SECTION H VASCULAR ACCESS FOR HAEMODIALYSIS

This section's data are available on-line in Tableau format which enables interaction with the data: http://www.srr.scot.nhs.uk/publications/Dashboards/Vascular-Access.html.

H1 Patients starting first RRT as Haemodialysis in Scotland

Details of vascular access used for haemodialysis for all hospital and home haemodialysis patients were collected during the SRR census week in May 2018. The SRR has collected data about the access used for first haemodialysis for incident patients since the start of 2012.

The Renal Association guideline (2015) suggests that 60% of all incident patients with established end stage kidney disease commencing planned haemodialysis should receive dialysis via a functioning arteriovenous fistula (AVF) or arteriovenous graft (AVG) and that 80% of all prevalent long term dialysis patients should receive dialysis treatment via definitive access: AVF or AVG.

Between 01 January 2017 and 31 December 2017 there were 504 incident adult haemodialysis patients in Scotland.

234 (46.4.%) of these commenced dialysis with AV access and 270 (53.6%) with a central venous catheter (CVC).

Between the 01 January 2018 and 30 June 2018 there were 219 incident adult haemodialysis patients. 99 (45.2%) patients commenced with AV access and 120 (54.8%) with a CVC.

During the same 6-month period, 1 paediatric patient started HD at RHC and commenced HD with a CVC.

There are no missing data.

H1.1 Types of vascular access used for first haemodialysis 2012 to June 2018

Year	No. starting HD	No. with data	Arteriovenous				Central Venous Catheter			
			Fistula	Graft	Total n	Total %	Tunnelled	Non-tunnelled	Total n	Total %
2012	418	418	173	2	**175**	**41.9**	164	79	**243**	**58.1**
2013	397	397	168	7	**175**	**44.1**	146	76	**222**	**55.9**
2014	433	433	183	9	**192**	**44.3**	155	86	**241**	**55.7**
2015	474	474	187	14	**201**	**42.4**	165	108	**273**	**57.6**
2016	440	440	186	21	**207**	**47.0**	139	94	**233**	**53.0**
2017	504	504	199	35	**234**	**46.4**	167	103	**270**	**53.6**
2018*	219	219	89	10	**99**	**45.2**	70	50	**120**	**54.8**

* 01 January - 30 June 2018.

In the five years 2012-2016 a total of 1212 patients started RRT via a central venous catheter. 60.5% were male, the distribution of primary renal diagnoses also reflected the incident RRT population as a whole, 29% had a primary renal diagnosis of diabetic nephropathy.

31 (2.6%) of the individuals starting RRT via a CVC had a live donor transplant within the first year of starting RRT.

37 (3.1%) of the individuals starting RRT via a CVC died within the first year of starting RRT and had malignancy recorded as primary cause of death.

It is not possible from Registry data to tell if a planned live donated kidney transplant, or knowledge of a life limiting malignancy influenced the decision not to form AV access for haemodialysis for these individuals.

H1.2 Relationship between time of first referral to nephrology and access used for first HD 01 January 2012 - 30 June 2018

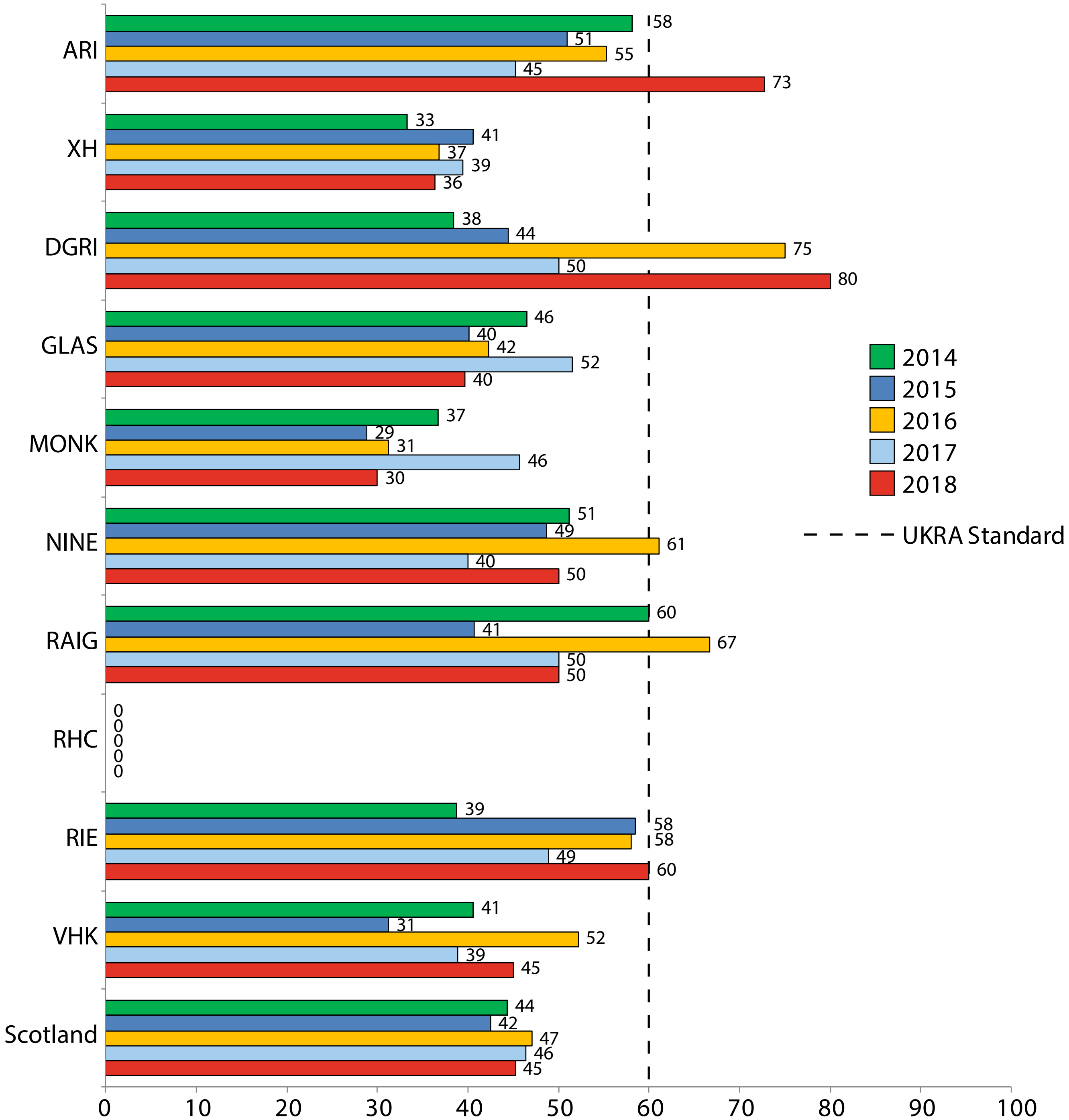
Type of Access	Total on HD	No. with data	Early referral		Late referral		Median time between referral and RRT	
			n	%	n	%	Months	IQR
AV	1283	1251	1226	51.8	25	5.5	61.3	31, 116.5
Line	1602	1569	1142	48.2	427	94.5	22.4	2.2, 68.5
Total	**2885**	**2820**	**2368**	**-**	**452**	**-**	**41.2**	**10.1, 92.8**

Date of referral to renal services was available for 2820 (97.7%) of the incident haemodialysis patients. Late referral was defined as less then 3 months between referral and first haemodialysis session.

Only 25 patients (5.5%) referred less than 3 months before starting dialysis had AV access for the first haemodialysis session.

Of patients referred within six months of starting haemodialysis 1232 (53.1%) started haemodialysis using AV access and 1165 (55.0%) of those referred within 12 months.

H1.3 Percentage of patients with AV access for first haemodialysis by renal unit 01 January 2014 - 30 June 2018



H2 Vascular access use in Scotland during census May 2018

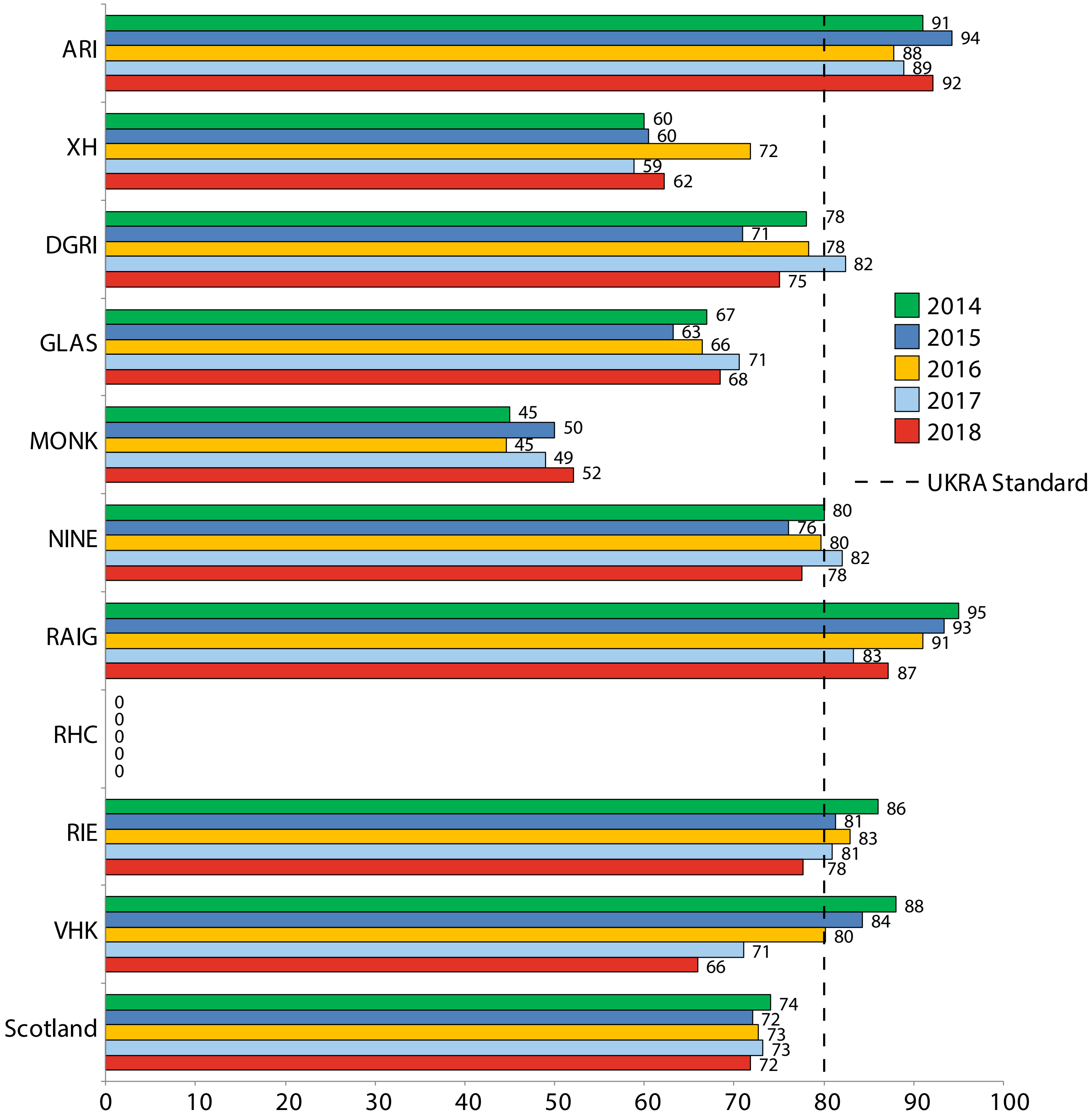
H2.1 Types of vascular access for haemodialysis patients each May 2009-2018

Year	No. on HD	No. with data		Arteriovenous					Central Venous Catheter			
							Total				Total	
		n	%	Fistula	Graft	Un-known	n	%	Tun-nelled	Non-tun-nelled	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**
2016	1878	1817	96.8	1207	114	1	**1322**	**72.8**	470	25	**495**	**27.2**
2017	1954	1874	95.9	1221	145	0	**1366**	**72.9**	491	17	**508**	**27.1**
2018	1950	1885	96.7	1189	164	0	**1353**	**71.8**	508	24	**532**	**28.2**

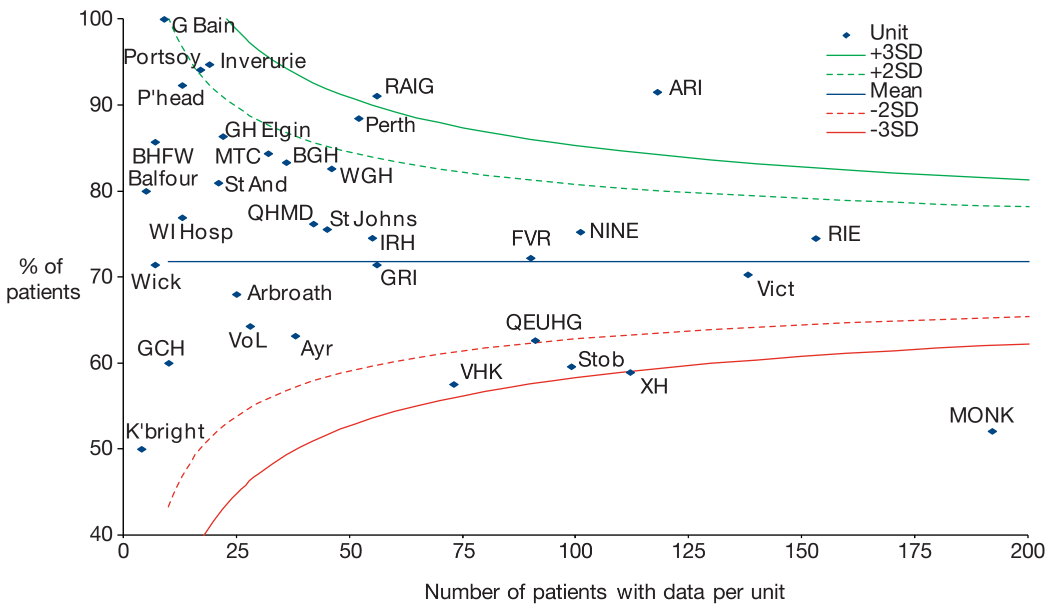
1950 patients with established renal failure were being treated by haemodialysis in May 2018, details of vascular access were available for 1885 (96.7%).

There were large, significant differences between renal units. Figure H2.2 shows the percentage of AV access in each unit for 2014-2018.

H2.2 Percentage of haemodialysis patients with AV access by renal unit: Census results 2014 - 2018



H2.3 Percentage of patients on hospital haemodialysis with AV access by satellite unit May 2018



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

Of the 46 patients receiving home haemodialysis during the census, information on vascular access was available for 44 (95.7%).

Of those with data, 38 patients were receiving dialysis via AV fistula or graft (86.4%) and 6 via a central venous catheter (13.6%).

H2.4 Number of patients confirmed as using buttonhole cannulation technique for AV fistulae by renal unit May 2018

	ARI	XH	DGRI	GLAS	MONK	NINE	RAIG	RHC	RIE	VHK	Scotland
Total on HD	222	166	53	594	195	181	90	10	298	141	1950
Total with AV access	167	93	33	322	95	112	64	0	216	87	1189
Sufficient data	165	90	11	278	90	111	64	0	209	76	1094
Buttonhole yes	135	78	1	8	75	82	43	0	70	3	495
Buttonhole no	30	12	10	270	15	29	21	0	139	73	599

1094 (92.0%) of the 1189 prevalent haemodialysis patients with AV Fistulae had their AV access cannulation technique recorded in the May 2018 census.

H3 Native Arterio-venous fistula creation across Scotland 2015 - 2016

A special project was undertaken identifying every native AV fistula created across Scotland in the years 2015 and 2016 with at least one-year follow up.

Several outcome measures were assessed including primary patency, primary-assisted patency and secondary patency.

Patency rates were estimated using recommended reporting standards of the Society for Vascular Surgery and the American Association for Vascular Surgery[1].

Primary patency was defined as the interval from the time of access placement until any type of intervention to maintain or restore patency.

Primary-assisted patency was defined as the interval from the time of access placement until access thrombosis.

Secondary patency was defined as the interval from the time of access placement until either final failure or until the vessel was abandoned with or without preceding successful interventional or surgical procedures to maintain or restore patency.

The definitions of patency are based on pubished guidelines[1] but some examples below help illustrate what each category means.

Example 1: A fistula was created at time x, required angioplasty to assist maturation at time y, thrombosed and successfully declotted at time z and then became aneurysmal and abandoned at time w. Primary, primary-assisted and secondary patencies are x-y, x-z, and x-w time, respectively.

Example 2: A fistula was created at time x, required ligation of tributaries at time y, thrombosed and had an unsuccessful attempt for surgical thrombectomy at time z. Primary, primary-assisted and secondary patencies are x-y, x-z and x-z time, respectively.

Example 3: A fistula was created at time x, is patent (based on surveillance scans, clinical examination etc.) but has not been used until the end of follow-up at time z. Primary, primary-assisted and secondary patencies are x-z time.

1. J Vasc Surg. 2002 Mar;35(3):603-10. Recommended standards for reports dealing with arteriovenous hemodialysis accesses. Sidawy AN, Gray R, Besarab A, Henry M, Ascher E, Silva M Jr, Miller A, Scher L, Trerotola S, Gregory RT, Rutherford RB, Kent KC.

H3.1 Patency rates of AVF created in 2015 stratified by access location (upper vs forearm and use of cephalic vs basilic vein)

2015	Total AVF (N=582)	Forearm AVF (N=196)	Upper arm AVF (N=386)	P-value[a]	Brachio-cephalic AVF (N=273)	Brachio-basilic AVF (N=107)	P-value[b]
Patency (%, 95% CI)							
Primary patency							
6 months	62% (58-66)	55% (47-62)	66% (61-71)	0.005	72% (66-77)	51% (41-60)	<0.001
12 months	48% (44-52)	43% (35-50)	51% (46-56)		57% (51-63)	35% (26-45)	
Primary-assisted patency							
6 months	74% (70-77)	62% (55-69)	80% (76-84)	<0.001	84% (79-88)	69% (59-76)	0.002
12 months	67% (63-71)	55% (48-62)	73% (68-77)		77% (72-82)	62% (52-71)	
Secondary patency							
6 months	76% (72-79)	65% (58-71)	82% (77-85)	<0.001	87% (82-90)	72% (63-80)	0.001
12 months	69% (65-73)	58% (51-65)	74% (70-79)		80% (75-85)	65% (55-73)	

a Upper vs. Forearm (log-rank test).
b Brachio-cephalic vs. brachio-basilic (log-rank test).

H3.2 Patency rates of AVF created in 2015 and 2016

Arm AVF	2015 (N=582)	2016 (N=751)
Patency (%, 95% CI)		
Primary patency		
6 months	62% (58-66)	72% (69-75)
12 months	48% (44-52)	62% (58-65)
Primary-assisted patency		
6 months	74% (70-77)	79% (76-82)
12 months	67% (63-71)	72% (69-75)
Secondary patency		
6 months	76% (72-79)	81% (77-83)
12 months	69% (65-73)	75% (71-78)