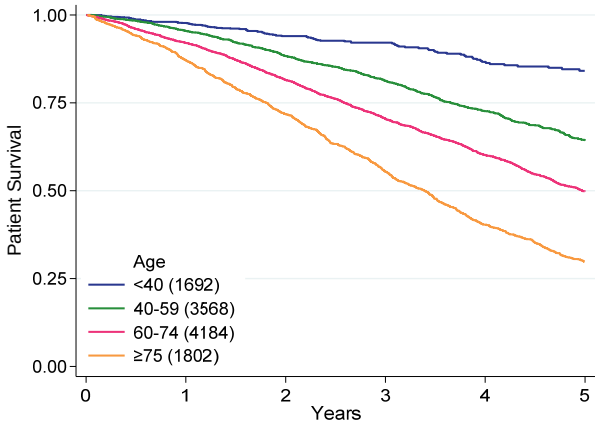


Figure 5.11.2 - Patient Survival by Age Group Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Transplant - New Zealand

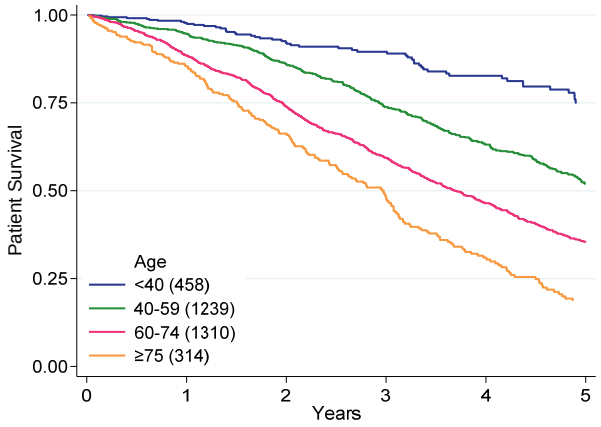


Table 5.11 and figure 5.12 present these data by diabetic status.

Table 5.11 Patient Survival by Diabetic Status - Peritoneal Dialysis within 365 days of RRT start - Censored for Transplant 2008-2019; % [95% Confidence Interval]

Country	Diabetic Status	Number of Patients	Survival			
			6 months	1 year	3 year	5 year
Australia	**Non-diabetic**	6186	98[97,98]	95[94,95]	79[78,80]	61[59,63]
	Diabetic	5013	96[95,96]	91[90,92]	67[65,68]	44[42,46]
New Zealand	**Non-diabetic**	1544	97[96,97]	92[91,94]	74[71,76]	53[49,57]
	Diabetic	1763	96[95,97]	91[90,92]	61[59,64]	36[33,39]

Figure 5.12.1 - Patient Survival by Diabetic Status Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Transplant - Australia

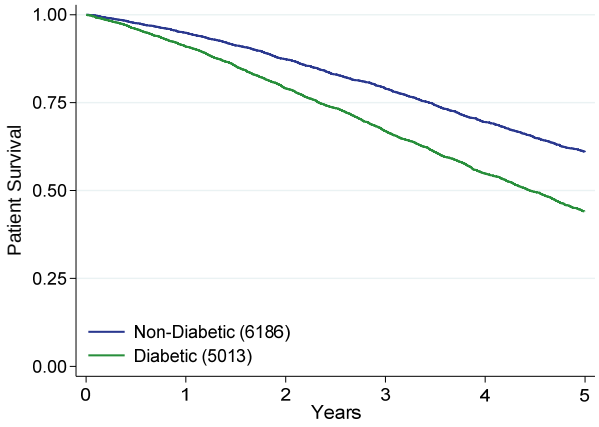
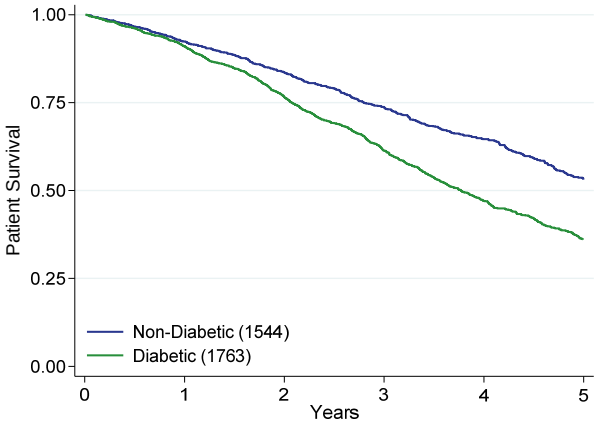


Figure 5.12.2 - Patient Survival by Diabetic Status Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Transplant - New Zealand



Technique Survival

This section examines PD technique survival, defined as the number of days the patient spent on PD before transferring to HD for at least 30 days or dying (either on PD or within 30 days of transfer to HD). Survival time is calculated from the date of PD start,only patients initiating PD for the first time within 365 days of RRT commencement are included and patients commencing PD after a transplant are excluded. PD technique survival censored for transplant is shown according to the same categories reported for patient survival above. This is followed by technique survival censored for both transplantation and patient death. As with patient survival, technique survival is varied by age and diabetic status.

Table 5.12 and figure 5.13 show technique survival by era.

Table 5.12 Technique Survival by Era - Peritoneal Dialysis within 365 days of RRT start - Censored for Transplant 2008-2019; % [95% Confidence Interval]

Country	Era	Number of Patients	Survival			
			6 months	1 year	3 year	5 year
Australia	**2008 - 2010**	2483	83[81,84]	72[70,73]	36[34,38]	17[15,18]
	2011 - 2013	2681	86[84,87]	75[73,76]	39[37,41]	17[15,18]
	2014 - 2016	3070	88[87,89]	77[76,79]	38[36,40]	16[14,18]
	2017 - 2019	3012	86[85,87]	76[74,77]	-	-
New Zealand	**2008 - 2010**	793	90[87,92]	79[76,82]	43[39,47]	19[16,22]
	2011 - 2013	760	87[84,89]	79[76,81]	40[37,44]	18[15,21]
	2014 - 2016	841	87[85,89]	78[75,80]	41[37,44]	20[16,24]
	2017 - 2019	927	86[84,88]	77[74,80]	-	-

Figure 5.13.1 - Technique Survival by Era Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Transplant - Australia

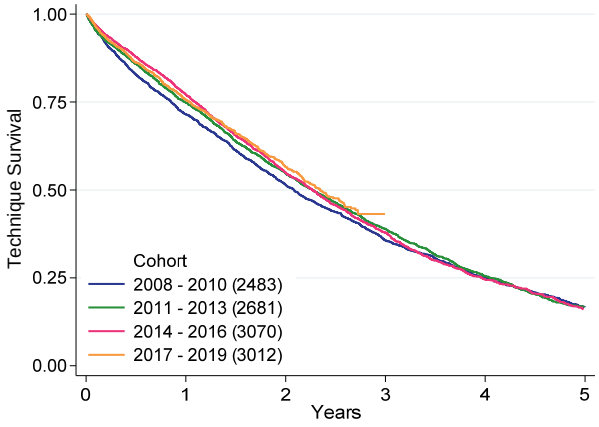


Figure 5.13.2 - Technique Survival by Era Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Transplant - New Zealand

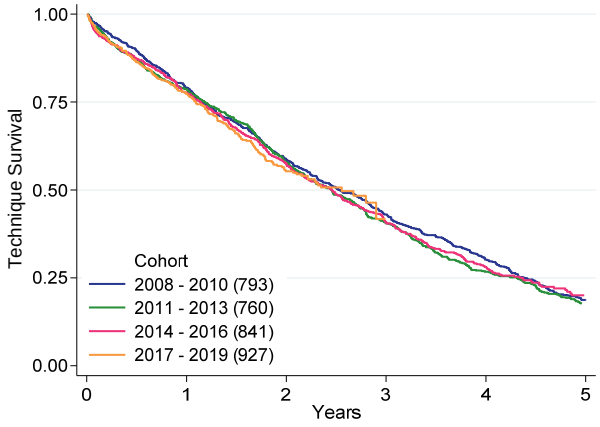


Table 5.13 and figure 5.14 show the association between patient age and technique survival.

Table 5.13 Technique Survival by Age Group - Peritoneal Dialysis within 365 days of RRT start - Censored for Transplant 2008-2019; % [95% Confidence Interval]

Country	Age Group	Number of Patients	Survival			
			6 months	1 year	3 year	5 year
Australia	**<40**	1692	89[87,90]	76[73,78]	43[40,47]	26[21,30]
	40-59	3568	87[86,88]	77[76,78]	40[38,43]	18[16,20]
	60-74	4184	85[84,86]	75[74,76]	38[37,40]	18[16,19]
	≥75	1802	82[80,84]	70[68,72]	30[28,33]	10[9,12]
New Zealand	**<40**	458	90[86,92]	80[75,83]	47[40,53]	29[22,36]
	40-59	1239	88[86,90]	80[78,82]	44[40,47]	19[16,23]
	60-74	1310	87[85,89]	77[74,79]	40[37,43]	18[15,20]
	≥75	314	84[79,87]	74[69,79]	34[28,40]	10[6,15]

Figure 5.14.1 - Technique Survival by Age Group Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Transplant - Australia

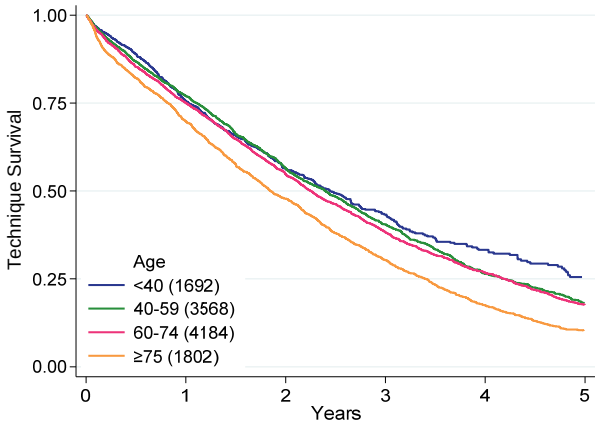


Figure 5.14.2 - Technique Survival by Age Group Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Transplant - New Zealand

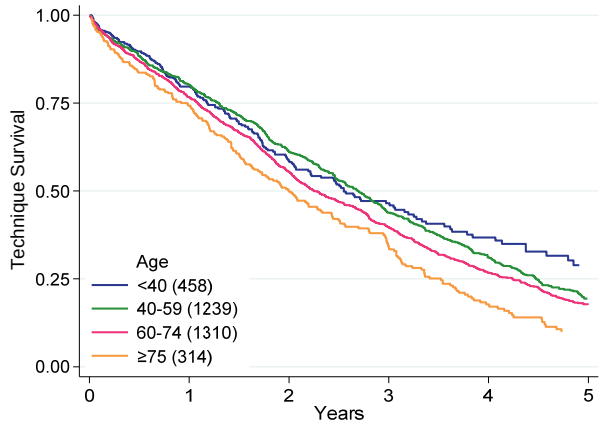


Table 5.14 and figure 5.15 present these data by diabetic status.

Table 5.14 Technique Survival by Diabetic Status - Peritoneal Dialysis within 365 days of RRT start - Censored for Transplant 2008-2019; % [95% Confidence Interval]

Country	Diabetic Status	Number of Patients	Survival			
			6 months	1 year	3 year	5 year
Australia	**Non-diabetic**	6186	87[86,88]	76[75,78]	43[41,44]	22[21,24]
	Diabetic	5013	85[84,86]	73[72,74]	33[31,34]	12[11,13]
New Zealand	**Non-diabetic**	1544	88[87,90]	79[77,81]	49[46,52]	26[23,29]
	Diabetic	1763	87[85,88]	77[75,79]	36[33,38]	13[11,15]

Figure 5.15.1 - Technique Survival by Diabetic Status Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Transplant - Australia

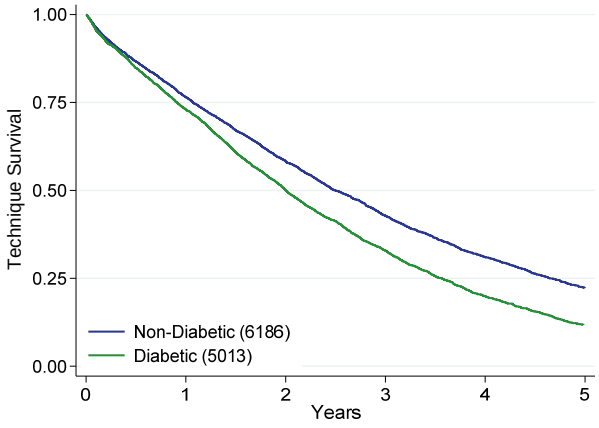


Figure 5.15.2 - Technique Survival by Diabetic Status Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Transplant - New Zealand

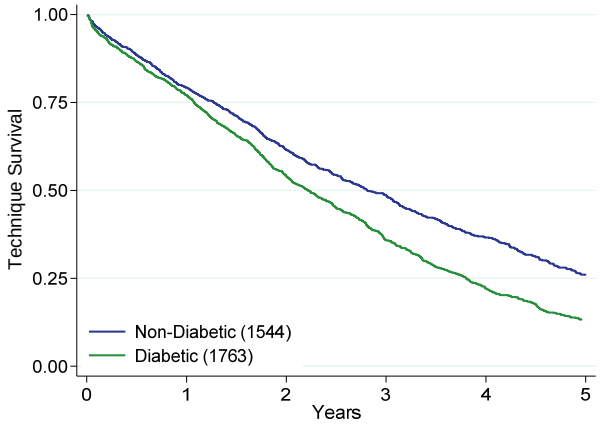


Table 5.15 and figure 5.16 show death-censored technique survival by era.

Table 5.15 Technique Survival by Era - Peritoneal Dialysis within 365 days of RRT start - Censored for Death and Transplant 2008-2019; % [95% Confidence Interval]

Country	Era	Number of Patients	Survival			
			6 months	1 year	3 year	5 year
Australia	**2008 - 2010**	2483	86[85,88]	78[77,80]	51[49,54]	36[33,39]
	2011 - 2013	2681	88[87,90]	79[78,81]	53[51,55]	34[31,36]
	2014 - 2016	3070	90[89,91]	82[81,84]	51[49,53]	33[30,36]
	2017 - 2019	3012	89[87,90]	81[79,82]	-	-
New Zealand	**2008 - 2010**	793	93[91,95]	87[84,89]	65[61,69]	46[41,51]
	2011 - 2013	760	90[88,92]	84[82,87]	62[57,65]	43[38,48]
	2014 - 2016	841	90[88,92]	83[80,86]	60[56,64]	46[40,52]
	2017 - 2019	927	89[87,91]	84[82,87]	-	-

Figure 5.16.1 - Technique Survival by Era Peritoneal Dialysis within 365 days of RRT start - 2008 – 2019, Censored for Death and Transplant – Australia

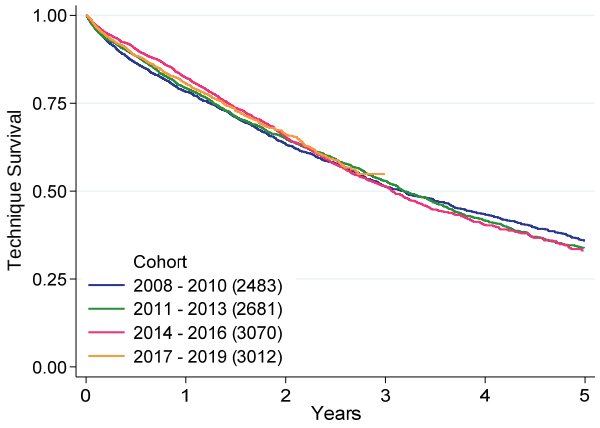


Figure 5.16.2 - Technique Survival by Era Peritoneal Dialysis within 365 days of RRT start - 2008 – 2019, Censored for Death and Transplant - New Zealand

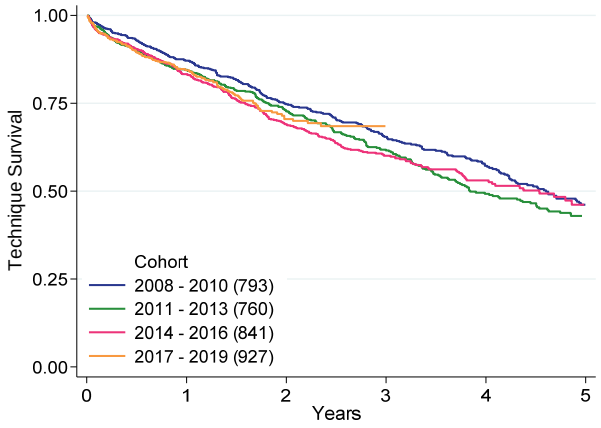


Table 5.16 and figure 5.17 show the association between patient age and death-censored technique survival. In contrast to overall technique survival, older patients receiving PD have higher death-censored technique survival than younger patients.

Table 5.16 Technique Survival by Age Group - Peritoneal Dialysis within 365 days of RRT start - Censored for Death and Transplant 2008-2019; % [95% Confidence Interval]

Country	Age Group	Number of Patients	Survival			
			6 months	1 year	3 year	5 year
Australia	**<40**	1692	90[88,91]	77[75,79]	47[43,50]	29[24,34]
	40-59	3568	88[87,89]	80[79,82]	49[47,51]	28[25,31]
	60-74	4184	89[88,90]	81[80,82]	54[52,56]	38[36,40]
	≥75	1802	87[86,89]	80[78,82]	57[54,60]	41[37,45]
New Zealand	**<40**	458	91[87,93]	81[77,85]	52[46,58]	38[29,46]
	40-59	1239	90[89,92]	84[82,86]	60[56,63]	38[34,43]
	60-74	1310	91[89,92]	86[84,88]	66[62,69]	50[46,55]
	≥75	314	91[87,94]	87[83,91]	72[66,78]	64[54,72]

Figure 5.17.1 - Technique Survival by Age Group Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Death and Transplant - Australia

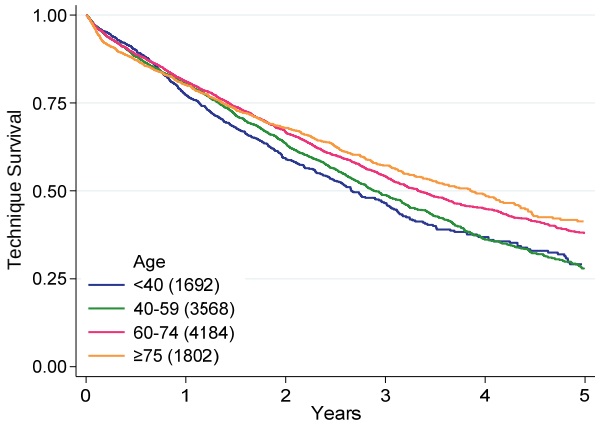


Figure 5.17.2 - Technique Survival by Age Group Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Death and Transplant - New Zealand

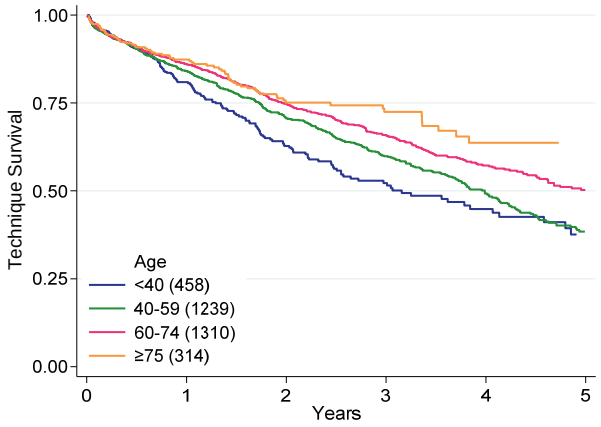


Table 5.17 and figure 5.18 present these data by diabetic status.

Table 5.17 Technique Survival by Diabetic Status - Peritoneal Dialysis within 365 days of RRT start - Censored for Death and Transplant 2008-2019; % [95% Confidence Interval]

Country	Diabetic Status	Number of Patients	Survival			
			6 months	1 year	3 year	5 year
Australia	**Non-diabetic**	6186	89[88,90]	80[79,81]	54[53,56]	38[36,40]
	Diabetic	5013	88[87,89]	80[79,81]	49[47,51]	31[28,33]
New Zealand	**Non-diabetic**	1544	91[90,93]	85[83,87]	65[62,68]	49[45,53]
	Diabetic	1763	90[89,91]	84[83,86]	60[57,63]	41[37,45]

Figure 5.18.1 - Technique Survival by Diabetic Status Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Death and Transplant - Australia

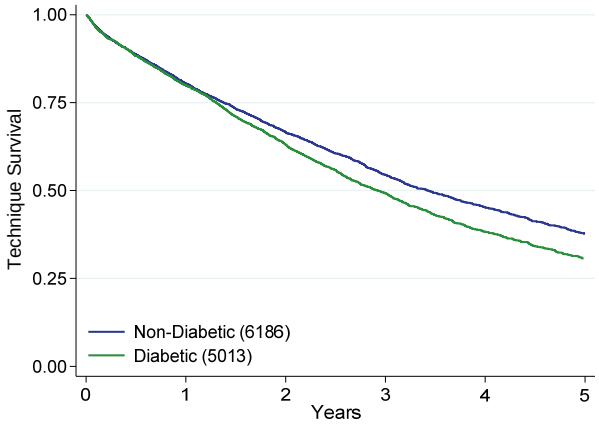
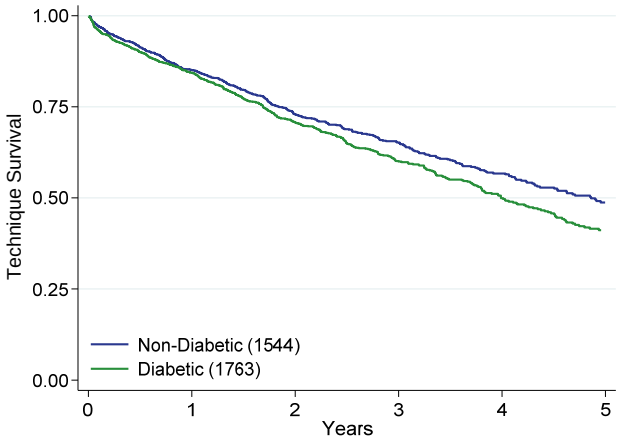


Figure 5.18.2 - Technique Survival by Diabetic Status Peritoneal Dialysis within 365 days of RRT start - 2008 - 2019 Censored for Death and Transplant - New Zealand



The causes of PD technique failure in 2019 are shown in table 5.18. The primary cause of technique failure in both countries was patient death, followed by inadequate dialysis in Australia and infective complications in New Zealand.

Table 5.18 Reason for Technique Failure 2019

Category	Cause of Technique Failure	Australia	New Zealand
	Recurrent/Persistent Peritonitis	42	24
	Acute Peritonitis	65	16
Infection	Tunnel/Exit Site Infection	17	13
	Diverticulitis	2	0
	Abdominal Abscess	2	0
Infection	**Total**	**128 (16%)**	**53 (20%)**
	Inadequate Solute Clearance	112	20
Inadequate dialysis	Inadequate Fluid Ultrafiltration	35	8
	Excessive Fluid Ultrafiltration	1	0
	Poor Nutrition	1	0
Inadequate dialysis	**Total**	**149 (19%)**	**28 (10%)**
	Dialysate Leak	15	6
	Catheter Block	14	3
	Hernia	23	7
	Abdominal Pain	2	0
Mechanical	Abdominal Surgery	20	1
	Pleural Effusion	6	1
	Other Surgery	8	0
	Hydrothorax	2	2
	Scrotal Oedema	4	1
Mechanical	**Total**	**94 (12%)**	**21 (8%)**
	Geography	1	0
Social	Patient Preference	20	5
	Unable to Manage Self-Care	24	10
Social	**Total**	**45 (6%)**	**15 (6%)**
	Cardiovascular	1	0
Other	Planned Transfer After Acute HD Start	1	0
	Other (Specify)	55	10
Other	**Total**	**57 (7%)**	**10 (4%)**
Death	**Total**	**272 (34%)**	**130 (48%)**
Not reported	**Total**	**52 (7%)**	**14 (5%)**

Figure 5.19 and table 5.19 show the cumulative incidence of patients returning to PD after a technique failure over 2015-2019. These data are censored at transplantation, and death is treated as a competing risk. Return to PD was common after a mechanical failure but rare after technique failure due to inadequate dialysis or social reasons.

Figure 5.19.1 - Time to Restarting PD after Technique Failure - Australia 2015-2019

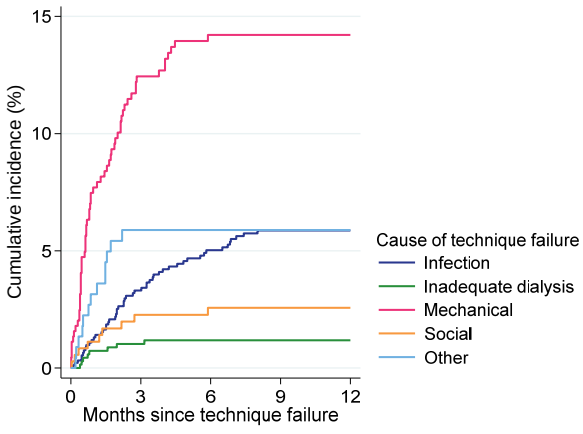


Figure 5.19.2 - Time to Restarting PD after Technique Failure - New Zealand 2015-2019

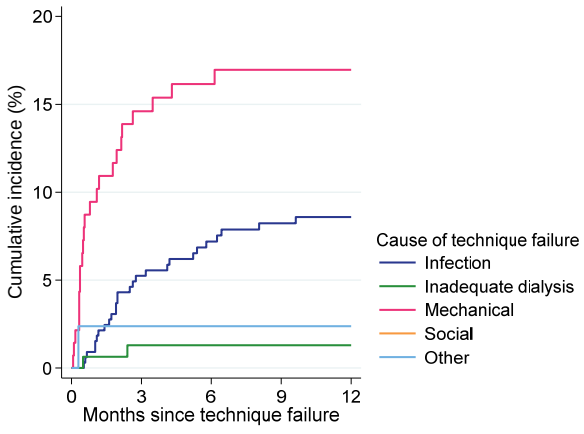


Table 5.19.1 Return to PD (Cumulative Incidence and 95% CI) by Cause of Technique Failure, Australia 2015-2019

Cause of technique failure	3 months	6 months	9 months	12 months
Infection	3.3 (2.3, 4.6)	5.0 (3.7, 6.6)	5.9 (4.4, 7.5)	5.9 (4.4, 7.5)
Inadequate dialysis	1.0 (0.5, 2.0)	1.2 (0.6, 2.2)	1.2 (0.6, 2.2)	1.2 (0.6, 2.2)
Mechanical	12.4 (9.5, 15.7)	14.2 (11.1, 17.7)	14.2 (11.1, 17.7)	14.2 (11.1, 17.7)
Social	2.3 (1.1, 4.2)	2.6 (1.3, 4.6)	2.6 (1.3, 4.6)	2.6 (1.3, 4.6)
Other	5.9 (3.3, 9.5)	5.9 (3.3, 9.5)	5.9 (3.3, 9.5)	5.9 (3.3, 9.5)

Table 5.19.2 Return to PD (Cumulative Incidence and 95% CI) by Cause of Technique Failure, New Zealand 2015-2019

Cause of technique failure	3 months	6 months	9 months	12 months
Infection	5.2 (3.2, 8.0)	7.2 (4.7, 10.4)	8.2 (5.5, 11.6)	8.6 (5.8, 12.0)
Inadequate dialysis	1.3 (0.3, 4.2)	1.3 (0.3, 4.2)	1.3 (0.3, 4.2)	1.3 (0.3, 4.2)
Mechanical	14.6 (9.3, 21.1)	16.1 (10.5, 22.8)	17.0 (11.2, 23.8)	17.0 (11.2, 23.8)
Social	. (., .)	. (., .)	. (., .)	. (., .)
Other	2.4 (0.2, 10.8)	2.4 (0.2, 10.8)	2.4 (0.2, 10.8)	2.4 (0.2, 10.8)

Peritonitis

Table 5.20 and figure 5.20 present the time to first peritonitis over 2015-2019 by age at PD start. Peritonitis is more common in children, but otherwise there is little association between age and time to first peritonitis.

Table 5.20 First PD Treatment to First Episode of Peritonitis By Age at Entry 01-Jan-2015 to 31-Dec-2019 % Survival [95% Confidence Interval]

Survival	Age Groups						
	00-14	15-34	35-54	55-64	65-74	≥75	All
Australia	**(n=100)**	**(n=464)**	**(n=1395)**	**(n=1164)**	**(n=1362)**	**(n=782)**	**(n=5267)**
3 months	84 [75,90]	93 [90,95]	93 [91,94]	93 [91,94]	94 [92,95]	94 [92,95]	**93 [92,94]**
6 months	77 [67,85]	87 [84,90]	88 [86,90]	88 [85,90]	89 [87,90]	89 [87,91]	**88 [87,89]**
9 months	70 [59,79]	84 [80,88]	82 [79,84]	82 [79,84]	83 [81,85]	84 [81,87]	**82 [81,83]**
1 year	68 [57,77]	79 [75,83]	77 [74,79]	76 [74,79]	79 [77,82]	80 [76,83]	**78 [77,79]**
2 years	54 [36,69]	62 [54,69]	62 [58,65]	62 [59,66]	64 [60,67]	64 [59,68]	**63 [61,64]**
3 years	27 [2,64]	52 [42,61]	48 [42,53]	49 [44,54]	51 [46,56]	49 [43,55]	**49 [47,52]**
New Zealand	**(n=29)**	**(n=141)**	**(n=461)**	**(n=394)**	**(n=392)**	**(n=160)**	**(n=1577)**
3 months	86 [67,95]	94 [89,97]	95 [92,97]	92 [89,95]	91 [88,94]	91 [86,95]	**93 [91,94]**
6 months	78 [58,90]	88 [81,93]	90 [87,93]	86 [82,89]	83 [79,87]	89 [83,93]	**87 [85,89]**
9 months	78 [58,90]	81 [72,87]	83 [79,87]	80 [75,84]	77 [71,81]	87 [80,91]	**81 [78,83]**
1 year	70 [48,84]	74 [64,82]	77 [73,82]	67 [61,72]	68 [63,74]	79 [70,85]	**72 [70,75]**
2 years	60 [33,79]	54 [41,66]	55 [49,61]	52 [45,58]	48 [41,54]	61 [50,70]	**53 [50,56]**
3 years	45 [15,71]	35 [16,55]	42 [34,49]	42 [34,50]	36 [28,44]	44 [30,56]	**40 [36,44]**

Figure 5.20.1 - First PD Treatment to First Peritonitis - By Age at First PD Australia 2015 - 2019

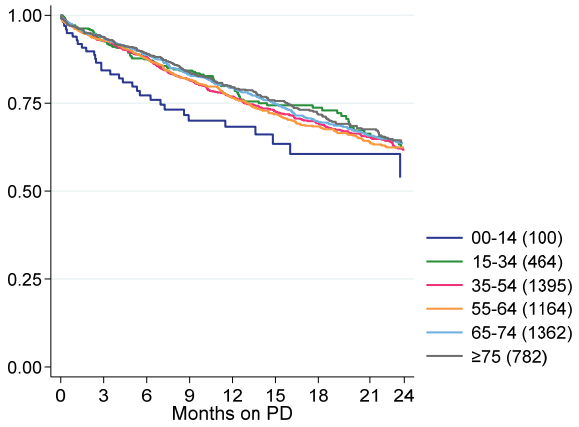
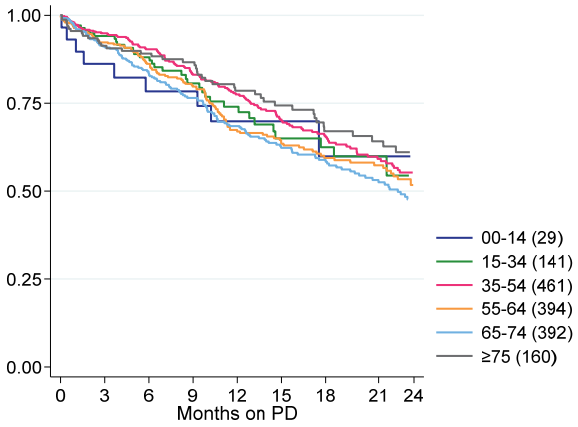


Figure 5.20.2 - First PD Treatment to First Peritonitis - By Age at First PD New Zealand 2015 - 2019



In Australia peritonitis is more common in Indigenous patients and less common in Asian patients. In New Zealand a similar but less pronounced pattern is seen (figure 5.21). Note that collection of ethnicity data in ANZDATA has evolved to align with Australian Bureau of Statistics Australian Standard Classification of Cultural and Ethnic Groups[3] and data collection now allows for a patient to nominate more than one ethnicity group, however, consultation regarding reporting of ethnicity data is currently ongoing and reporting guidelines have not been finalised at the time of publication. As a result, ethnicity data thorough this report includes only the first ethnicity category entered for each patient and uses the legacy term 'Caucasian' which includes data recorded as 'Caucasoid', 'Oceanian – Australian', 'Oceanian – New Zealand European', 'North American' and a number of European ethnicities.

Figure 5.21.1 - First PD Treatment to First Peritonitis - By Ethnicity Australia 2015 - 2019

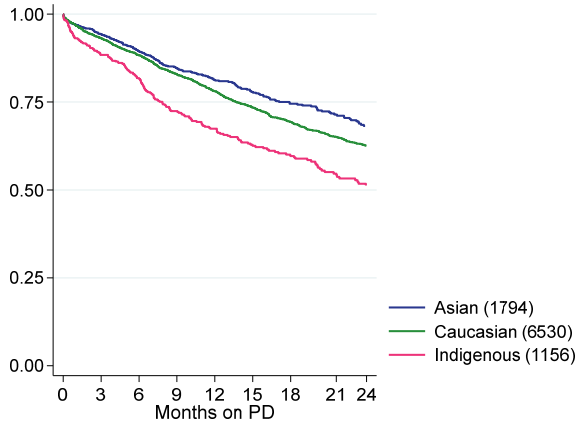
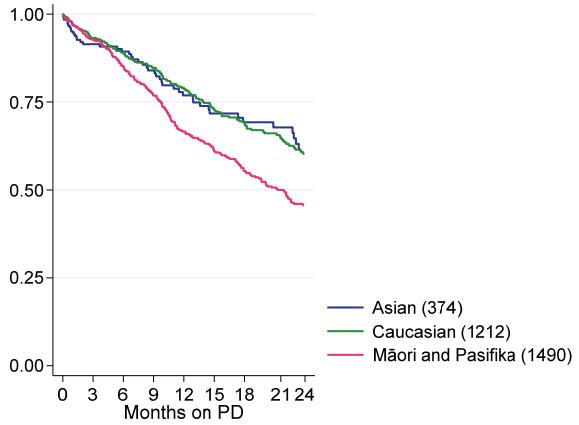


Figure 5.21.2 - First PD Treatment to First Peritonitis - By Ethnicity New Zealand 2015 - 2019



Diabetes is associated with a shorter time to first peritonitis in both countries, but this difference only appears several months into PD treatment (figure 5.22).

Figure 5.22.1 - First PD Treatment to First Peritonitis - By Diabetic Status at RRT entry Australia 2015 - 2019

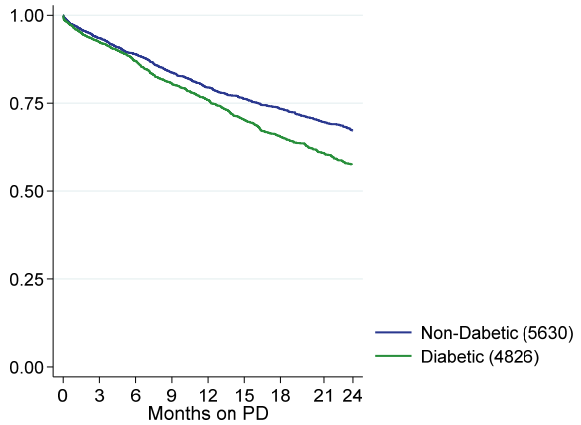
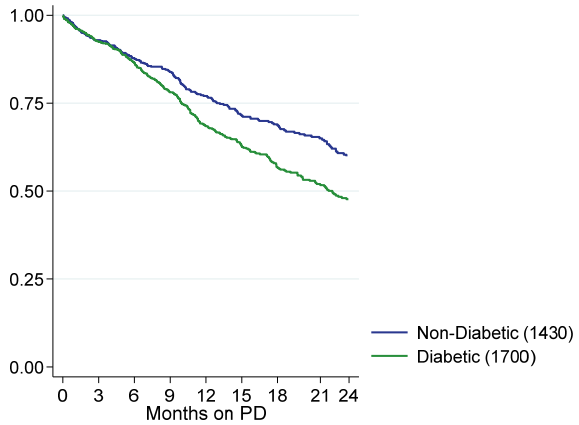


Figure 5.22.2 - First PD Treatment to First Peritonitis - By Diabetic Status at RRT entry New Zealand 2015 - 2019



Australian Peritonitis Registry

Since October 2003 ANZDATA has collected detailed information on PD peritonitis episodes in Australian patients. A selection of those data is reported here. New Zealand has a separate PD registry which is not currently linked with ANZDATA.

Table 5.21 and Figures 5.23-5.27 report the peritonitis rate, expressed as episodes per patient-year in the table and on the left y axis of the figures and patient-months per episode on the right y axis of the figures, according to different categories. The overall peritonitis rate in Australia has dropped considerably over the last few years (figure 5.23). However, there remains significant variation between states/territories (figures 5.24 and 5.25) and individual treating hospitals (figures 5.26 and 5.27).

Table 5.21 PD Peritonitis Episodes Per Year by State/Territory, Australia 2015-2019

State	2015	2016	2017	2018	2019	2015-2019
QLD	0.48	0.39	0.43	0.41	0.38	**0.42**
NSW	0.31	0.31	0.31	0.31	0.22	**0.30**
ACT	0.58	0.42	0.38	0.41	0.60	**0.49**
VIC	0.30	0.31	0.24	0.26	0.15	**0.25**
TAS	0.33	0.29	0.12	0.20	0.08	**0.22**
SA	0.31	0.27	0.29	0.15	0.22	**0.24**
NT	0.71	0.58	0.59	0.60	0.32	**0.53**
WA	0.48	0.38	0.32	0.39	0.50	**0.42**
Australia	**0.37**	**0.33**	**0.32**	**0.32**	**0.26**	**0.32**

Figure 5.23 - PD Peritonitis Rate - Australia 2004-2019

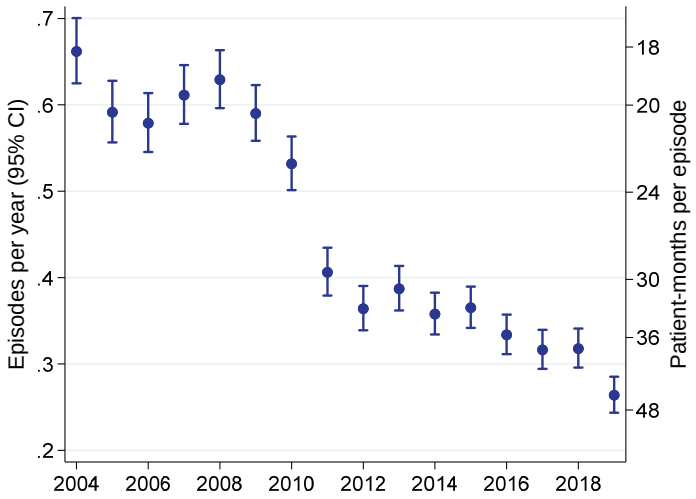


Figure 5.24 - PD Peritonitis Rate - By State/Territory, Australia 2015-2019

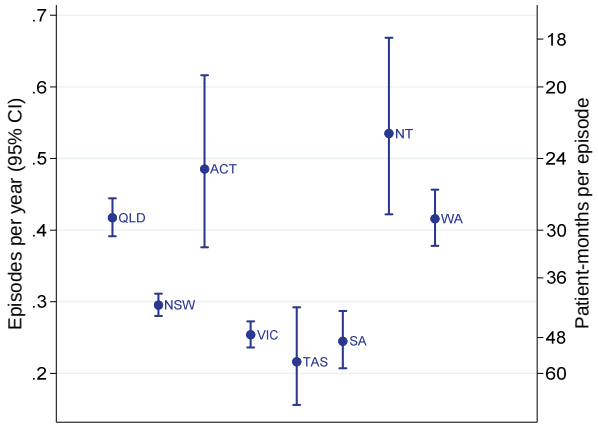


Figure 5.25 - PD Peritonitis Rate - By State/Territory, Australia 2010-2019

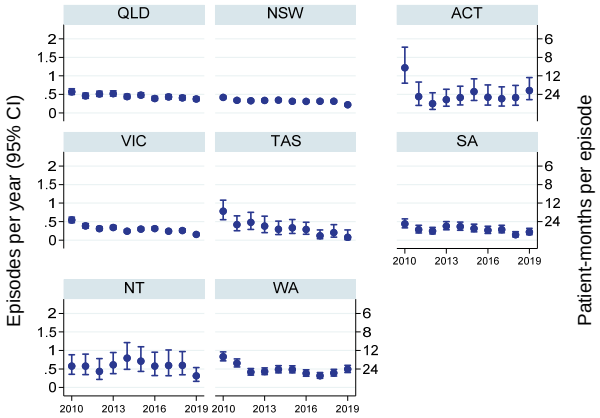


Figure 5.26 - PD Peritonitis Rate - By Treating Unit, Australia 2010-2019

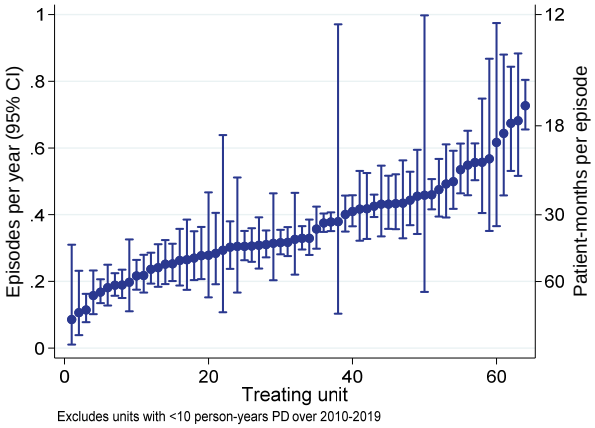
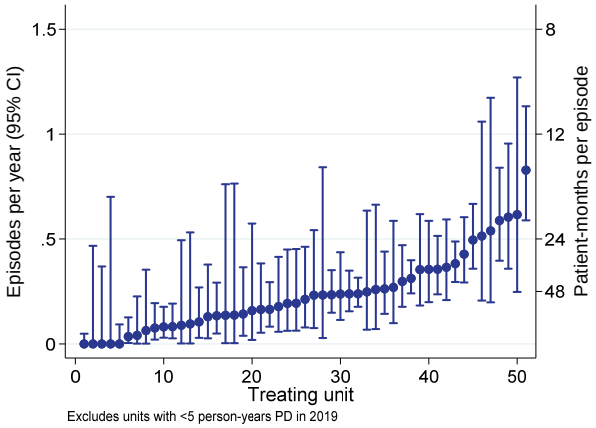


Figure 5.27 - PD Peritonitis Rate - By Treating Unit, Australia 2019



The organisms causing peritonitis are presented in figure 5.28. There was a higher proportion of culture negative peritonitis in 2019 compared with the preceding 5 years. Figure 5.29 shows these data for 2019 stratified by state/territory.

Figure 5.28 - Distribution of Organisms Causing Peritonitis - Australia 2014-2019

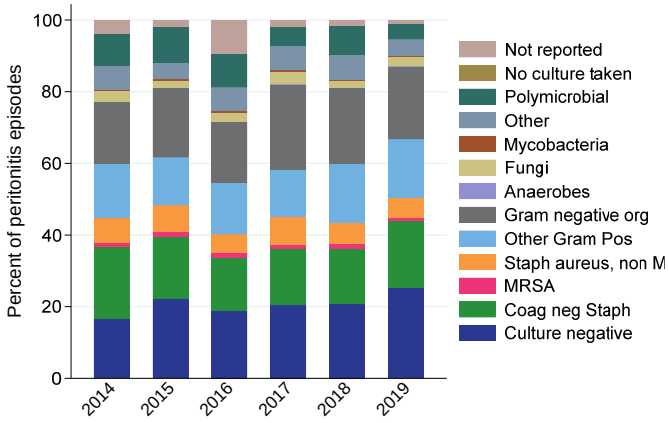
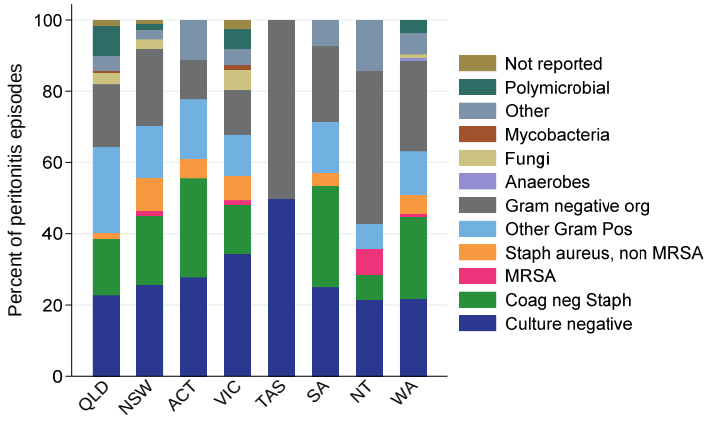


Figure 5.29 - Distribution of Organisms Causing Peritonitis - Australia 2019



The percentage of peritonitis episodes using vancomycin or an aminoglycoside in the initial antibiotic regimen is shown in figure 5.30. Almost half of all episodes are initially treated with vancomycin, and the majority receive an aminoglycoside. The use of these drugs in the final regimen are shown in figure 5.31.

Figure 5.30 - Initial Antibiotic Regimen - Australia 2014-2019

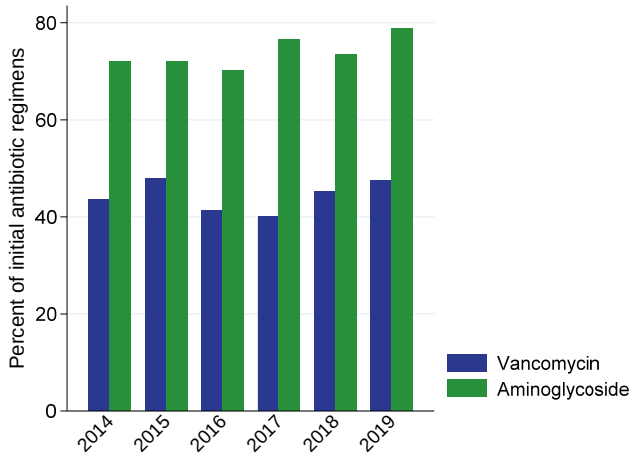
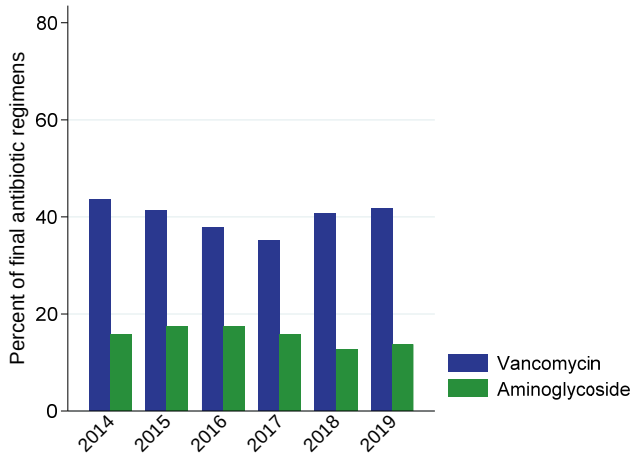
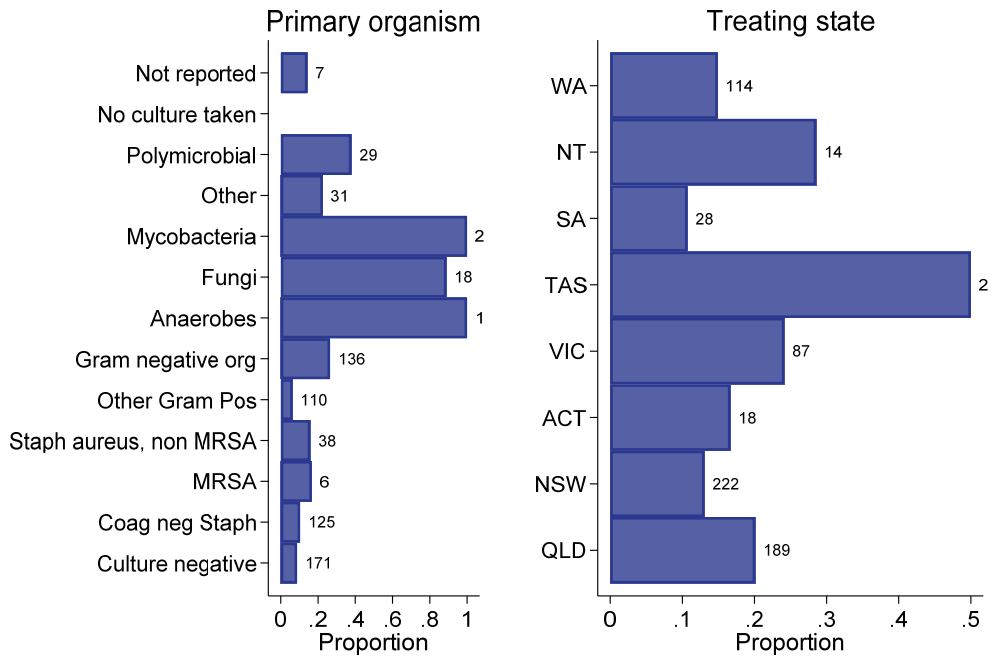


Figure 5.31 - Final Antibiotic Regimen - Australia 2014-2019



The proportion of peritonitis episodes resulting in a permanent transfer to haemodialysis varies by organism and, to a lesser extent, state/territory (figure 5.32).

Figure 5.32 - Proportion of Episodes Resulting in Permanent HD Transfer - Australia 2019



Values are total number of peritonitis episodes reported in 2019

Laboratory Values

Anaemia

Figure 5.33 shows the distribution of haemoglobin (Hb) in prevalent PD patients over the last 3 years.

Figure 5.33 - Haemoglobin - Peritoneal Dialysis - December 2017-2019

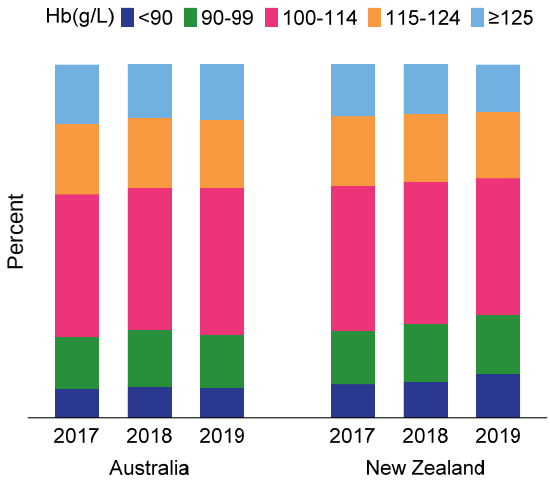


Figure 5.34 shows the variation in Hb of prevalent PD patients between treating hospitals; median Hb ranged from 100 to 124g/L in Australia and 104-116g/L in New Zealand

Figure 5.34.1 - Haemoglobin in Peritoneal Dialysis Patients - Australia 31 December 2019

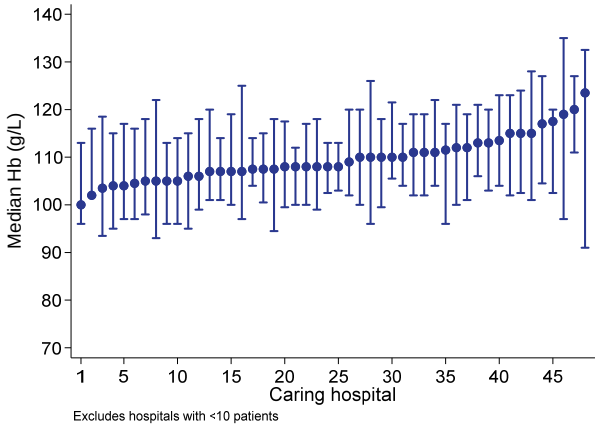


Figure 5.34.2 - Haemoglobin in Peritoneal Dialysis Patients - New Zealand 31 December 2019

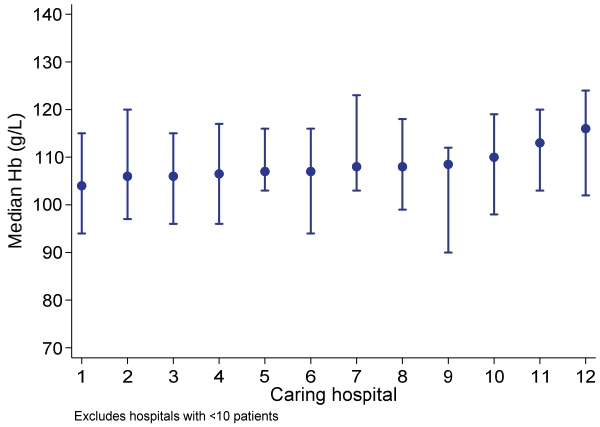


Figure 5.35 shows the proportion of prevalent PD patients with Hb between 110-129g/L; the proportion ranged from 20-64% in Australia and 26-52% in New Zealand

Figure 5.35.1 - % Peritoneal Dialysis Patients with Hb 110-129 g/L - Australia 31 December 2019

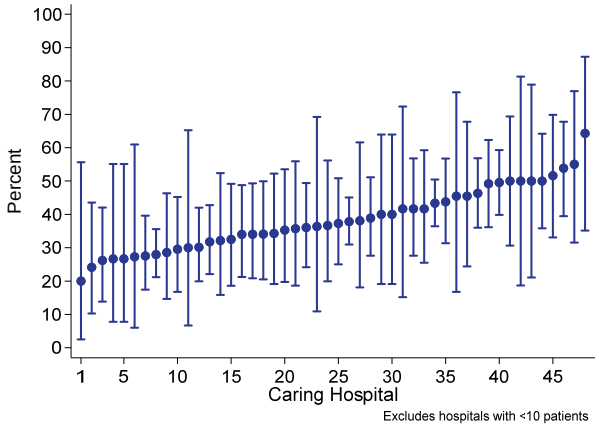
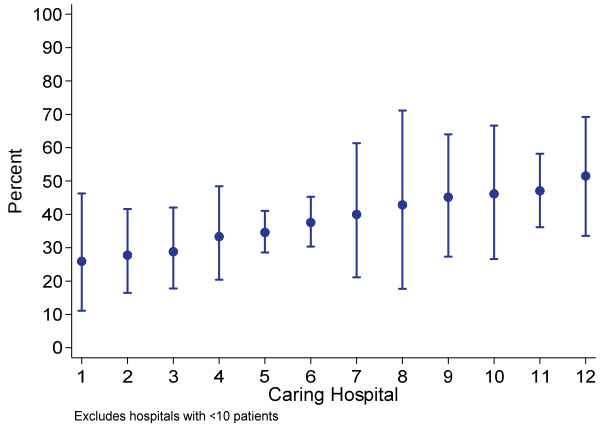


Figure 5.35.2 - % Peritoneal Dialysis Patients with Hb 110-129 g/L - New Zealand 31 December 2019



Biochemistry

Figures 5.36-5.39 present the distributions of calcium and phosphate in prevalent PD patients over the last 3 years.

Figure 5.36 - Serum Calcium - Peritoneal Dialysis - December 2017-2019

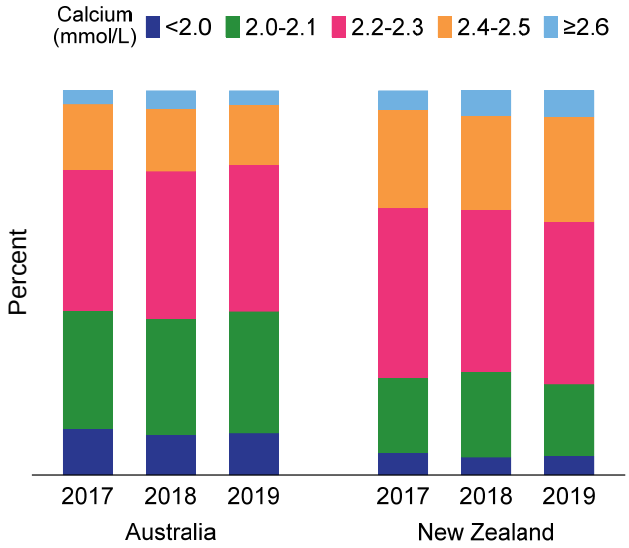


Figure 5.37.1 - % PD Patients with Calcium 2.1-2.4 mmol/L - Australia 31 December 2019

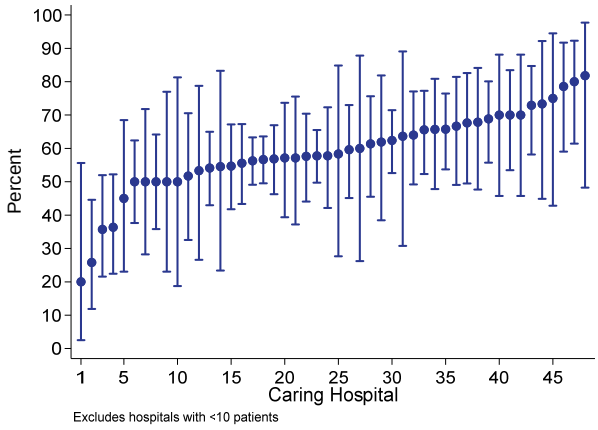


Figure 5.37.2 - % PD Patients with Calcium 2.1-2.4 mmol/L - New Zealand 31 December 2019

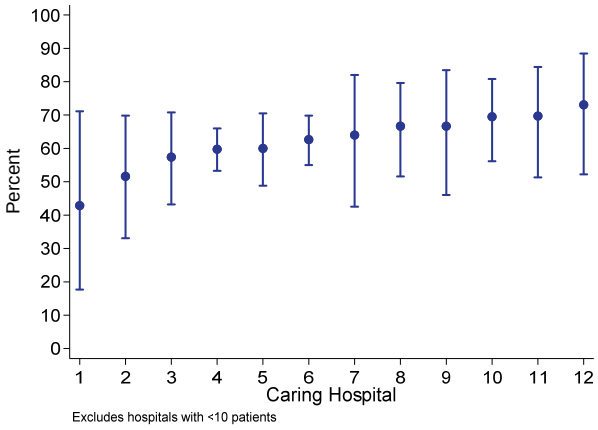


Figure 5.38 - Serum Phosphate - Peritoneal Dialysis - December 2017-2019

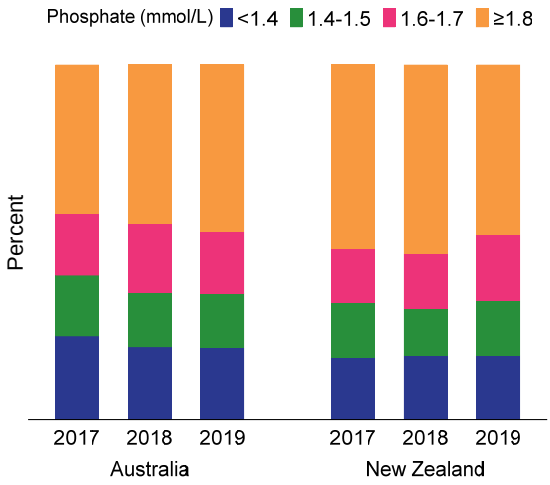


Figure 5.39.1 - % PD Patients with Phosphate 0.8-1.6 mmol/L - Australia 31 December 2019

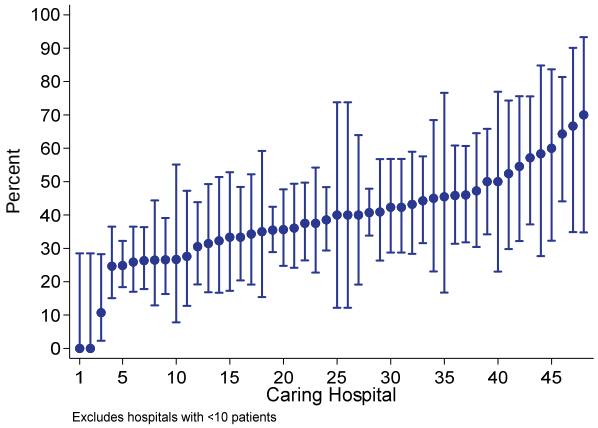
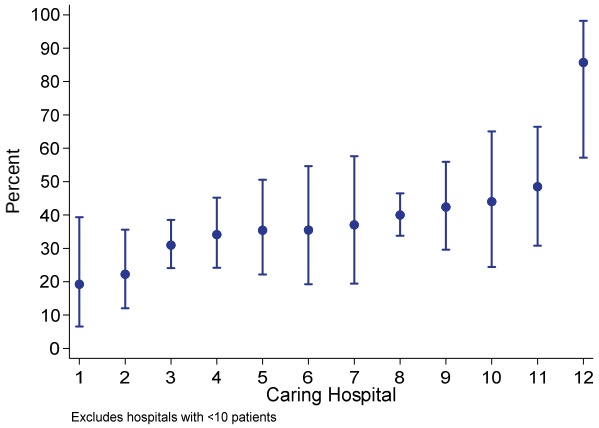


Figure 5.39.2 - % PD Patients with Phosphate 0.8-1.6 mmol/L - New Zealand 31 December 2019



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[1] *Australian Bureau of Statistics, 2019, Australian Demographic Statistics, Jun 2019, time series spreadsheets, cat. no. 3101.0, viewed 19 Dec 2019, http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3101.0Jun%202019?OpenDocument*

[2] *This work is based on/includes Stats NZ's data which are licensed by Stats NZ for re-use under the Creative Commons Attribution 4.0 International licence. Stats NZ, 2019, Estimated Resident Population by Age and Sex (1991+) (Annual-Jun), NZ Infoshare, viewed 19 Dec 2019, http://archive.stats.govt.nz/infoshare/*

[3] Australian Bureau of Statistics, 2019, Australian Standard Classification of Cultural and Ethnic Groups (ASCCEG), December 2019, viewed 23 Oct 2020, https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1249.0Main+Features12019?OpenDocument