NHS SCOTLAND

Scottish Renal Registry Report 2014

With demographic data to 2014 and audit data to 2015

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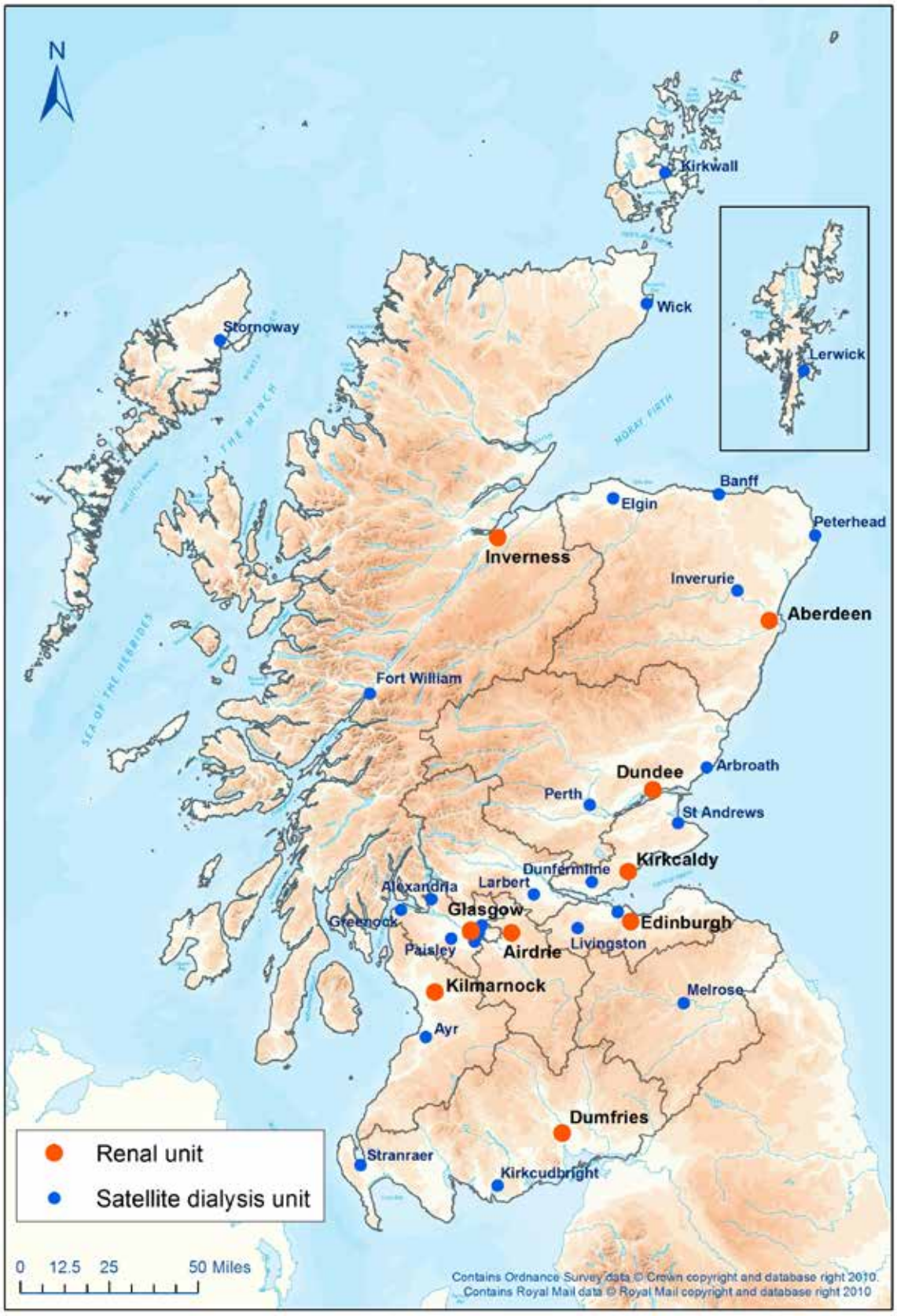
CONTENTS

RENAL UNITS AND SATELLITE DIALYSIS UNITS IN SCOTLAND ON 31 DECEMBER 2014



ACKNOWLEDGEMENTS

The steering group of the Scottish Renal Registry and the report editors would like to thank the staff in all renal units in Scotland for their immense efforts with data collection and checking. Jackie McDonald of ISD runs the SRR office with skill and dedication and is integral to the work of the Registry; she is ably assisted by Stephanie Lang.

The SRR website is expertly managed by the web and publications team at ISD and the report has been skilfully published by Chris Dunn and the publications team at ISD.

Our statistical advice and much of the core data analysis is expertly provided by Jacqueline Campbell and colleagues of ISD.

The quality and completeness of the data within this report represents the concerted efforts of many members of staff in each renal unit and would not be possible without them. Their dedication and diligence is greatly appreciated.

The analysis and presentation of the data is the result of hard work by many contributing chapter authors.

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We have benefitted greatly from collaborative working with colleagues from Health Protection Scotland and present data about bacteraemia occurring in patients receiving renal replacement therapy as a result of that work.

We very much value our collaboration with NHS Blood and Transplant (NHSBT) who through data linkage provide us with transplant listing status and donor details for patients on the SRR who are registered with them on the UK national transplant waiting list. We thank them for their support of the SRR.

We thank the National Records of Scotland for allowing us to use and report data from the population census.

Our computer hardware is supported by Greater Glasgow and Clyde IT department and our software by VitalPulse. The database software is Proton from Clinical Computing plc. The Information Technology staff of the hospitals and NHS Scotland support our use of the NHS computer network.

We are indebted to patients attending all renal units in Scotland and to their friends, families and carers for their brave and unwavering support and for their continuing encouragement to obtain and publish hard facts about the quality of the service, quality of life and outcomes. Patients are full members of the SRR Steering group, they vote on all major decisions and have organised major projects.

The report has been edited by Jamie Traynor, Bruce Mackinnon and Wendy Metcalfe. As editors we remain responsible for the content.

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EXECUTIVE SUMMARY

The first patient was dialysed for established renal failure (ERF) in Scotland in 1960. Up to 31 December 2014, 15673 patients had started renal replacement therapy (RRT) for ERF in Scotland.

On 31 December 2014 there were 9 adult and one paediatric renal units in Scotland with 25 satellite dialysis units between them. All units contribute fully to the Scottish Renal Registry (SRR) and all patients receiving RRT for ERF are registered.

105 patients per million population started RRT for ERF in 2014. The incidence of new patients starting RRT has been between 96 and 107 per million population since 2008.

There were no significant differences in the incidence of patients starting RRT in the 4 years 2011-2014 between NHS Board areas when standardised for age, sex and Scottish Index of Multiple Deprivation (SIMD).

The incidence of new patients starting RRT in 2014 was highest in those aged 64-74 years at 258 patients per million age specific population. The median age of patients starting RRT in 2014 across Scotland was 61 years.

25% of patients starting RRT in the 5 years 2010-2014 had a primary renal diagnosis (PRD) causing their ERF recorded as diabetic nephropathy.

On 31 December 2014 there were 4761 prevalent patients receiving RRT. Of these 56% of patients had a functioning kidney transplant, 39% were being treated with haemodialysis (HD) and 4% with peritoneal dialysis (PD).In contrast to numbers of new patients starting RRT, the numbers of prevalent patients is still rising.

There are significant differences in the age, sex and SIMD standardised prevalence of patients receiving RRT on 31 December 2014 between NHS Board areas.

The prevalence of patients receiving RRT in 2014 was highest in those aged 64-74 years at 1649 patients per million age specific population. The median age of patients receiving RRT on 31 December 2014 was 56 years.

There is a significant trend of improving survival for patients starting RRT in the 10 years 2005-2014. However the life expectancy of patients receiving RRT is shorter than that of the general population. The survival of patients is influenced by their age at the time of starting RRT and also by their PRD. Of those patients who started RRT between 1994-2009 when aged 45 to 64 years with glomerulonephritis 33% had died within 5 years of starting treatment and 54% of those starting RRT 1994-2004 within 10 years. The mortality of patients starting RRT over the same time periods in the same age group with a PRD of diabetic nephropathy was 69% at 5 years and 90% at 10 years. In contrast the life expectancy of a male from the general population aged 55 years currently is 25.32 years.

There is no significant difference in survival between renal units or NHS Board areas.

8.2% of patients who were receiving RRT on 31 December 2013 or who started RRT in 2014 died in 2014. 31% of patients dying in 2014 died due to cardiovascular disease and 24% due to infections.

67% of patients dying in 2014 did so in hospital, 19% died at home. Withdrawal of RRT was recorded as contributing to death in 34% of cases.

261 patients resident in Scotland received a kidney transplant in Scotland in 2014, 41 (15.7%) of

those transplants were pre-emptive meaning they were performed before the patient had required any other form of RRT. 28% of kidney transplants performed 2005-2014 were from live kidney donors. The mean age of patients when receiving a first transplant 2010-2014 was 47.8 years. First kidney transplants performed in 2013 had a 97% 1 year graft survival and a 96% 1 year patient survival.

The Renal Association (UKRA) is the professional body for United Kingdom Nephrologists and produces clinical practice guidelines for management of patients with renal disease, a process accredited by the National Institute for Health and Care Excellence (NICE). Measures of quality of care are compared against the UKRA guidelines facilitating nationwide comparative audit and identification of areas of concern and of excellence in practice. This is one of the mechanisms through which the SRR contributes to continued efforts to improve standards of delivered care for renal patients across Scotland.

For UKRA clinical practice guidelines refer to website: http://www.renal.org/guidelines/

The incidence of PD related peritonitis across Scotland was 24.2 months between episodes in 2014. *UKRA guideline: <1 episode per 18 patient treatment months.*

Vascular access describes the connection between a patient's circulation and a haemodialysis machine. 44.5% of patients started HD via AV access in the first six months of 2015, 44.2% started HD via AV access in 2014. There were significant differences between renal units. *UKRA guideline: minimum standard - 65% of incident HD patients should commence HD via AV access.*

In May 2015 72% of HD patients had a form of arteriovenous (AV) fistula which is the best form of access. 28% were using central venous catheters which are prone to infection. There were significant differences between renal units. *UKRA guideline: minimum standard - 85% of prevalent haemodialysis patients should receive dialysis via an arteriovenous fistula.*

Data linkage with Health Protection Scotland reveals that the number of *Staphylococcus aureus* bacteraemia (SAB) episodes in haemodialysis patients has shown a significant decrease over the period 2006-2014 from 0.29 episodes per 1000 HD days in 2006-2009 to 0.13 episodes per 1000 HD days in 2010-2014.

87% of patients treated three times weekly by HD in May 2015 achieved a urea reduction ratio (URR) of >65%. *UKRA guideline: every patient with ERF receiving thrice weekly HD should consistently have URR >65%.*

56.5% of patients (excluding those not treated with an erythropoiesis stimulating agent (ESA)) treated by HD had blood haemoglobin concentration in range 100-120 g/L in May 2015. *UKRA guideline: patients with CKD on ESA therapy should achieve haemoglobin between 100-120 g/L.*

In May 2015 51% of patients treated by HD had pre-dialysis phosphate in the recommended range; 83% had corrected calcium within their local laboratory's normal range; 51% had PTH concentration within international guidelines target range when assay specific ranges were taken into account. *UKRA Guidelines: pre-dialysis serum phosphate should be lowered towards normal range 1.1-1.7 mmol/L; pre-dialysis serum calcium should fall within the normal range.*

In May 2015 mean achieved systolic blood pressure in haemodialysis patients was 141 mmHg and mean diastolic 72 mmHg.

Data from the Scottish renal biopsy registry show that the rate of native kidney biopsy in 2014 was 127.5 biopsies per million population. There were significant differences in biopsy rates and practice between renal units.

INTRODUCTION

This eleventh report from the Scottish Renal Registry (SRR) follows the outline of previous reports and presents information about the causes, incidence, prevalence, distribution, methods of treatment and outcome of patients receiving renal replacement therapy (RRT) for established renal failure (ERF) between 1960 and 31 December 2014. It also presents audit data relating to measures of quality of treatment delivered up until 30 June 2015. In addition we present data from the Scottish renal biopsy registry relating to native kidney biopsies performed in Scotland in 2014.

The SRR does not routinely collect data about the care of patients with acute kidney injury, nor those with ERF who are not treated with RRT.

Funding

The Information Services Division (ISD) of NHS Scotland assumed overall responsibility and funding for the SRR in April 1999. In the period covered by this report, no financial assistance was received from commercial organisations.

Other background information

Detailed information about our computer hardware, software, analytic tools, the SRR office, staff, steering group, projects, data quality assurance, publications, security and confidentiality and details of how data are provided to external bodies is published on the SRR website.

http://www.srr.scot.nhs.uk

Renal unit anonymity has been progressively removed since 1998.

Patient anonymity is rigorously protected.

Conflict of interest

The SRR Chair, steering group and report editorial group do not have any conflicting interests.

SUMMARY OF DATA

Patients

16111 patients have been registered with the SRR from its inception in 1991 until 31 December 2014 when the data for this report were collated. 10900 of the patients registered with the SRR are known to be dead by 31 December 2014. The total number of patients receiving RRT for ERF who died in 2014 was 437.

Inclusions and exclusions from analyses

Incident patients

All patients starting RRT in Scotland are included in incidence figures (15673 patients). Patients who have moved into Scotland already receiving RRT, either dialysis or with a functioning kidney transplant are excluded. The SRR does not routinely record the incidence of RRT for acute kidney injury.

Prevalent patients

All patients whose treatment started on or before 31 December 2014 and who were still alive and resident in Scotland on that date are included. Patients who have moved outside of Scotland, those who are lost to follow-up and those who have recovered renal function (within 90 days of starting RRT) are excluded.

Survival analyses

The start date for the survival analyses is the first date of RRT. The end date is the date of death or the censor date of 31 December 2014. Also censored are those patients moving outside of Scotland and those lost to follow-up, both groups are censored on the date that the SRR received the last laboratory or treatment information about them. Patients who were lost to follow up or moved, but later came back to have RRT in Scotland had their entire period of RRT included for survival analyses.

Cause of death analyses

Patients who die whilst being treated by RRT are included. Some patients stop RRT with no expectation of recovery of renal function. If death does not occur within 90 days of stopping RRT such patients are excluded from cause of death analyses.

Patients who recover native renal function

Patients who recovered renal function within 90 days of starting RRT and have not yet needed to restart RRT were excluded from the analyses. Patients who recovered, but required more than 90 days RRT remain in the data set.

If a patient had to restart RRT within a 90 day period after initial recovery, the date of first starting RRT is considered as the beginning of the first period of treatment. If however the initial period of treatment is less than 90 days, and the period of recovery greater than 90 days, the date of first RRT is recorded as that on which they restart treatment that lasts for at least 90 days.

Where a patient started RRT and then died before the 91st day or if they recovered before the 91st day but then died within the next 90 days, their nephrologist was asked to decide whether they had been treated for acute or established renal failure. Only those with ERF are included in this report.

Primary renal diagnoses

A diagnosis code for the primary renal disease (PRD) has been chosen by the nephrologists responsible for the care of the patient from the code list published by the ERA-EDTA. In 2012 the ERA-EDTA published an updated primary renal diagnosis code list and since 01 January 2014 that revised code list has been used exclusively. To simplify analysis of the data ERA-EDTA PRD codes have been grouped into five categories: glomerulonephritis, interstitial nephritis, diabetic nephropathy, multi-system disorders and unknown diagnosis. It is often not possible to make a precise diagnosis for patients presenting with ERF because the subtle signs of the original disease may have been obscured. The PRD groupings of both old and new ERA-EDTA PRD codes as used in all SRR publications are listed on the SRR website:

http://www.srr.scot.nhs.uk/Projects/Methods.html

31 patients have no PRD recorded on the SRR, 1 has moved outside of Scotland. The remaining 30 patients are deceased and their clinical notes have been destroyed. They started RRT in 4 units: ARI (10), MONK (5), NINE (14), RIE (1).

Renal units in Scotland

All renal units in Scotland contribute fully to the SRR. Since the publication of the last SRR report a new satellite dialysis unit has opened in University Hospital Ayr and the Glasgow renal and transplant unit has moved to the Queen Elizabeth University Hospital Glasgow. A complete list of units is given in Appendix 2.

Health Board Areas

On 01 April 2014 Scottish Health Board area boundaries were changed to align with those of local authorities. In line with guidance issued all analyses in this report use population data defined by the new health board boundaries. More information is available at:

http://www.isdscotland.org/Products-and-Services/GPD-Support/Geography/NHS-Board-Boundary-Changes/

Presentation of the data

Throughout the report numeric data are shown either in charts or in a separate table. In many charts the data are shown in five year bands, in order to present all the available data, the first time band represents a different number of years.

Abbreviations

Throughout this report for brevity and ease of reading some abbreviations are used. These are listed in full in Appendix 1 and on the SRR website.

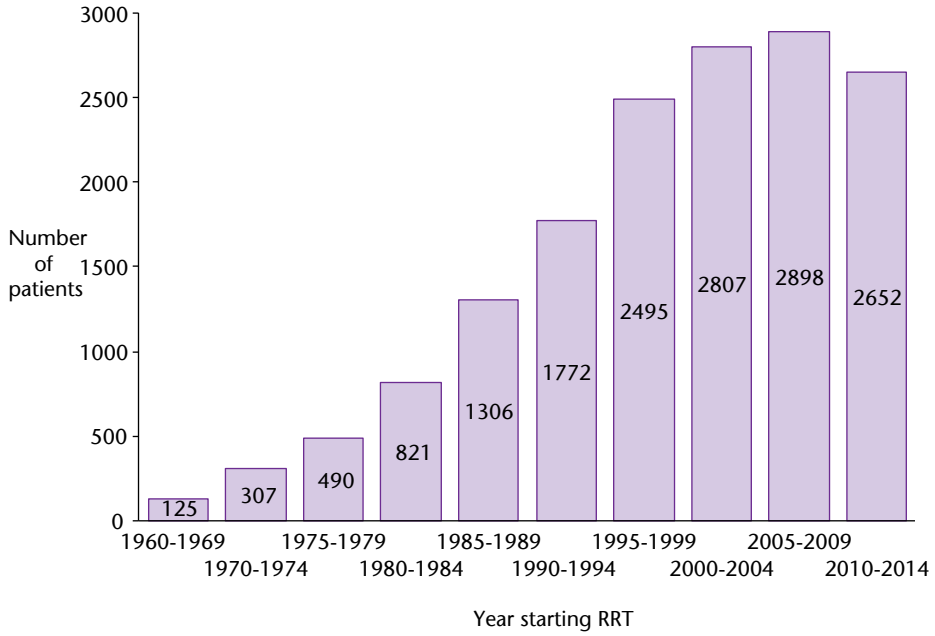
Extensive information about the conduct of the audits and the quality assurance and validation methods used and much background information are available on the SRR website. A list of publications and a copy of the SRR reports are also available:

http://www.srr.scot.nhs.uk

SECTION A INCIDENCE

A1 Incidence of new patients starting RRT

A1.1 Incidence of new patients starting RRT 1960-2014



A1.2 Annual incidence per 100000 population of new patients starting RRT 1985-2014

Year	Number starting RRT	Population of Scotland	Incidence per 100000
1985-1989	1306	5098860*	5.1
1990-1994	1772	5088978*	7.0
1995-1999	2495	5085648*	9.8
2000-2004	2807	5069188*	11.1
2005	630	5110200	12.3
2006	592	5133100	11.5
2007	575	5170000	11.1
2008	555	5202900	10.7
2009	546	5231900	10.4
2010	523	5262200	9.9
2011	511	5299900	9.6
2012	543	5313600	10.2
2013	514	5327700	9.6
2014	561	5347600	10.5

* The population estimates shown for the five year bands between 1985 and 2004 are the arithmetical mean of the mid-year population estimates for each of the five years in question, the annual incidence of new patients is averaged over the five year periods.
Population figures are from National Records for Scotland. They are population estimates for the 30 June each year.
http://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates

A1.3 Incidence of new patients starting RRT 2011-2014 by NHS Board area of residence standardised for age, sex and social deprivation			
NHS Board	**Number starting RRT**	**Incidence per 100000 population**	**Standardised incidence per 100000 population**
A&A	171	11	10.8
BORD	33	7	6.4
D&G	69	11	10.0
FIFE	175	12	11.6
FV	124	10	10.4
GG&C	501	11	11.6
GRAM	219	9	9.7
HIGH	99	8	7.0
LAN	280	11	10.9
LOTH	250	7	7.9
ORKN	8	9	8.5
SHET	7	8	7.2
TAY	182	11	10.6
WI	10	9	7.9
SCOT	**2128**	**10**	**10.0**

There is one patient who lived outwith Scotland when they started RRT.

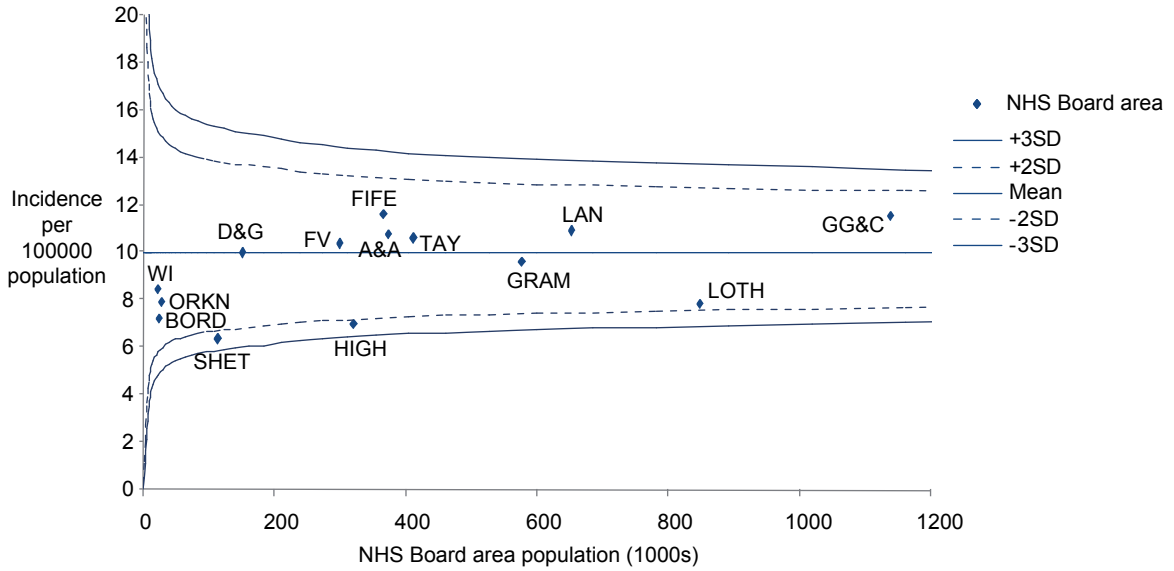
The incidence of new patients starting RRT in each NHS Board area of residence has been standardised to take into account differences in the age, sex and multiple deprivation distribution of residents to allow direct comparison between areas. Patients' postcode of residence when starting RRT was used to derive a Scottish Index of Multiple Deprivation (SIMD) score. The Scottish Index of Multiple Deprivation (SIMD) identifies small area concentrations of multiple deprivation across all of Scotland in a consistent way and ranks small areas (datazones) from most deprived (ranked 1) to least deprived (ranked 6505). SRR data have previously shown an association between SIMD and RRT use:

http://www.srr.scot.nhs.uk/Projects/Projects3.html#simd

The age, sex, SIMD standardised incidence is the total number of residents who would be expected to start RRT in an NHS Board area population, if the age, sex, SIMD structure of the Board area was the same as that of Scotland as a whole.

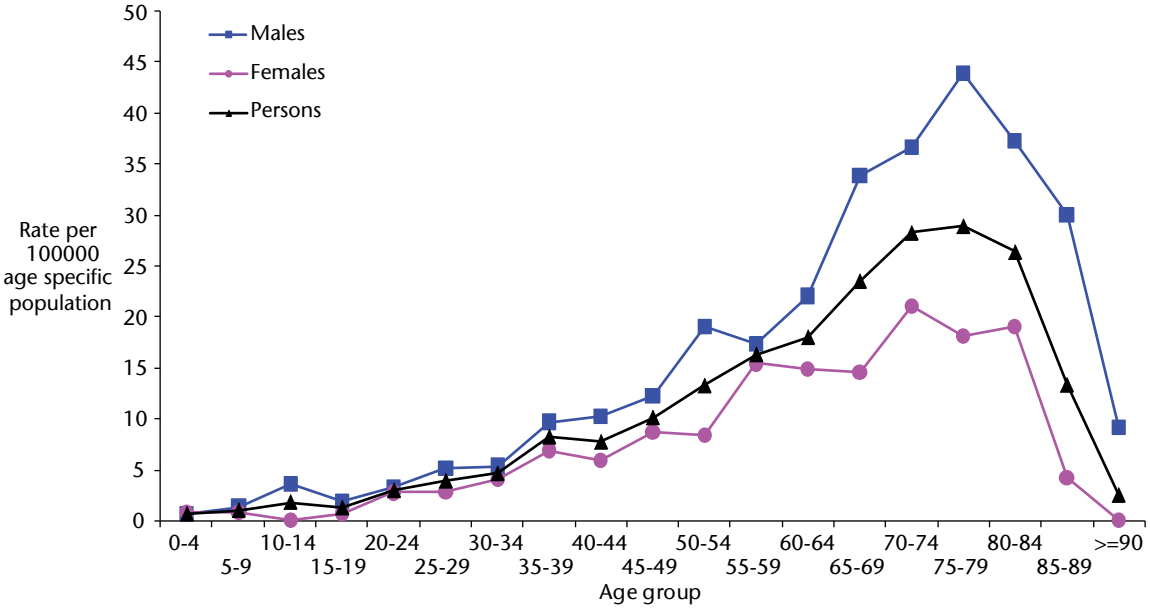
A four year incident period from 2011 to 2014 has been used to minimise the impact of year to year fluctuations in numbers of patients.

A1.4 Incidence of patients starting RRT from 2011-2014 by NHS Board: standardised for age, sex and social deprivation



A2 General population and incident RRT population 2014

A2.1 Age specific incidence of new patients starting RRT 2014 per 100000 population



A2.2 Age specific incidence and prevalence of RRT patients 2014

Age	Estimated population 30/06/2014	Number starting RRT 2014	Incidence per 100000 population	All prevalent patients receiving RRT on 30/06/2014	Prevalence per 100000 population
≥75	433235	101	23.3	632	145.9
65-74	535154	138	25.8	879	164.3
45-64	1472590	212	14.4	2089	141.9
20-44	1743091	96	5.5	1034	59.3
<20	1163530	14	1.2	76	6.5
Total	**5347600**	**561**	**10.5**	**4710**	**88.1**

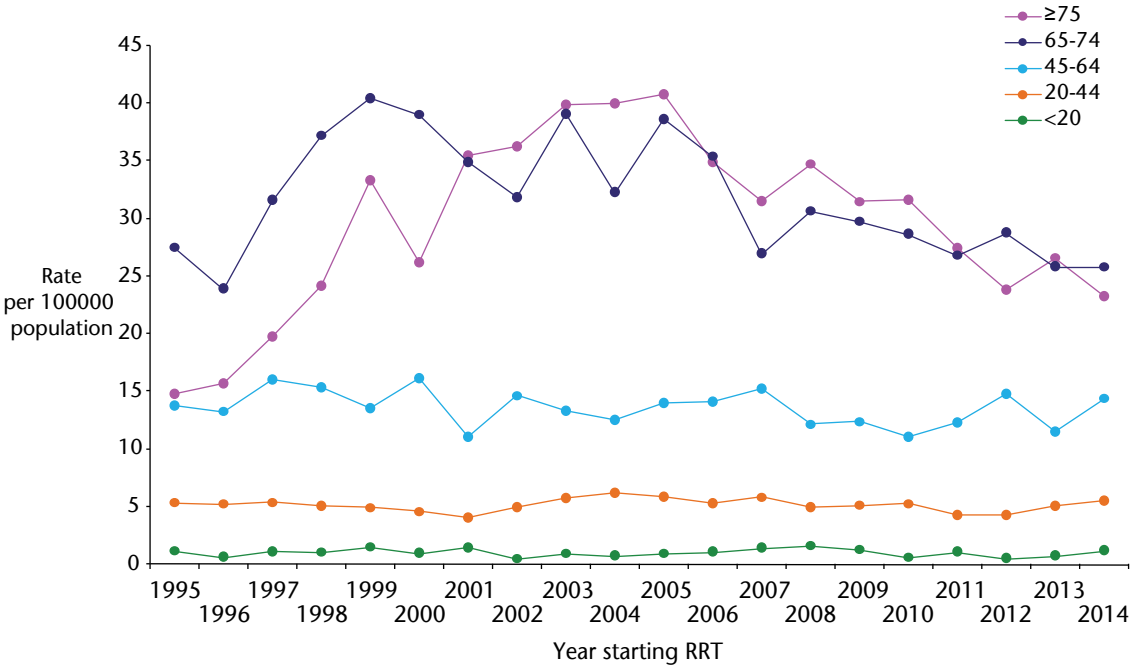
Source: National Records of Scotland mid-year estimates

This table shows age specific incidence and prevalence on 30 June 2014, of patients receiving RRT per 100000 population.

Ages given are at the start of RRT for incidence figures and age on 30 June 2014 for prevalence figures.

This allows use of National Records of Scotland mid-year population statistics to calculate age specific rates.

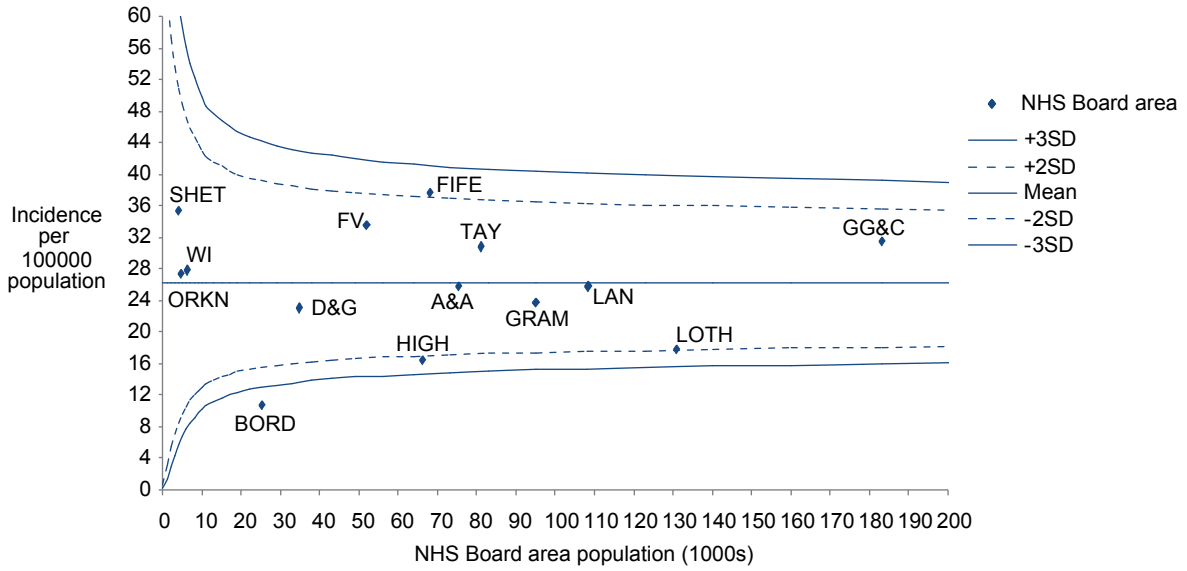
A2.3 Age specific incident RRT population 1995 to 2014 per 100000 population



A2.4 Incidence per 100000 population of patients aged 65 and over starting RRT 2011-2014 by NHS Board: standardised for age, sex and social deprivation

NHS Board	2011	2012	2013	2014	Standardised incidence per 100000 population 2011-2014	95% Confidence Intervals
A&A	26	25	31	19	26	(20,32)
BORD	17	12	4	11	11	(5,20)
D&G	12	35	9	36	23	(16,33)
FIFE	37	36	38	41	38	(31,46)
FV	32	27	42	33	34	(26,43)
GRAM	25	27	29	16	31	(27,36)
GG&C	35	30	29	30	24	(19,29)
HIGH	22	18	16	10	16	(12,22)
LAN	18	31	35	20	26	(21,31)
LOTH	19	19	14	19	18	(14,22)
ORKN	0	67	44	0	27	(9,64)
SHET	53	0	49	47	35	(14,89)
TAY	40	27	22	32	31	(25,38)
WI	0	0	32	78	28	(11,57)
SCOTLAND	**24**	**25**	**28**	**28**	**26**	**(25,28)**

A2.5 Incidence of patients aged 65 and over starting RRT 2011-2014 by NHS Board: standardised for age, sex and social deprivation



A3 Age distribution of patients when starting RRT

A3.1 Number of patients in each age group and median age when starting RRT 1960-2014

Year starting RRT	<20		20-44		45-64		65-74		≥75		Median age
	n	%	n	%	n	%	n	%	n	%	
1960-1974	68	**16**	277	**64**	85	**20**	2	-	-	-	33
1975-1979	59	**12**	241	**49**	183	**37**	7	**1**	-	-	40
1980-1984	88	**11**	317	**39**	368	**45**	45	**5**	3	-	45
1985-1989	97	**7**	364	**28**	563	**43**	240	**18**	42	**3**	52
1990-1994	79	**4**	428	**24**	686	**39**	450	**25**	129	**7**	58
1995-1999	69	**3**	478	**19**	859	**34**	718	**29**	371	**15**	62
2000-2004	56	**2**	454	**16**	853	**30**	797	**28**	647	**23**	65
2005-2009	75	**3**	479	**17**	928	**32**	747	**26**	669	**23**	64
2010-2014	49	**2**	426	**16**	936	**35**	686	**26**	555	**21**	63
Total	**640**	**4**	**3464**	**22**	**5461**	**35**	**3692**	**24**	**2416**	**15**	

A3.2 Number and median age of patients starting RRT 2010-2014 by renal unit				
Renal unit	Number starting RRT 2010-2014	Median Age 2010-2014	Number starting RRT 2014	Median Age 2014
ARI	267	63	52	62
XH	194	65	36	59
DGRI	75	65	22	65
GLAS	886	64	186	62
MONK	264	61	53	57
NINE	240	67	50	66
RAIG	100	63	22	63
RHSC	40	11	11	11
RIE	384	57	88	55
VHK	202	67	41	68
SCOTLAND	**2652**	**63**	**561**	**61**

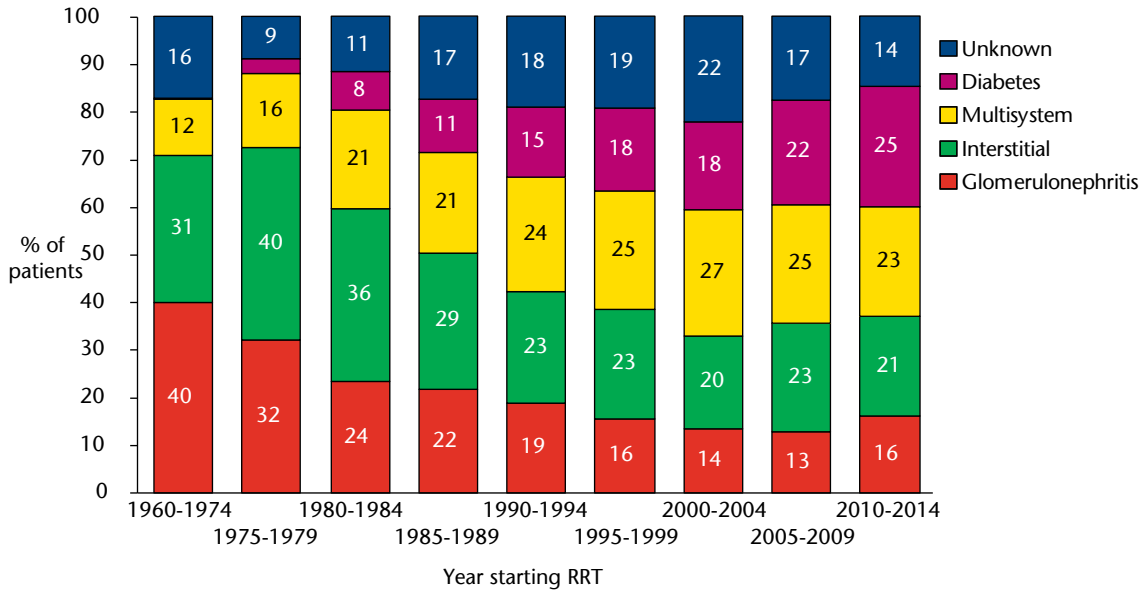
A3.3 Number of patients in each age group and median age when starting RRT 2010-2014 by NHS Board area of residence							
NHS Board area	<20	20-44	45-64	65-74	≥75	Number starting RRT 2010-2014	Median Age
A&A	5	26	81	56	51	219	64
BORD	-	9	19	15	3	46	59
D&G	1	13	27	20	21	82	64
FIFE	3	26	70	73	59	231	67
FV	6	13	46	60	36	161	67
GG&C	7	103	225	147	126	608	62
GRAM	7	55	99	65	45	271	61
HIGH	4	19	46	36	21	126	62
LAN	8	66	128	73	68	343	61
LOTH	5	60	122	71	44	302	58
ORKN	1	-	2	2	4	9	74
SHET	-	-	1	5	2	8	70
TAY	2	32	67	57	72	230	67
WI	-	3	3	6	3	15	67
SCOTLAND	**49**	**425**	**936**	**686**	**555**	**2651**	**63**

Note: There is one patient who lived outwith Scotland when they started RRT.

A4 Primary renal diagnosis of patients starting RRT

ERA-EDTA Primary Renal Diagnoses (PRD) codes and groupings used in SRR reports are available on the SRR website: http://www.srr.scot.nhs.uk/Projects/Methods.html

A4.1 Percentage of patients in each diagnosis group starting RRT 1960-2014



A4.2 Number of patients in each diagnosis group starting RRT 1960-2014

Year starting RRT	Glomerulo-nephritis	Interstitial	Multisystem	Diabetes	Unknown	Missing
1960-1974	173	134	51	1	71	2
1975-1979	158	198	77	15	42	-
1980-1984	193	298	170	67	88	5
1985-1989	285	376	274	148	218	5
1990-1994	337	414	427	262	327	5
1995-1999	391	572	623	438	466	5
2000-2004	382	549	745	518	613	-
2005-2009	376	662	722	638	492	8
2010-2014	427	559	613	672	381	-
TOTAL	**2722**	**3762**	**3702**	**2759**	**2698**	**30**

Please see primary renal diagnosis section on page x for details of the missing diagnoses.

A4.3 Primary renal diagnosis of patients aged less than 45 years starting RRT 1960-2014

Year starting RRT	Glomerulo-nephritis		Interstitial		Multisystem		Diabetes		Unknown		Total
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n
1960-1974	146	**42**	109	**32**	32	**9**	1	**0**	55	**16**	345
1975-1979	104	**35**	128	**43**	44	**15**	7	**2**	17	**6**	300
1980-1984	104	**26**	157	**39**	57	**14**	38	**9**	48	**12**	405
1985-1989	127	**28**	156	**34**	71	**15**	49	**11**	58	**13**	461
1990-1994	123	**24**	179	**35**	63	**12**	80	**16**	62	**12**	507
1995-1999	116	**21**	191	**35**	75	**14**	90	**16**	75	**14**	547
2000-2004	107	**21**	162	**32**	58	**11**	102	**20**	81	**16**	510
2005-2009	100	**18**	208	**38**	66	**12**	119	**21**	61	**11**	554
2010-2014	122	**26**	150	**32**	54	**11**	106	**22**	43	**9**	475

There are three patients with a missing PRD code, these patients started RRT before 1983.

A4.4 Primary renal diagnosis of patients aged 75 years and older starting RRT 1985-2014

Year starting RRT	Glomerulo-nephritis		Interstitial		Multisystem		Diabetes		Unknown		Total
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n
1985-1989	5	**12**	8	**19**	8	**19**	1	**2**	19	**45**	42
1990-1994	8	**6**	17	**13**	42	**33**	5	**4**	57	**44**	129
1995-1999	47	**13**	60	**16**	103	**28**	35	**9**	125	**34**	371
2000-2004	49	**8**	73	**11**	243	**38**	65	**10**	217	**34**	647
2005-2009	56	**8**	82	**12**	238	**36**	96	**14**	192	**29**	669
2010-2014	66	**12**	63	**11**	185	**33**	89	**16**	152	**27**	555

There are seven patients with a missing PRD code.

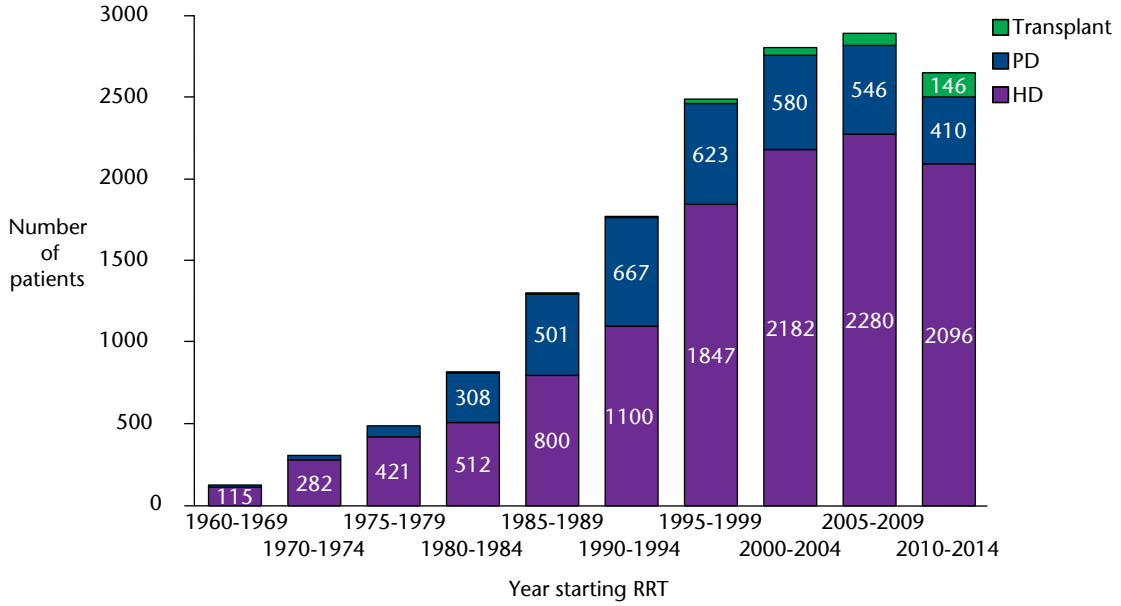
Data are presented from 1985 - 2014 due to the small number of patients aged 75 years or older when starting RRT prior to 1985. Three patients in total in this age group started RRT between 1960-1984.

A5 Modality of RRT

There are three principal types of RRT: Haemodialysis (HD); Peritoneal dialysis (PD); Kidney Transplantation.

Patients who have received a kidney transplant as their first mode of RRT are termed as receiving a pre-emptive transplant.

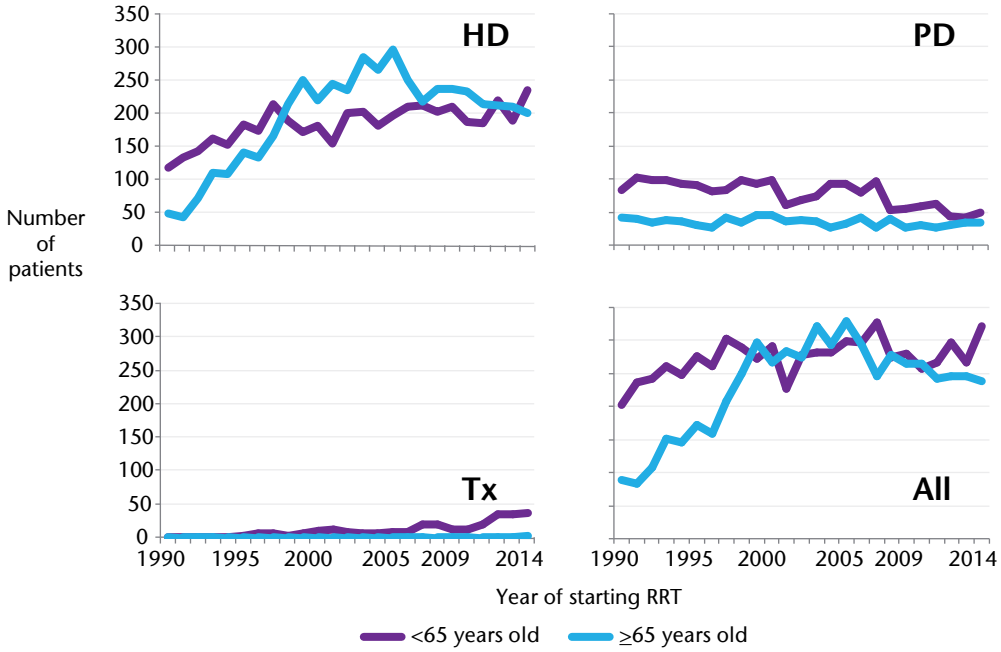
A5.1 Mode of first RRT 1960-2014



A5.2 Mode of first RRT 1960-2014

Year starting RRT	HD		PD		Transplant		Total
	n	%	n	%	n	%	
1960-1974	397	**92**	35	**8**	-	-	432
1975-1984	933	**71**	377	**29**	1	-	1311
1985-1994	1900	**62**	1168	**38**	10	-	3078
1995-1999	1847	**74**	623	**25**	25	**1**	2495
2000-2004	2182	**78**	580	**21**	45	**2**	2807
2005	495	**79**	126	**20**	9	**1**	630
2006	462	**78**	121	**20**	9	**2**	592
2007	432	**75**	123	**21**	20	**3**	575
2008	442	**80**	93	**17**	20	**4**	555
2009	449	**82**	83	**15**	14	**3**	546
2010	422	**81**	89	**17**	12	**2**	523
2011	402	**79**	89	**17**	20	**4**	511
2012	433	**80**	74	**14**	36	**7**	543
2013	403	**78**	75	**15**	37	**7**	515
2014	437	**78**	83	**15**	41	**7**	561

A5.3 Mode of first RRT by age group 1990-2014



A5.4 Number of patients on each mode of RRT after one, five and ten years by mode of RRT for patients starting RRT from 2000-2004

First RRT Mode	Number of patients	Subsequent RRT Mode	1 year		5 years		10 years	
			n	(%)	n	(%)	n	(%)
HD	2182	HD	1305	**59.8**	462	**21.2**	123	**5.6**
		PD	142	**6.5**	22	**1.0**	5	**0.2**
		Tx	54	**2.5**	231	**10.6**	268	**12.3**
		Deceased	625	**28.6**	1413	**64.8**	1737	**79.6**
		Other*	56	**2.6**	54	**2.5**	49	**2.2**
PD	580	HD	64	**11.0**	86	**14.8**	42	**7.2**
		PD	400	**69.0**	75	**12.9**	6	**1.0**
		Tx	50	**8.6**	176	**30.3**	182	**31.4**
		Deceased	59	**10.2**	237	**40.9**	341	**58.8**
		Other*	7	**1.2**	6	**1.0**	9	**1.6**
Tx	45	HD	1	**2.2**	2	**4.4**	3	**6.7**
		PD	-	-	1	**2.2**	-	-
		Tx	43	**95.6**	39	**86.7**	37	**82.2**
		Deceased	1	**2.2**	3	**6.7**	4	**8.9**
		Other*	-	-	-	-	1	**2.2**

* This category includes other outcomes such as lost to follow up and renal recovery.

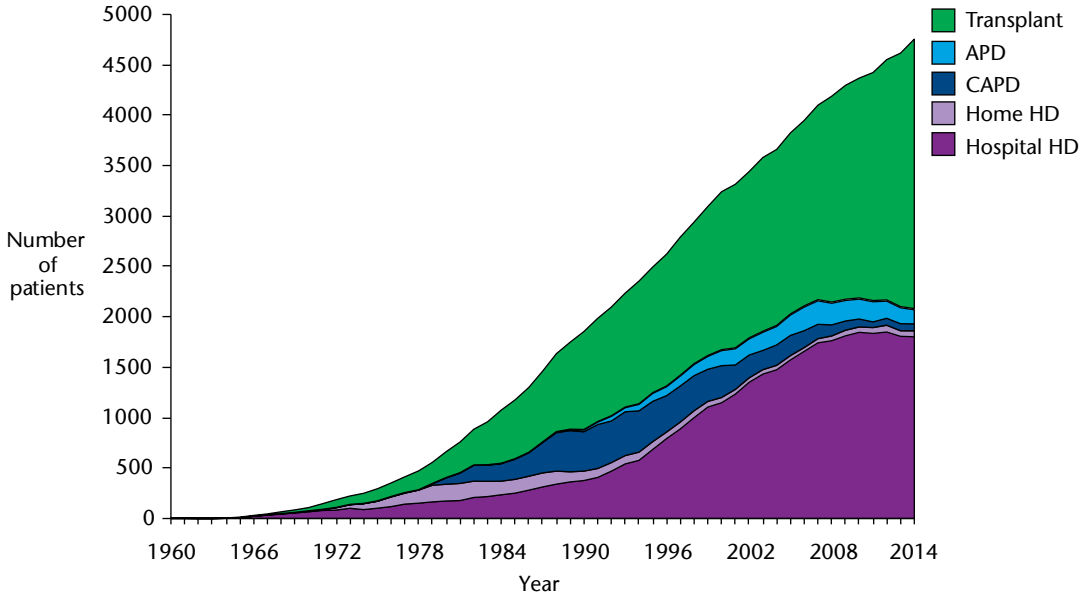
The percentage of patients receiving each mode of RRT is given exactly one, five and ten years after the date of first RRT for each individual, according to their first mode of RRT.

Changes in RRT modality between the reported time points are not shown.

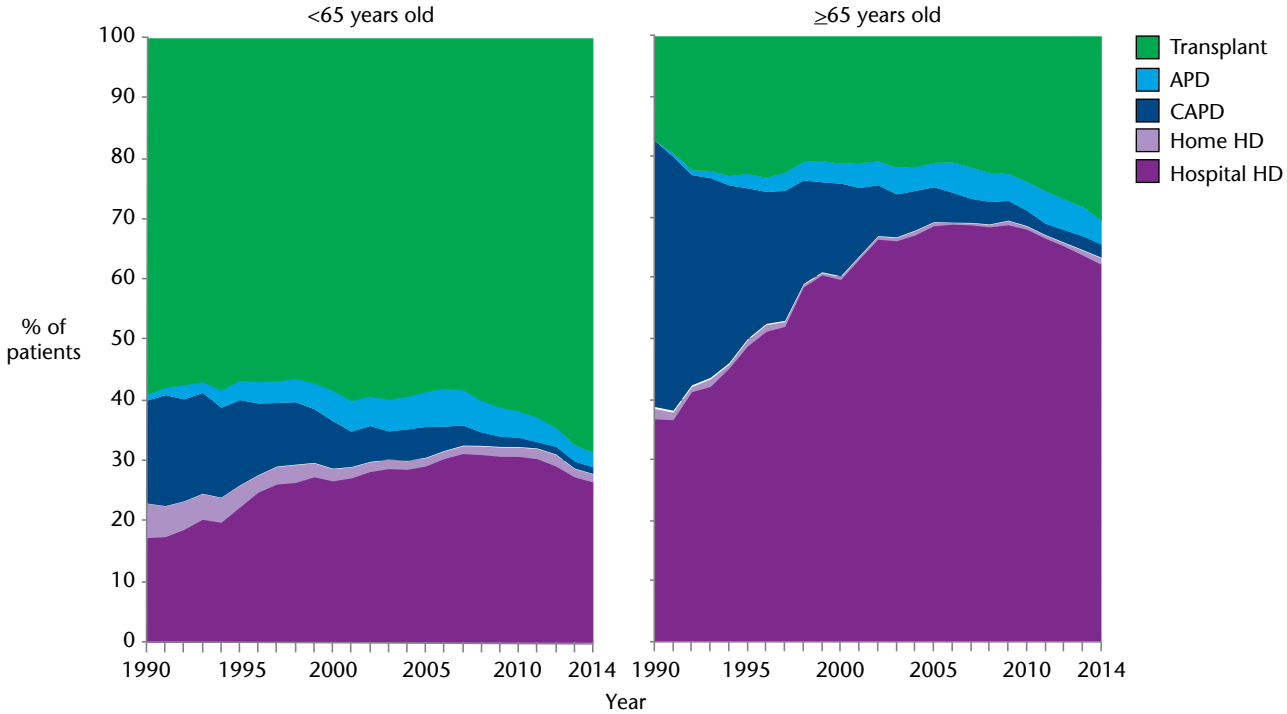
SECTION B PREVALENCE

B1 Patients receiving RRT in Scotland according to modality of treatment on 31 December

B1.1 Prevalent patients every year between 1960-2014



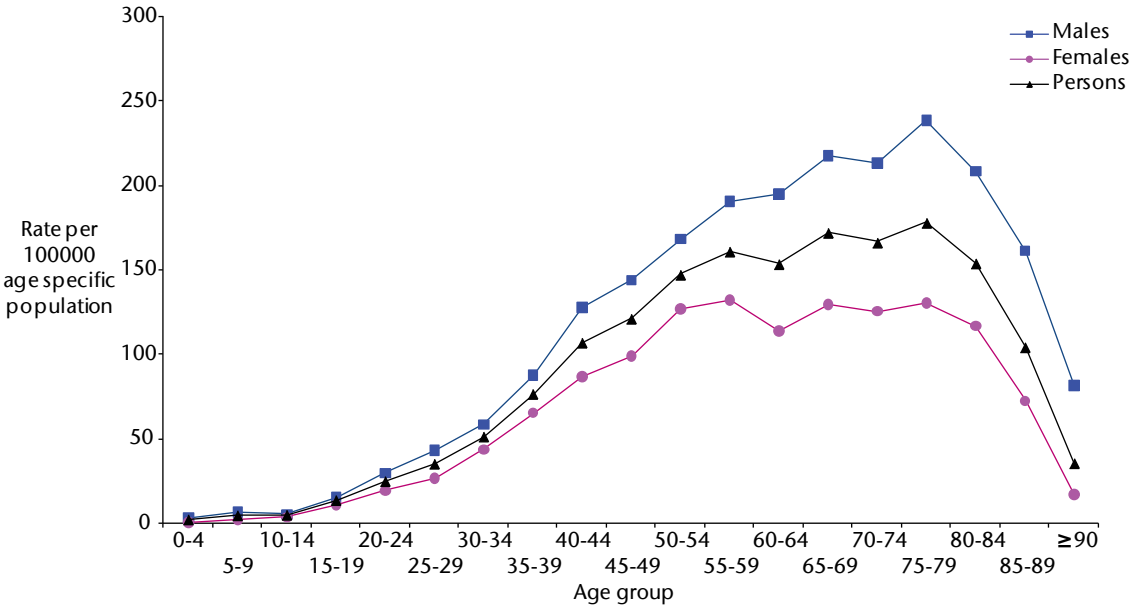
B1.2 Prevalent patients by modality and age group on 31 December each year 1990-2014



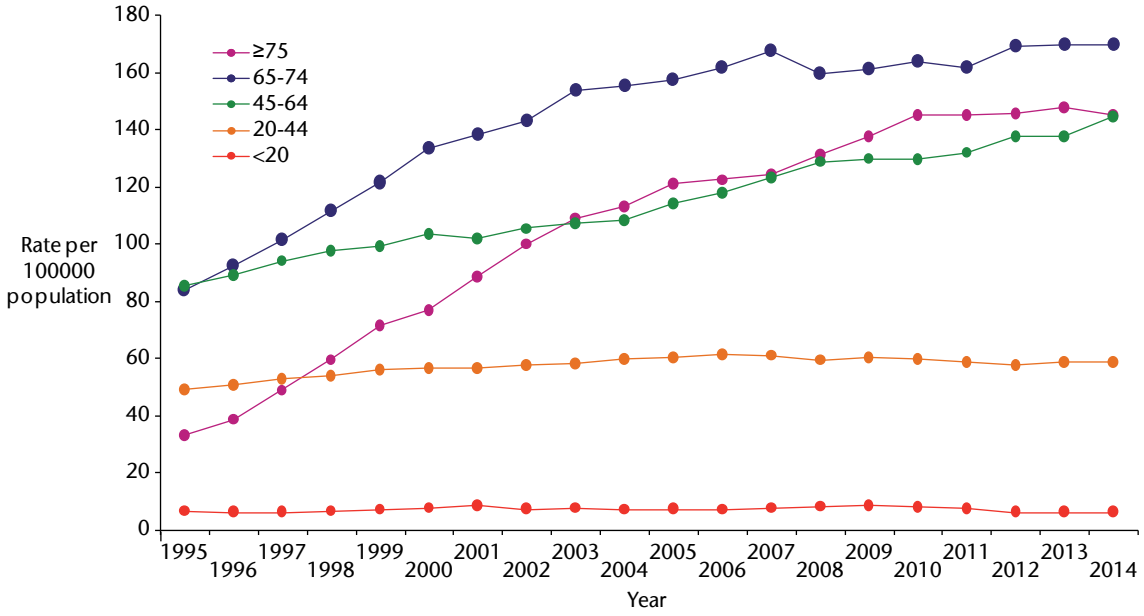
B1.3 Prevalent patients between 1960-2014

Year	Hospital HD		Home HD		CAPD		APD		Transplant		Total
	n	%	n	%	n	%	n	%	n	%	
1960	1	**50**	-	-	-	-	-	-	1	**50**	2
1965	7	**58**	-	-	-	-	-	-	5	**42**	12
1970	67	**63**	7	**7**	1	**1**	-	-	32	**30**	107
1975	103	**35**	69	**23**	2	**1**	-	-	120	**41**	294
1980	175	**26**	167	**25**	64	**10**	-	-	257	**39**	663
1985	253	**21**	138	**12**	202	**17**	-	-	584	**50**	1177
1990	379	**20**	94	**5**	393	**21**	17	**1**	973	**52**	1856
1995	689	**28**	78	**3**	403	**16**	79	**3**	1248	**50**	2497
2000	1155	**36**	52	**2**	319	**10**	150	**5**	1569	**48**	3245
2005	1582	**41**	43	**1**	203	**5**	203	**5**	1798	**47**	3829
2010	1858	**42**	53	**1**	81	**2**	198	**5**	2184	**50**	4374
2011	1847	**42**	58	**1**	58	**1**	201	**5**	2265	**51**	4429
2012	1861	**41**	67	**1**	71	**2**	171	**4**	2388	**52**	4558
2013	1818	**39**	55	**1**	72	**2**	159	**3**	2518	**54**	4622
2014	1814	**38**	59	**1**	70	**1**	141	**3**	2677	**56**	4761

B1.4 Age specific prevalence of RRT patients on 31 December 2014 per 100000 population



B1.5 Age specific prevalent RRT population 1995-2014 per 100000 population



The graph shows the age specific prevalence of RRT patients on 31 December of each of the years shown.

B1.6 Number and percentage of patients, median age and age range on each mode of RRT by age group on 31 December 2014

Age	Hospital HD		Home HD		CAPD		APD		Transplant		Total
	n	%	n	%	n	%	n	%	n	%	
≥75	479	**26**	1	**2**	16	**23**	24	**17**	108	**4**	**628**
65-74	478	**26**	15	**25**	18	**26**	37	**26**	360	**13**	**908**
45-64	643	**35**	35	**59**	28	**40**	48	**34**	1378	**51**	**2132**
20-44	206	**11**	8	**14**	8	**11**	27	**19**	770	**29**	**1019**
<20	8	**0**	-	-	-	-	5	**4**	61	**2**	**74**
Total	**1814**		**59**		**70**		**141**		**2677**		**4761**
Median age	66		56		63		59		52		**56**
Age range	4-94		22-82		25-93		1-88		4-93		**1-94**

B2 Prevalent patients at each renal unit

The number of patients treated at each renal unit differs considerably. Detailed information about each renal unit is given on the SRR website: http://www.srr.scot.nhs.uk/Renal_Units/clinics.htm

B2.1 Number and percentage of patients in each age group receiving RRT at each renal unit on 31 December 2014

		ARI	XH	DGRI	GLAS	MONK	NINE	RAIG	RHSC	RIE	VHK
≥75	Number	69	43	28	194	58	77	28	-	73	58
	%	**13**	**14**	**21**	**12**	**14**	**19**	**12**	-	**9**	**20**
65-74	Number	87	69	31	314	76	89	37	-	139	66
	%	**17**	**22**	**23**	**19**	**19**	**21**	**16**	-	**18**	**23**
45-64	Number	225	146	48	767	178	170	111	-	380	107
	%	**44**	**48**	**36**	**47**	**44**	**41**	**49**	-	**49**	**38**
20-44	Number	132	48	27	363	88	79	52	1	176	53
	%	**26**	**16**	**20**	**22**	**22**	**19**	**23**	**2**	**23**	**19**
<20	Number	2	1	-	11	2	1	-	55	2	-
	%	-	-	-	**1**	-	-	-	**98**	-	-
Total		**515**	**307**	**134**	**1649**	**402**	**416**	**228**	**56**	**770**	**284**
Median age		57	58	62	56	56	60	56	13	55	61
IQR		43-67	49-69	48-71	46-67	45-68	47-71	45-67	8-15	45-66	49-72

B2.2 Number and percentage of patients on each mode of RRT and renal unit providing treatment on 31 December 2014

		ARI	XH	DGRI	GLAS	MONK	NINE	RAIG	RHSC	RIE	VHK
Hospital HD	Number	208	130	49	563	188	175	72	7	273	149
	%	**40**	**42**	**37**	**34**	**47**	**42**	**32**	**13**	**35**	**52**
Home HD	Number	5	11	2	28	-	4	3	-	6	-
	%	**1**	**4**	**1**	**2**	-	**1**	**1**	-	**1**	-
CAPD	Number	12	3	12	9	4	13	10	-	6	1
	%	**2**	**1**	**9**	**1**	**1**	**3**	**4**	-	**1**	-
APD	Number	16	34	4	33	3	10	4	5	17	15
	%	**3**	**11**	**3**	**2**	**1**	**2**	**2**	**9**	**2**	**5**
Transplant	Number	274	129	67	1016	207	214	139	44	468	119
	%	**53**	**42**	**50**	**62**	**51**	**51**	**61**	**79**	**61**	**42**
Total		**515**	**307**	**134**	**1649**	**402**	**416**	**228**	**56**	**770**	**284**

B3 Prevalent patients in each NHS Board area

Abbreviations for NHS boards are given in Appendix 1.

B3.1 Number of patients in each age group, median age and inter-quartile range by NHS Board area of residence on 31 December 2014

NHS Board	<20	20-44	45-64	65-74	≥75	Total	Median age	IQR
A&A	7	62	178	77	46	370	57	48-68
BORD	0	23	48	19	13	103	57	46-68
D&G	1	28	47	32	28	136	62	47-71
FIFE	4	67	122	80	60	333	61	48-71
FV	6	50	102	64	37	259	59	47-70
GG&C	21	248	521	196	125	1111	55	45-67
GRAM	8	130	216	86	65	505	56	43-66
HIGH	2	61	132	46	36	277	56	46-67
LAN	14	137	275	104	76	606	55	45-67
LOTH	8	131	309	116	58	622	55	46-66
ORKN	1	1	8	-	5	15	54	48-77
SHET	1	2	3	5	2	13	66	46-71
TAY	1	73	163	77	74	388	59	47-71
WI	-	6	5	6	3	20	60	42-71
Total	**74**	**1019**	**2129**	**908**	**628**	**4758**	**56**	**45-68**

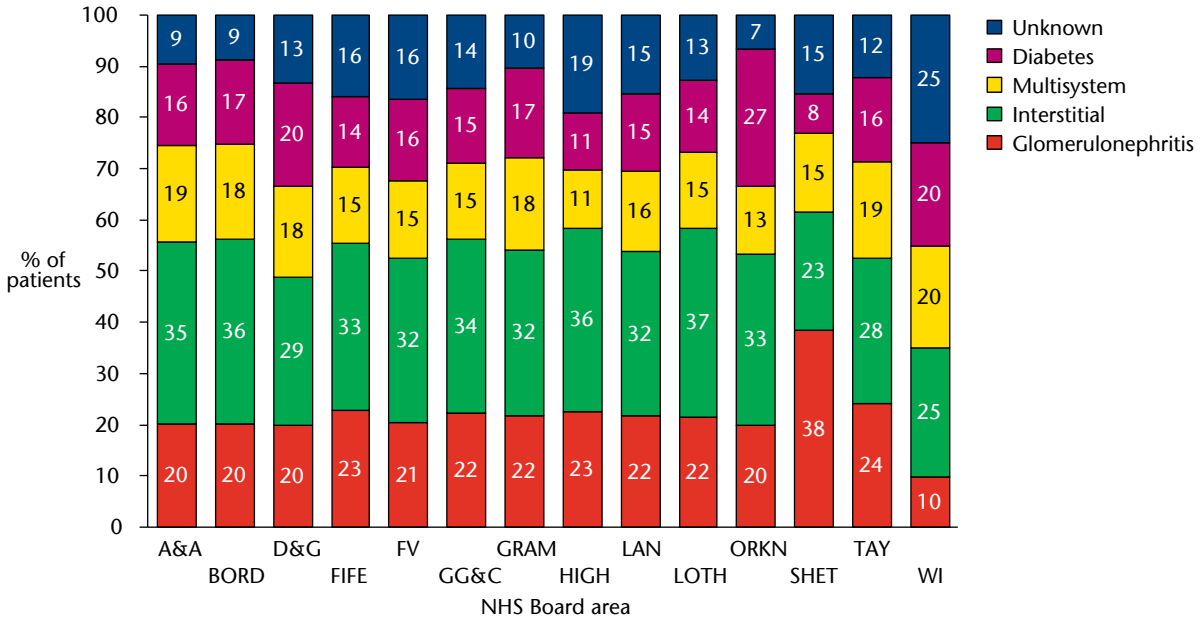
Three patients live outside of Scotland and were receiving treatment within Scottish renal units on 31 December 2014.

B3.2 Number of patients on each mode of RRT in each NHS Board area of residence on 31 December 2014

NHS Board	Hospital HD		Home HD		PD		Transplant		Total
	n	%	n	%	n	%	n	%	
A&A	138	**37**	12	**3**	37	**10**	183	**49**	**370**
BORD	37	**36**	-	**-**	5	**5**	61	**59**	**103**
D&G	48	**35**	2	**1**	16	**12**	70	**51**	**136**
FIFE	157	**47**	1	**-**	16	**5**	159	**48**	**333**
FV	103	**40**	9	**3**	6	**2**	141	**54**	**259**
GG&C	399	**36**	12	**1**	28	**3**	672	**60**	**1111**
GRAM	200	**40**	5	**1**	27	**5**	273	**54**	**505**
HIGH	78	**28**	6	**2**	16	**6**	177	**64**	**277**
LAN	228	**38**	3	**-**	13	**2**	363	**60**	**607**
LOTH	236	**38**	6	**1**	18	**3**	362	**58**	**622**
ORKN	6	**40**	-	**-**	3	**20**	6	**40**	**15**
SHET	5	**38**	-	**-**	2	**15**	6	**46**	**13**
TAY	170	**44**	3	**1**	21	**5**	193	**50**	**387**
WI	9	**45**	-	**-**	3	**15**	8	**40**	**20**
SCOTLAND	**1814**	**38**	**59**	**1**	**211**	**4**	**2674**	**56**	**4758**

Three patients live outside of Scotland and were receiving treatment within Scottish renal units on 31 December 2014.

B3.3 Percentage of patients in each PRD group and their NHS Board area of residence on 31 December 2014

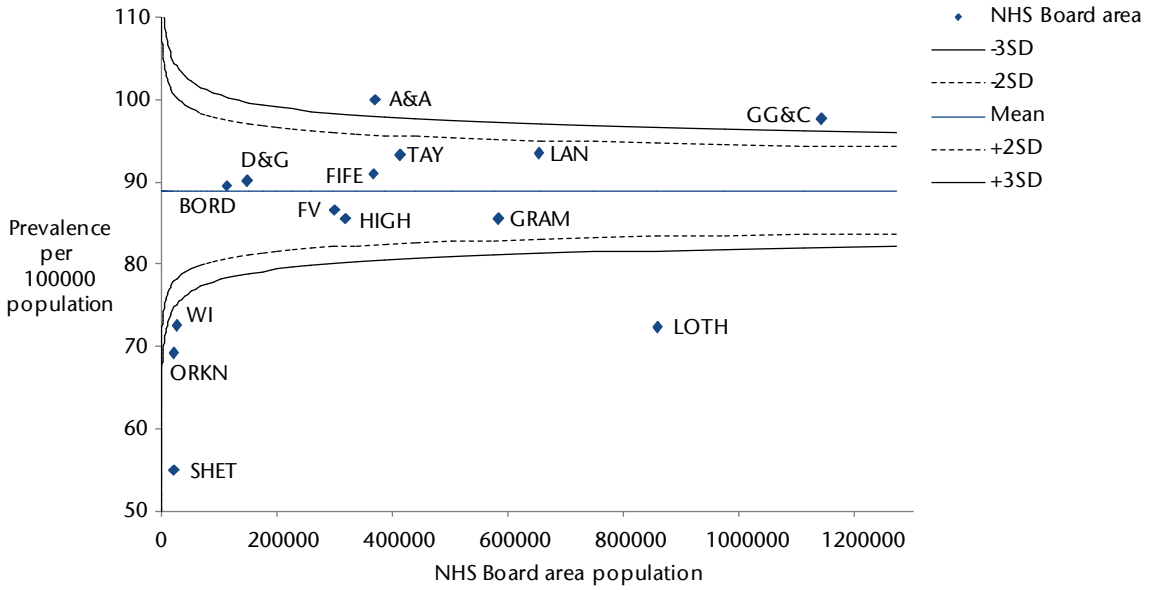


B3.4 Prevalence of patients receiving RRT on 31 December 2014 by NHS Board: standardised for age, sex and social deprivation

NHS Board	Population on 30 June 2014*	RRT population 31 December 2014	Prevalence per 100000 population	Standardised prevalence per 100000 population
A&A	371110	370	99.7	100.1
BORD	114030	103	90.3	89.6
D&G	149940	136	90.7	90.1
FIFE	367260	333	90.7	91.1
FV	300410	259	86.2	86.7
GG&C	1142580	1111	97.2	97.7
GRAM	584240	505	86.4	85.6
HIGH	320760	277	86.4	85.6
LAN	653310	607	92.9	93.6
LOTH	858090	622	72.5	72.3
ORKN	21590	15	69.5	69.1
SHET	23230	13	56.0	55.0
TAY	413800	387	93.5	93.2
WI	27250	20	73.4	72.5
Scotland	**5347600**	**4758**	**89.0**	**89.0**

* National Records of Scotland Mid-year estimates

B3.5 Prevalence of patients receiving RRT on 31 December 2014 by NHS Board: standardised for age, sex and social deprivation



SECTION C SURVIVAL

C1 Survival analyses

C1.1 Proportion of patients starting RRT 1994 - 2013 surviving at one, two, five and ten years by age and primary renal diagnosis group

Age group (years)	Diagnosis group	1 year survival			2 year survival			5 year survival			10 year survival		
		Number starting RRT (1994-2013)	n	%	Number starting RRT (1994-2012)	n	%	Number starting RRT (1994-2009)	n	%	Number starting RRT (1994-2004)	n	%
≥75	Unknown	683	433	**63**	652	289	**44**	549	81	**15**	357	7	**2**
	Diabetes	271	170	**63**	248	113	**46**	199	25	**13**	103	1	**1**
	Multisystem	743	429	**58**	708	293	**41**	597	79	**13**	359	7	**2**
	Interstitial	268	189	**71**	258	131	**51**	218	44	**20**	136	4	**3**
	Glomerulo-nephritis	207	130	**63**	193	87	**45**	155	28	**18**	99	8	**8**
65-74	Unknown	596	439	**74**	575	345	**60**	503	158	**31**	363	29	**8**
	Diabetes	586	422	**72**	560	303	**54**	446	84	**19**	288	7	**2**
	Multisystem	975	609	**62**	927	426	**46**	797	159	**20**	560	23	**4**
	Interstitial	438	354	**81**	412	281	**68**	364	137	**38**	236	27	**11**
	Glomerulo-nephritis	318	265	**83**	304	209	**69**	255	99	**39**	174	19	**11**
45-64	Unknown	426	353	**83**	412	300	**73**	359	192	**53**	260	77	**30**
	Diabetes	891	744	**84**	836	568	**68**	678	211	**31**	413	42	**10**
	Multisystem	701	522	**74**	679	429	**63**	583	230	**39**	402	85	**21**
	Interstitial	888	824	**93**	837	730	**87**	692	494	**71**	448	214	**48**
	Glomerulo-nephritis	596	546	**92**	569	486	**85**	466	314	**67**	327	150	**46**
20-44	Unknown	239	226	**95**	229	205	**90**	207	170	**82**	154	107	**69**
	Diabetes	414	376	**91**	398	324	**81**	333	208	**62**	214	92	**43**
	Multisystem	213	197	**92**	205	184	**90**	177	143	**81**	117	80	**68**
	Interstitial	558	546	**98**	533	511	**96**	469	416	**89**	314	245	**78**
	Glomerulo-nephritis	410	402	**98**	380	365	**96**	317	293	**92**	225	198	**88**
<20	Unknown	30	29	**97**	28	27	**96**	25	24	**96**	17	16	**94**
	Diabetes	1	-	-	1	-	-	1	-	-	1	-	-
	Multisystem	37	36	**97**	37	36	**97**	32	29	**91**	26	23	**88**
	Interstitial	151	147	**97**	146	141	**97**	130	121	**93**	77	68	**88**
	Glomerulo-nephritis	31	30	**97**	29	29	**100**	27	25	**93**	19	16	**84**
All ages	**All diagnoses**	**10671**	**8418**	**79**	**10156**	**6812**	**67**	**8579**	**3739**	**44**	**5689**	**1545**	**27**

7 patients with missing PRD Codes

Information on the inclusions and exclusions that are applied to survival analysis are detailed in the Summary of Data section of the report.

C1.2 Life expectancy for the general population of Scotland 2012-2014		
Age	Life expectancy males	Life expectancy females
85	5.53	6.38
75	10.54	12.11
65	17.29	19.61
55	25.32	28.13
45	34.14	37.29

Source: National Records of Scotland (NRS) life expectancy tables

Life expectancy in years for the general population of Scotland in 2012-2014 by sex, at the exact age given, is shown in this table. This allows comparison with patients receiving RRT.

C1.3 Survival of patients by year of start of RRT 2005-2014					
Date starting RRT	% surviving 90 days	% surviving 1 year	% surviving 1 year + 90 days	% surviving 2 years	% surviving 2 years + 90 days
2005	**91.5**	**76.7**	**72.8**	**62.6**	**60.2**
2006	**91.9**	**78.7**	**74.7**	**66.6**	**63.9**
2007	**93.0**	**81.4**	**78.0**	**71.1**	**69.1**
2008	**93.5**	**81.9**	**78.9**	**71.2**	**67.7**
2009	**91.3**	**78.4**	**76.9**	**69.0**	**66.4**
2010	**94.5**	**83.8**	**80.2**	**72.9**	**69.9**
2011	**94.4**	**86.2**	**84.0**	**77.2**	**73.9**
2012	**95.4**	**86.1**	**83.4**	**76.9**	**74.8**
2013	**96.0**	**85.7**	**82.3**		
2014	**95.5**				

Note: Censored patients are excluded from this table.

Patients with insufficient follow-up and those who recovered within 90 days or who were lost to follow-up within the relevant period have been excluded.

C1.4 Trends in survival of patients starting RRT 2005-2014

Trend in 90 days survival: year to year OR is 1.09 (95% CI 1.05 -1.13).

Trend in 1 year survival: year to year OR is 1.08 (95% CI is 1.05 - 1.11).

Trend in 2 years survival: year to year OR is 1.10 (95% CI is 1.06 -1.13).

There is a statistically significant trend of improving survival at 90 days, 1 year and 2 years after starting RRT.

C1.5 Proportion of patients starting RRT 2004-2013 surviving at 90 days and 1 year, by NHS Board area of residence

NHS Board	Number of patients	90 day survival		1 year survival	
		n	%	n	%
A&A	435	406	**93**	355	**82**
BORD	120	115	**96**	109	**91**
D&G	174	156	**90**	138	**79**
FIFE	455	422	**93**	368	**81**
FV	308	293	**95**	257	**83**
GG&C	1242	1144	**92**	1000	**81**
GRAM	570	543	**95**	487	**85**
HIGH	323	304	**94**	269	**83**
LAN	635	605	**95**	536	**84**
LOTH	721	666	**92**	565	**78**
ORKN	23	22	**96**	20	**87**
SHET	16	14	**88**	12	**75**
TAY	512	468	**91**	396	**77**
WI	27	26	**96**	22	**81**
SCOTLAND	**5561**	**5184**	**93**	**4534**	**82**

C2 Survival of patients aged 45-64 when starting RRT over time

The trend of survival was calculated to investigate whether survival has improved over time for patients in two diagnosis groups, glomerulonephritis and diabetic nephropathy, and in a single age group, 45-64 years.

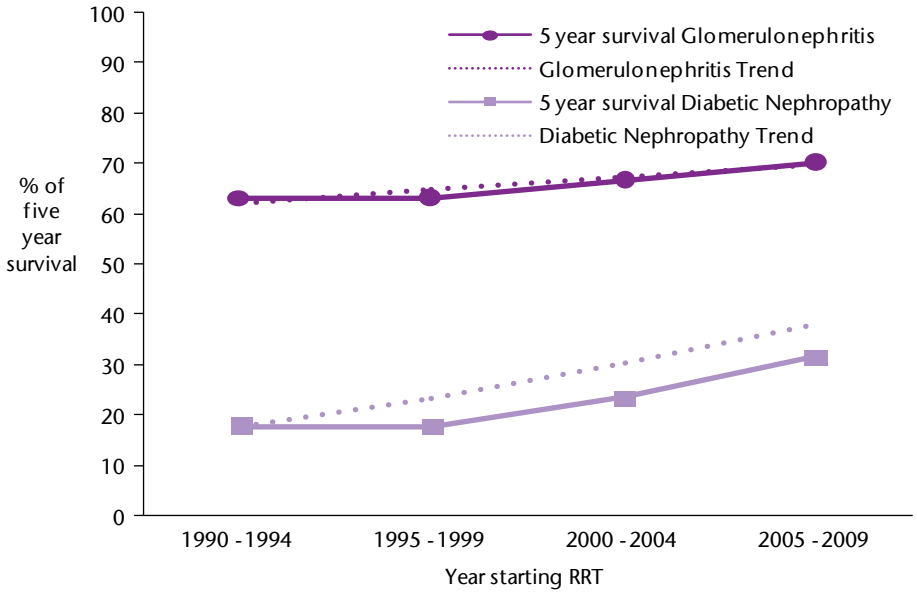
Data relating to patients starting RRT 2012 onwards are excluded to ensure a minimum available follow up period of 2 years.

C2.1 Proportion of patients surviving at 1, 2, 5 and 10 years from starting RRT 1990-2012 when aged 45-64 in the glomerulonephritis and diabetic nephropathy PRD groups

Year starting RRT	PRD Group	Number of Patients	1 year survival		2 year survival		5 year survival		10 year survival	
			n	%	n	%	n	%	n	%
1990-1994	Glomerulonephritis	136	122	**90**	112	**82**	86	**63**	51	**38**
	Diabetic Nephropathy	118	88	**75**	64	**54**	21	**18**	1	**1**
1995-1999	Glomerulonephritis	149	134	**90**	122	**82**	94	**63**	61	**41**
	Diabetic Nephropathy	202	155	**77**	120	**59**	36	**18**	7	**3**
2000-2004	Glomerulonephritis	135	121	**90**	111	**82**	90	**67**	67	**50**
	Diabetic Nephropathy	186	151	**81**	120	**65**	44	**24**	13	**7**
2005-2009	Glomerulonephritis	134	124	**93**	120	**90**	94	**70**	/	/
	Diabetic Nephropathy	256	226	**88**	195	**76**	81	**32**	/	/
2010-2012	Glomerulonephritis	100	97	**97**	92	**92**	/	/	/	/
	Diabetic Nephropathy	153	132	**86**	109	**71**	/	/	/	/

For those aged 45-64 who started RRT between 1990-2009, 34% (190/554) in the glomerulonephritis group died within 5 years of beginning RRT compared with 76% (580/762) in the diabetic nephropathy group.

C2.2 Trend in 5 year survival from starting RRT 1990-2009 for patients aged 45-64 in the glomerulonephritis and diabetic nephropathy PRD groups



Glomerulonephritis - there is an increasing trend in survival which is statistically significant (OR 1.12, 95% CI 1.04 to 1.21, p= 0.03).

Diabetic Nephropathy - there is an increasing trend in survival which is statistically significant (OR 1.42, 95% CI 1.22 to 1.65, p<0.001).

C3 Comparison of survival by NHS Board area of residence providing first RRT using Cox regression

The standardised mortality ratio (SMR) is the number of deaths in every health board or unit divided by the number of expected deaths in that health board or unit.

This makes the SMR a measure of case-mix adjusted mortality (hence the label 'standardised').

The expected number of deaths is based on a logistic regression comprising patient's age, sex, SIMD and primary renal diagnosis group.

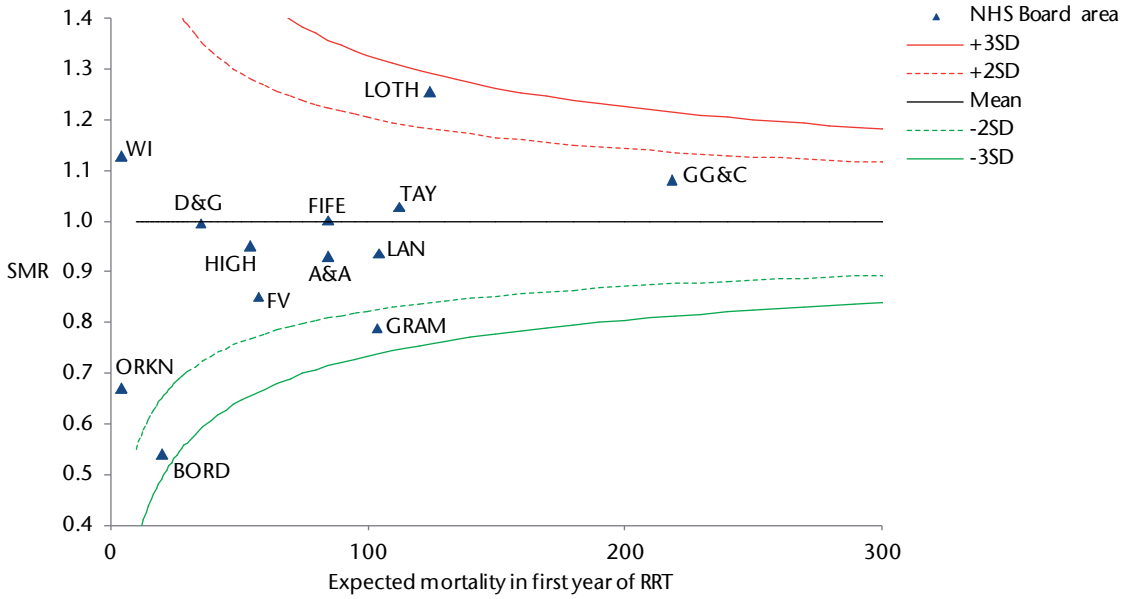
A SMR close to one means that the observed number of deaths is close to the expected number.

A SMR higher than one means that the observed number of deaths is higher than the expected number.

The units within the outer control limits (-3SD, +3SD) are considered equivalent and different only by chance.

The control limits are calculated via the Poisson probability distribution.

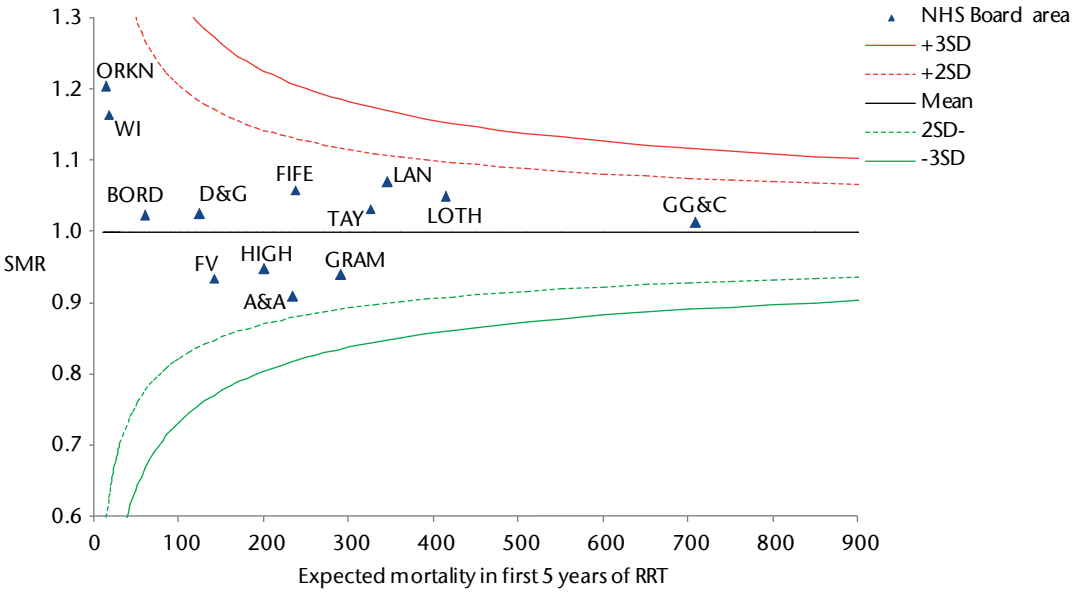
C3.1 One year standardised mortality ratio at 1 year for patients starting RRT 2004-2013 by NHS Board area of residence



All NHS Board areas fall within 3 standard deviations of the mean.

The mortality in first year of RRT for patients starting RRT in the ten years 2004-2013 was 18.5%.

C3.2 Five year standardised mortality ratio for patients starting RRT 2000-2009 by NHS Board area of residence

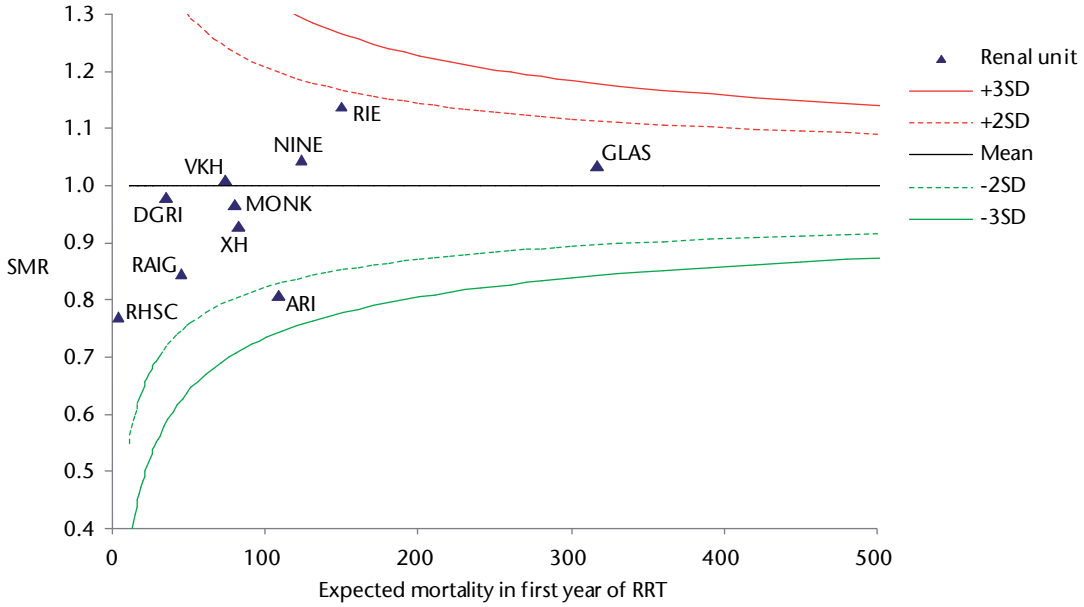


All NHS Board areas fall within 3 standard deviations of the mean.

The mortality in first five years of RRT for patients starting RRT in the ten years 2000 - 2009 was 57%.

C4 Survival by renal unit providing first RRT

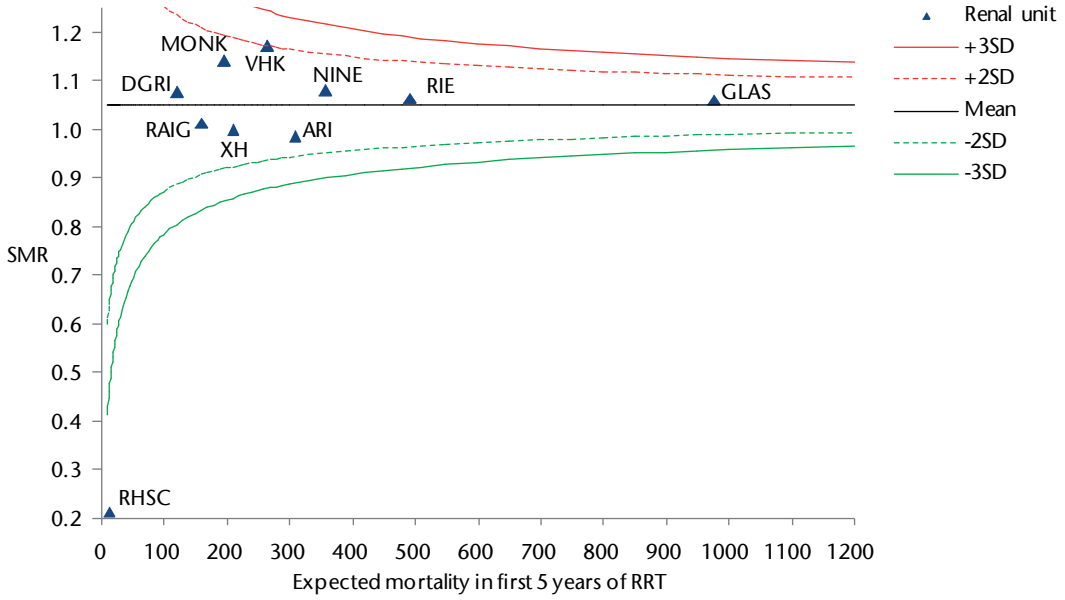
C4.1 One year standardised mortality ratio by renal unit providing first RRT for patients starting RRT 2004-2013



All units fall within three standard deviations of the mean.
Expected mortality is based on sex, age group, SIMD and primary renal diagnosis group.

The mortality in first year of RRT for patients starting RRT in the ten years 2004-2013 was 18.5%.

C4.2 Five year standardised mortality ratio by renal unit providing first RRT for patients starting RRT 2000-2009



All units fall within 3 standard deviations of the mean.
Expected mortality is based on sex, age group, SIMD and primary renal diagnosis group.

The mortality in the first five years of RRT for patients starting RRT in the ten years 2000 - 2009 was 57%.

SECTION D CAUSE OF DEATH

Please see Summary of Data section of the report for details on the inclusion/exclusion of patients.

D1 Death in the prevalent RRT population 2008-2014

Year of death	Number of deaths	% of deaths in RRT population*	Age at death	
			Median	IQR
2008	457	**9.8**	71	(63,78)
2009	425	**9.0**	72	(61,79)
2010	428	**8.9**	71	(60,78)
2011	434	**8.9**	72	(63,77)
2012	388	**7.8**	71	(61,78)
2013	442	**8.7**	71	(62,79)
2014	424	**8.2**	72	(63,79)

* Percentage of deaths is expressed as: number of deaths in given year/number of patients starting RRT in given year + number prevalent on 31 December of previous year.

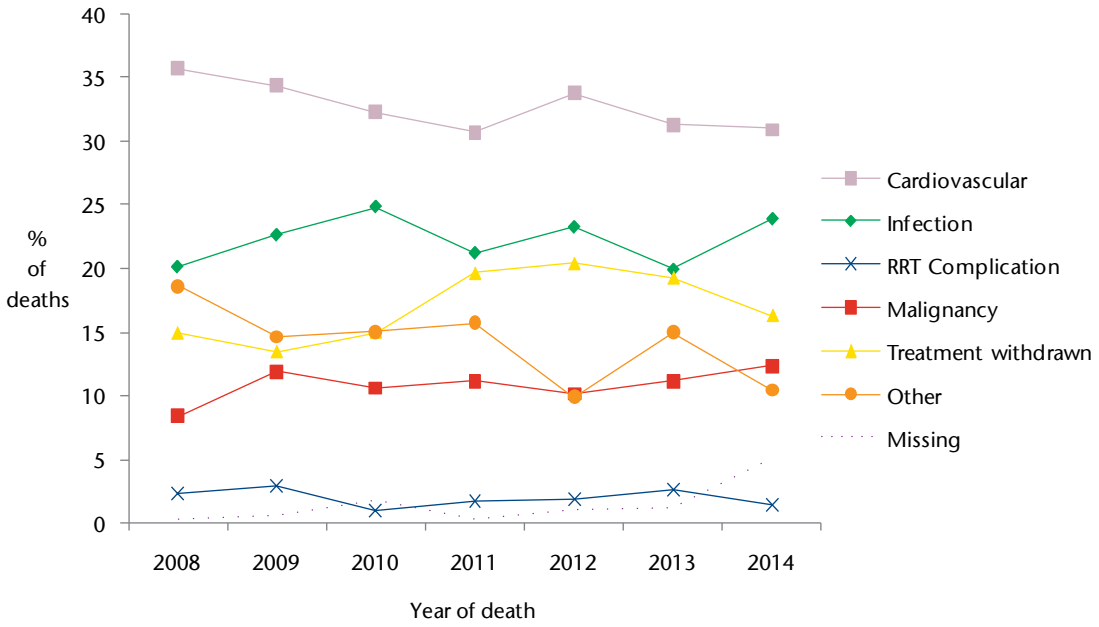
ERA-EDTA Cause of death codes and the groupings used in SRR reports are available on the SRR website: http://www.srr.scot.nhs.uk/Projects/Methods.html

D2 Cause of death group by year 2008-2014

	Year														
	2008		2009		2010		2011		2012		2013		2014		All
Cause of death	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
Cardiovascular	163	**36**	146	**34**	138	**32**	133	**31**	131	**34**	138	**31**	131	**31**	980
Infection	92	**20**	96	**23**	106	**25**	92	**21**	90	**23**	88	**20**	101	**24**	665
RRT Complication	10	**2**	12	**3**	4	**1**	7	**2**	7	**2**	11	**2**	6	**1**	57
Malignancy	38	**8**	50	**12**	45	**11**	48	**11**	39	**10**	49	**11**	52	**12**	321
Treatment withdrawn	68	**15**	57	**13**	64	**15**	85	**20**	79	**20**	85	**19**	69	**16**	507
Other	85	**19**	62	**15**	64	**15**	68	**16**	38	**10**	66	**15**	44	**10**	427
Missing	1	**0**	2	**0**	7	**2**	1	**0**	4	**1**	5	**1**	21	**5**	41
Total	**457**		**425**		**428**		**434**		**388**		**442**		**424**		**2998**

Cause of death for adult patients has been collected as part of the Scottish Mortality Audit of Renal Replacement Therapy (SMARRT) since January 2008. Prior to this cause of death data were less complete within the SRR. 3501 patients died whilst in receipt of RRT 2000-2007, 1790 (51%) had their cause of death recorded on the SRR. 2836 patients died whilst in receipt of RRT 1990-1999, 2034 (72%) had their cause of death recorded on the SRR.

D3 Trends in cause of death group by year 2008-2014

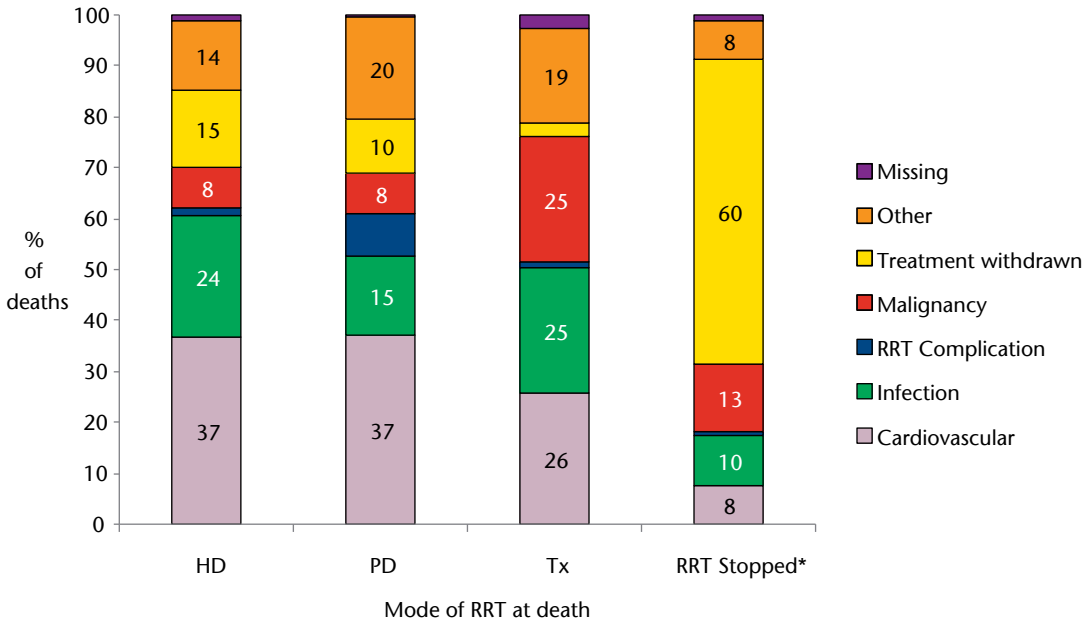


D4 Cause of death group and modality of RRT at death 2008-2014

	Modality								
	HD		PD		Tx		RRT stopped*		All
Cause of death	n	%	n	%	n	%	n	%	
Cardiovascular	785	**37**	67	**37**	108	**26**	20	**8**	**980**
Infection	508	**24**	28	**15**	104	**25**	25	**10**	**665**
RRT Complication	36	**2**	15	**8**	4	**1**	2	**1**	**57**
Malignancy	167	**8**	15	**8**	104	**25**	35	**13**	**321**
Treatment withdrawn	321	**15**	19	**10**	12	**3**	155	**60**	**507**
Other	293	**14**	36	**20**	78	**19**	20	**8**	**427**
Missing	26	**1**	1	**1**	11	**3**	3	**1**	**41**
Total	**2136**		**181**		**421**		**260**		**2998**

* This group were recorded on the SRR as having stopped RRT with no recovery of renal function, prior to death. Of those patients who died after stopping RRT between 2008-2014 the median, IQR and range between stopping RRT and death was 7 days, 3-12 days and 0-88 days respectively.
Over the time period 2008-2014 8 patients stopped RRT and then survived for more than 90 days. They had received RRT for a median of 356 days, range 9-2734 days before stopping RRT.

D5 Percentage of deaths in each group by modality of RRT at death 2008-2014



* This group were recorded on the SRR as having stopped RRT with no recovery of renal function.

D6 Cause of death by age group 2008-2014

	Age group										
	<20		20-44		45-64		65-74		≥75		All
Cause of death	n	%	n	%	n	%	n	%	n	%	
Cardiovascular	1	**17**	52	**33**	298	**38**	289	**33**	340	**29**	**980**
Infection	0	**0**	27	**17**	169	**22**	203	**23**	266	**22**	**665**
RRT Complication	1	**17**	15	**10**	13	**2**	18	**2**	10	**1**	**57**
Malignancy	0	**0**	13	**8**	101	**13**	109	**13**	98	**8**	**321**
Treatment withdrawn	0	**0**	8	**5**	74	**9**	117	**13**	308	**26**	**507**
Other	1	**17**	36	**23**	122	**16**	119	**14**	149	**13**	**427**
Missing	3	**50**	5	**3**	9	**1**	12	**1**	12	**1**	**41**
Total	**6**		**156**		**786**		**867**		**1183**		**2998**

D7 Cause of death by primary renal diagnosis 2008-2014

	PRD Group										
	Glomerulo-nephritis		Interstitial		Multisystem		Diabetes		Unknown		Total
Cause of death	n	%	n	%	n	%	n	%	n	%	
Cardiovascular	127	**31**	183	**31**	233	**31**	298	**42**	139	**26**	**980**
Infection	84	**20**	145	**24**	150	**20**	149	**21**	136	**25**	**664**
RRT Complication	10	**2**	13	**2**	9	**1**	10	**1**	15	**3**	**57**
Malignancy	58	**14**	92	**15**	104	**14**	21	**3**	46	**9**	**321**
Treatment withdrawn	56	**14**	65	**11**	149	**20**	123	**17**	114	**21**	**507**
Other	68	**16**	87	**15**	91	**12**	99	**14**	82	**15**	**427**
Missing	10	**2**	10	**2**	9	**1**	7	**1**	5	**1**	**41**
Total	**413**		**595**		**745**		**707**		**537**		**2997**

There is one patient with a missing PRD code.

SECTION E SCOTTISH MORTALITY AUDIT RENAL REPLACEMENT THERAPY (SMARRT)

Data on all deaths in adult patients receiving RRT in Scotland are submitted to the SRR via the Scottish Mortality Audit of Renal Replacement Therapy (SMARRT). Cause and contributors to death as well as location of death are recorded. In addition,the clinicians responsible for a patient's care are asked to comment on the presence or absence of areas of clinical concern in patient management prior to death.

A five point scale is used:

1. There were no areas of concern or for consideration in the management of this patient
2. There were areas for consideration but they made no difference to the eventual outcome
3. There were areas of concern but they made no difference to the eventual outcome
4. There were areas of concern which may have contributed to this patient's death
5. There were areas of concern which CAUSED the death of this patient who would have been expected to survive

Those deaths classed as category 4 or 5 are further assessed through a process which may include a review of case note records, discussion at local morbidity and mortality meetings, critical incident review reports or procurator fiscal reports. From analysis of this additional information several recurring themes have emerged.

These themes are:

- **Hyperkalaemia**

Death due to hyperkalaemic arrest. Patient non-concordance with treatment is noted to contribute in >50% of cases.

- **Prescribing**

Death attributed to adverse drug effects - inappropriate drug choices, combinations or monitoring. Most cases involve the use of common drugs including antiplatelet agents/anticoagulants, opioid analgesics or immunosuppressant medication.

- **Systems of care**

Deaths attributed to failures of communication, inadequate out of hours cover, delays in specialist renal input or inadequate staff training.

- **Infection**

Deaths attributed to severe infection due to delays in its recognition or management, sepsis in the context of immunosuppressive drugs or due to vascular access related infection.

- **Vascular Access**

Deaths attributed to complications of vascular access. Examples include fatal blood loss (intentional and accidental), inadequate dialysis following failure to address poor vascular access or cardiovascular compromise from AVF formation.

- **Interventions**

Deaths attributed as a direct consequence of an operation or procedure. Examples include recognised bleeding complications of angiography and viscus perforation during endoscopic procedures.

- **Other**

Deaths following a fall-related fracture, unexpected deterioration during dialysis or non-compliance.

E1 Categories of deaths by year 2008-2014

Year	Cat 1		Cat 2		Cat 3		Cat 4		Cat 5		Missing	
	n	%	n	%	n	%	n	%	n	%	n	%
2008	375	**81.2**	55	**11.9**	14	**3.0**	14	**3.0**	2	**0.4**	2	**0.4**
2009	355	**82.6**	54	**12.6**	6	**1.4**	11	**2.6**	4	**0.9**	0	-
2010	369	**86.0**	35	**8.2**	6	**1.4**	17	**4.0**	1	**0.2**	1	**0.2**
2011	387	**86.6**	32	**7.2**	5	**1.1**	16	**3.6**	3	**0.7**	4	**0.9**
2012	319	**80.8**	52	**13.2**	7	**1.8**	13	**3.3**	2	**0.5**	2	**0.5**
2013	343	**76.6**	54	**12.1**	20	**4.5**	15	**3.3**	6	**1.3**	10	**2.2**
2014	319	**73.8**	41	**9.5**	17	**3.9**	23	**5.3**	6	**1.4**	26	**6.0**

E2 Themes of category 4 and 5 deaths by year 2008-2014

Year	Hyper-kalaemia		Prescribing		Systems of Care		Infection		Vascular Access		Interven-tion		Other		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
2008	1	**6.3**	3	**18.8**	3	**18.8**	7	**43.8**	2	**12.5**	0	-	0	-	**16**
2009	0	-	2	**13.3**	4	**26.7**	5	**33.3**	1	**6.7**	2	**13.3**	1	**6.7**	**15**
2010	0	-	4	**22.2**	5	**27.8**	7	**38.9**	0	-	2	**11.1**	0	-	**18**
2011	1	**5.3**	3	**15.8**	3	**15.8**	6	**31.6**	4	**21.1**	1	**5.3**	1	**5.3**	**19**
2012	2	**13.3**	1	**6.7**	4	**26.7**	3	**20.0**	3	**20.0**	2	**13.3**	0	-	**15**
2013	2	**9.5**	0	-	9	**42.9**	3	**14.3**	1	**4.8**	4	**19.0**	2	**9.5**	**21**
2014	0	-	0	-	7	**24.1**	11	**37.9**	5	**17.2**	2	**6.9**	4	**13.8**	**29**

The emergence of recurring themes highlights the important role of SMARRT as a quality improvement tool. Our aim is to complete SMARRT forms as close to the point of death as possible so that the results of SMARRT and the output of any clinical incident reviews can be shared with all local clinical governance committees across the country.

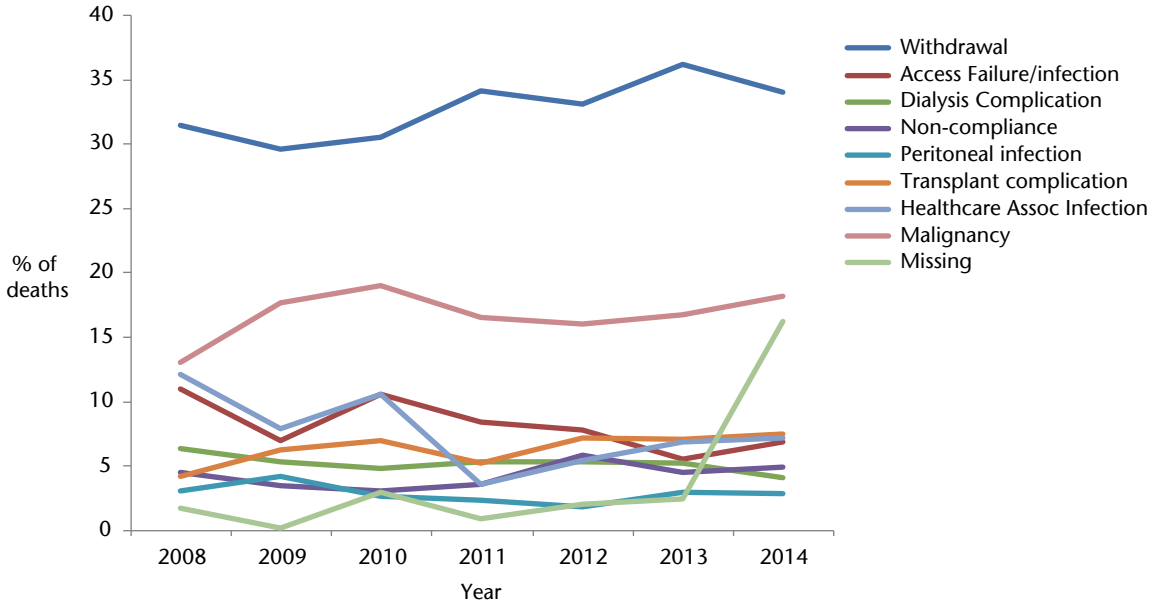
E3 Location of death by year 2008-2014														
Year	Usual Residence		Hospital		Hospice		Community Hospital		Other		Unknown		Missing	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
2008	89	**19.3**	318	**68.8**	6	**1.3**	12	**2.6**	6	**1.3**	7	**1.5**	24	**5.2**
2009	89	**20.7**	303	**70.5**	7	**1.6**	10	**2.3**	5	**1.1**	5	**1.2**	11	**2.6**
2010	87	**20.3**	298	**69.4**	9	**2.1**	9	**2.1**	11	**2.6**	7	**1.6**	8	**1.9**
2011	110	**24.6**	299	**66.9**	11	**2.5**	12	**2.7**	5	**1.1**	0	-	10	**2.2**
2012	93	**23.5**	270	**68.3**	13	**3.3**	5	**1.3**	9	**2.3**	0	-	5	**1.3**
2013	98	**21.9**	312	**69.6**	11	**2.5**	13	**2.9**	5	**1.1**	2	**0.4**	7	**1.6**
2014	81	**18.8**	291	**67.3**	16	**3.7**	9	**2.1**	3	**0.7**	0	-	32	**7.4**

There have been no significant changes in location of death over the 7 years of SMARRT.

E4 Factors contributing to death 2008-2014																		
Year	With-drawal		Access failure/ infection		Dialysis complica-tions		Non-com-pliance		Peritoneal Infection		Trans-plant Complica-tion		Health-care As-sociated Infection		Malig-nancy		Missing	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
2008	143	**31.5**	50	**11.0**	29	**6.4**	21	**4.6**	14	**3.1**	19	**4.2**	55	**12.1**	59	**13.0**	8	**1.7**
2009	127	**29.6**	30	**7.0**	23	**5.4**	15	**3.5**	18	**4.2**	27	**6.3**	34	**7.9**	76	**17.7**	1	**0.2**
2010	127	**30.5**	44	**10.6**	20	**4.8**	13	**3.1**	11	**2.6**	29	**7.0**	44	**10.6**	79	**19.0**	13	**3.0**
2011	151	**34.1**	37	**8.4**	24	**5.4**	16	**3.6**	10	**2.3**	23	**5.2**	16	**3.6**	73	**16.5**	4	**0.9**
2012	128	**33.1**	30	**7.8**	21	**5.4**	23	**5.9**	7	**1.8**	28	**7.2**	21	**5.4**	62	**16.0**	8	**2.0**
2013	158	**36.2**	24	**5.5**	23	**5.3**	20	**4.6**	13	**3.0**	31	**7.1**	30	**6.9**	73	**16.7**	11	**2.5**
2014	123	**34.0**	25	**6.9**	15	**4.1**	18	**5**	10	**2.8**	27	**7.5**	26	**7.2**	66	**18.2**	70	**16.2**

As well as reporting cause of death, clinicians completing the SMARRT data are asked to comment on whether any of the factors in Table E4 contributed to death. There has been a significant decline in the number of deaths where access failure/infection or healthcare associated infection ($p=0.027$ and $p<0.001$ respectively) are cited as contributory factors over the period of the SMARRT audit.

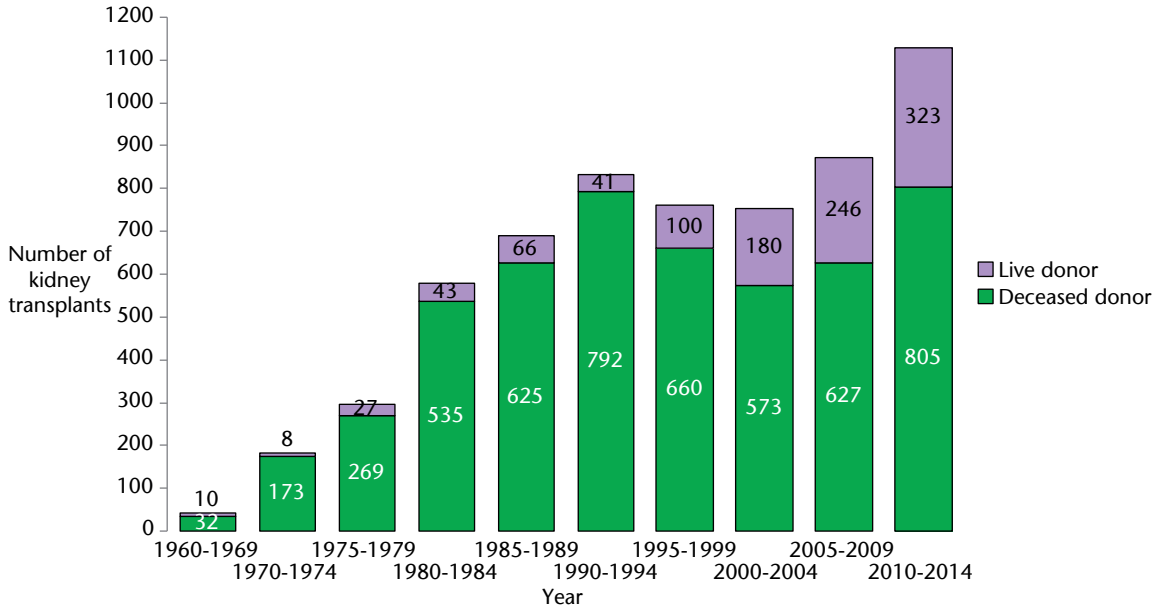
E5 Trends in factors contributing to death 2008-2014



SECTION F KIDNEY TRANSPLANTATION

F1 Frequency of kidney transplantation in Scotland

F1.1 Frequency and donor type, kidney transplants performed in Scotland 1960-2014



Between 1960 and 31 December 2014, 6145 kidney transplants were performed in Scotland in 5191 patients with postcode of residence in Scotland.

The kidney donor was deceased for 5097 (83%) transplants, 1048 (17%) of transplanted kidneys were donated by live donors.

5161 first kidney transplants were performed, 806 second transplants, 153 third transplants and 25 fourth or subsequent kidney transplants.

183 Scottish residents have received a simultaneous kidney and pancreas transplant, 14 patients have received a simultaneous kidney and liver transplant.

Kidney transplants performed outside of Scotland are excluded. Transplants performed in Scotland for patients not resident in Scotland are also excluded.

F1.2 Frequency, transplant type and donor type, kidney transplants performed in Scotland 2005-2014

Year of transplant	Deceased donor kidney alone		Live donor kidney		Kidney and pancreas		Kidney and Liver		Total kidney transplants
	n	%	n	%	n	%	n	%	
2005	86	**61.4**	41	**29.3**	12	**8.6**	1	**0.7**	**140**
2006	88	**68.8**	29	**22.7**	10	**7.8**	1	**0.8**	**128**
2007	102	**56.0**	58	**31.9**	22	**12.1**	0	-	**182**
2008	128	**60.4**	69	**32.5**	13	**6.1**	2	**0.9**	**212**
2009	147	**69.7**	49	**23.2**	14	**6.9**	1	**0.5**	**211**
2010	127	**69.0**	50	**27.2**	7	**3.8**	0	-	**184**
2011	127	**65.8**	53	**27.5**	12	**6.2**	1	**0.5**	**193**
2012	146	**64.9**	63	**28.0**	14	**6.2**	2	**0.9**	**225**
2013	166	**62.6**	83	**31.3**	16	**6.0**	0	-	**265**
2014	171	**65.5**	74	**28.4**	16	**6.1**	1	**0.4**	**261**

F1.3a Frequency and donor type of adult kidney transplants performed in Scotland 2005-2014 by transplanting centre

Year	GLASGOW								Total
	DBD		DCD		DD		LD		
	n	%	n	%	n	%	n	%	
2005	0	-	3	**4.1**	48	**65.8**	22	**30.1**	**73**
2006	0	-	0	-	50	**80.6**	12	**19.4**	**62**
2007	1	**1.3**	0	-	52	**67.5**	24	**31.2**	**77**
2008	0	-	3	**3.3**	51	**55.4**	38	**41.3**	**92**
2009	5	**5.4**	3	**3.3**	65	**70.7**	19	**20.7**	**92**
2010	40	**47.6**	11	**13.1**	14	**16.7**	19	**22.6**	**84**
2011	53	**54.6**	14	**14.4**	2	**2.1**	28	**28.8**	**97**
2012	59	**48.4**	33	**27.0**	0	-	30	**24.6**	**122**
2013	56	**39.4**	41	**28.9**	0	-	45	**34.6**	**142**
2014	64	**46.0**	38	**27.3**	1	**0.7**	36	**25.9**	**139**

DBD - Deceased after brain death; DCD - Deceased after circulatory death;
DD - Deceased donor unspecified; LD - Living donor.

F1.3b Frequency and donor type of adult kidney transplants performed in Scotland 2005-2014 by transplanting centre

Year	RIE								Total
	DBD*		DCD*		DD*		LD		
	n	%	n	%	n	%	n	%	
2005	24	**39.3**	2	**3.3**	21	**34.4**	14	**22.9**	**61**
2006	42	**72.4**	1	**1.7**	0	-	15	**25.8**	**58**
2007	56	**57.7**	12	**12.4**	0	-	29	**29.9**	**97**
2008	63	**60.6**	19	**18.3**	0	-	22	**21.2**	**104**
2009	71	**64.0**	13	**11.7**	0	-	27	**24.3**	**111**
2010	49	**52.7**	17	**18.3**	0	-	27	**29.0**	**93**
2011	53	**58.2**	16	**17.6**	0	-	22	**24.2**	**91**
2012	43	**44.8**	25	**26.0**	0	-	28	**29.2**	**96**
2013	48	**41.4**	33	**28.4**	0	-	35	**30.2**	**116**
2014	50	**45.5**	29	**26.4**	0	-	31	**28.2**	**110**

* Includes combined kidney + pancreas and kidney + liver transplants.
DBD - Deceased after brain death; DCD - Deceased after circulatory death;
DD - Deceased donor unspecified; LD - Living donor.

Since 2005 kidney transplantation for adult patients in Scotland has been undertaken in two units the Glasgow renal and transplant unit and the transplant unit of the Royal Infirmary of Edinburgh.

Kidney transplants for patients under the care of RHSC are not shown in tables F1.3a+b.

F1.4 Age of patients at the time of kidney transplantation

Year of transplant	First kidney transplants				Second and subsequent transplants			
	n	Mean Age	SD	Age Range	n	Mean Age	SD	Age Range
1960-1969	41	26.4	11.0	8.0 - 47.6	1	19.1	-	-
1970-1974	162	33.2	12.2	10.1 - 64.8	19	30.2	10.3	11.6 - 55.2
1975-1979	258	35.0	11.2	12.0 - 65.1	38	30.7	9.3	13.0 - 47.9
1980-1984	479	38.1	14.6	2.3 - 68.6	99	36.2	11.5	15.4 - 68.9
1985-1989	565	39.9	15.9	1.3 - 77.6	126	35.5	13.4	3.4 - 63.6
1990-1994	697	43.0	15.5	0.3 - 76.2	136	37.0	12.3	12.4 - 69.5
1995-1999	628	41.7	15.4	2.1 - 78.4	132	37.8	12.7	3.9 - 65.5
2000-2004	628	42.4	15.5	4.0 - 78.1	125	38.7	11.4	16.7 - 71.3
2005-2009	736	44.1	15.4	2.4 - 77.7	137	42.4	11.4	16.4 - 69.2
2010-2014	967	47.8	14.8	3.3 - 79.3	161	43.5	11.8	8.2 - 75.5

F1.5 Year of first kidney transplant and diagnosis group

Year of transplant	Glomerulo-nephritis		Interstitial		Multisystem		Diabetes		Unknown	
	n	%	n	%	n	%	n	%	n	%
1960-1969	19	**46.3**	11	**26.8**	3	**7.3**	0	-	8	**19.5**
1970-1974*	69	**42.6**	54	**33.3**	13	**8.0**	0	-	25	**15.4**
1975-1979	104	**40.3**	102	**39.5**	30	**11.6**	0	-	22	**8.5**
1980-1984	142	**29.6**	208	**43.4**	53	**11.1**	28	**5.8**	48	**10.0**
1985-1989	162	**28.7**	214	**37.9**	80	**14.2**	41	**7.3**	68	**12.0**
1990-1994	194	**27.8**	260	**37.3**	102	**14.6**	69	**9.9**	72	**10.3**
1995-1999	174	**27.7**	232	**36.9**	75	**11.9**	70	**11.1**	77	**12.3**
2000-2004	154	**24.5**	229	**36.5**	81	**12.9**	74	**11.8**	90	**14.3**
2005-2009	157	**21.3**	289	**39.3**	91	**12.4**	106	**14.4**	93	**12.6**
2010-2014	229	**23.7**	372	**38.5**	120	**12.4**	131	**13.5**	115	**11.9**

* One patient who received a first kidney transplant between 1960-1974 has missing PRD.

F2 Transplanted Kidney Survival

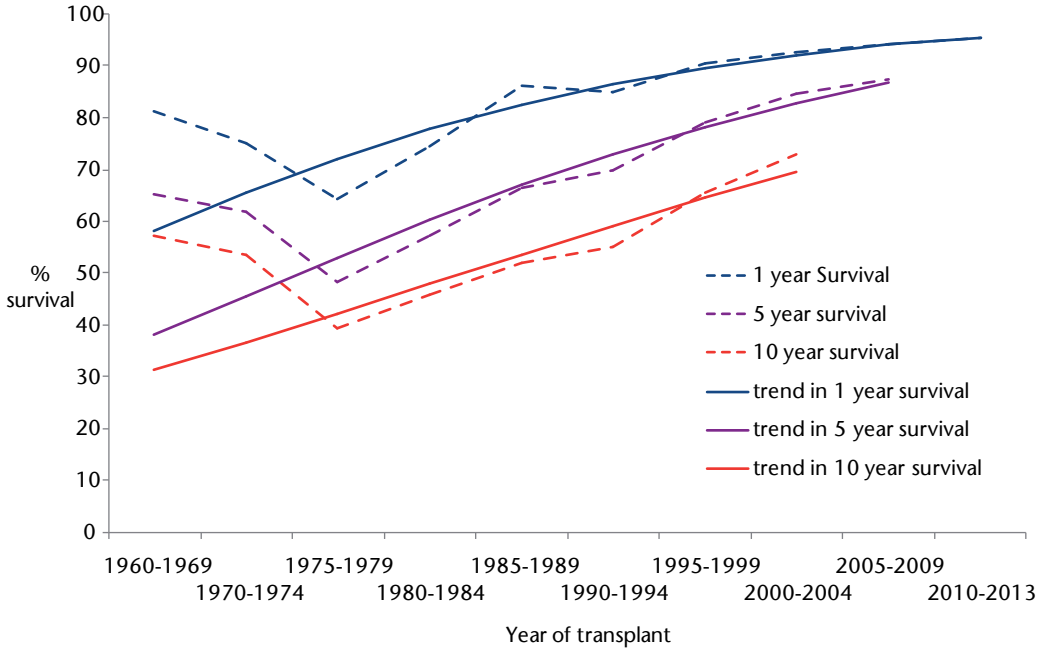
F2.1 Graft survival of first kidney transplants by year of transplantation 1960 - 2013

Year of transplant	Grafts surviving 1 year		Grafts surviving 5 years		Grafts surviving 10 years	
	n	%	n	%	n	%
1960-1969	26	**81**	15	**65**	12	**57**
1970-1974	97	**75**	67	**62**	51	**54**
1975-1979	149	**64**	107	**48**	83	**40**
1980-1984	340	**74**	248	**57**	178	**46**
1985-1989	464	**86**	327	**67**	229	**52**
1990-1994	561	**85**	429	**70**	301	**55**
1995-1999	548	**90**	459	**79**	345	**66**
2000-2004	563	**93**	481	**85**	382	**73**
2005-2009	675	**94**	592	**87**	/	/
2010	145	**94**	/	/	/	/
2011	147	**94**	/	/	/	/
2012	182	**97**	/	/	/	/
2013	212	**97**	/	/	/	/

Survival of first kidney transplants only, for transplants performed in Scotland, are shown in the table.

Grafts with insufficient follow-up and those that did not fail in patients dying within the relevant period have been excluded from the table.

F2.2 Trends in first graft survival by year of transplantation 1960-2013



Trend in 1 year survival: year to year OR 1.06 (95% CI 1.05-1.07)

Trend in 5 year survival: year to year OR 1.06 (95% CI 1.05-1.07)

Trend in 10 year survival: year to year OR 1.05 (95% CI 1.04-1.06)

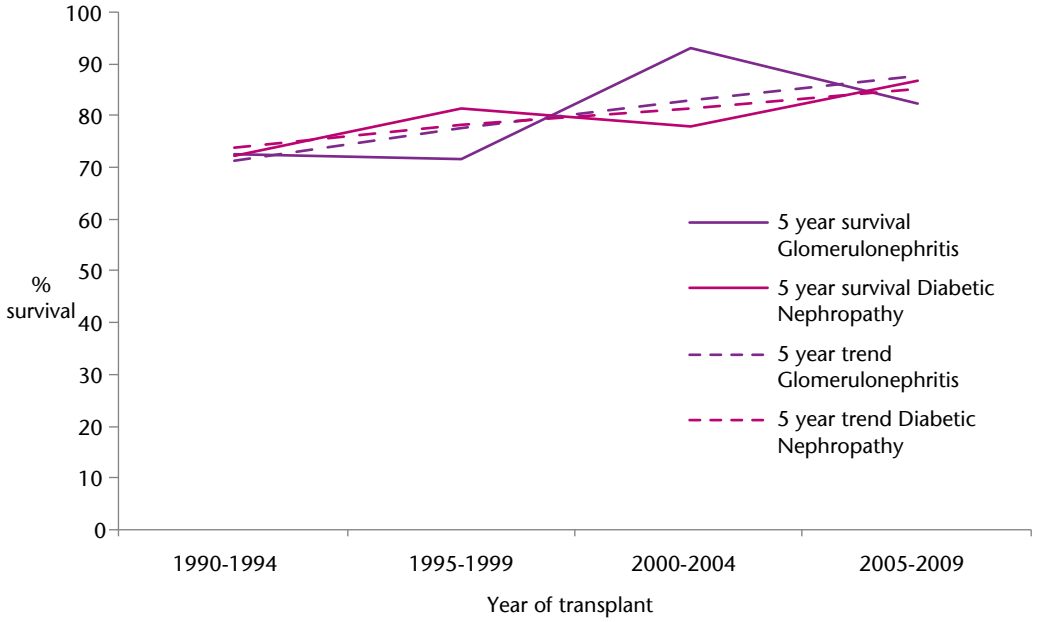
The trends in 1 year, 5 year and 10 year graft survival are all statistically significant. (Wald-statistic, df=1,p<0.001)

F2.3 Graft survival in the glomerulonephritis and diabetic nephropathy PRD groups in those aged 45-64 at time of first kidney transplant 1990-2013

Year of transplant	PRD Group	1 year survival		5 year survival		10 year survival	
		n	%	n	%	n	%
1990-1994	Glomerulonephritis	60	**90**	45	**73**	29	**55**
	Diabetic nephropathy	21	**88**	13	**72**	4	**40**
1995-1999	Glomerulonephritis	54	**87**	43	**72**	32	**59**
	Diabetic nephropathy	17	**89**	13	**81**	9	**75**
2000-2004	Glomerulonephritis	59	**95**	55	**93**	41	**79**
	Diabetic nephropathy	22	**96**	14	**78**	12	**71**
2005-2009	Glomerulonephritis	53	**88**	47	**82**	/	/
	Diabetic nephropathy	32	**91**	26	**87**	/	/
2010-2013	Glomerulonephritis	77	**97**	/	/	/	/
	Diabetic nephropathy	39	**93**	/	/	/	/

Grafts with insufficient follow-up and those that did not fail in patients dying within the relevant period have been excluded from the table. Patients in receipt of combined kidney and pancreas transplant are included in the analysis.

F2.4 Trend in five year graft survival in the glomerulonephritis and diabetic nephropathy PRD groups in those aged 45-64 at time of first kidney transplant 1990-2009



Glomerulonephritis trend in 5 year survival: year to year OR 1.07 (95% CI 1.01-1.14)

Diabetic nephropathy trend in 5 year survival: year to year OR 1.05 (95% CI 0.96-1.15)

F2.5 Graft survival by current Health board of residence 2005-2013

	Grafts surviving 1 year			Grafts surviving 2 years			Grafts surviving 5 years		
	Number of first kidney transplants 2005-2013	n	%	Number of first kidney transplants 2005-2012	n	%	Number of first kidney transplants 2005-2009	n	%
A&A	94	90	**95.7**	93	87	**93.5**	89	80	**89.9**
BORD	37	36	**97.3**	37	36	**97.3**	33	31	**93.9**
D&G	38	37	**97.4**	35	34	**97.1**	35	32	**91.4**
FIFE	98	89	**90.8**	98	85	**86.7**	96	79	**82.3**
FV	78	75	**96.2**	78	73	**93.6**	76	69	**90.8**
GG&C	342	323	**94.4**	338	312	**92.3**	331	295	**89.1**
GRAM	155	148	**95.5**	155	142	**91.6**	149	133	**89.3**
HIGH	96	92	**95.8**	96	89	**92.7**	92	83	**90.2**
LAN	187	178	**95.2**	183	168	**91.8**	177	159	**89.8**
LOTH	210	199	**94.8**	206	191	**92.7**	193	174	**90.2**
ORKN	3	3	**100.0**	3	3	**100.0**	3	3	**100.0**
SHET	3	3	**100.0**	3	3	**100.0**	3	3	**100.0**
TAY	88	82	**93.2**	87	81	**93.1**	86	78	**90.7**
WI	6	6	**100.0**	6	6	**100.0**	6	6	**100.0**
Scotland	**1435**	**1361**	**94.8**	**1418**	**1311**	**92.5**	**1369**	**1225**	**89.5**

Grafts with insufficient follow-up and those that did not fail in patients dying within the relevant period have been excluded from the table.

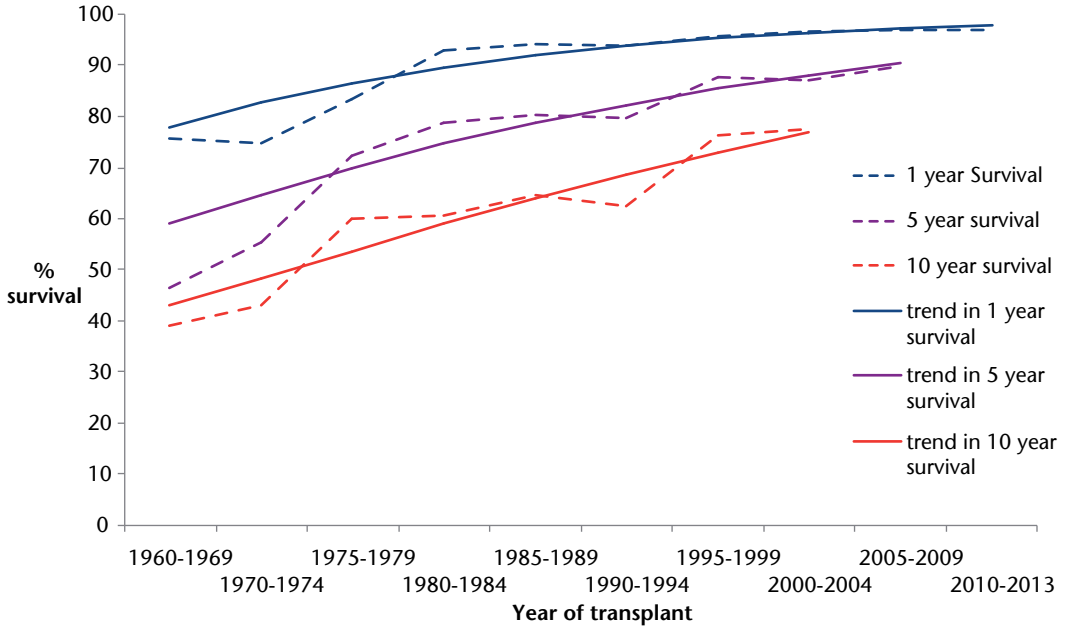
F3 Patient survival after Kidney Transplantation

F3.1 Patient survival after first kidney transplant by year of transplantation 1960-2013

Year of transplant	Patients surviving 1 year		Patients surviving 5 years		Patients surviving 10 years	
	n	%	n	%	n	%
1960-1969	31	**75.6**	19	**46.3**	16	**39.0**
1970-1974	121	**74.7**	90	**55.6**	70	**43.2**
1975-1979	215	**83.3**	187	**72.5**	155	**60.1**
1980-1984	446	**93.1**	377	**78.7**	290	**60.5**
1985-1989	532	**94.2**	455	**80.5**	365	**64.6**
1990-1994	655	**94.0**	556	**79.8**	435	**62.4**
1995-1999	602	**95.9**	551	**87.7**	479	**76.3**
2000-2004	607	**96.7**	547	**87.1**	487	**77.5**
2005-2009	714	**97.0**	662	**89.9**	/	/
2010	155	**98.7**	/	/	/	/
2011	157	**97.5**	/	/	/	/
2012	187	**96.4**	/	/	/	/
2013	217	**96.4**	/	/	/	/

Patient survival is reported from the time of first kidney transplant for transplants performed in Scotland. Patients with insufficient follow-up are excluded.

F3.2 Trends in patient survival by year of first kidney transplantation 1960-2013



Trend in 1 year survival: year to year OR 1.06 (95% CI 1.05-1.07)

Trend in 5 year survival: year to year OR 1.05 (95% CI 1.04-1.06)

Trend in 10 year survival: year to year OR 1.04 (95% CI 1.04-1.05)

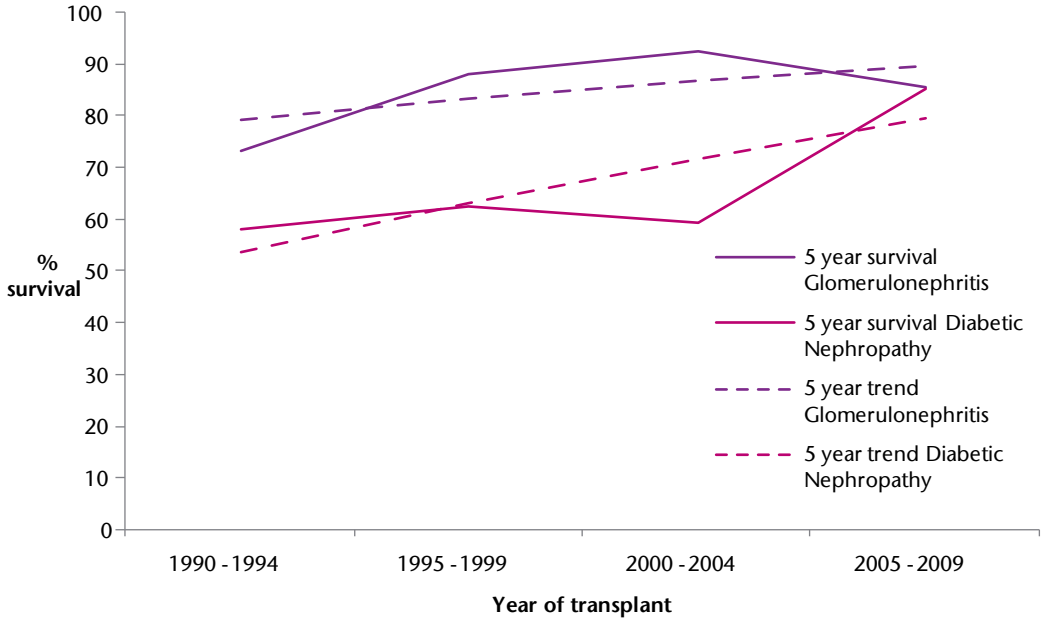
The trends in 1 year, 5 year and 10 year graft survival are all statistically significant. (Wald-statistic, df=1,$p<0.001$)

F3.3 Patient survival in the glomerulonephritis and diabetic nephropathy PRD groups in those aged 45-64 at time of first kidney transplant 1990-2013

Year of transplant	PRD Group	1 year survival		5 year survival		10 year survival	
		n	%	n	%	n	%
1990-1994	Glomerulonephritis	71	**95**	55	**73**	40	**53**
	Diabetic nephropathy	27	**87**	18	**58**	7	**23**
1995-1999	Glomerulonephritis	64	**96**	59	**88**	48	**72**
	Diabetic nephropathy	20	**83**	15	**63**	11	**46**
2000-2004	Glomerulonephritis	65	**97**	62	**93**	52	**78**
	Diabetic nephropathy	28	**88**	19	**59**	16	**50**
2005-2009	Glomerulonephritis	67	**96**	60	**86**		
	Diabetic nephropathy	47	**100**	40	**85**		
2010-2013	Glomerulonephritis	82	**99**				
	Diabetic nephropathy	44	**92**				

Patients in receipt of combined kidney and pancreas transplant are included in the analysis.

F3.4 Trend in five year survival in the glomerulonephritis and diabetic nephropathy PRD groups in those aged 45-64 at time of first kidney transplant 1990-2009



Glomerulonephritis trend in 5 year survival: year to year OR 1.06 (95% CI 0.99-1.21)

Diabetic Nephropathy trend in 5 year survival: year to year OR 1.09 (95% CI 1.02-1.16)

F4 Transplant Kidney Function

F4.1 Transplanted kidney function at one year in adult recipients after first kidney transplant performed 2004-2013

Year	Transplants performed	Surviving patients with functioning graft at 1 year		Patients with creatinine result	Serum creatinine (micromole/L)		eGFR (ml/min)	
		n	%	n	Median	IQR	Median	IQR
2004	95	90	**94.7**	83	137	111-174	46.1	34.5-56.0
2005	106	98	**92.5**	98	131	106-159	51.2	39.3-62.7
2006	97	92	**94.8**	89	132	108-161	49.7	39.1-59.6
2007	147	132	**89.8**	131	118	100-143	55.0	43.9-64.9
2008	167	154	**92.2**	153	118	102-145	55.2	42.4-66.9
2009	170	152	**89.4**	145	123	95-152	54.4	40.2-68.6
2010	151	140	**92.7**	118	111	93-137	58.8	46.0-73.9
2011	156	143	**91.7**	130	119	102-152	52.5	41.7-67.4
2012	187	175	**94.6**	165	119	94-144	55.5	45.2-73.3
2013	218	206	**94.5**	171	111	88-135	57.5	46.6-73.0

Patients dying within the first year post transplant are excluded.

Patients aged under 18 years at the time of transplantation are excluded.

Kidney transplants performed outside of Scotland are excluded. Transplants performed in Scotland for patients not resident in Scotland are also excluded.

F4.2 Transplanted kidney function one year in adult recipients after first kidney transplant performed 2004-2013 by primary renal diagnosis group

Recipient primary renal diagnosis group	Transplants performed	Surviving patients with functioning graft at 1 year		Patients with creatinine result	Serum creatinine (micromole/L)		eGFR (ml/min)	
		n	%	n	Median	IQR	Median	IQR
Glomerulo-nephritis	347	320	**92.2**	289	127	105-165	51.2	39.7-64.9
Interstitial	547	515	**94.1**	480	120	97-146	53.0	40.2-66.6
Multisystem	190	173	**91.0**	157	118	100-143	55.5	44.3-67.6
Diabetic nephropathy*	215	199	**92.6**	195	113	94-139	59.2	46.5-71.4
Unknown	195	175	**87.9**	162	119	102-151	55.2	43.5-66.9

* Includes patients receiving simultaneous kidney and pancreas transplant

F4.3 Transplanted kidney function one year in adult recipients after first kidney transplant performed 2004-2013 by donor type

Donor type	Transplants performed	Surviving patients with functioning graft at 1 year		Patients with creatinine result	Serum creatinine (micromole/L)		eGFR (ml/min)	
		n	%	n	Median	IQR	Median	IQR
Deceased donor	1077	988	**91.7**	930	121	100-153	52.6	40.2-66.8
Live donor	417	394	**94.5**	353	116	100-139	56.2	46.1-68.3

F4.4 Transplanted kidney function one year in adult recipients after first kidney transplant performed 2005-2013 by transplanting unit

Transplant Centre	Transplants performed	Surviving patients with functioning graft at 1 year		Patients with creatinine result	Serum creatinine (micromole/L)		eGFR (ml/min)	
		n	%	n	Median	IQR	Median	IQR
GLAS	684	631	**92.3**	565	117	96-144	55.7	42.9-70.2
RIE	714	660	**92.4**	634	121	101-147	53.3	41.9-66.5

F5 Listing for Kidney Transplantation

F5.1 Percentage and prevalence per 100000 population of RRT patients with functioning kidney transplant or on transplant waiting list 31 December 2014 by NHS Board area of residence

	All RRT patients 31/12/2014	Patients with kidney transplant		Transplant or transplant listed		NHS Board population	Prevalence per 100000 population
		n	%	n	%		
A&A	370	183	**49**	246	**66**	371110	66.3
BORD	103	61	**59**	81	**79**	114030	71.0
D&G	136	70	**51**	97	**71**	149940	64.7
FIFE	333	159	**48**	209	**63**	367260	56.9
FV	259	141	**54**	182	**70**	300410	60.6
GG&C	1111	672	**60**	839	**76**	1142580	73.4
GRAM	505	273	**54**	351	**70**	584240	60.1
HIGH	277	177	**64**	223	**81**	320760	69.5
LAN	607	363	**60**	473	**78**	653310	72.4
LOTH	622	362	**58**	459	**74**	858090	53.5
ORKN	15	6	**40**	9	**60**	21590	41.7
SHET	13	6	**46**	8	**62**	23230	34.4
TAY	387	193	**50**	252	**65**	413800	60.9
WI	20	8	**40**	11	**55**	27250	40.4
Scotland	**4758**	**2674**	**56**	**3443**	**72**	**5347600**	**64.4**

The percentage of patients in each NHS Board area treated by all forms of RRT (PD, HD, Transplant) who are either on the transplant waiting list or have a functioning transplant are shown.

Patients who were on the transplant waiting list but had suspended rather than active status are included.

Three patients live outside of Scotland and were receiving treatment within Scottish renal units on 31 December 2014.

F5.2 Frequency of first kidney transplants and time from start of RRT to activation on transplant waiting list, by NHS Board area of residence at transplantation 2010-2014

	n	Pre-emptive transplants (DD)	LD Tx in first year of RRT*	Patients with listing date**	Days from start of RRT to listing***	
					Median	IQR
A&A	59	9 (4)	8	50	110	-96 - 558
BORD	29	3 (2)	3	26	118	-85 - 274
D&G	25	6 (2)	7	20	101	27 - 336
FIFE	63	10 (4)	8	55	86	-123 - 339
FV	67	8 (4)	8	58	146	-17 - 326
GG&C	244	50 (19)	46	211	109	-147 -380
GRAM	100	10 (2)	13	89	86	-75 - 320
HIGH	52	7 (3)	8	45	195	-41 - 330
LAN	146	20 (8)	22	132	268	9 - 494
LOTH	125	13 (6)	18	112	183	-56 - 426
ORKN	0	0 -	0	-	-	-
SHET	2	0 -	1	1	-	-
TAY	54	9 (1)	12	45	99	-34 - 75
WI	1	0 -	0	1	-	-
Scotland	**967**	**145 55**	**154**	**845**	**144**	**-66 - 392**

* Includes pre-emptive LD transplants
** Patients receiving LD pre-emptive transplants excluded
*** Truncated to -182 days

145 patients received a pre-emptive transplant in 2010-2014, 90 from a live donor (LD), 55 from a deceased donor (DD).

A further 64 patients received a LD transplant within one year of starting RRT.

Renal Association guidelines suggest that patients with progressive deterioration in renal function who are suitable for transplantation should be placed on the national transplant list within six months (-182 days) of their anticipated dialysis start date. Patients listed from transplantation for longer than six months prior to starting RRT have their duration of listing truncated to six months for the analysis.

F5.3 Time from start of RRT to activation on transplant waiting list patients starting RRT 2010-2013, by NHS Board area of residence at start of RRT					
	Number starting RRT 2010-2013	Patients active on Tx waiting list by 31 Dec 2014*		Days from start of RRT to listing***	
		n	%	Median	IQR
A&A	177	50	**28.4**	138	-65 - 384
BORD	37	19	**51.4**	103	-62 - 370
D&G	56	19	**33.9**	41	-182 - 239
FIFE	185	42	**22.7**	136	-182 - 341
FV	125	38	**30.4**	87	-26 - 341
GG&C	484	179	**37.0**	29	-167 - 215
GRAM	219	77	**35.2**	58	-78 - 304
HIGH	101	38	**37.6**	22	-100 - 246
LAN	269	113	**42.0**	241	-39 - 435
LOTH	233	67	**28.8**	108	-118 - 311
ORKN	9	2	**22.2**	114	-
SHET	5	1	**20.0**	600	-
TAY	181	42	**23.2**	106	-99 - 332
WI	9	3	**33.3**	119	-
Scotland	**2090**	**690**	**33.0**	**91**	**-99 - 329**

* Patients active on transplant waiting list at any time up until 31 December 2014.
** Truncated to -182 days

Renal Association guidelines suggest that patients with progressive deterioration in renal function who are suitable for transplantation should be placed on the national transplant list within six months (-182 days) of their anticipated dialysis start date. Patients listed from transplantation for longer than six months prior to starting RRT have their duration of listing truncated to six months for the analysis.

SECTION G PERITONEAL DIALYSIS

The number of prevalent adult patients treated by peritoneal dialysis (PD) has fallen progressively since 1999, see table B1.3. During the same time period the proportion of patients on automated PD (APD) has increased. These data exclude children on PD who are treated primarily by APD rather than CAPD.

Prospective audit data of the incidence of episodes of PD associated peritonitis, adequacy of dialysis and causes of PD technique failure are reported to the Scottish Renal Registry (SRR) by all adult renal units in Scotland every 6 months.

During 2014 a total of 122 adult patients started PD: 84 incident patients, 28 transfers from HD, 4 transfers from other units outside of Scotland and 6 patients after failure of a kidney transplant. A total of 129 adult patients discontinued PD: 66 transfers to HD, 2 transfers to other units, 33 transplants and 28 deaths.

G1 Reasons for starting and stopping PD in adult renal units 2010-2014

Renal unit	New	From HD	Transfer in	From Tx	Total in	Death	To Tx	To HD	Transfer out	Re-covered	Total out
ARI	51	22	4	7	**84**	7	23	51	1	0	**82**
XH	58	17	1	1	**77**	30	17	27	0	2	**76**
DGRI	32	3	4	0	**39**	9	7	19	1	0	**36**
GLAS	93	42	4	9	**148**	33	41	88	3	1	**166**
MONK	33	7	2	2	**44**	5	12	32	1	1	**51**
NINE	33	23	0	4	**60**	6	17	41	1	2	**67**
RAIG	31	22	1	2	**56**	8	13	37	2	2	**62**
RIE	56	23	6	5	**90**	25	31	62	0	2	**120**
VHK	32	11	1	1	**45**	10	6	36	0	0	**52**
Total	**419**	**170**	**23**	**31**	**643**	**133**	**167**	**393**	**9**	**10**	**712**

The standard 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

Recurrent episodes of peritonitis, defined as peritonitis within 4 weeks of stopping antibiotics, are included as separate episodes of peritonitis throughout the audit period.

There were 107 episodes of peritonitis in 2586 patient months on PD in 2014. Comparison with peritonitis rates in earlier years is shown in G2.

G2 PD associated peritonitis rates in adult renal units 2000-2014								
	2000-2007	2008	2009	2010	2011	2012	2013	2014
Months between episodes of peritonitis	19.9	18.5	18.7	18.8	23.4	27.0	22.1	24.2

G3 PD associated peritonitis rates in adult renal units 2010-2014			
Unit	No of episodes of peritonitis	Total patient months on PD	Peritonitis rate (months between episodes)
ARI	75	1606	21.4
XH	73	2584	35.4
DGRI	29	787	27.1
GLAS	142	2886	20.3
MONK	23	620	27.0
NINE	40	1275	31.9
RAIG	59	1054	17.9
RIE	137	2362	17.2
VHK	71	1372	19.3
SCOTLAND	**649**	**14547**	**22.4**

There is wide variance in peritonitis rates among renal units.

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

G4 Rate (PD treatment months between episodes) of causative organisms of PD peritonitis in adult renal units 2010-2014							
Renal unit	Causative Organism						Total Rate
	Staph Aureus	Coagulase negative Staph	Gram negative bacilli	Fungi	Other	Culture negative	
ARI	0.0	84.5	133.9	1606.4	89.2	64.3	21.4
XH	430.7	172.3	215.3	0.0	198.8	95.7	35.4
DGRI	262.3	65.6	131.2	0.0	196.8	196.8	27.1
GLAS	192.4	80.2	87.5	577.2	93.1	131.2	20.3
MONK	56.4	310.4	0.0	206.9	310.4	124.2	27.0
NINE	212.5	115.9	141.7	637.6	127.5	637.6	31.9
RAIG	175.7	75.3	65.9	0.0	58.6	210.8	17.9
RIE	181.7	44.6	168.7	1181.0	57.6	168.7	17.2
VHK	105.5	59.7	91.5	274.4	137.2	274.4	19.3
Average rate	**199.3**	**78.6**	**124.3**	**808.2**	**99.0**	**133.5**	**22.4**

The distribution of causative organisms of PD related peritonitis in adult renal units 2010-2014 is expressed a rate of treatment months between episodes.

The spectrum of causative organisms is similar to historical reports and those from other regional and national registries.

The culture negative peritonitis rate in 2014 improved to 16.9% from 18.4% in 2013.

G5	Number of patients with total (peritoneal and renal) creatinine clearances (Litres/week/1.73m^2) in each 6 month audit period 2010-2014 and percentage of PD patients with inadequate (<50) and borderline (50-60) creatinine clearance							
Year	Adequacy						% < 50	% 50-60
	< 50	50-60	61-70	>70	Unassessed	Total		
2010a*	18	38	33	123	61	273	**6.6**	**13.9**
2010b*	25	37	31	107	70	270	**9.3**	**13.7**
2011a	22	30	37	110	48	247	**8.9**	**12.1**
2011b	23	35	32	98	61	249	**9.2**	**14.1**
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	26	30	88	34	206	**12.1**	**14.1**
Total	**226**	**320**	**317**	**978**	**581**	**2422**	**9.3**	**13.2**

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

The absolute number of PD patients with inadequate small solute clearances (total creatinine clearance < 50 Litres/week/1.73m^2) and borderline small solute clearances (total creatinine clearance 50-60 Litres/week/1.73m^2) remained relatively constant as the total number of PD patients decreased from 2010 to 2014.

Patients who did not have adequacy of PD assessed either were within 2 months of starting PD or had significant residual renal function and so were considered very unlikely to have inadequate dialysis.

At the end of each 6 month audit period in the 5 years 2010-2014 on average 9.3% of patients on PD had a total creatinine clearance < 50 Litres/week/1.73m^2 and 13.2% had a total creatinine clearance 50-60 Litres/week/1.73m^2 indicating that these patients had either inadequate or borderline dialysis adequacy.

G6 Causes of technique failure and end of year prevalence of inadequate dialysis in adult renal units 2010-2014				
Year	No. of PD patients transferred to HD	n (%) patients with peritonitis as cause of technique failure	n (%) patients with under-dialysis as cause of technique failure	% of PD patients at end of year with total creatinine clearance < 50/L/1.73m^2/ week
2010	93	35 **(38)**	15 **(16)**	**9.2**
2011	85	33 **(39)**	27 **(32)**	**9.2**
2012	65	20 **(31)**	18 **(28)**	**10.7**
2013	83	36 **(43)**	15 **(18)**	**10.3**
2014	66	25 **(37)**	15 **(22)**	**12.2**

12.2% of the 206 patients on PD at the end of December 2014 had a most recent total creatinine clearance < 50/L/week/1.73m^2 and will be at risk of technique failure due to underdialysis in 2015.

G7 Causes of PD technique failure in each adult renal 2010-2014								
Renal unit	Peritonitis	Access	Under-dialysis	Poor UF*	High IP**	Wish HD	Stop Dialysis	Total
ARI	16	2	19	3	6	5	2	53
XH	6	3	5	3	3	6	1	27
DGRI	4	0	7	2	1	2	1	17
GLAS	34	8	18	4	12	11	2	89
MONK	20	2	2	7	1	1	0	41
NINE	17	4	10	2	3	4	1	41
RAIG	15	4	3	0	4	6	1	33
RIE	24	10	16	3	3	8	1	65
VHK	13	4	11	2	3	3	0	36
Total	**149**	**37**	**91**	**26**	**36**	**46**	**9**	**394**

* Poor ultrafiltration
** High intraperitoneal pressure

Despite the higher peritonitis rates in some units there was no association between the incidence of peritonitis and the proportion of patients stopping PD who had peritonitis as the attributed cause of technique failure.

SECTION H VASCULAR ACCESS FOR HAEMODIALYSIS

Details of vascular access used for haemodialysis for all hospital and home haemodialysis patients were collected during the SRR census week in May 2015. The SRR has collected data about the access used for first haemodialysis for incident patients since the start of 2012.

The Renal Association guideline suggests that 65% of all incident adult haemodialysis patients should commence dialysis with an arteriovenous (AV) fistula and that 85% of established patients should have AV access.

In 2014 there were 437 incident adult haemodialysis in Scotland. 193 (44.2%) of these commenced dialysis with an AVF and 244 (55.8%) with a central venous cannula (CVC).

Between the 01 January 2015 and 30 June 2015 there were 211 incident adult haemodialysis patients. 94 (44.6%) patients commenced with AV access and 117 (55.4%) with a CVC.

6 paediatric patients started HD in total at RHSC and all commenced HD with a CVC.

There are no missing data.

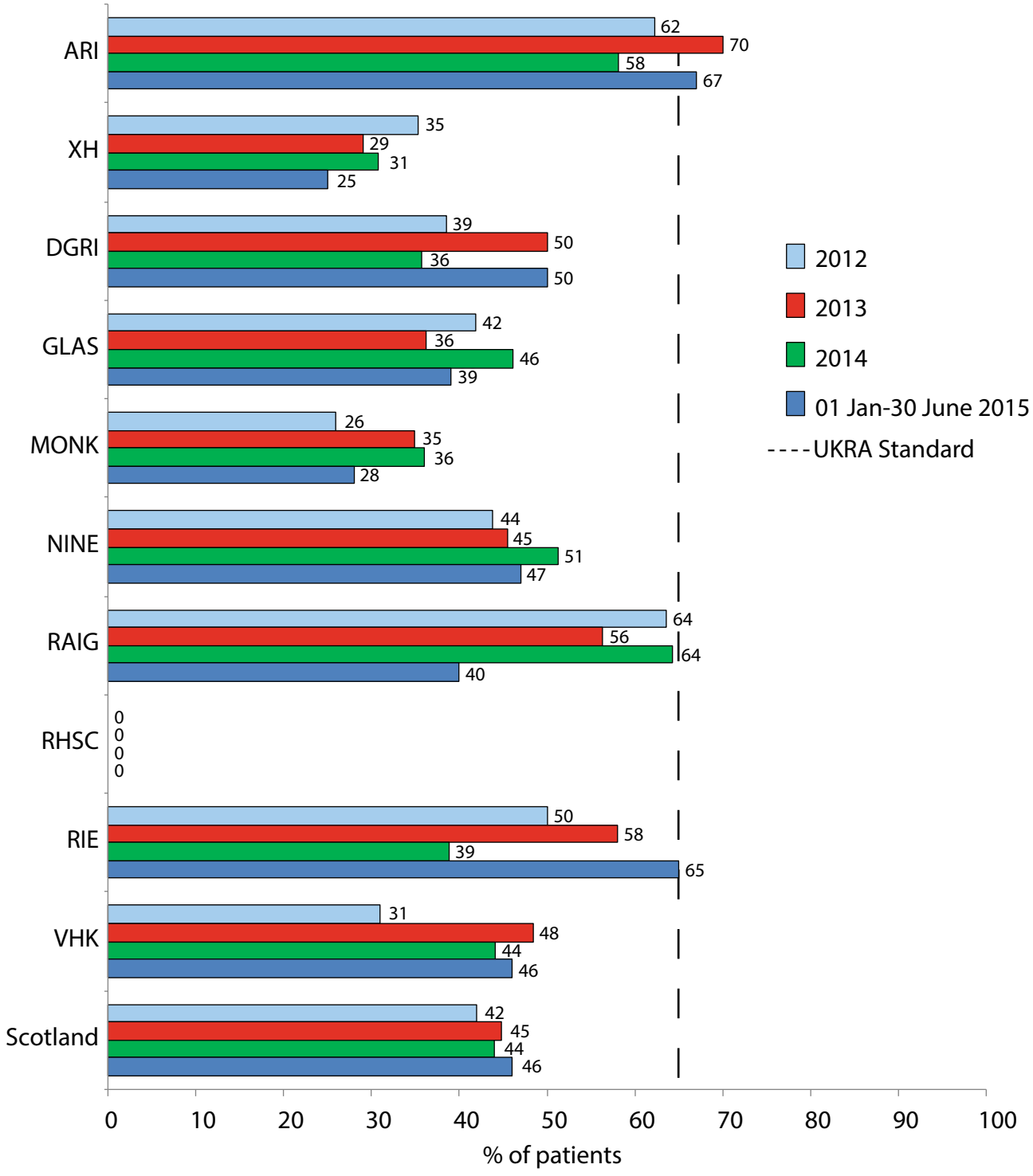
H1 Types of vascular access used for first haemodialysis 2012 to June 2015

Year	No. starting HD	No. with data	Arteriovenous					Central Venous Catheter			
						Total				Total	
			Fistula	Graft	Not known	n	%	TCVC**	NTCVC***	n	%
2012	423	423	178	3	0	**181**	**42.8**	161	81	**242**	**57.2**
2013	402	402	173	7	0	**180**	**44.8**	147	75	**222**	**55.2**
2014	437	437	184	9	0	**193**	**44.2**	159	86	**244**	**55.8**
2015*	211	211	90	4	0	**94**	**44.5**	68	49	**117**	**55.5**

* 01 January - 30 June 2015.
** TCVC: Tunnelled central venous cannula
*** NTCVC: Non tunnelled central venous cannula

Analysis of access of incident patients by age, sex and primary renal diagnosis showed no significant differences.

H2 Percentage of patients with AV access for first haemodialysis by renal unit 01 January 2012 - 30 June 2015



H3	Types of vascular access for haemodialysis patients each May 2009-2015											
Year	No. on HD	No. with data		Arteriovenous					Central Venous Catheter			
							Total				Total	
		n	%	Fistula	Graft	Not known	n	%	TCVC**	NTCVC***	n	%
2009	1848	1699	**91.9**	1206	58	16	**1280**	**75.3**	385	34	**419**	**24.7**
2010	1868	1748	**93.6**	1262	51	2	**1315**	**75.2**	400	33	**433**	**24.8**
2011	1877	1810	**96.4**	1275	54	40	**1369**	**75.6**	405	36	**441**	**24.4**
2012	1873	1769	**94.4**	1284	72	10	**1366**	**77.2**	379	24	**403**	**22.8**
2013	1885	1680	**89.1**	1217	69	0	**1286**	**76.5**	343	51	**394**	**23.5**
2014	1853	1803	**97.3**	1256	76	4	**1336**	**74.1**	437	30	**467**	**25.9**
2015*	1906	1831	**96.1**	1236	79	0	**1315**	**71.8**	482	34	**516**	**28.2**

* 01 January - 30 June 2015.
** TCVC: Tunnelled central venous cannula
*** NTCVC: Non tunnelled central venous cannula

1906 patients with established renal failure were being treated by haemodialysis in May 2015, details of vascular access were available for 1831 (96.1%).

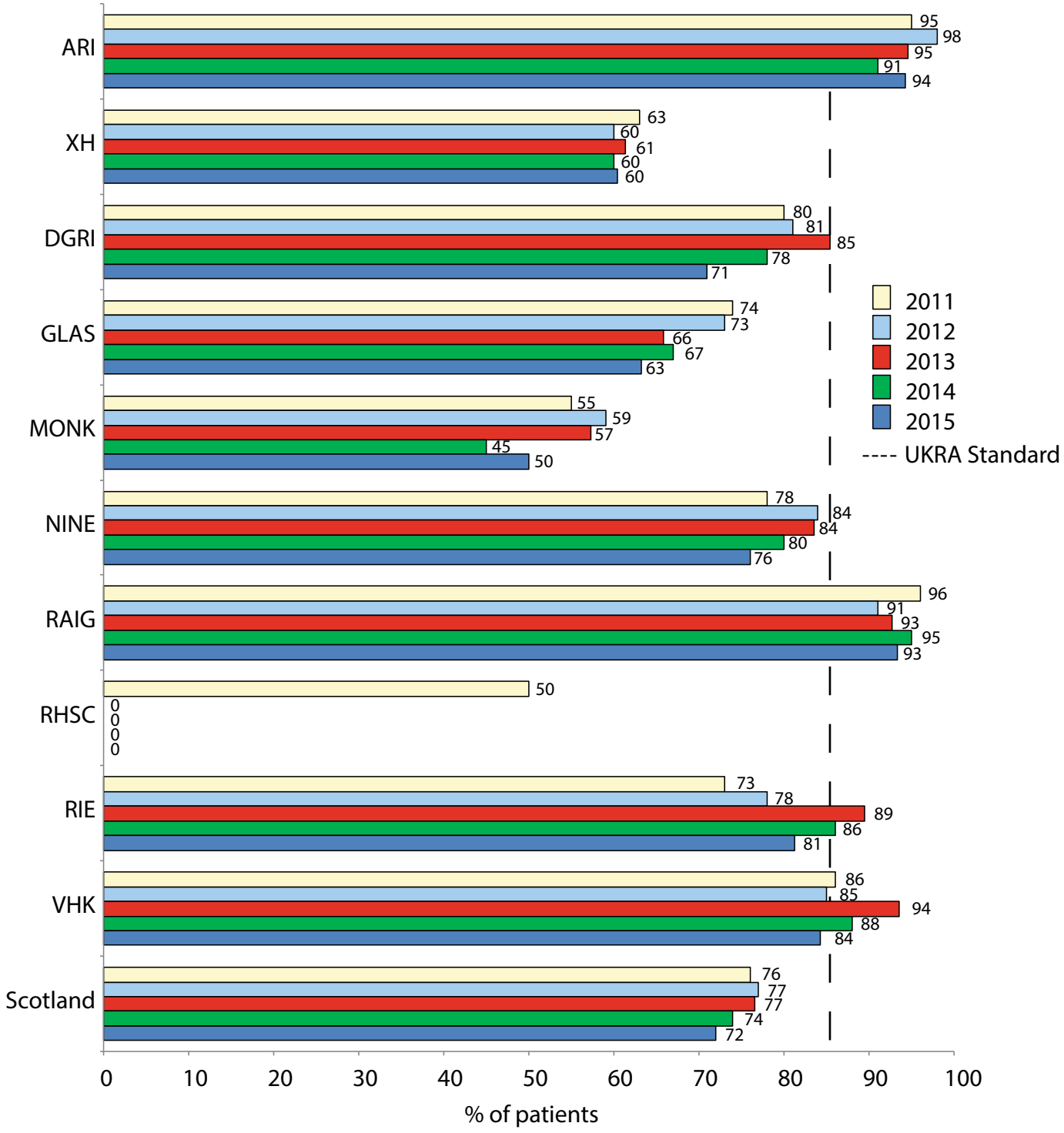
As in previous years, in 2015 males were significantly more likely than females to be using AV access (77% v 66%; p <0.001).

Age did not affect vascular access, there was no significant difference in prevalence of AV access between the age quartiles.

There were significant differences between diagnostic groups, patients with diabetic nephropathy being the least likely to have AV access ($p < 0.001$).

There were large, significant differences between renal units. Figure H4 shows the percentage of AV access in each unit for 2011-2015.

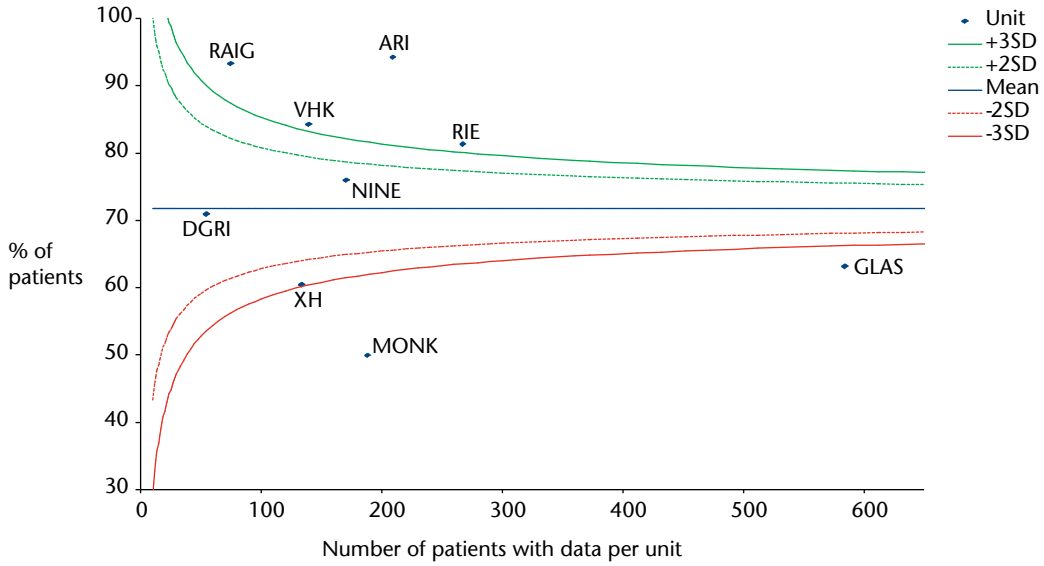
H4 Percentage of haemodialysis patients with AV access by renal unit: Census results 2011 - 2015



Rates of AV access (for patients with data submitted) in the adult units in May 2015 ranged from 50% to 94% (Chi square $p < 0.001$).

The Renal Association guideline suggests that 85% of all prevalent adult patients on haemodialysis should receive dialysis via a functioning arteriovenous fistula.

H5 Percentage of patients on hospital haemodialysis with AV access by renal unit May 2015



RHSC had no patients with AV access and is not shown on the funnel plot.

Of the 56 patients receiving home haemodialysis during the census, information on vascular access was available for 51 (91.1%). Of those with data, 46 patients were receiving dialysis via AV fistula or graft (90.2%) and 5 via a central venous cannula (9.8%).

Patients who had been on dialysis for less than a year were significantly less likely to be using AV access than those who had been on dialysis for longer (59% v 78%; p <0.001).

Patients who had been on dialysis for more than one but less than two years, were not significantly less likely to have AV access than those who had been on dialysis for more than two years.

SECTION I BACTERAEMIA IN RRT RECIPIENTS

Patients treated by renal replacement therapy (RRT) for established renal failure are at high risk of infection with associated increased morbidity and mortality. Infection was the second most frequent cause of death of RRT recipients in 2014.

All bacteraemia in Scotland, that is bacteria being detected within a patient's blood stream by means of a positive blood culture, are reported directly from microbiology laboratories to Health Protection Scotland (HPS) using the Electronic Communication of Surveillance in Scotland (ECOSS) system. Meticillin resistant *Staphylococcus aureus* (MRSA) bacteraemia incidence surveillance has been mandatory in Scotland since 2001 and surveillance was extended in 2006 to include meticillin sensitive *S. aureus* (MSSA). In addition, mandatory *Escherichia coli* bacteraemia surveillance will be introduced in Scotland in April 2016. Whilst surveillance of bacteraemia with other organisms is not mandatory, all positive blood cultures are reported to ECOSS enabling these data to be used robustly in epidemiological analyses.

In June 2015 database linkage was performed between the Scottish Renal Registry including all patients who have received RRT in Scotland and ECOSS bacteraemia data namely *S. aureus*, *Staphylococcus epidermidis*, *Streptococcus* sp., *E. coli*, *Klebsiella* sp. and *Pseudomonas* sp.. These organisms were chosen due to their clinical significance in RRT patients. For the purpose of the analyses, *E. coli*, *Klebsiella* sp. and *Pseudomonas* sp. were grouped as Gram negative organisms. Linkage was performed for the period 01 January 2010 to 31 December 2014. An episode of bacteraemia was defined as a bacteraemia in a patient without a previous episode of bacteraemia with the same organism in the preceding two weeks.

A similar linkage was previously undertaken in 2011 which solely looked at the number of *Staphylococcus aureus* bacteraemia (SAB) recorded in patients who received RRT between 2006 and 2009. This analysis has been added to the most recent time period to provide trend analysis over nine years and to calculate the difference in SAB rates in haemodialysis patients by adult renal unit.

I1 Bacteraemia reported in patients treated by RRT 2010-2014

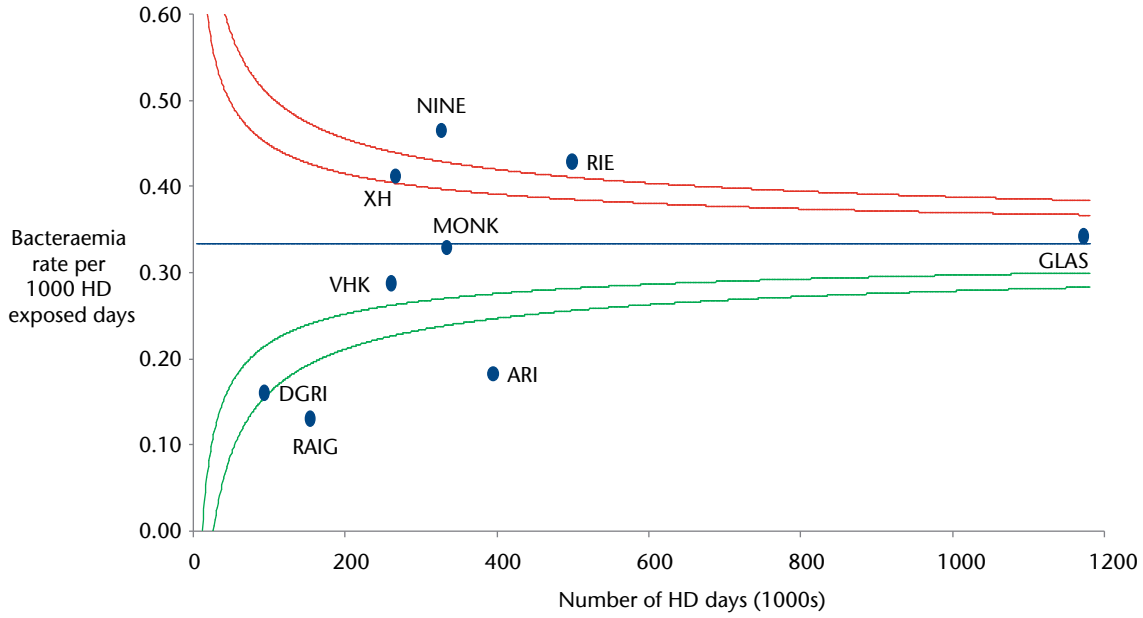
I1.1 Incidence of Bacteraemia in RRT population 2010-2014 by modality of RRT

Organism	HD		PD		Tx		All
	n	%	n	%	n	%	n
Gram negative*	277	**58.6**	21	**4.4**	175	**37.0**	473
Staphylococcus aureus	442	**94.0**	9	**1.9**	19	**4.0**	470
Staphylococcus epidermidis	314	**89.7**	11	**3.1**	25	**7.1**	350
Streptococcus sp.	145	**83.8**	9	**5.2**	19	**11.0**	173
Total	1178	**80.4**	50	**3.4**	238	**16.2**	1466

* Gram negative organism group comprises *Escherichia coli*, *Klebsiella* sp. and *Pseudomonas* sp.

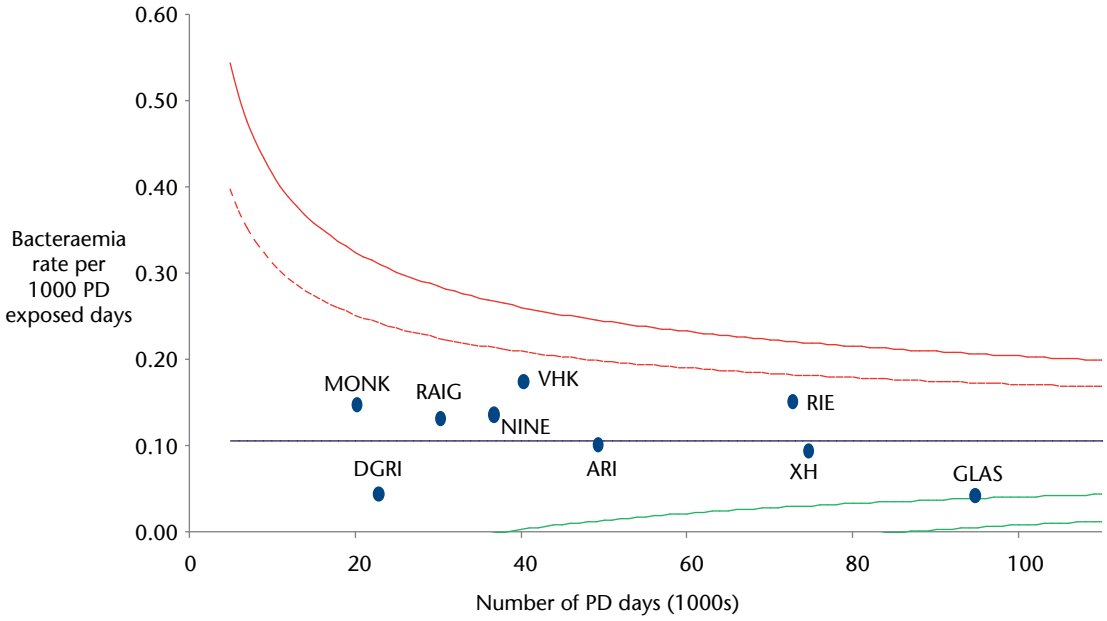
S. epidermidis, a member of the coagulase negative *Staphylococcus* group, are commonly found on the skin and may be identified in blood cultures incidentally due to a breakdown in technique during collection of blood cultures. *S. epidermidis* bacteraemia rates should be interpreted with some caution as clinical investigation, not undertaken whilst using a data linkage approach to measurement of bacteraemia outcome, is required to assess whether the bacteraemia are significant or due to contaminated blood cultures.

I1.2 Haemodialysis patient bacteraemia* rate per 1000 HD treatment days by adult renal unit 2010-2014



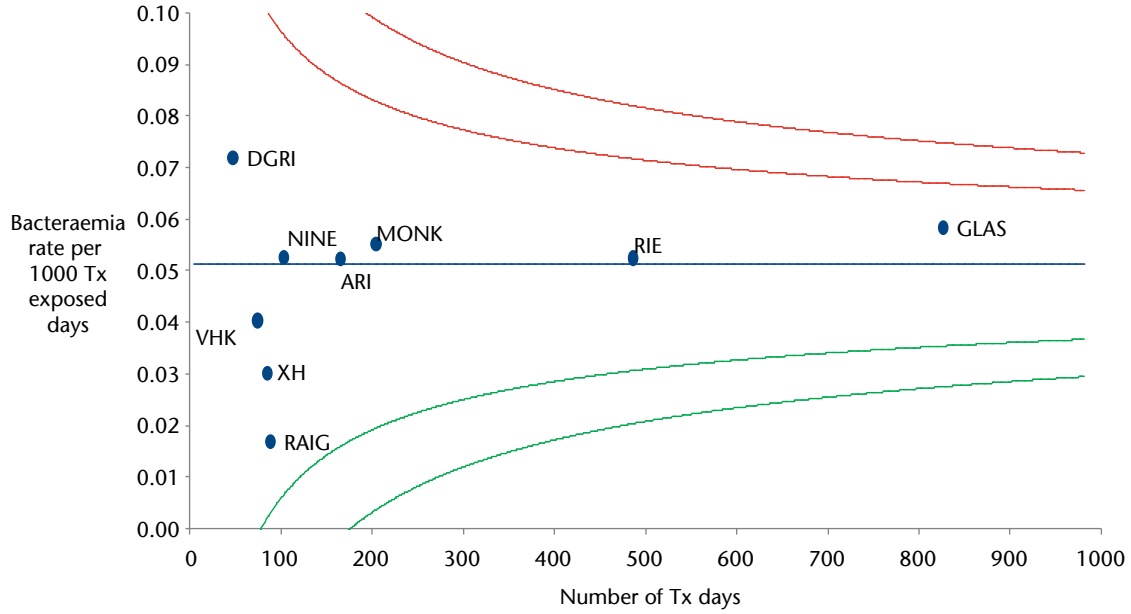
* Includes *S. aureus*, *S. epidermidis*, *Streptococcus* sp. and Gram negative group as previously defined.

I1.3 Peritoneal dialysis patient bacteraemia* rate per 1000 PD treatment days by adult renal unit 2010-2014



*Includes *S. aureus*, *S. epidermidis*, *Streptococcus* sp. and Gram negative group as previously defined.

I1.4 Transplanted patient bacteraemia* rate per 1000 Tx treatment days by adult renal unit 2010-2014



*Includes *S. aureus*, *S. epidermidis*, *Streptococcus* sp. and Gram negative group as previously defined.

Graphs I1.2, I1.3 and I1.4 show the bacteraemia rate occurring in patients treated by each mode of RRT. The number of treatment days for each modality is the total number of days provided at each adult unit for all patients in the time period 2010-2014.

I2 *Staphylococcus aureus* bacteraemia reported in patients treated by RRT 2006-2014

I2.1 Incidence of SAB in RRT population and percentage of SAB reported in NHS Scotland 2006-2014

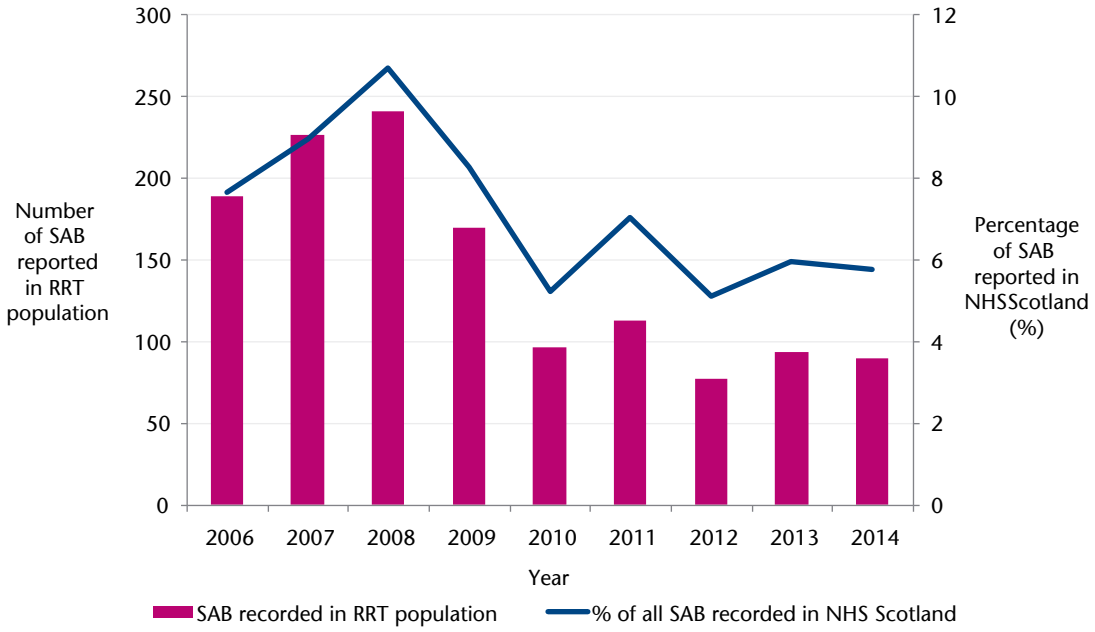
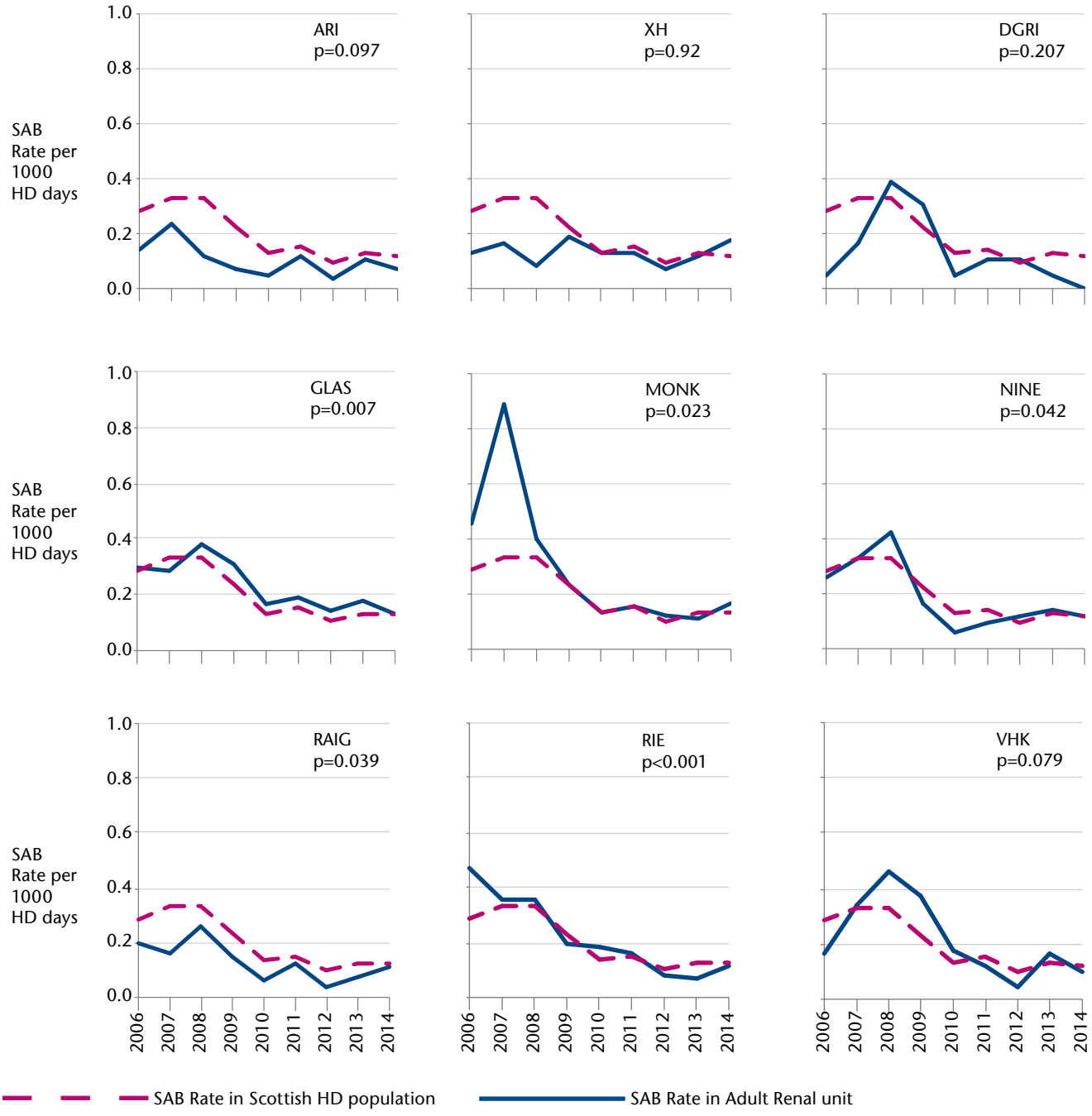


Figure I2.1 describes the number of SAB (MRSA and MSSA) reported in the RRT population and the percentage of all reported in NHS Scotland during 2006-2014 that occurred in the RRT population. The decline in the number of SAB in the RRT population is contributing to the overall decline in the number of SAB reported in NHS Scotland. There was a significant decrease in the percentage of all SAB in NHS Scotland that were reported in the RRT population (Pearson's correlation r=-0.7, p=0.03).

I2.2 Trend in SAB rate for haemodialysis patients by adult renal unit 2006-2014



Between 2006-2014 there has been a significant decrease (Pearson's correlation r=-0.873, p=0.002) in rate of SAB per 1000 HD days in the Scottish RRT haemodialysis population.

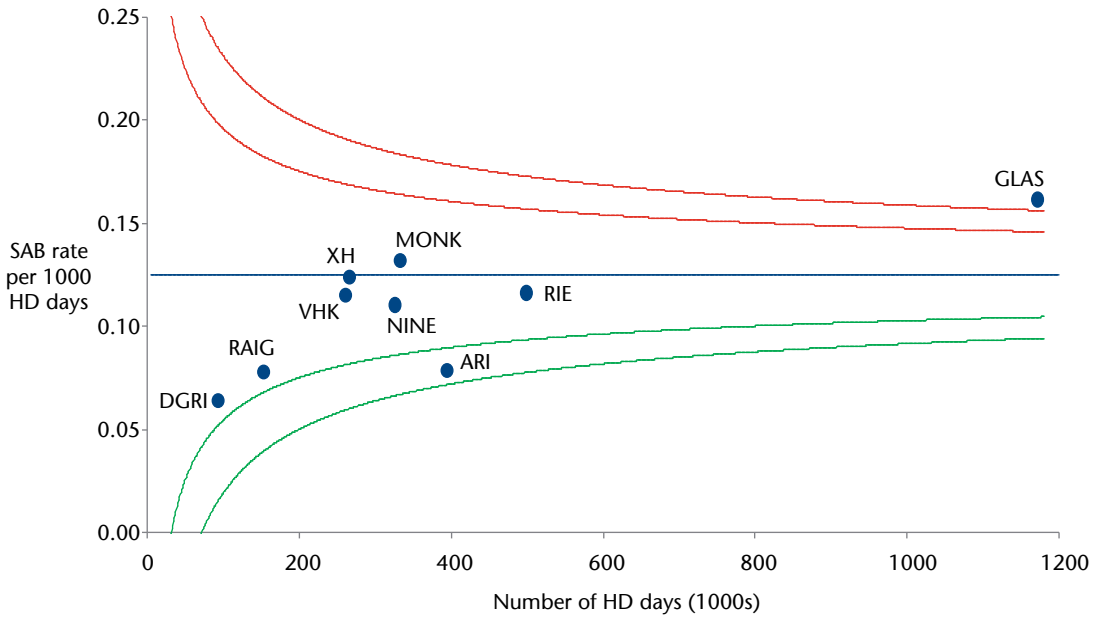
I2.2 show data according to the renal unit providing haemodialysis at the time of the reported *S. aureus* bacteraemia. 5 out of the 9 adult renal units (GLAS, MONK, NINE, RAIG, RIE) show a significant decrease in SAB rates over the study period.

Data within I2.2 does not include data from RHSC. There were 4 instances of SAB reported between 2006-2014.

I2.3 SAB rate for haemodialysis patients by adult renal unit 2006-2009 and 2010-2014

Year	Rate per 1000 HD Days		
	2006-2009	2010-2014	Difference
ARI	0.14	0.08	-0.06
XH	0.14	0.12	-0.02
DGRI	0.23	0.06	-0.16
GLAS	0.32	0.16	-0.16
MONK	0.49	0.13	-0.36
NINE	0.30	0.11	-0.19
RAIG	0.19	0.08	-0.11
RIE	0.34	0.12	-0.22
VHK	0.34	0.11	-0.22
SCOTLAND	0.29	0.13	-0.17

I2.4 SAB rate for haemodialysis patients by adult renal unit 2010-2014



I2.5 Type of vascular access for haemodialysis at the time of SAB 2006-2009 and 2010-2014

Unit	Arteriovenous						Central venous catheter						Unknown						All		
	2006-2009		2010-2014		Total		2006-2009		2010-2014		Total		2006-2009		2010-2014		Total		2006-2009	2010-2014	Total
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	n	n
ARI	25	**61.0**	18	**58.1**	43	**59.7**	16	**39.0**	13	**41.9**	29	**40.3**	0	**0.0**	0	**0.0**	0	**0.0**	**41**	**31**	**72**
XH	15	**53.6**	16	**48.5**	31	**50.8**	13	**46.4**	16	**48.5**	29	**47.5**	0	**0.0**	1	**3.0**	1	**1.6**	**28**	**33**	**61**
DGRI	6	**35.3**	0	**0.0**	6	**26.1**	11	**64.7**	6	**100.0**	17	**73.9**	0	**0.0**	0	**0.0**	0	**0.0**	**17**	**6**	**23**
GLAS	80	**27.5**	48	**25.4**	128	**26.7**	211	**72.5**	141	**74.6**	352	**73.3**	0	**0.0**	0	**0.0**	0	**0.0**	**291**	**189**	**480**
MONK	29	**26.4**	19	**43.2**	48	**31.2**	59	**53.6**	18	**40.9**	77	**50.0**	22	**20.0**	7	**15.9**	29	**18.8**	**110**	**44**	**154**
NINE	18	**25.7**	23	**63.9**	41	**38.7**	52	**74.3**	13	**36.1**	65	**61.3**	0	**0.0**	0	**0.0**	0	**0.0**	**70**	**36**	**106**
RAIG	19	**76.0**	8	**66.7**	27	**73.0**	6	**24.0**	4	**33.3**	10	**27.0**	0	**0.0**	0	**0.0**	0	**0.0**	**25**	**12**	**37**
RIE	40	**30.5**	12	**20.7**	52	**27.5**	91	**69.5**	46	**79.3**	137	**72.5**	0	**0.0**	0	**0.0**	0	**0.0**	**131**	**58**	**189**
VHK	28	**51.9**	18	**60.0**	46	**54.8**	0	**44.4**	12	**40.0**	36	**42.9**	2	**3.7**	0	**0.0**	2	**2.4**	**54**	**30**	**84**
SCOT-LAND	260	**33.9**	162	**36.9**	422	**35.0**	483	**63.0**	269	**61.3**	752	**62.4**	24	**3.1**	8	**1.8**	32	**2.7**	**767**	**439**	**1206**

These data were collected by members of staff in each renal unit from case notes, dialysis records and electronic patient records. The access shown is that in use for haemodialysis at the time of the SAB.

SAB rates have not been calculated for the type of vascular access as the denominator (time on access) is not currently available.

SECTION J ADEQUACY OF HAEMODIALYSIS

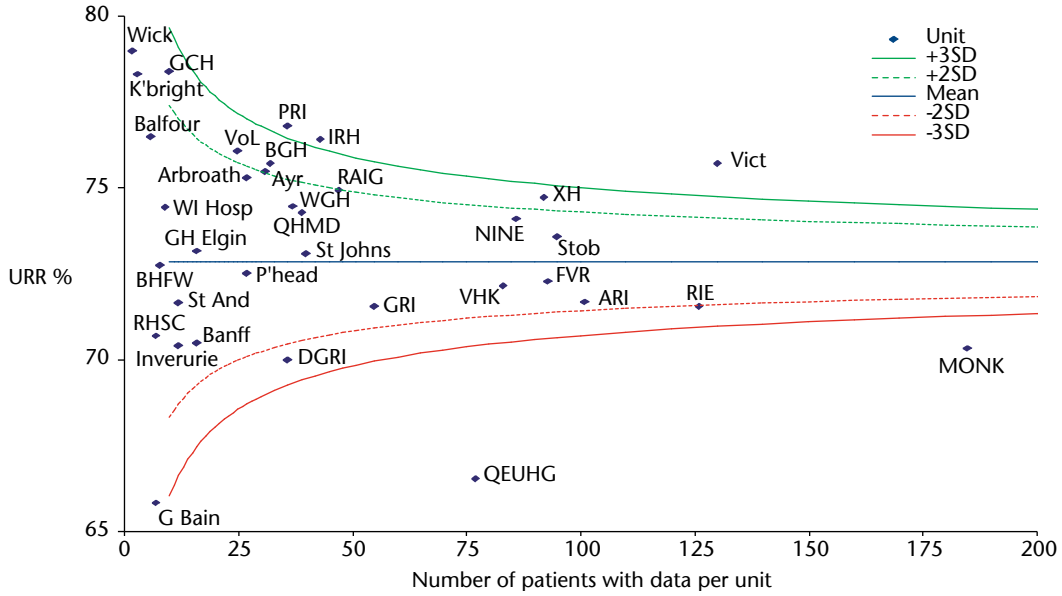
The quality of haemodialysis treatment for ERF can be assessed by measuring the urea reduction ratio (URR). The UKRA guideline for adult patients on three times per week HD is to achieve a URR consistently >65%.

The URR audit was performed in May 2015; all patients in Scotland receiving hospital or home haemodialysis on 01 May 2015 were included in the audit. There were 1762 results from 1906 patients (92.4%).

Although most patients continue to receive haemodialysis three times per week, it is clear that a large proportion of home and a small proportion of hospital haemodialysis patients are receiving more frequent sessions.

Of the 1783 patients with information on dialysis frequency 1715 continue to have three times per week and 56 patients received a greater frequency (30 hospital HD (1.6%) and 26 home HD (44.4%)). 12 patients were receiving twice weekly dialysis. For those patients receiving greater than three times per week URR may not reflect adequately the quality of dialysis and for these patients standardised Kt/V is preferable. We therefore have limited URR comparison to those receiving three times weekly HD in Figures J1 and J2 and used data from the census to calculate standardised Kt/V for all those with sufficient data.

J1 Mean achieved URR in Hospital HD patients on thrice weekly treatment in May 2015 by dialysis unit



1668 patients (87.5%) had adequate data to calculate standardised Kt/V (URR, dialysis frequency, dialysis treatment time and access used). More information about this method of calculating Kt/V is available on the SRR website.

http://www.srr.scot.nhs.uk/Projects/Projects1.html#adequ

J2 Number of haemodialysis patients, median URR, median stdKt/V and achievement of audit standard by renal unit May 2015											
	ARI	XH	DGRI	GLAS	MONK	NINE	RAIG	RHSC*	RIE	VHK	Scotland
Number of patients on HD	220	144	55	609	191	181	78	9	269	150	**1906**
Number of patients with missing data	16	17	5	58	6	20	4	1	12	4	**144**
% patients with URR >65%**	**86**	**90**	**78**	**84**	**82**	**91**	**94**	**71**	**90**	**90**	**87**
Upper quartile**	76	81	79	78	75	80	78	77	76	76	**78**
Median URR**	73	75	74	74	71	75	76	73	74	74	**74**
Lower quartile**	69	71	67	69	67	70	73	66	70	70	**69**
% patients with data for stdKt/V***	**90**	**85**	**82**	**83**	**94**	**85**	**92**	**89**	**91**	**92**	**88**
Median stdKt/V***	2.13	2.24	2.18	2.17	2.08	2.20	2.22	2.18	2.15	2.12	**2.15**

* Data for RHSC. The standards set for adult patients are not applicable to children; data are given for reference purposes only.

** Analysis limited to those with sufficient data and confirmed as receiving thrice-weekly haemodialysis (n = 1662).

*** Standardised Kt/V calculation only possible for patients with URR, dialysis frequency, dialysis treatment time and access used (n = 1668).

SECTION K ANAEMIA

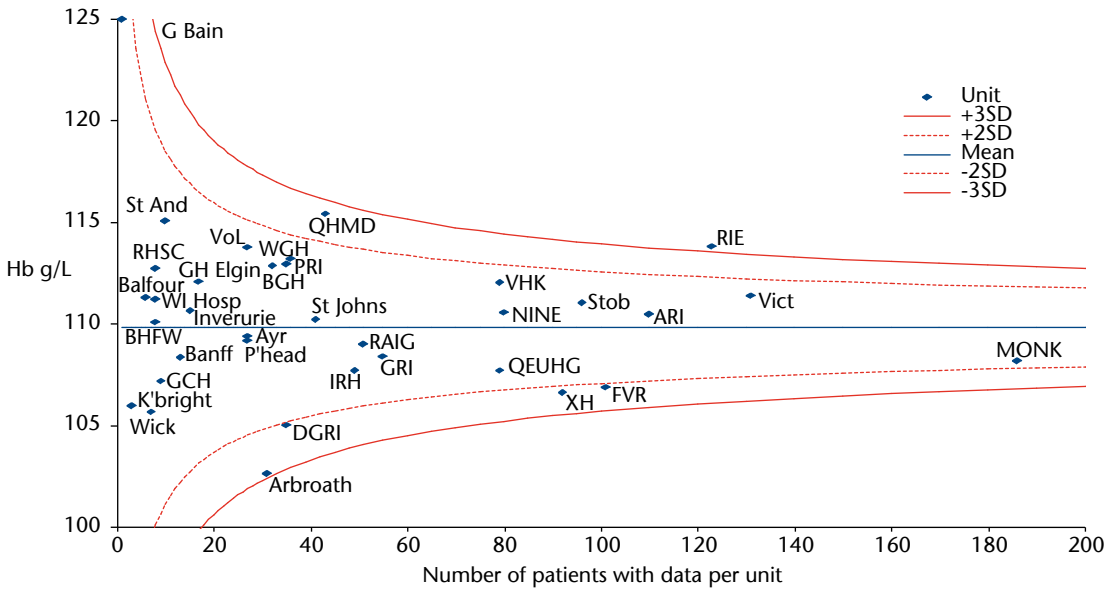
The anaemia audit was performed in May 2015; all patients in Scotland receiving hospital or home haemodialysis on 01 May 2015 were included in the audit. Results were excluded for patients who had received a recent blood transfusion. There were 1822 results from 1906 patients (95.6%).

Haemoglobin concentration (Hb) was measured in a pre-dialysis blood sample after the first short interdialytic gap of the audit week, or as soon as possible thereafter. Auditing after the short (2 day) gap is done in order to minimise the potential effect of dilution due to fluid overload.

The UK Renal Association guideline from November 2010 recommends a target Hb of 100-120g/L for patients with chronic kidney disease, but only for those patients receiving ESA therapy.

We have reported the mean achieved haemoglobin value by satellite unit where data available and also the percentage of patients, by parent unit, achieving the UKRA standard.

K1 Mean Hb of Hospital HD patients in each dialysis unit May 2015



Patients with Hb >120 g/L and confirmed as not receiving ESA therapy (92 patients) are excluded from the funnel plot. All units, except RIE, lie within 3 standard deviations of the mean (109.9g/L) for the whole HD population.

K2 Number of HD patients, median Hb and achievement of audit standards by renal unit May 2015											
	ARI	XH	DGRI	GLAS	MONK	NINE	RAIG	RHSC*	RIE	VHK	Scot-land
Number of patients	220	144	55	608	191	181	78	9	269	150	1906
Missing data or transfused	11	12	6	21	3	11	1	1	12	7	84
% patients with Hb data	**95**	**92**	**89**	**97**	**98**	**94**	**99**	**89**	**96**	**95**	**96**
Median Hb all patients**	112	108	108	111	110	111	110	112	116	117	112
% patients with Hb 100-120 g/L***	**61.7**	**63.2**	**69.2**	**55.0**	**52.0**	**64.2**	**69.2**	**50.0**	**47.2**	**51.7**	**56.5**
% patients with Hb >120 g/L***	18.6	14.9	10.3	22.2	20.8	19.0	12.3	37.5	34.0	31.9	22.5
Upper quartile***	118	117	114	119	119	118	117	125	122	123	119
Median Hb g/L***	111	109	109	110	110	111	109	112	116	116	111
Lower quartile***	103	101	101	100	99	103	102	107	106	104	101
Range g/L***	78 - 142	77 - 133	80 - 130	62 - 162	67 - 144	75 - 135	68 - 139	86 - 130	68 - 155	78 - 142	62 - 162

* The standards set for adults are not applicable to children.
** All patients with results except those with recent blood transfusion (n=1822).
*** UKRA standard. Hb 100-120 g/L on ESA therapy. Patients were excluded if there were no data, they had recently received a blood transfusion or were not receiving ESA therapy on the census date (n=1553).

Of the 1822 patients with Hb values, 1449 (79.5%) had Hb ≥100 g/L.

228 patients were not on ESA therapy and had not recently received a blood transfusion. Of the 219 with data 29 (13.2%) had Hb <100 g/L, 98 (44.8%) had Hb 100-120 g/L and 92 (42.0%) had Hb >120 g/L.

Data on ESA treatment (including patients confirmed as not receiving ESA) were available for 1848 (96.9%) patients. Using this information we were able to calculate the proportion of patients achieving the UKRA standard (Hb 100-120 g/L) receiving ESA therapy on the census date. Of the 1553 patients confirmed as receiving ESA treatment and who had with data and had not recently been transfused, 877 (56.5%) achieved the UKRA standard. Hb was <100 g/L in 327 (21.0%) of patients, Hb was >120 g/L in 349 (22.5%) and 179 (11.5%) had Hb >125 g/L.

SECTION L BONE MINERAL METABOLISM

The laboratory data relating to bone mineral metabolism were audited in May 2015 for all prevalent patients receiving hospital or home haemodialysis. Pre-dialysis blood samples were collected after a short interdialytic gap. Any samples marked 'post-haemodialysis' were excluded.

As recommended by the Working Group of Senior Scottish Clinical Biochemists on bone biochemistry targets in the management of renal failure, the PTH data in this report are presented according to the recommended assay specific targets appropriate to each renal unit.

The working group's recommendations which have been adopted across Scotland are available on the SRR website:

http://www.srr.scot.nhs.uk/Projects/Projects1.html#calc

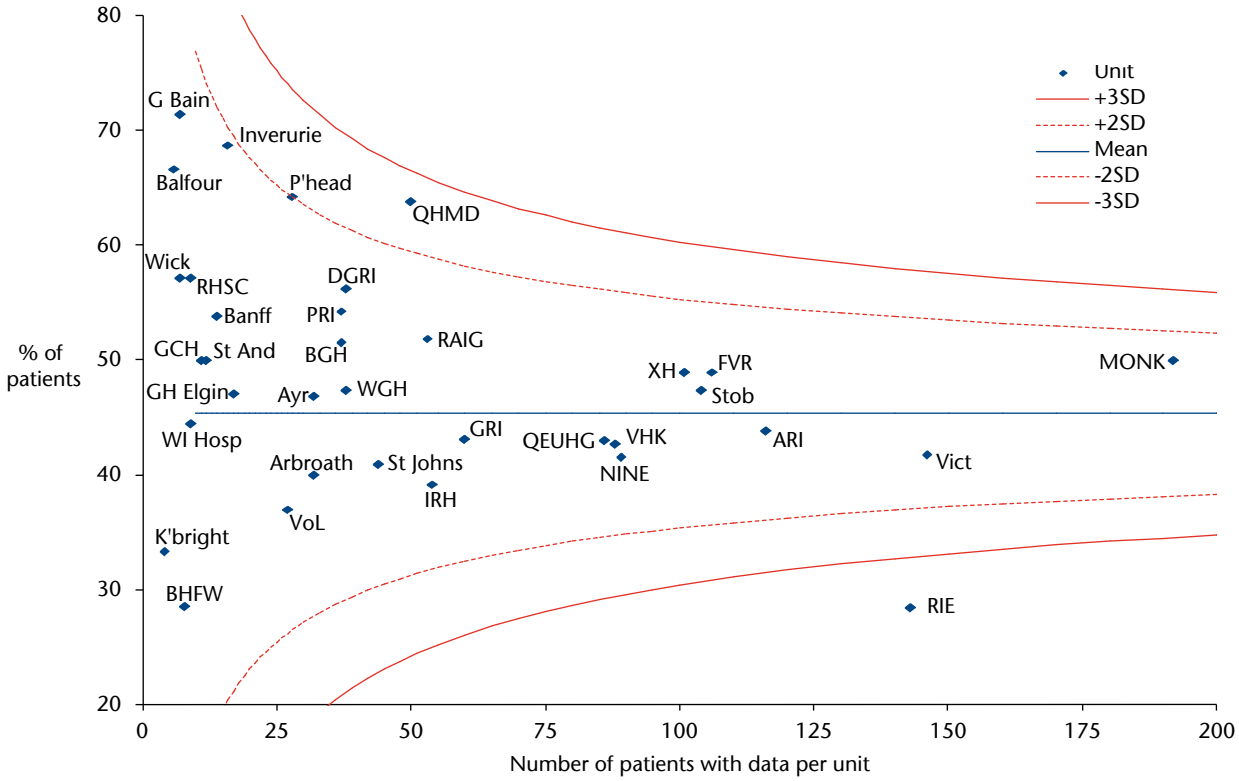
L1 Achievement of guideline targets for phosphate, corrected calcium and PTH in haemodialysis patients by renal unit May 2015

Renal Unit	Number of patients	% with PO4 result	Mean PO4 mmol/L	% with result 1.1-1.7 mmol/L	% with cCa result	% with cCa in normal range	% with PTH result	% PTH result 2-9x UL* normal
ARI	220	**98.6**	1.56	**49.3**	**99.5**	**79.5**	**98.2**	**40.7**
XH	144	**95.8**	1.36	**47.8**	**96.5**	**76.3**	**90.3**	**58.5**
DGRI	55	**81.8**	1.56	**53.3**	**83.6**	**87.0**	**90.9**	**68.0**
GLAS	609	**87.7**	1.67	**44.0**	**92.9**	**89.2**	**89.5**	**44.4**
MONK	191	**97.9**	1.48	**49.7**	**98.4**	**72.9**	**98.4**	**58.0**
NINE	181	**95.6**	1.68	**42.2**	**95.6**	**78.6**	**83.4**	**53.0**
RAIG	78	**97.4**	1.69	**48.7**	**100.0**	**89.7**	**88.5**	**47.8**
RHSC	9	**77.8**	1.65	**57.1**	**77.8**	**71.4**	**88.9**	**25.0**
RIE	269	**92.9**	1.72	**36.8**	**97.4**	**82.8**	**92.2**	**56.9**
VHK	150	**94.7**	1.62	**50.7**	**96.0**	**85.4**	**94.0**	**64.5**
Scotland	**1906**	**92.8**	**1.61**	**45.4**	**95.6**	**83.0**	**91.6**	**51.3**

* UL - upper limit of normal

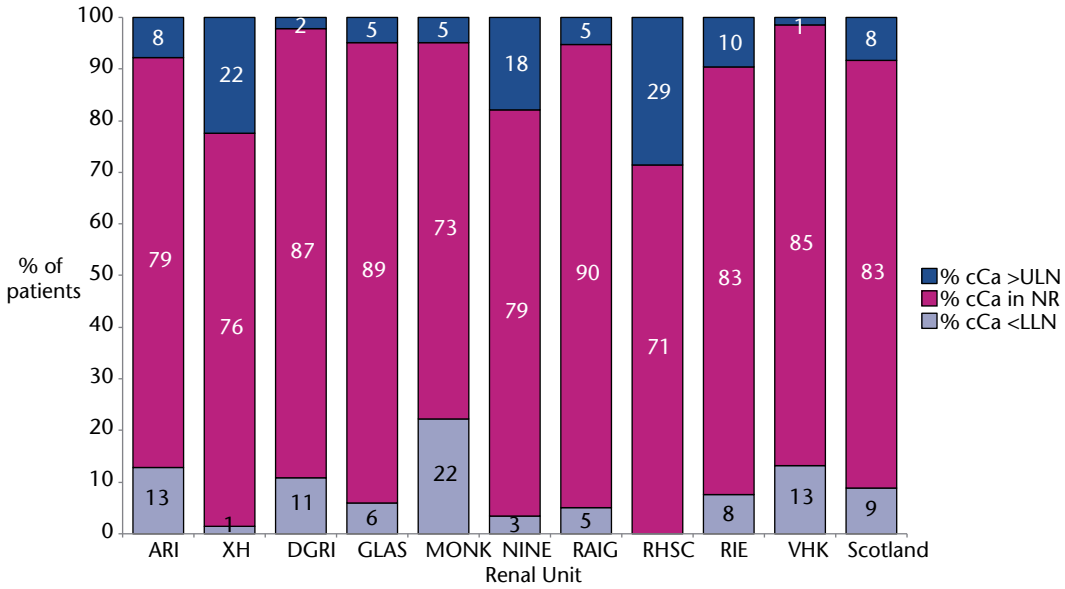
Analytical methods for phosphate are standard across Scotland and results are comparable both between units, and against the UKRA recommended guideline (Pre-dialysis PO4 between 1.1 and 1.7 mmol/L).

L2 Percentage of hospital HD patients achieving pre-dialysis PO4 target of 1.1-1.7 mmol/L by dialysis unit May 2015



1769 (92.8%) patients had phosphate results, 259 (14.6%) had a phosphate <1.1 mmol/L, 803 (45.4%) achieved the UKRA standard and 707 (40.0%) had phosphate >1.7 mmol/L.

L3 Distribution of pre-dialysis corrected serum calcium in haemodialysis patients by renal unit May 2015



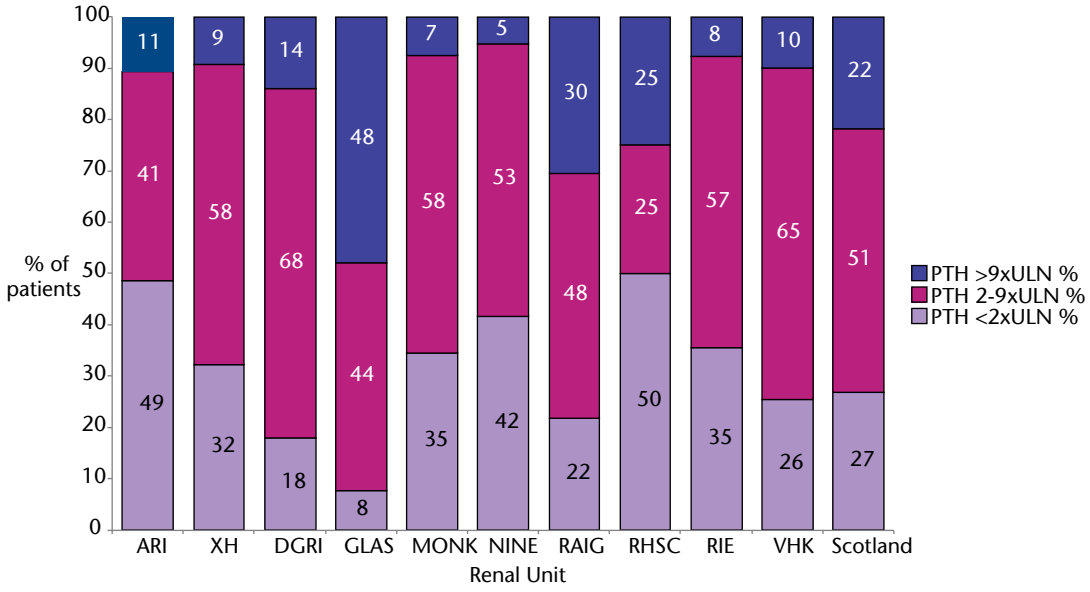
The graph shows the percentage of patients within each unit, who were hypocalcaemic (cCa< lower limit of normal range (LLN)), normocalcaemic (cCa in normal range (NR)) and hypercalcaemic (cCa>upper limit of normal range (ULN)) according to the local assay ranges for the biochemistry laboratory serving each dialysis unit.

The UKRA guideline suggests that corrected calcium should be maintained within the local normal range, the normal range differs between renal units, therefore actual calcium values are not shown.

The local ranges for corrected calcium for the biochemistry laboratories that serve each dialysis unit are available on the SRR website:

http://www.srr.scot.nhs.uk/Projects/Projects1.html#calc

L4 Distribution of pre-dialysis serum PTH in haemodialysis patients by renal unit May 2015



The UKRA guideline suggests that PTH levels should be maintained between 2 and 9 times the upper limit of normal (ULN) for the assay used. The assay used differs between renal units, therefore actual PTH values are not shown.

Assay specific PTH ranges are available on the SRR website:

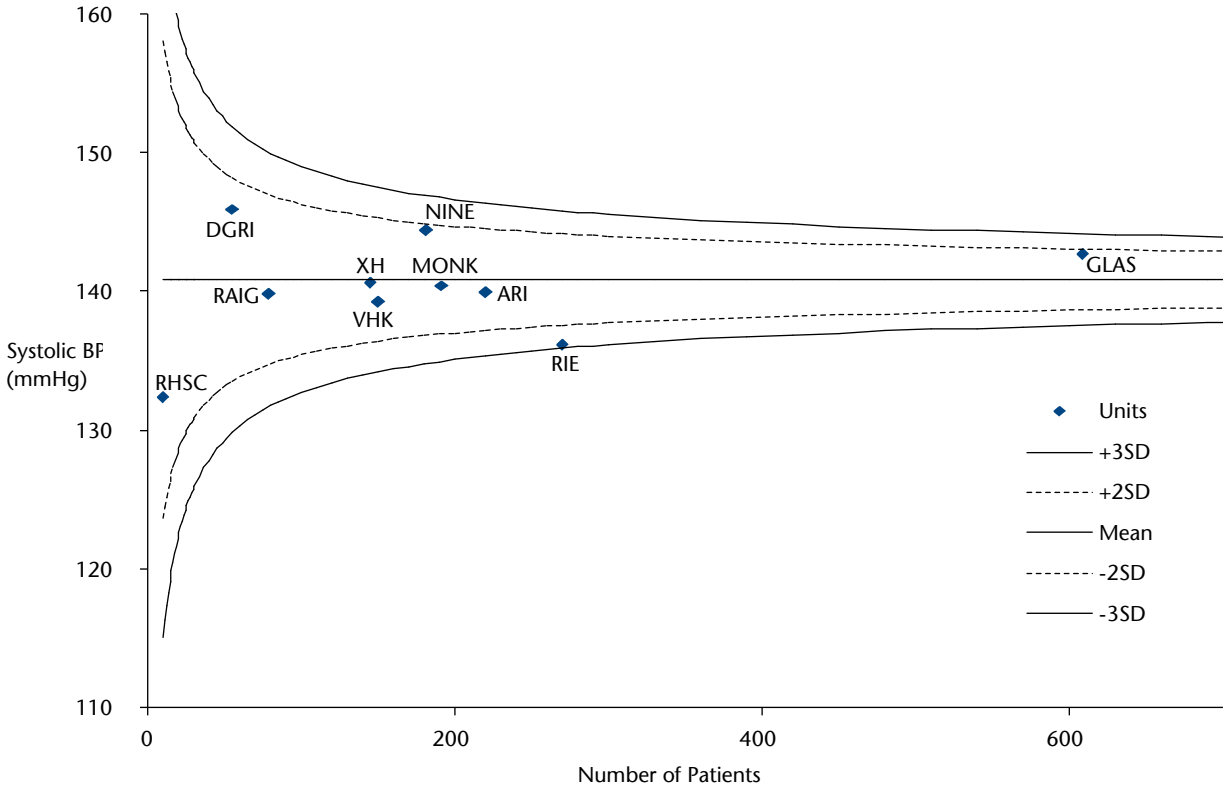
http://www.srr.scot.nhs.uk/Projects/Projects1.html#calc

SECTION M BLOOD PRESSURE

Pre-dialysis systolic and diastolic blood pressures (BP) in patients receiving haemodialysis at home or in hospital were collected on the census day in May 2015. Blood pressure measures were available for 1790 (94.0%) of the 1906 patients.

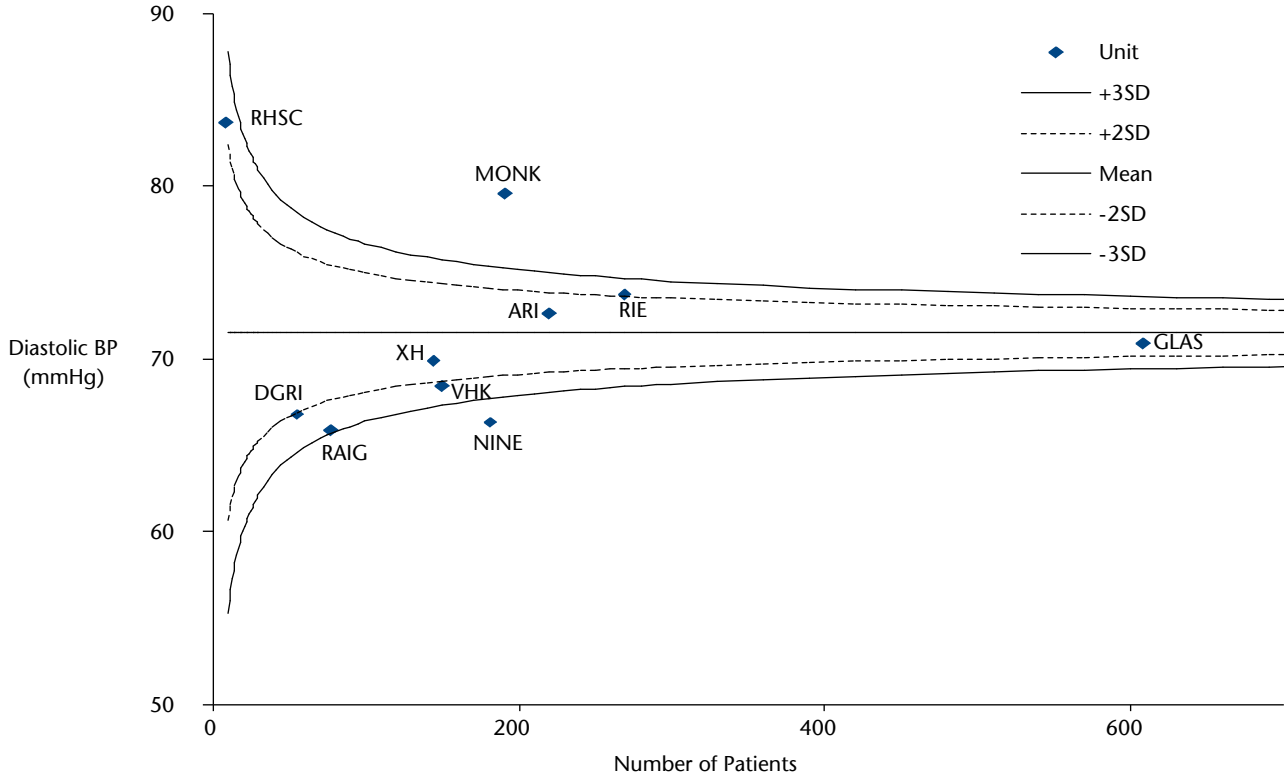
Information on co-morbidity and the use of drugs which affect blood pressure are not available. Mean achieved pre-dialysis blood pressure in the whole population was 141mmHg (SD 27.2) systolic and 72mmHg (SD 17.2) diastolic. This has not changed significantly during the last 10 annual census periods.

M1 Pre HD systolic blood pressure by renal unit May 2015



Mean pre-dialysis systolic BP in all renal units was within three standard deviations of the population mean.

M2 Pre HD diastolic blood pressure by renal unit May 2015



Mean pre-dialysis diastolic BP in patients from MONK was three standard deviations greater than the population mean, while in patients from NINE it was more than three standard deviations below the population mean.

SECTION N SCOTTISH RENAL BIOPSY REGISTRY: SURVEY OF NATIVE KIDNEY BIOPSY IN SCOTLAND 2014

All centres in Scotland were able to provide date of procedure, date of birth, sex, and main diagnosis for all native kidney biopsies performed in the calendar year 2014. Diagnosis was selected from the 2012 ERA-EDTA primary renal diagnosis codes:

http://www.era-edta-reg.org/prd.jsp

Where possible, centres also provided indication for biopsy, operator and major complications all selected from pre-defined terms.

The total number of reported biopsies was 682 in 664 patients giving an incidence of 127.5 per million population (pmp) per year which is almost exactly the same incidence of 127.4 pmp reported in the Scottish Renal Registry in 2008 for the period 2002-2006.

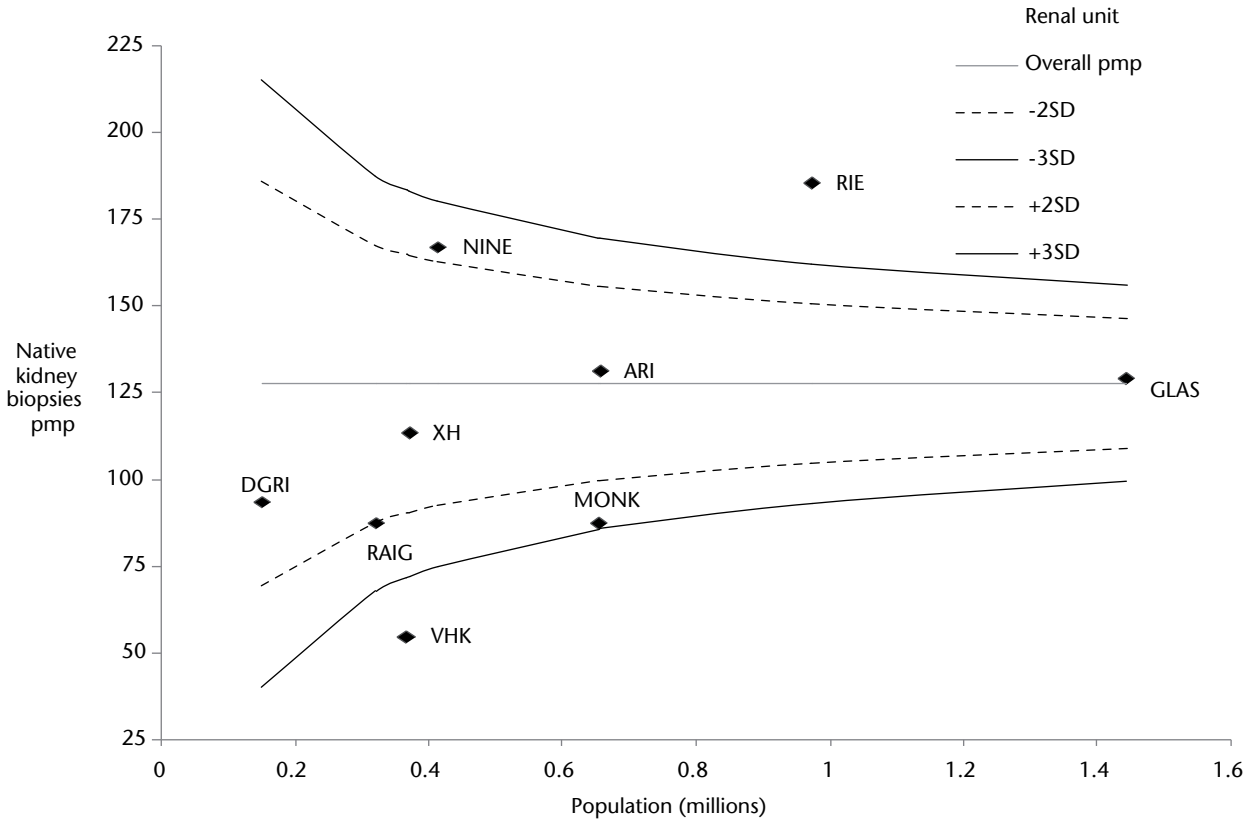
http://www.srr.scot.nhs.uk/Projects/Projects3.html#biopsy

N1 Number of native kidney biopsies 2014 by renal unit and NHS Board

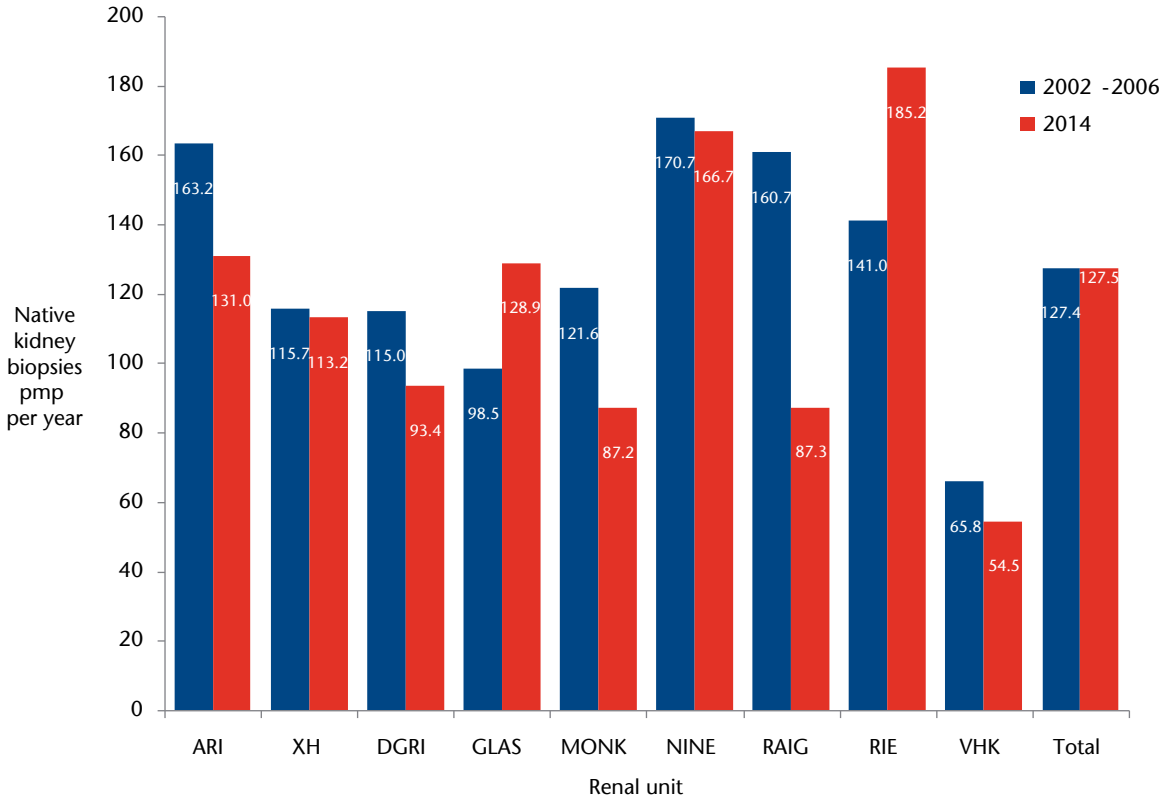
Unit	NHS Board	Population 2014*	Total native biopsies	Second or sub-sequent biopsies	Number patients biopsied	Biopsies pmp/year	Patients biopsied pmp/year	Mean age at biopsy	% Male
ARI	GRAM +SHET +ORKN	656310	86	5	81	131	123.4	56.3	**55.3**
XH	A&A	371110	42	0	42	113.2	113.2	56.9	**64.3**
DGRI	D&G	149940	14	0	14	93.4	93.4	59.6	**72.7**
GLAS	GG&C +FV	1442990	186	3	183	128.9	126.8	59.5	**50.0**
MONK	LAN	653310	57	1	56	87.2	85.7	55.7	**57.9**
NINE	TAY	413800	69	0	69	166.7	166.7	61.4	**43.5**
RAIG	HIGH +WI	320760	28	0	28	87.3	87.3	60.3	**57.1**
RIE	LOTH +BORD	972120	180	9	171	185.2	175.9	54.4	**56.1**
VHK	FIFE	367260	20	0	20	54.5	54.5	53.7	**85.0**
Total		**5347600**	**682**	**18**	**664**	**127.5**	**124.2**	**57.3**	**54.8**

* National Records of Scotland Mid-year estimates

N2 Incidence per million population of native kidney biopsies in 2014 by renal unit

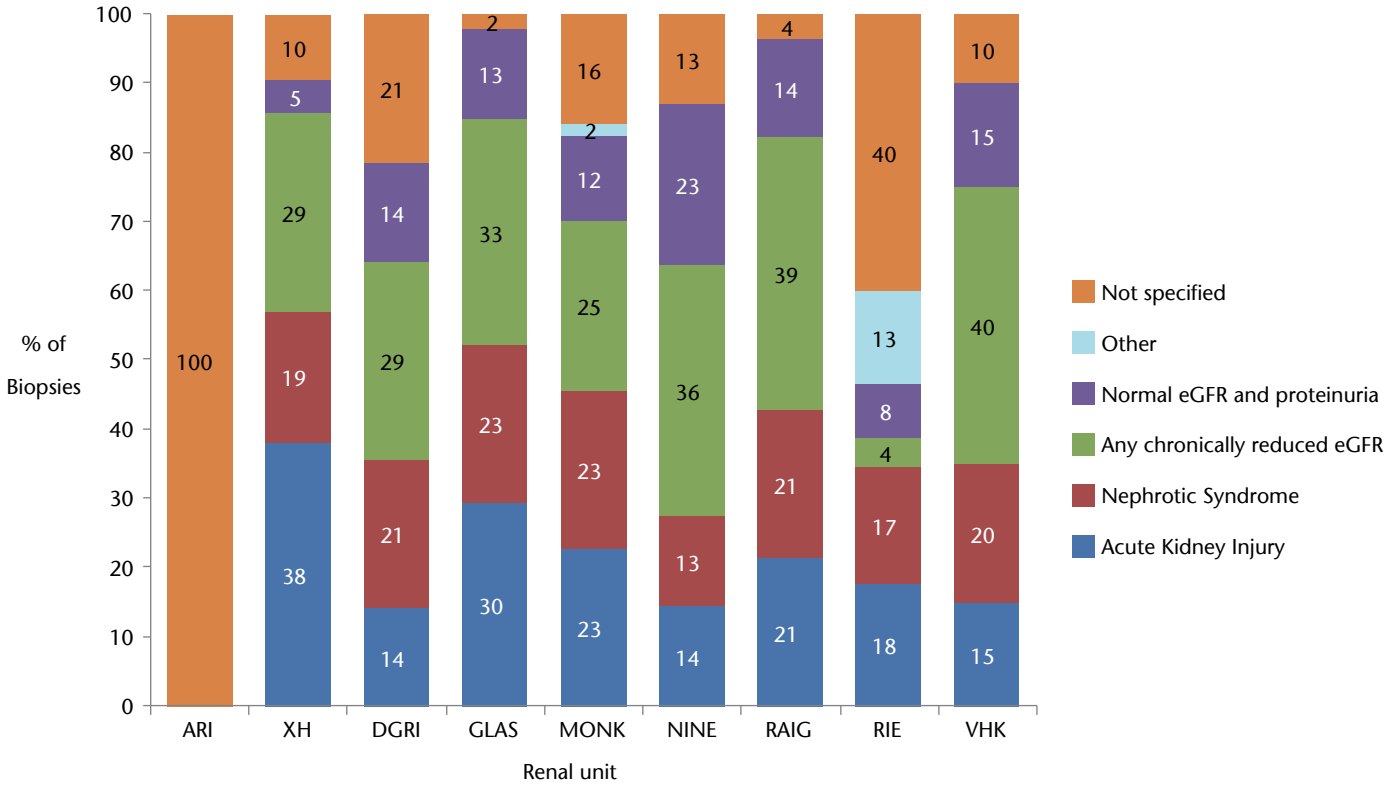


N3 Incidence of native kidney biopsy 2002-2006 and 2014



The incidence for each renal unit was compared with the previously published Scottish Renal Registry data for 2002-2006. Of note the data for GLAS are expressed as a combination of the two previous units in Glasgow.

N4 Pre-defined indications for native kidney biopsy



Indications for native kidney biopsy are shown in N4. Not all centres were able to provide data on indication.

Diagnosis

Nephrologists were asked to select the diagnosis that was the main explanation for the clinicopathological features from the ERA-EDTA primary renal diagnosis code set.

17 biopsies had no diagnosis recorded.

In 22 cases the diagnosis was recorded as insufficient tissue for diagnosis (most of which had a further biopsy procedure).

A further 23 biopsies had sufficient tissue but did not reach a diagnosis.

In a further 9 cases the nephrologists felt that none of the ERA-EDTA terms were sufficient (recorded as 'other').

Of the remainder a total of 46 different ERA-EDTA Primary Renal Diagnosis terms were recorded. The 20 most frequently reported diagnoses are shown in table N5 in order of frequency.

A complete list of all recorded diagnoses and frequencies in each renal unit can be viewed on the Scottish Renal Registry website.

http://www.srr.scot.nhs.uk/Projects/Projects3.html#biopsy

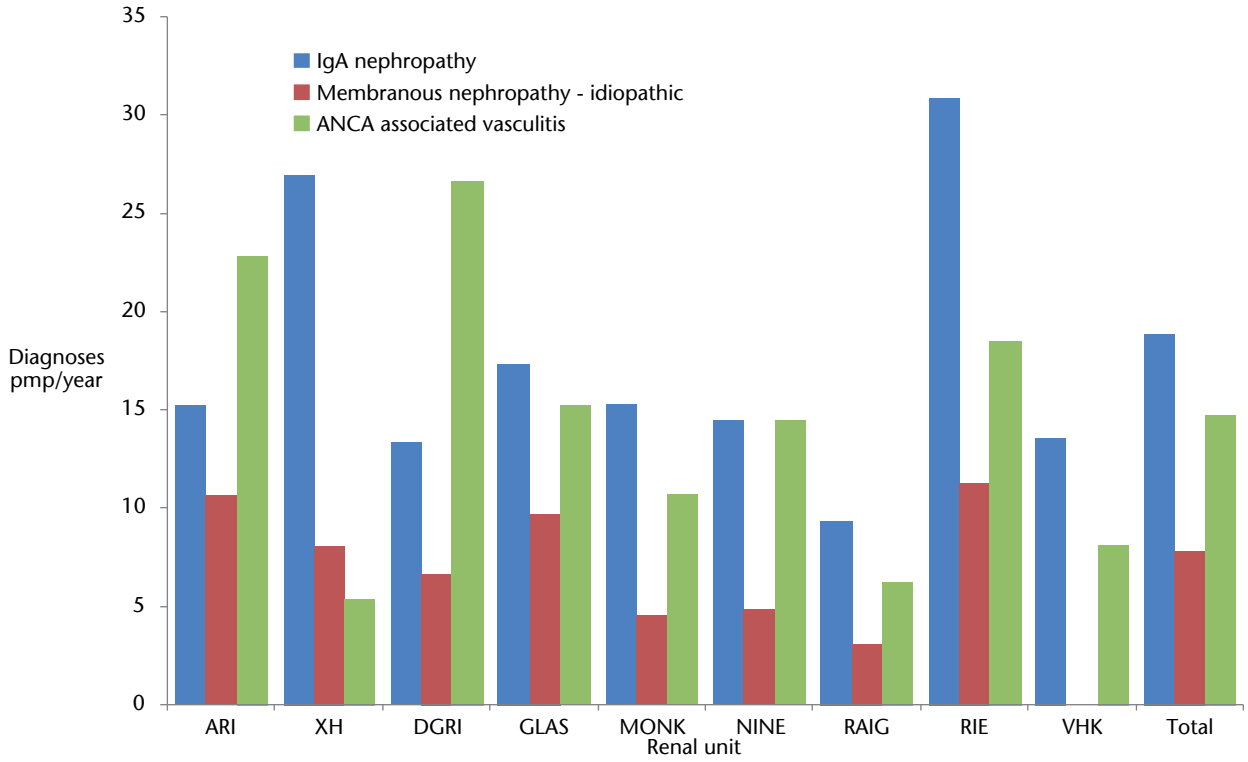
N5 Most frequently reported native kidney biopsy diagnoses by renal unit

Diagnosis	ARI	XH	DGRI	GLAS	MONK	NINE	RAIG	RIE	VHK	Total
IgA nephropathy	10	10	2	25	10	6	3	30	5	101
Tubulointerstitial nephritis	5	5	1	20	5	3	2	19	2	62
Primary focal segmental glomerulosclerosis	1	5	1	12	6	7	1	6	5	44
Microscopic polyangiitis	5	0	0	13	6	1	1	14	2	42
Membranous nephropathy - idiopathic	7	3	1	14	3	2	1	11	0	42
Minimal change nephropathy	3	1	1	13	2	3	2	10	0	35
Granulomatosis with polyangiitis	9	1	4	9	1	5	0	4	1	34
Diabetic nephropathy	2	2	0	10	4	7	0	5	0	30
Systemic lupus erythematosus/ nephritis	2	3	0	9	3	3	3	4	1	28
Mesangiocapillary glomerulonephritis (not type 2)	2	1	0	8	1	0	1	7	1	21
Acute kidney injury	2	4	0	5	0	1	0	6	0	18
Chronic kidney disease – aetiology uncertain	2	0	0	7	0	0	2	5	0	16
Glomerulonephritis – histologically indeterminate	9	0	0	1	1	0	1	4	0	16
Ischaemic nephropathy/ microvascular disease	0	2	1	3	1	2	0	3	1	13
Renal amyloidosis*	0	0	0	6	0	2	0	2	0	10
Mesangial proliferative glomerulonephritis**	0	0	0	0	1	2	0	6	0	9
Chronic hypertensive nephropathy	2	0	0	5	0	1	0	0	0	8
Myeloma cast nephropathy	1	0	0	2	0	0	1	4	0	8
Anti-glomerular basement membrane disease/ Goodpasture's syndrome	3	0	0	0	0	2	0	2	0	7
Normal	**1**	**1**	**0**	**1**	**2**	**0**	**0**	**2**	**0**	**7**

* Not including AL amyloidosis secondary to plasma cell dyscrasia (6 cases total) or AA amyloidosis secondary to chronic inflammation (4 cases total).

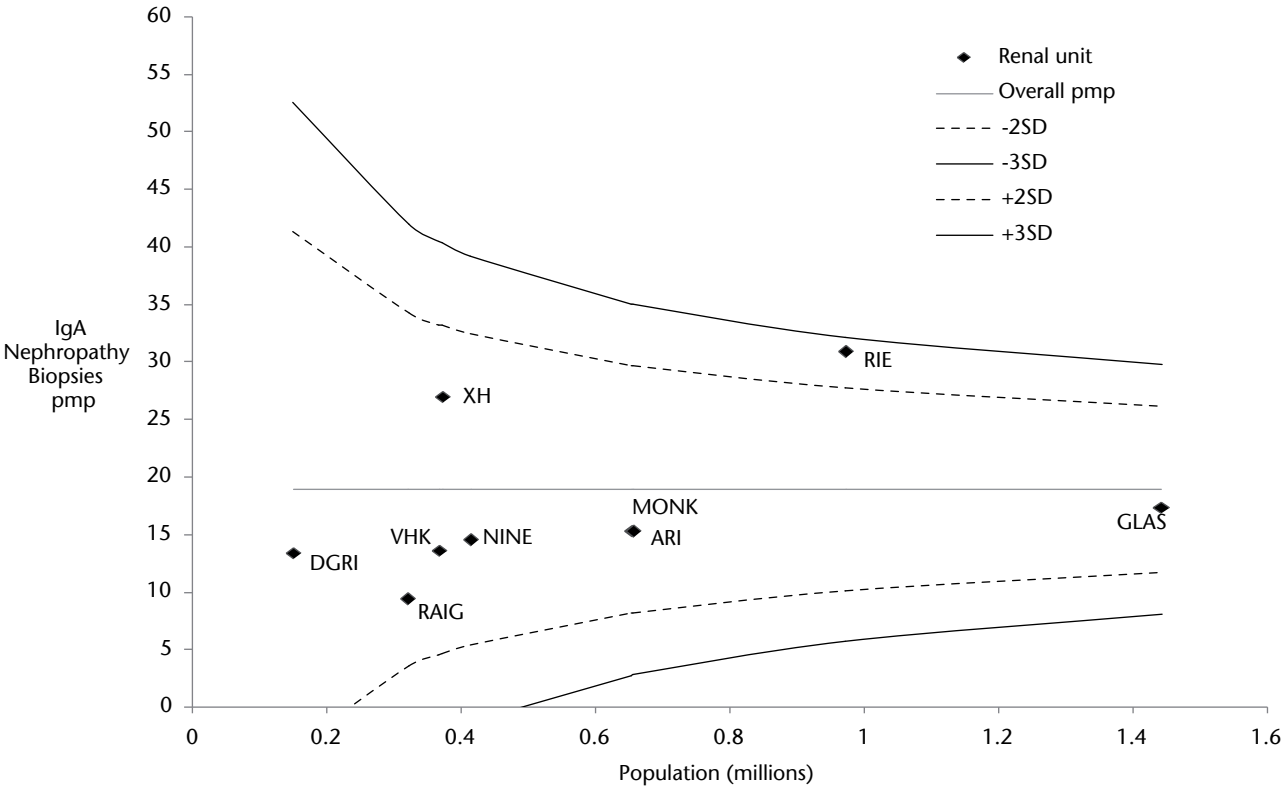
** Not including IgA nephropathy or IgM nephropathy (1 case).

N6 Incidences per million population of selected biopsy diagnoses by renal unit

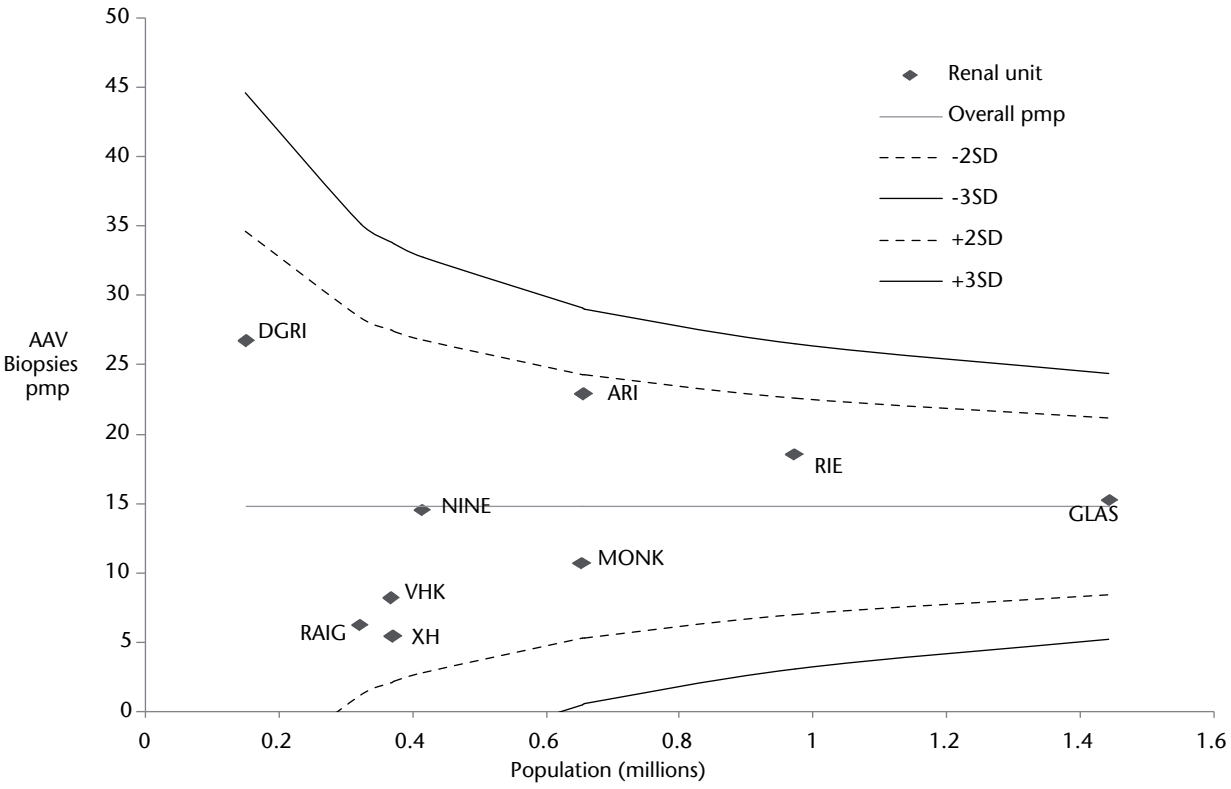


The incidences of IgA nephropathy, idiopathic membranous nephropathy and ANCA associated vasculitis (AAV) (a combination of granulomatosis with polyangiitis, microscopic polyangiitis and Churg Strauss syndrome) were expressed as pmp and compared between renal units.

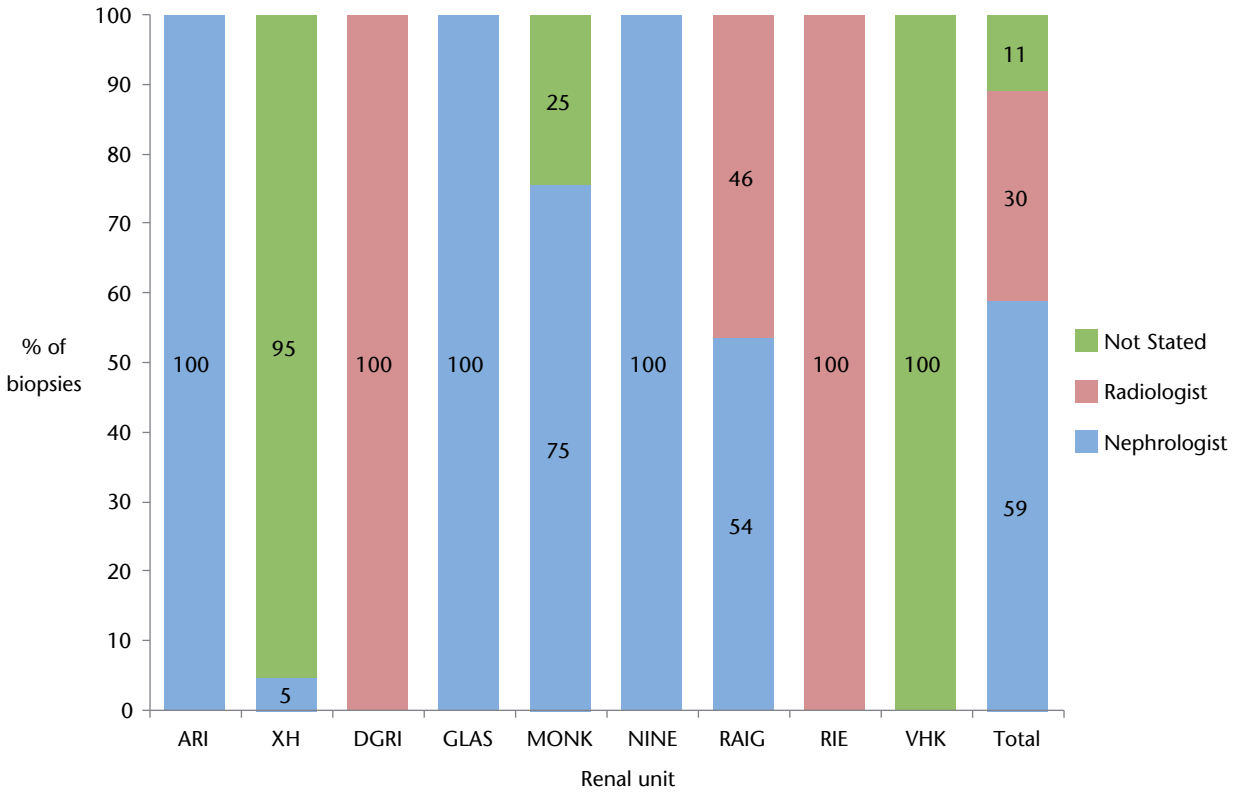
N7 Incidence per million population of biopsy diagnosis of IgA nephropathy by renal unit 2014



N8 Incidence per million population of biopsy diagnosis of ANCA associated vasculitides by renal unit 2014



N9 Operator performing native kidney biopsies by renal unit



N10 Major complications of native kidney biopsies performed in 2014

Complication	Number in 2014
Arteriography no embolisation	1
Arteriography and embolisation	2
Blood transfusion alone	7
Clot obstruction managed conservatively	1
Clot obstruction requiring intervention	0
Death	1
Nephrectomy	0
Other	1
Surgery no nephrectomy	0
Total	**13**

Complications were categorised as shown.

There were 13 major complications (1.9%) including 1 death attributed to bleeding after biopsy.

APPENDIX 1 ABBREVIATIONS USED IN THE TEXT

Some definitions and further details of parent and satellite renal units are given in the SRR website at: http://www.srr.scot.nhs.uk/Renal_Units/Main.html

Abbreviation	Expanded text
AAPD	Assisted Automated Peritoneal Dialysis
APD	Automated Peritoneal Dialysis
AV	Arteriovenous
AVF	Arteriovenous Fistula
AVG	Arteriovenous Graft
BP	Blood Pressure
CAPD	Continuous Ambulatory Peritoneal Dialysis
Cat	Category
cCa	Corrected calcium
CI	Confidence Interval
CKD	Chronic Kidney Disease
CVC	Central Venous Cannula
DBD	Donor after Brain-stem Death
DCD	Donor after Circulatory Death
DD	Deceased Donor
DM	Diabetes Mellitus
DN	Diabetic Nephropathy
ECOSS	Electronic Communication of Surveillance in Scotland
eKt/V	equilibrated Kt/V
EPR	Electronic Patient Record
ERA-EDTA	European Renal Association-European Dialysis and Transplant Association
ERF	Established (chronic) Renal Failure
ESA	Erythropoiesis Stimulating Agent
ESRD	End Stage Renal Disease
g/L	Grams per Litre
GN	Glomerulonephritis
Hb	Haemoglobin concentration
HD	Haemodialysis
HDF	Haemodiafiltration
HHD	Home Haemodialysis
HR	Hazard Ratio
IP	Intraperitoneal Pressure
IQR	Interquartile Range
ISD	Information Services Division NHS Scotland
IU/L	International Unit per Litre
IV	Intravenous
KDOQI	Kidney Disease Outcomes Quality Initiative
Kg	Kilogram
LD	Living Donor

LLN	Lower Limit of Normal range
m2	Metre squared
Max	Maximum
MDRD	Modification of Diet in Renal Disease
Min	Minimum
mmol/L	Millimole per Litre
MRSA	Meticillin Resistant Staphylococcus Aureus
MSSA	Meticillin Sensitive Staphylococcus Aureus
n	Number
NHS	National Health Service
NHSBT	NHS Blood and Transplant
NHS QIS	NHS Quality Improvement Scotland
NHSScotland	National Health Service in Scotland
NK	Not Known
NR	Normal Range
NTCVC	Non Tunnelled Central Venous Cannula
OR	Odds Ratio
PD	Peritoneal Dialysis
PHI	Public Health and Intelligence
pmol/L	picomoles per Litre
PMP	Patients per million population
PO4	Phosphate
PRD	Primary Renal Diagnosis
PTH	Parathyroid Hormone
RA	Renal Association
RCP	Royal College of Physicians
RRT	Renal Replacement Therapy
SAB	Staphylococcus aureus Bacteraemia
SD	Standard Deviation
SIMD	Scottish Index of Multiple Deprivation
SMARRT	Scottish Mortality Audit of Renal Replacement Therapy
SMR	Standardised Mortality Ratio
sp.	Species
SRA	Scottish Renal Association
SRR	Scottish Renal Registry
StdKt/V	Standardised Kt/V
TCVC	Tunnelled Central Venous Cannula
Tx	Transplant
UF	Ultrafiltration
UK	United Kingdom
UKRA	United Kingdom Renal Association
UKRR	UK Renal Registry
UL	Upper Limit
ULN	Upper Limit of Normal range
URR	Urea Reduction Ratio

Renal and Satellite units

Abbreviation	Expanded text
Arbroath	Arbroath Infirmary dialysis unit
ARI	Aberdeen Royal Infirmary
Ayr	Ayr Hospital
Balfour	Balfour Hospital
Banff	Chalmers Hospital, Banff
BGH	Borders General Hospital
BHFW	Belford Hospital, Fort William
DGRI	Dumfries and Galloway Royal Infirmary
FVR	Forth Valley Royal Hospital
G Bain	Gilbert Bain Hospital
GCH Stran	Galloway Community Hospital, Stranraer
GH Elgin	Dr Gray's Hospital, Elgin
GLAS	Glasgow Renal and Transplant Unit
GRI	Glasgow Royal Infirmary
Inverurie	Inverurie Dialysis unit
IRH	Inverclyde Royal Hospital
K'bright	Kirkcudbright Hospital
MONK	Monklands Hospital
NINE	Ninewells Hospital
P'head	Peterhead Community Hospital
PRI	Perth Royal Infirmary
QEUHG	Queen Elizabeth University Hospital Glasgow
QMHD	Queen Margaret's Hospital, Dunfermline
RAIG	Raigmore Hospital
RHSC	Royal Hospital for Sick Children Glasgow
RIE	Royal Infirmary of Edinburgh
St And	St Andrews Community Hospital
St John's	St John's Hospital
Stob	Stobhill Hospital
VHK	Victoria Hospital, Kirkcaldy
Vict	Victoria Hospital
VoL	Vale of Leven Hospital
XH	Crosshouse Hospital
WGH	Western General Hospital
Wick	Caithness General Hospital
WIG	Western Infirmary Glasgow
WI Hosp	Western Isles Hospital

NHS Boards

Abbreviation	Expanded text
A&A	Ayrshire& Arran
BORD	Borders
D&G	Dumfries & Galloway
FIFE	Fife
FV	Forth Valley
GRAM	Grampian
GG&C	Greater Glasgow and Clyde
HIGH	Highland
LAN	Lanarkshire
LOTH	Lothian
ORKN	Orkney
SHET	Shetland
TAY	Tayside
WI	Western Isles

APPENDIX 2 RENAL UNITS, SATELLITE DIALYSIS UNITS AND HEALTH BOARD AREA OF UNITS' LOCATION

Parent Renal Unit	Satellites	Health Board	Full name
ARI		GRAM	Aberdeen Royal Infirmary
	Balfour	ORKN	Balfour Hospital, Orkney
	Banff	GRAM	Chalmers Hospital, Banff
	G Bain	SHET	Gilbert Bain Hospital, Lerwick
	GH Elgin	GRAM	Dr Gray's Hospital, Elgin
	Inverurie	GRAM	Inverurie Dialysis Unit
	P'head	GRAM	Peterhead Community Hospital
XH		A&A	University Hospital Crosshouse, Kilmarnock
	Ayr	A&A	University Hospital Ayr
DGRI		D&G	Dumfries and Galloway Royal Infirmary
	GCH Stran	D&G	Galloway Community Hospital, Stranraer
	K'bright	D&G	Kirkcudbright Hospital
GLAS		GG&C	Glasgow Renal and Transplant Unit, Queen Elizabeth University Hospital, Glasgow
	FVR	FV	Forth Valley Royal Hospital
	GRI	GG&C	Glasgow Royal Infirmary
	IRH	GG&C	Inverclyde Royal Hospital, Greenock
	Stob	GG&C	Stobhill Hospital, Glasgow
	Vict	GG&C	Victoria Hospital, Glasgow
	VoL	GG&C	Vale of Leven Hospital, Alexandria
MONK		LAN	Monklands Hospital, Airdrie
NINE		TAY	Ninewells Hospital, Dundee
	Arbroath	TAY	Arbroath Infirmary Dialysis unit
	PRI	TAY	Perth Royal Infirmary
VHK		FIFE	Victoria Hospital, Kirkcaldy
	St And	FIFE	St Andrews Community Hospital
	QMHD	FIFE	Queen Margaret Hospital, Dunfermline

Parent Renal Unit	Satellites	Health Board	Full name
RAIG		HIGH	Raigmore Hospital, Inverness
	BHFW	HIGH	Belford Hospital, Fort William
	Wick	HIGH	Caithness General Hospital
	WI Hosp	WI	Western Isles Hospital, Stornoway
RHSC		GG&C	Royal Hospital for Sick Children, Glasgow
RIE		LOTH	Royal Infirmary of Edinburgh
	BGH	BORD	Borders General Hospital, Melrose
	St John's	LOTH	St John's Hospital, Livingston
	WGH	LOTH	Western General Hospital, Edinburgh

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