

SECTION G PERITONEAL DIALYSIS

Prospective audit of the incidence of peritoneal dialysis (PD) associated peritonitis, adequacy of dialysis and causes of technique failure have been reported the Scottish Renal Registry (SRR) by all adult renal units in Scotland since 1999.

In this report, details of the type of peritonitis (first episode, repeat, relapse, recurrent) and outcome of peritonitis are also presented for 2016.

The number of prevalent adult patients treated with PD was 230 at the end of December 2016 with 75% of adult PD patients using automated PD (APD).

G1 Reasons for starting and stopping PD in adult renal units 2012-2016											
Renal unit	New	From HD	Transfer in	From Tx	Total in	Death	To Tx	To HD	Transfer out	Re-covered	Total out
ARI	41	24	4	8	77	7	24	47	0	1	79
XH	49	16	2	1	68	34	19	27	0	0	80
DGRI	30	3	3	4	40	8	7	26	2	0	43
GLAS	111	46	3	17	177	39	49	86	4	2	180
MONK	47	11	2	4	64	8	12	31	1	1	53
NINE	37	18	0	2	57	9	11	36	1	1	58
RAIG	31	23	2	3	59	4	15	44	2	0	65
RIE	61	24	8	5	98	21	22	44	1	4	92
VHK	37	12	0	1	50	13	12	38	0	0	63
Total	444	177	24	45	690	143	171	379	11	9	713

G2 PD associated peritonitis rates in adult renal units 2000-2016										
	2000-2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Months between episodes	19.9	18.5	18.7	18.8	23.4	27	22.1	24.2	20.6	15.8

2016 saw high rates of peritonitis in most units, reflected in the highest overall rate for many years of 1 episode every 15.8 months in Scotland.

The definition of PD associated peritonitis used by the SRR can be found on the SRR website:

<http://www.srr.scot.nhs.uk/Projects/Projects3.html#periton>

G3 PD associated peritonitis rates in adult renal units 2012-2016				
Unit	No. of peritonitis episodes	Total patient months on PD	Peritonitis rate (months between episodes)	Peritonitis rate (episodes per PD treatment year)
ARI	66	1514	22.9	0.5
XH	88	2346	26.7	0.5
DGRI	41	823	20.1	0.6
GLAS	117	2838	24.3	0.5
MONK	42	698	16.6	0.7
NINE	36	1163	32.3	0.4
RAIG	60	855	14.2	0.8
RIE	110	1800	16.4	0.7
VHK	63	1214	19.3	0.6
SCOTLAND	623	13251	21.3	0.6

MONK, RAIG and RIE have peritonitis rates across the five years worse than the minimum standard specified by the Renal Association 2010 guideline (<1 episode per 18 months).

The Renal Association updated guideline (published June 2017) recommends that peritonitis rates should be less than 0.5 episodes per patient year. All units except XH have peritonitis rates \geq 0.5 episodes per patient year and so fail to meet this revised standard.

The proportion of patients treated with PD in 2016 who developed peritonitis varied between units from 4.3% to 50%.

Peritonitis may occur as a single episode, or may be followed by further episodes which are described as relapse, recurrent or repeat according to the definition agreed by the International Society for Peritoneal dialysis (ISPD) and available on the SRR website:

<http://www.srr.scot.nhs.uk/Projects/Projects3.html#periton>

The SRR has previously reported peritonitis rate using all episodes of peritonitis (which will result in a higher overall rate). The ISPD recommend omitting recurrent, relapsed and repeat episodes from rate calculations; using these criteria the rate by unit for the 2 audit periods in 2016 are shown in table G4. The outcome of peritonitis by unit is also shown.

G4 PD associated peritonitis in adult renal units 2016 by audit period and episode type with outcomes

Unit		Proportion of patients experiencing peritonitis per unit			Type of peritonitis episode					Outcome of Peritonitis		
		Patients treated with PD	Patients with peritonitis		Single episode	Re-current	Re-lapse	Repeat	Rate**	% Cure	% Catheter Removed	% Death
			n	n								
ARI	a*	31	8	25.8	8	0	0	1	17.0	70	30	0
	b	27	3	11.1	3	1	0	0	41.8	75	25	0
XH	a	46	13	28.3	14	1	0	1	9.5	100	0	0
	b	44	8	18.2	12	0	1	3	15.3	88	6	6
DGRI	a	15	5	33.3	6	1	1	0	13.0	100	0	0
	b	15	2	13.3	1	0	1	0	68.0	100	0	0
GLAS	a	74	5	6.8	10	0	0	0	30.4	70	30	0
	b	69	6	8.7	4	0	0	1	73.3	100	0	0
MONK	a	26	5	19.2	2	0	2	3	46.4	43	43	14
	b	25	7	28.0	8	0	2	1	14.5	90	10	0
NINE	a	23	1	4.3	1	0	0	0	98.0	0	100	0
	b	28	8	28.6	8	0	0	1	11.9	60	40	0
RAIG	a	17	3	17.6	3	0	0	0	23.7	33	67	0
	b	14	7	50.0	7	0	0	0	8.0	71	29	0
RIE	a	41	5	12.2	5	0	0	1	38.1	80	20	0
	b	44	14	31.8	16	2	4	1	12.1	73	27	0
VHK	a	25	6	24.0	6	0	0	0	20.7	80	20	0
	b	29	8	27.6	9	0	2	1	12.4	75	17	8
Scotland	a	298	51	17.1	55	2	3	6	22.3	77.0	21.0	2.0
	b	295	63	21.4	68	3	10	8	18.3	79.0	19.0	2.0

* a refers to first 6 months and b refers to second 6 months of each year.

** Peritonitis rate (number of months between episodes) excluding repeat, recurrent and relapsed episodes.

In 2016, 78% of peritonitis episodes were cured, 20% resulted in PD catheter removal, and 2% resulted in patient death. The UK Renal Association guideline targets an 80% primary cure rate.

G5 Rate (PD treatment months between episodes) of causative organisms of PD peritonitis in adult renal units 2012-2016

Renal unit	Staph aureus	Coagulase negative staph	Gram negative bacilli	Fungi	Other	Culture negative	Total Rate
ARI	757.0	94.6	116.5	1514.0	84.1	94.6	22.9
XH	195.5	335.1	195.5	-	195.5	53.3	26.7
DGRI	274.3	63.3	102.9	-	68.6	137.2	20.1
GLAS	218.3	105.1	129.0	567.6	113.5	113.5	24.3
MONK	63.6	-	174.8	233.0	116.5	38.8	16.6
NINE	193.9	145.4	145.4	-	96.9	581.6	32.3
RAIG	213.9	65.8	71.3	-	40.7	85.6	14.2
RIE	105.9	81.8	138.4	1799.5	40.9	138.4	16.4
VHK	303.6	46.7	71.4	-	151.8	202.4	19.3
Scotland	184.1	100.4	121.6	1019.4	83.9	94.7	21.3

The organisms cultured vary between units. The culture negative rate 2012-2016 was 22%, above the UK Renal Association target of less than 20%. The culture negative rate varies from 5.6-50% between units.

G6 Number of patients with total (peritoneal and renal) creatinine clearances (litres/week/1.73m²) in each 6 months audit period 2012-2016 and percentage of patients with inadequate (<50) and borderline (50-60) creatinine clearances

Year	Adequacy						% < 50	% 50-60
	< 50	50-60	61-70	>70	Unassessed	Total		
2012a*	24	37	26	94	54	235	10.2	15.7
2012b	25	24	34	103	45	231	10.8	10.4
2013a	16	30	33	92	112	283	5.7	10.6
2013b	23	31	34	84	52	224	10.3	13.8
2014a	25	29	27	79	44	204	12.3	14.2
2014b	25	29	30	88	34	206	12.1	14.1
2015a	28	28	19	73	59	207	13.5	13.5
2015b	25	27	26	74	61	213	11.7	12.7
2016a	23	28	21	76	49	197	11.7	14.2
2016b	24	25	18	74	70	211	11.4	11.8
TOTAL	238	288	268	837	580	1803	13.2	16.0

* a refers to first 6 months and b refers to second 6 months of each year

The adequacy results are for patients still on PD at the end of each audit period as opposed to all adequacy tests performed. Most units wait at least 2 months after starting PD before performing an initial adequacy test.

The proportion of patients with inadequate dialysis (ie below 50 litres/week/1.73m²) has remained stable for the last 5 years.

G7 Causes of PD technique failure in each adult renal unit 2012-2016															
Unit	Peritonitis		Access		Under-dialysis		Poor UF*		High IP**		Wish HD		Stop Dialysis		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
ARI	16	38	2	5	15	38	0	0	3	7	5	12	1	2	42
XH	32	37	3	3	21	22	5	6	11	13	14	16	1	1	87
DGRI	16	41	4	10	9	29	1	3	2	5	5	13	2	5	39
GLAS	23	42	9	16	6	16	2	4	0	0	12	22	3	5	55
MONK	14	37	5	13	9	29	3	8	3	8	3	8	1	3	38
NINE	20	65	4	13	3	6	1	3	0	0	3	10	0	0	31
RAIG	16	41	4	10	8	21	0	0	4	10	7	18	0	0	39
RIE	5	18	3	11	8	23	2	7	3	11	7	25	0	0	28
VHK	5	21	1	4	12	45	1	4	2	8	3	13	0	0	24
Scotland	147	38	35	9	91	24	15	4	28	7	59	15	8	2	383

* Poor ultrafiltration

** High intraperitoneal pressure

The causes of technique failure have remained consistent overall in Scotland, with 38% caused by peritonitis, but there is variation between units.