

NCAP

NATIONAL CARDIAC AUDIT PROGRAMME

NACSA Annual Report 2022
(Data for the 3 years - from April 2018
to March 2021)
Appendix – additional data (including
all data from which main report
derived)



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Introduction

Last year we produced an Appendix to the NACSA Annual Report for the first time. This was to allow publication of far more data and tables than could possibly be fitted within the main report. The feedback received was positive, so we have chosen to repeat the idea this year. Much of the data within the Appendix is also presented at unit level, as well as at a national level.

Results of cardiac surgery within the UK are remarkably good, with very low mortality rates now seen for the common non-emergency operations. Also, within the section of this report on hospital survival rates, there are no hospitals with performance that is below expectations either for all cardiac operations combined, or for isolated coronary artery surgery.

As detailed in the NACSA report, COVID-19 has had a dramatic effect on our speciality – unlike any other seen in our lifetime – both in terms of throughput and outcomes. It has underlined the importance of the data we collect. We are indebted to the many units that provided near real-time data during the pandemic, allowing us to track these changes.

In the future we are aiming to move towards quicker feedback of data to units. Many of the metrics within this report are now available “live” to Audit Leads at each hospital via the online NICOR web-portal. This allows hospitals to compare themselves to contemporaneous UK data and outcomes long before reports such as this are published. This is very much part of the drive from SCTS and NICOR towards a quality agenda that does not just focus on mortality rates.

We hope readers find this additional data helpful. I would like to say a huge thank you to all those that contributed to the report, and in particular everyone who diligently collected and submitted their data despite the difficulties over the last couple of years.

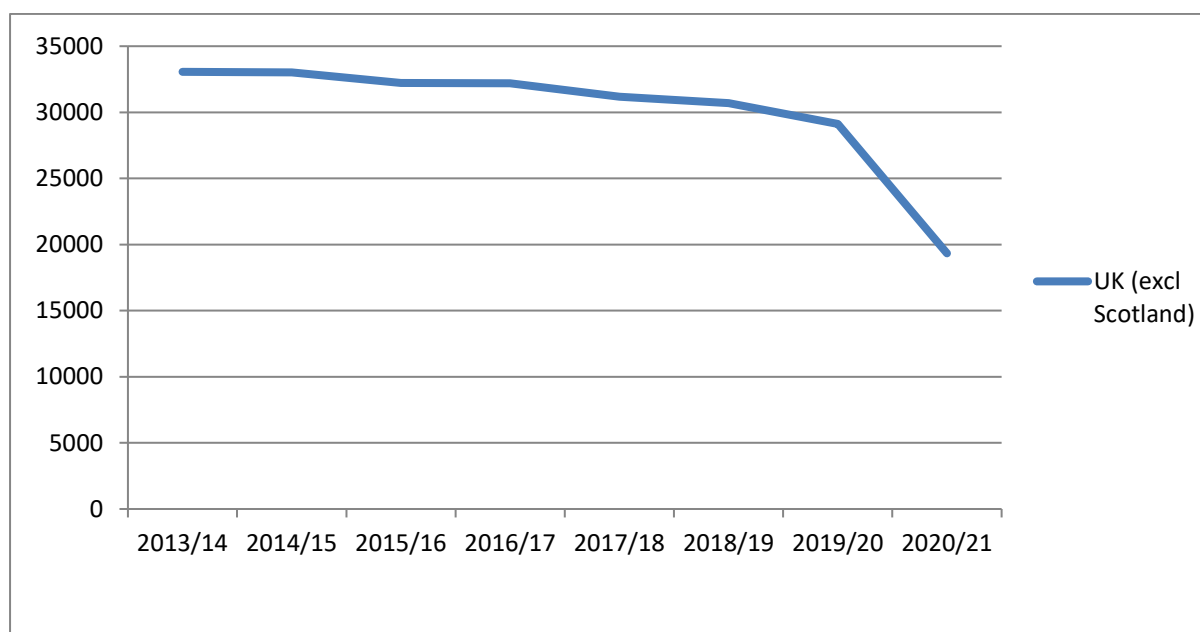
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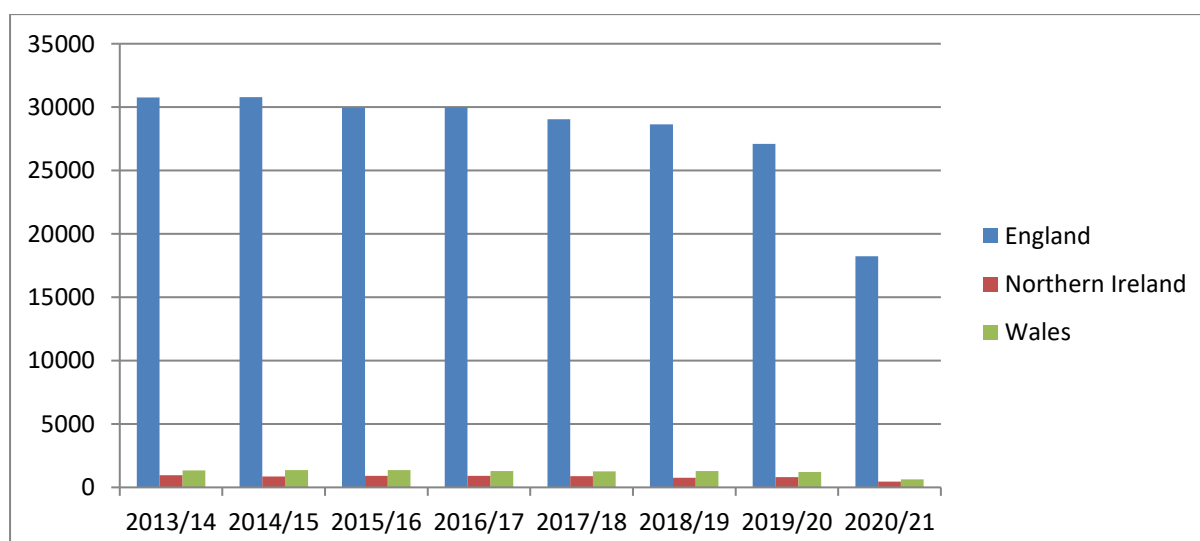
General Outcomes and Trends for Cardiac Surgery

Case Numbers - All Procedures (including emergencies) for UK (excluding Scotland)



Region	All procedures							
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
UK (excl Scotland)	33062	33011	32231	32195	31179	30698	29112	19333
England	30769	30782	29949	29991	29032	28647	27088	18236
Northern Ireland	951	864	917	907	878	762	803	465
Wales	1342	1365	1365	1297	1269	1289	1221	632

Case Numbers - All Procedures (including emergencies) by UK region

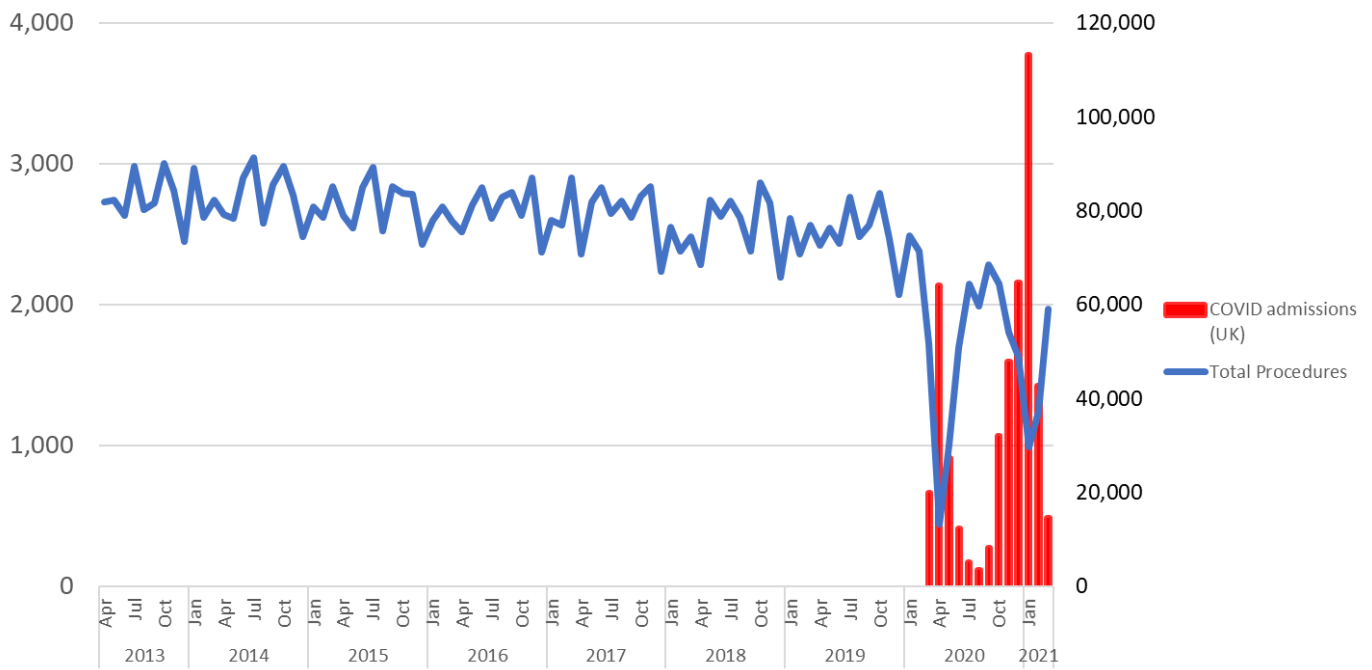


Reduction in Case Numbers (All Procedures) in 2020/21 compared to previous 2 years

All procedures					
Region	2018/19	2019/20	2020/21	2020/21 (as % of 2018/19)	2020/21 (as % of 2019/20)
UK (excl Scotland)	30698	29112	19333	63%	66%
England	28647	27088	18236	64%	67%
Northern Ireland	762	803	465	61%	58%
Wales	1289	1221	632	49%	52%

Case numbers in the UK were already beginning to fall slightly due to COVID by end of March 2020 – which might cause the estimate of the reduction in activity to be underestimated (when 2020/21 compared to 2019/20). However, there has been a steady downward trend of cardiac surgical activity year to year for several years now – meaning that using 2018/19 data for comparison might slightly overestimate the reduction. However, there is little difference using either year as comparator (+/-3%).

Reductions in monthly rates of cardiac operations vs COVID-19 admission rates (UK excluding Scotland)

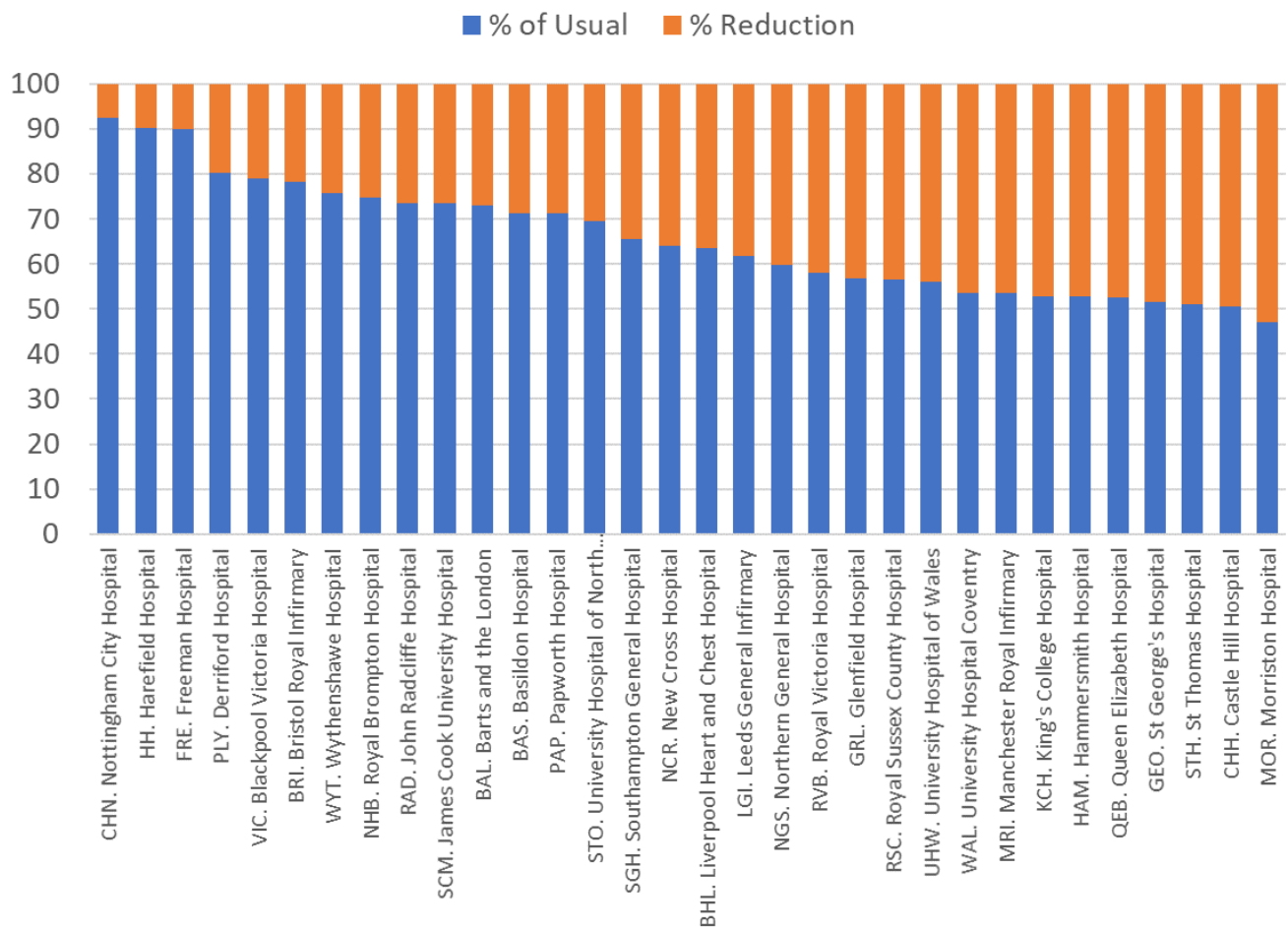


Case Numbers - All Procedures (including emergencies) - Unit level

Hospital	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21
ANT. Spire St Anthony's Hospital	262	350	258	108	98	87	59	13
BAL. Barts and the London	1028	940	1654	1837	1933	2124	2001	1459
BAS. Basildon Hospital	922	911	909	890	750	819	713	508
BHL. Liverpool Heart and Chest Hospital	1922	1935	1908	2067	2040	1891	1778	1130
BRI. Bristol Royal Infirmary	1488	1407	1315	1308	1257	1331	1183	924
CBS. Spire Southampton Hospital	574	449	403	407	401	336	184	95
CHH. Castle Hill Hospital	702	655	660	696	627	788	837	423
CHN. Nottingham City Hospital	666	572	550	535	603	611	548	506
CRO. Cromwell hospital	15	0	2	33	21	33	15	23
FRE. Freeman Hospital	725	737	743	735	712	703	611	550
GEO. St George's Hospital	907	843	898	1102	1005	717	670	346
GRL. Glenfield Hospital	1104	1177	1091	1115	1068	1051	974	554
HAM. Hammersmith Hospital	767	619	626	591	600	620	619	327
HH. Harefield Hospital	1000	971	943	929	940	954	1039	937
HHW. Wellington Hospital North	219	218	141	124	92	NA	NA	NA
HSC. Harley Street Clinic	119	134	109	133	119	NA	NA	NA
KCH. King's College Hospital	787	987	869	888	820	760	798	422
LBH. London Bridge Hospital	205	155	147	163	89	NA	NA	NA
LGI. Leeds General Infirmary	995	975	1036	869	918	916	866	534
MOR. Morriston Hospital	603	697	613	607	657	654	572	269
MRI. Manchester Royal Infirmary	715	772	648	742	785	715	679	363
NCR. New Cross Hospital	913	850	810	851	778	869	848	543
NGS. Northern General Hospital	888	928	1014	928	918	908	874	523
NHB. Royal Brompton Hospital	671	855	831	882	849	870	849	634
PAP. Papworth Hospital	1892	2104	2043	1957	1821	1798	1644	1170
PLY. Derriford Hospital	1116	1058	1121	1104	1010	968	1058	849
QEB. Queen Elizabeth Hospital	468	592	563	611	648	667	612	322
RAD. John Radcliffe Hospital	883	860	828	774	833	824	659	485
RSC. Royal Sussex County Hospital	608	520	603	659	605	637	593	335
RVB. Royal Victoria Hospital	951	864	917	907	878	762	803	465
SCM. James Cook University Hospital	1052	1052	1052	1031	975	949	886	650
SGH. Southampton General Hospital	1251	1333	1316	1307	1324	1281	1180	773
STH. St Thomas Hospital	1053	1076	1010	1065	958	1067	1138	580
STO. University Hospital of North Staffordshire	854	853	875	871	754	732	673	467
UCL. University College Hospital	932	911	38	0	0	0	0	0
UHW. University Hospital of Wales	739	668	752	690	612	635	649	363
VIC. Blackpool Victoria Hospital	1281	1165	1109	977	1080	1066	1017	803
WAL. University Hospital Coventry	783	795	772	677	657	637	609	326
WYT. Wythenshawe Hospital	1002	1023	1054	1025	944	918	874	662

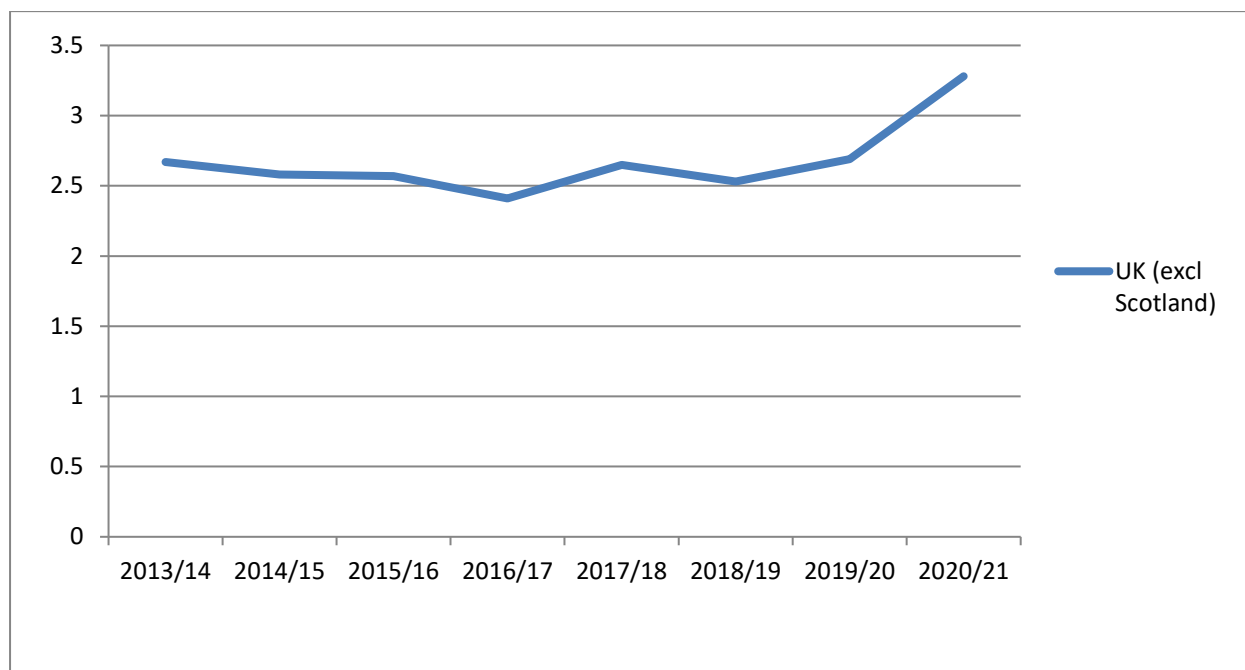
Reduction in Case Numbers (All Procedures) in 2020/21 compared to 2019/20 - Unit level

Hospital	2019/20	2020/21	2020/21 (as % of 2019/20)
CRO. Cromwell hospital (PP)	15	23	153%
CHN. Nottingham City Hospital	548	506	92%
HH. Harefield Hospital	1039	937	90%
FRE. Freeman Hospital	611	550	90%
PLY. Derriford Hospital	1058	849	80%
VIC. Blackpool Victoria Hospital	1017	803	79%
BRI. Bristol Royal Infirmary	1183	924	78%
WYT. Wythenshawe Hospital	874	662	76%
NHB. Royal Brompton Hospital	849	634	75%
RAD. John Radcliffe Hospital	659	485	74%
SCM. James Cook University Hospital	886	650	73%
BAL. Barts and the London	2001	1459	73%
BAS. Basildon Hospital	713	508	71%
PAP. Papworth Hospital	1644	1170	71%
STO. University Hospital of North Staffordshire	673	467	69%
SGH. Southampton General Hospital	1180	773	66%
NCR. New Cross Hospital	848	543	64%
BHL. Liverpool Heart and Chest Hospital	1778	1130	64%
LGI. Leeds General Infirmary	866	534	62%
NGS. Northern General Hospital	874	523	60%
RVB. Royal Victoria Hospital	803	465	58%
GRL. Glenfield Hospital	974	554	57%
RSC. Royal Sussex County Hospital	593	335	56%
UHW. University Hospital of Wales	649	363	56%
WAL. University Hospital Coventry	609	326	54%
MRI. Manchester Royal Infirmary	679	363	53%
KCH. King's College Hospital	798	422	53%
HAM. Hammersmith Hospital	619	327	53%
QEB. Queen Elizabeth Hospital	612	322	53%
GEO. St George's Hospital	670	346	52%
CBS. Spire Southampton Hospital (PP)	184	95	52%
STH. St Thomas Hospital	1138	580	51%
CHH. Castle Hill Hospital	837	423	51%
MOR. Morriston Hospital	572	269	47%
ANT. Spire St Anthony's Hospital (PP)	59	13	22%



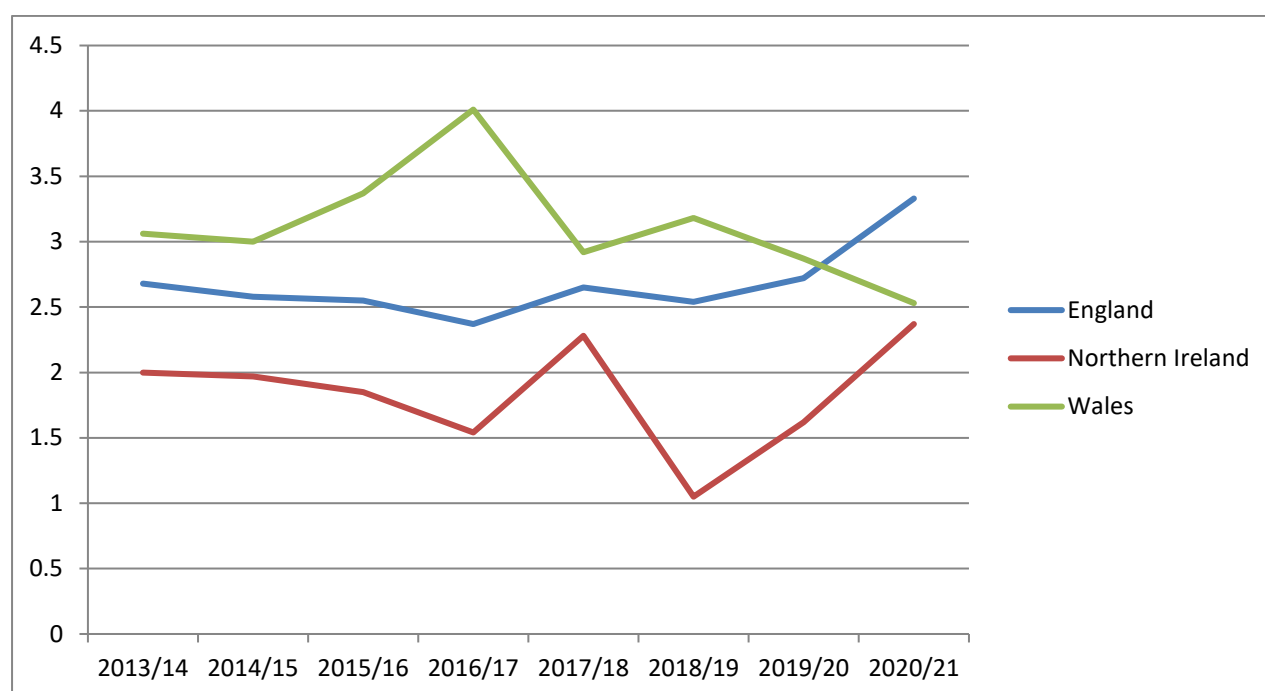
All Cases. NHS hospitals only.

Crude Mortality Rate (%) - All Procedures (including emergencies) in UK



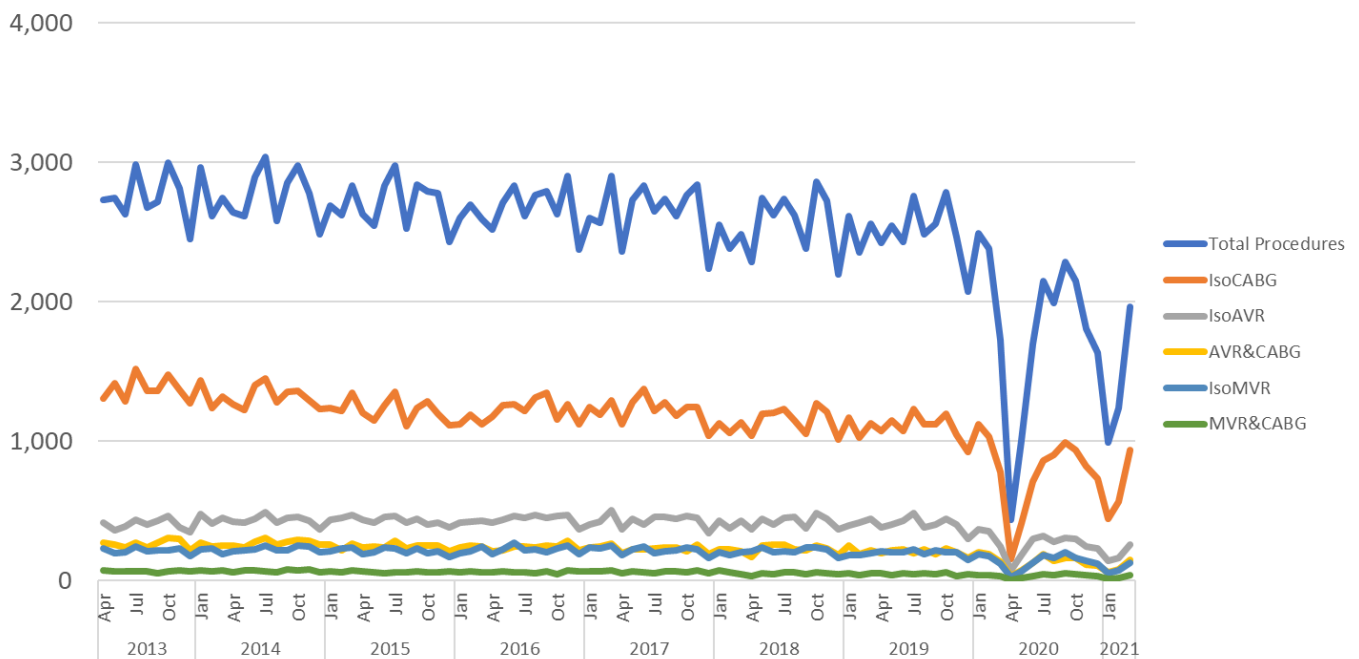
	All procedures							
	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21
UK (excl Scotland)	2.67	2.58	2.57	2.41	2.65	2.53	2.69	3.28

Crude Mortality Rate (%) - All Procedures (including emergencies) by UK region



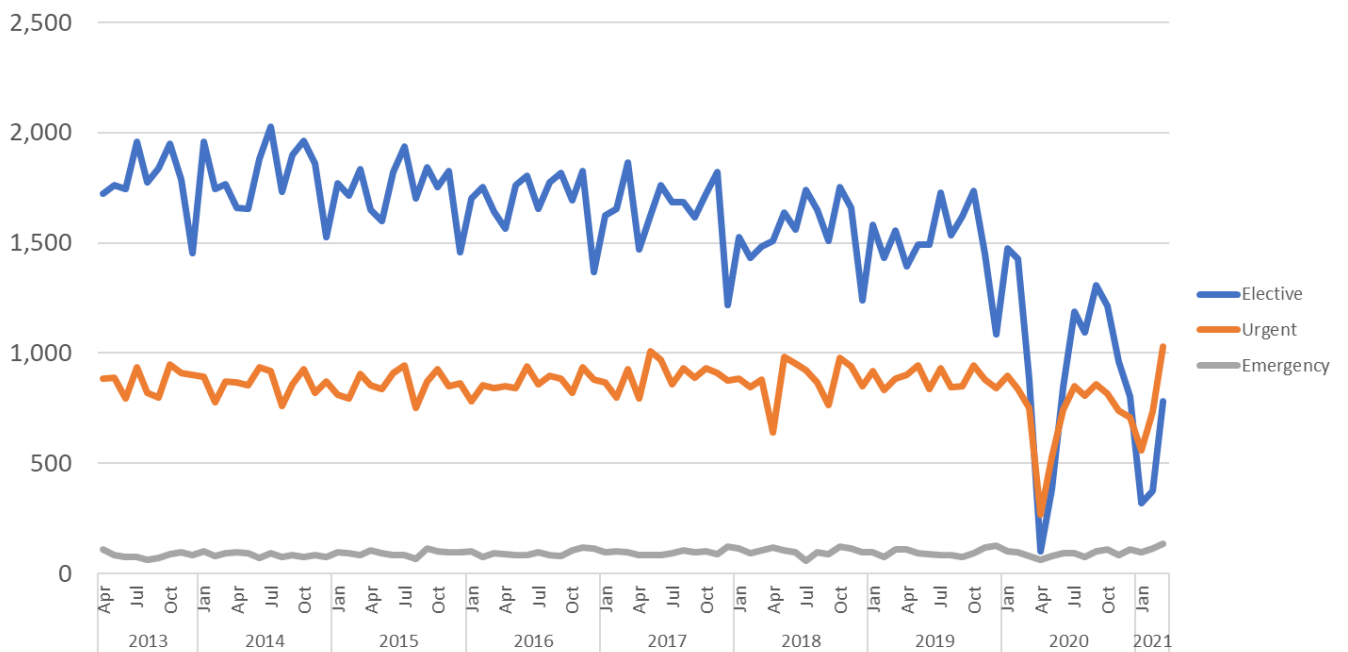
Region	All procedures							
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
UK (excl Scotland)	2.67	2.58	2.57	2.41	2.65	2.53	2.69	3.28
England	2.68	2.58	2.55	2.37	2.65	2.54	2.72	3.33
Northern Ireland	2	1.97	1.85	1.54	2.28	1.05	1.62	2.37
Wales	3.06	3	3.37	4.01	2.92	3.18	2.87	2.53

Trends (monthly) in cardiac surgical activity by procedure type – since 2013 – UK (excluding Scotland)



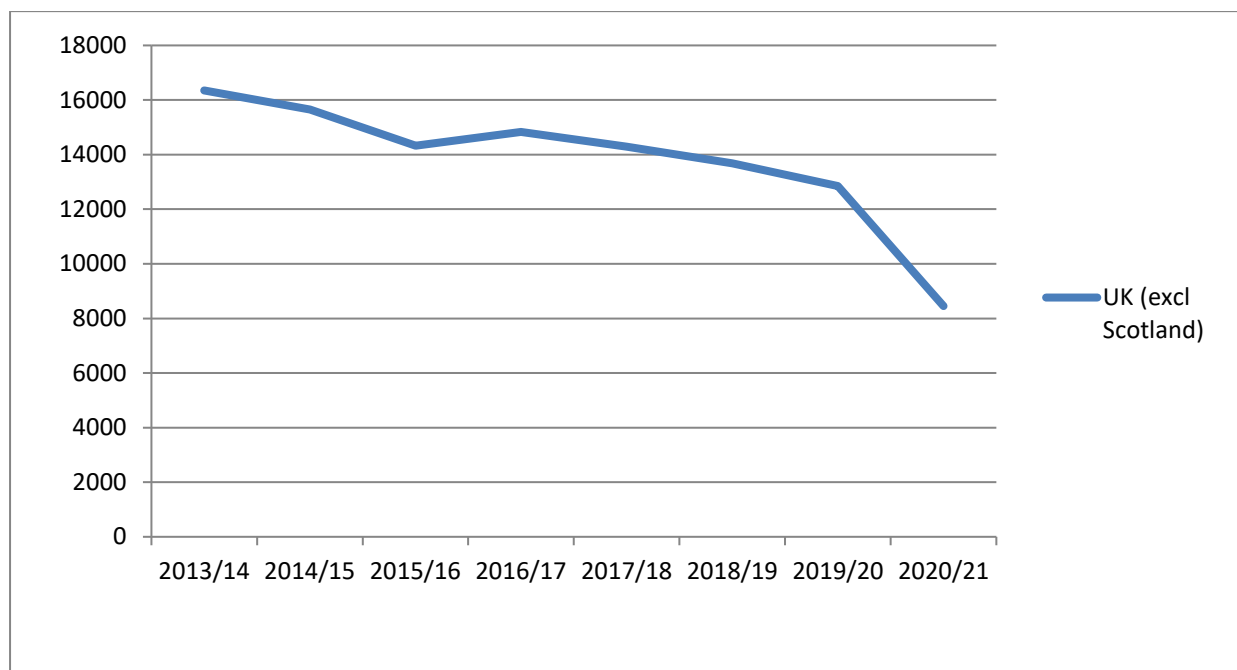
IsoCABG isolated CABG; IsoAVR isolated AVR; AVR&CABG (with no concomitant procedures); IsoMVR isolated mitral valve procedure (repair or replace); MVR&CABG (with no concomitant procedures)

Trends (monthly) in cardiac surgical activity by operative priority – since 2013 – UK (excluding Scotland)

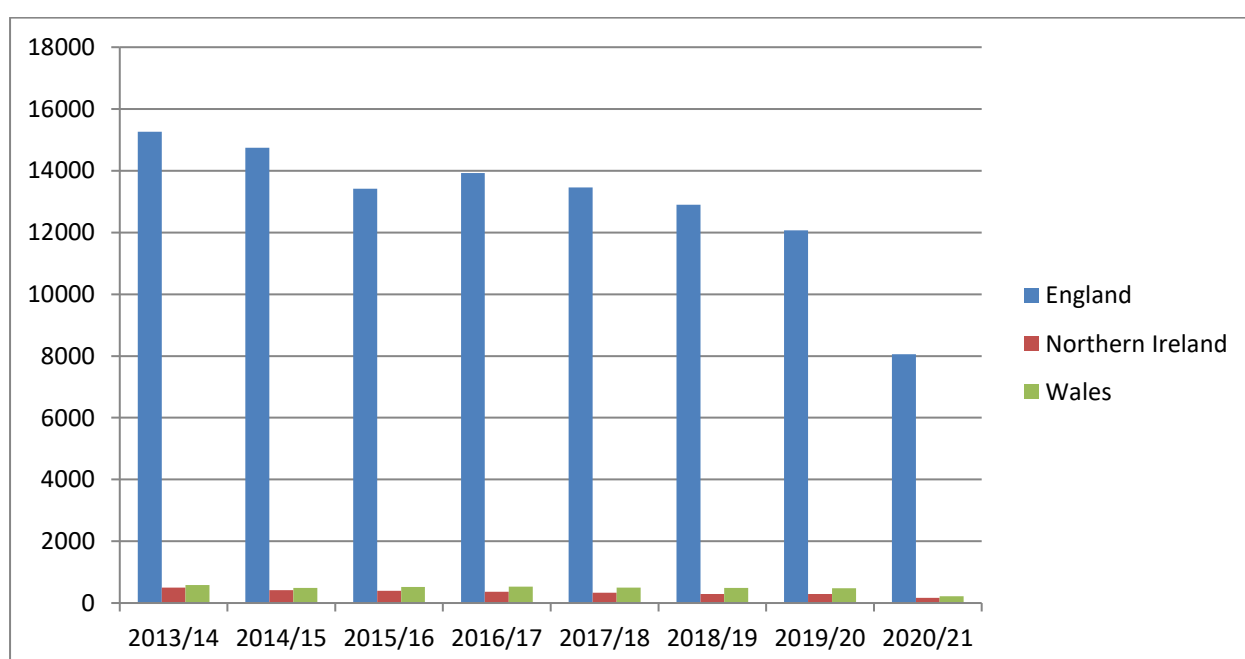


UK data (excluding Scotland).

Case Numbers – Isolated CABG (including emergencies)

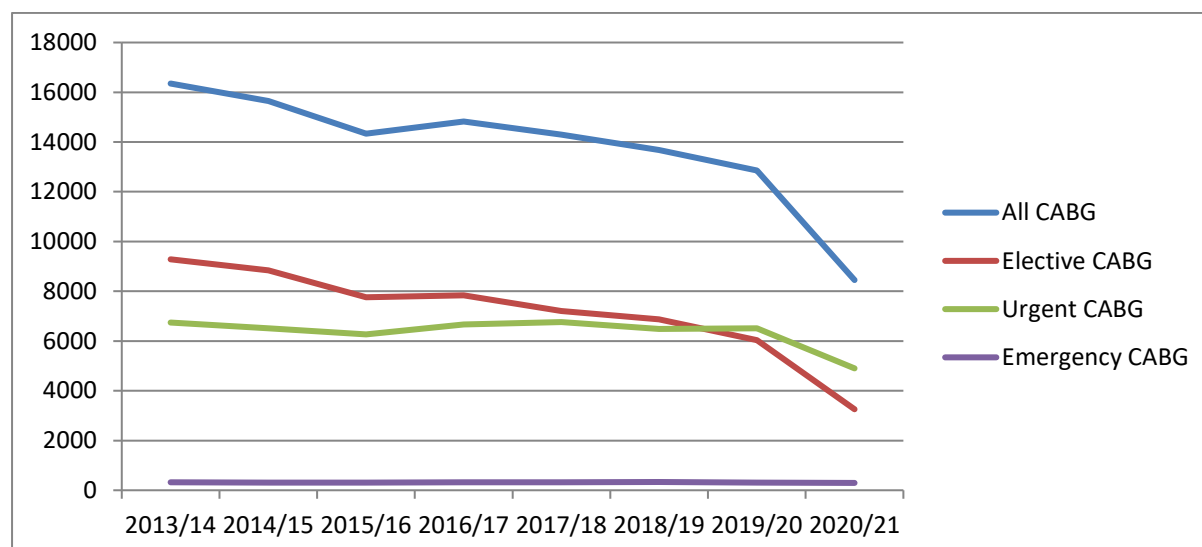


Region	First time isolated CABG (incl Emergency and Salvage)							
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
UK (excl Scotland)	16350	15653	14332	14826	14291	13685	12852	8451
England	15265	14747	13419	13927	13462	12903	12073	8057
Northern Ireland	503	413	395	365	330	294	296	172
Wales	582	493	518	534	499	488	483	222



Hospital	First time isolated CABG (incl Emergency and Salvage)							
	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21
ANT. Spire St Anthony's Hospital	149	185	111	53	53	47	25	6
BAL. Barts and the London	561	512	731	852	885	1002	959	687
BAS. Basildon Hospital	527	507	422	392	334	381	313	228
BHL. Liverpool Heart and Chest Hospital	919	877	901	952	939	773	793	511
BRI. Bristol Royal Infirmary	731	663	553	529	503	505	442	363
CBS. Spire Southampton Hospital	236	146	126	150	133	124	53	27
CHH. Castle Hill Hospital	387	373	367	334	321	412	452	241
CHN. Nottingham City Hospital	322	260	221	206	254	274	223	211
CRO. Cromwell hospital	10	0	2	23	10	22	9	9
FRE. Freeman Hospital	278	272	291	256	283	260	230	226
GEO. St George's Hospital	501	448	502	569	531	399	363	167
GRL. Glenfield Hospital	507	511	516	460	478	444	444	220
HAM. Hammersmith Hospital	446	363	354	327	296	331	322	188
HH. Harefield Hospital	490	475	406	459	473	462	464	440
HHW. Wellington Hospital North	92	108	72	48	49	NA	NA	NA
HSC. Harley Street Clinic	47	66	41	45	35	NA	NA	NA
KCH. King's College Hospital	399	501	424	461	397	349	395	204
LBH. London Bridge Hospital	117	84	67	82	40	NA	NA	NA
LGI. Leeds General Infirmary	589	541	36	471	576	520	463	251
MOR. Morriston Hospital	280	258	242	271	265	242	243	113
MRI. Manchester Royal Infirmary	343	411	326	388	462	398	352	233
NCR. New Cross Hospital	494	468	443	458	404	473	429	268
NGS. Northern General Hospital	443	432	395	364	356	300	316	159
NHB. Royal Brompton Hospital	336	418	419	407	385	429	394	288
PAP. Papworth Hospital	847	823	768	754	735	671	580	394
PLY. Derriford Hospital	589	484	562	522	408	349	307	268
QEB. Queen Elizabeth Hospital	231	282	257	322	294	310	269	122
RAD. John Radcliffe Hospital	396	373	364	364	388	342	299	195
RSC. Royal Sussex County Hospital	307	269	308	313	286	285	274	139
RVB. Royal Victoria Hospital	503	413	395	365	330	294	296	172
SCM. James Cook University Hospital	582	589	571	568	527	527	530	356
SGH. Southampton General Hospital	472	475	486	498	472	507	442	303
STH. St Thomas Hospital	421	455	416	461	407	386	441	214
STO. University Hospital of North Staffordshire	478	463	443	452	384	355	335	234
UCL. University College Hospital	408	377	10	0	0	0	0	0
UHW. University Hospital of Wales	302	235	276	263	234	246	240	109
VIC. Blackpool Victoria Hospital	757	641	603	508	575	546	511	448
WAL. University Hospital Coventry	373	381	349	303	292	277	268	157
WYT. Wythenshawe Hospital	480	514	556	576	497	443	376	300

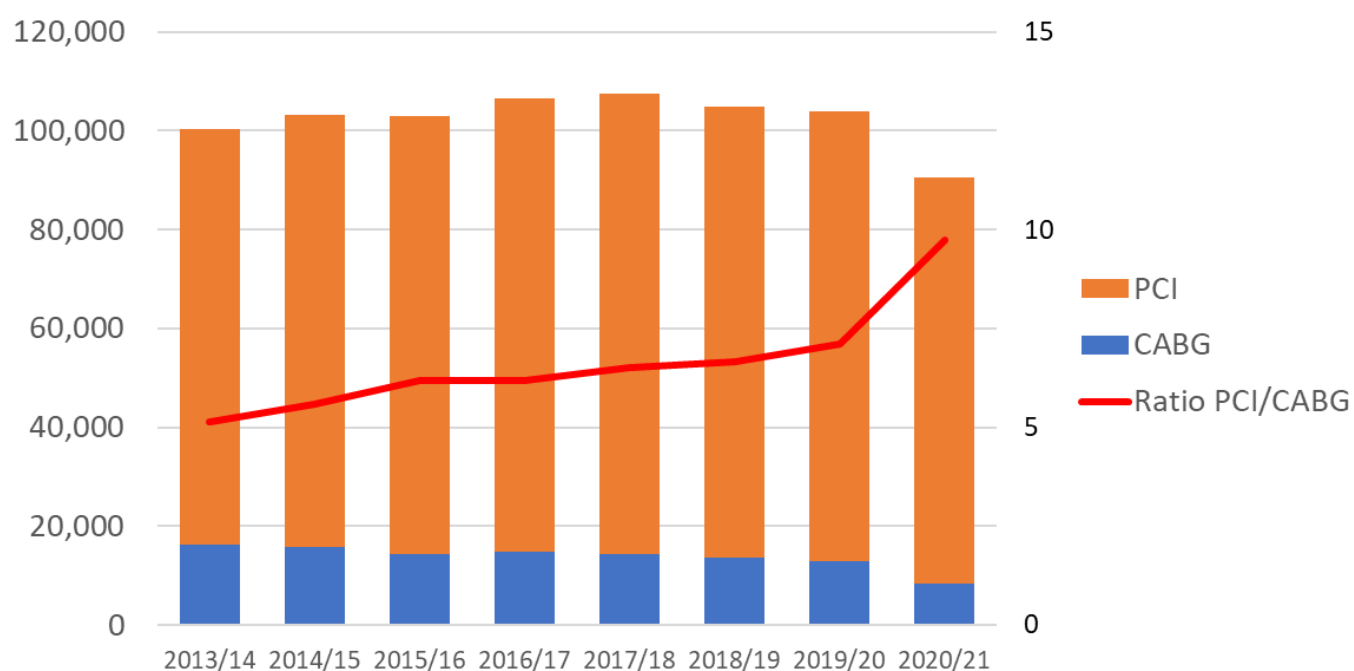
Numbers of isolated CABG operations in UK (total and divided into operative urgency)



	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21
All CABG	16350	15653	14332	14826	14291	13685	12852	8451
Elective CABG	9284	8837	7760	7842	7203	6873	6040	3256
Urgent CABG	6748	6514	6267	6667	6762	6479	6506	4900
Emergency CABG	318	302	305	317	326	333	306	295

UK (excluding Scotland). Emergency CABG includes both emergencies and salvage.

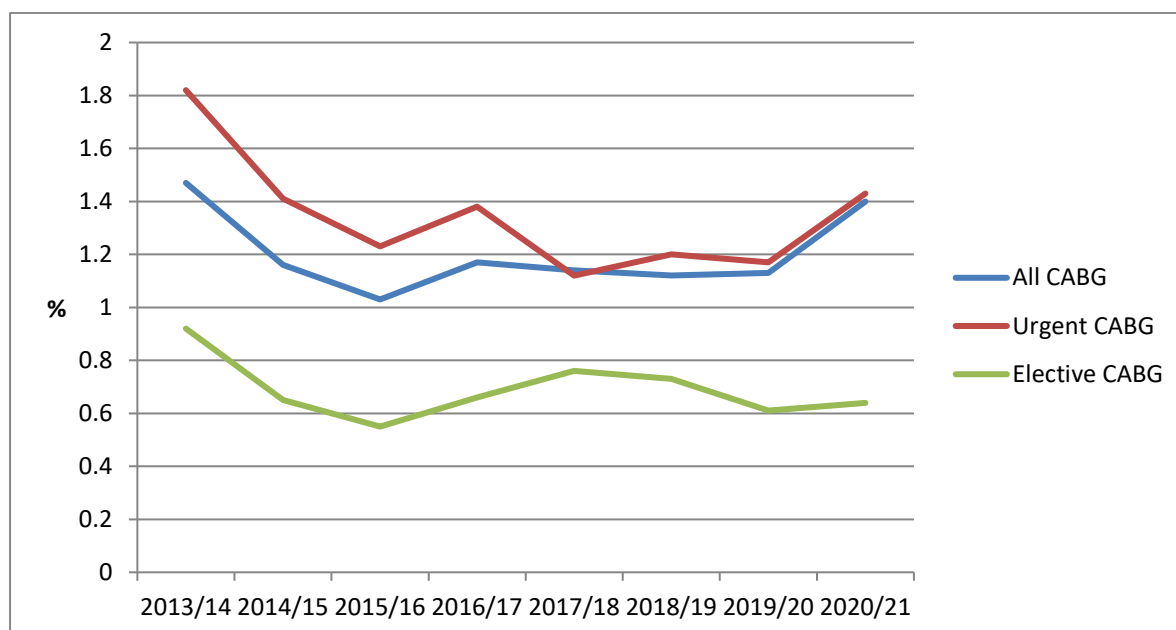
Revascularisation numbers (UK, excluding Scotland) with ratio of PCI to CABG – by year



PCI percutaneous coronary intervention; CABG coronary artery bypass grafts

	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21
CABG	16350	15653	14332	14826	14291	13685	12852	8451
PCI	84074	87644	88607	91638	93185	91227	91181	82188
Ratio PCI/CABG	5.1	5.6	6.2	6.2	6.5	6.7	7.1	9.7

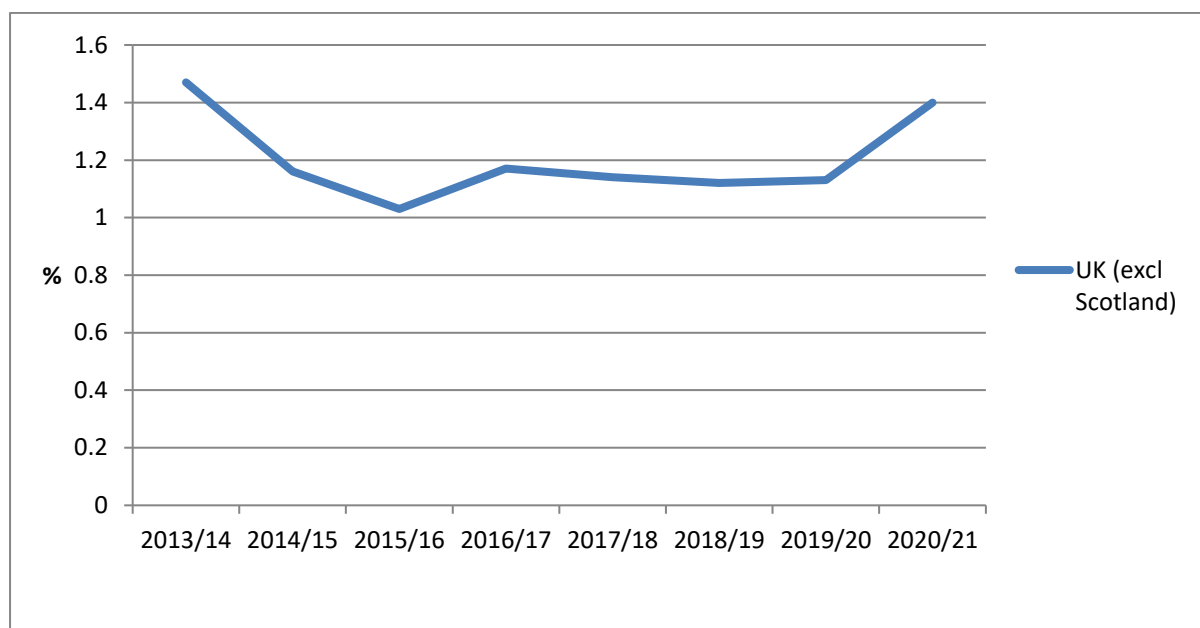
Mortality (%) following isolated CABG operations in the UK (total and divided into operative urgency)



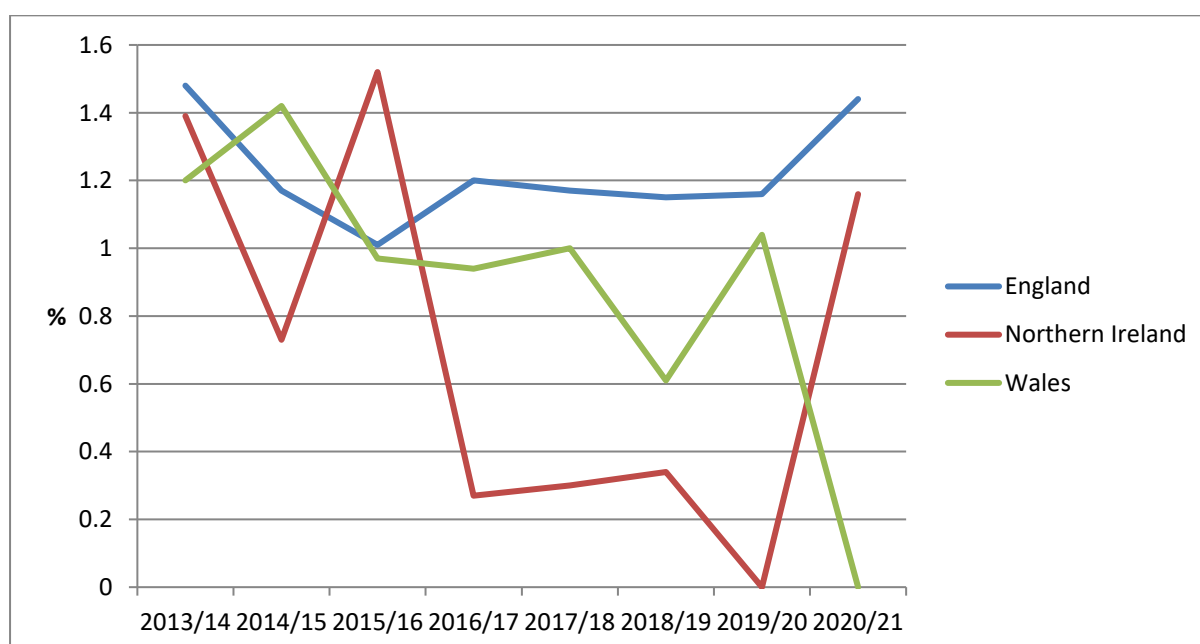
All CABG includes emergencies. UK data (excluding Scotland)

UK	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21
All CABG	1.47	1.16	1.03	1.17	1.14	1.12	1.13	1.4
Urgent CABG	1.82	1.41	1.23	1.38	1.12	1.2	1.17	1.43
Elective CABG	0.92	0.65	0.55	0.66	0.76	0.73	0.61	0.64

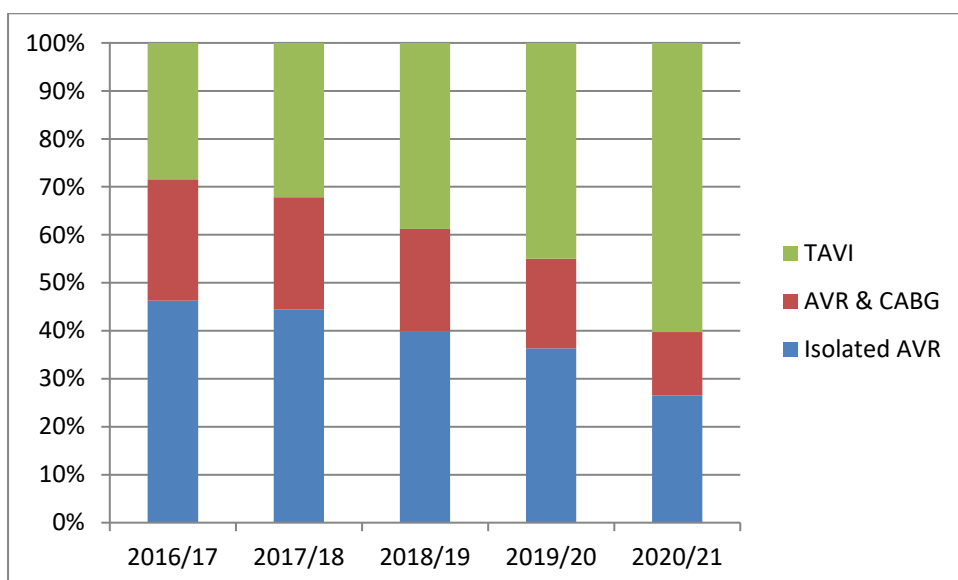
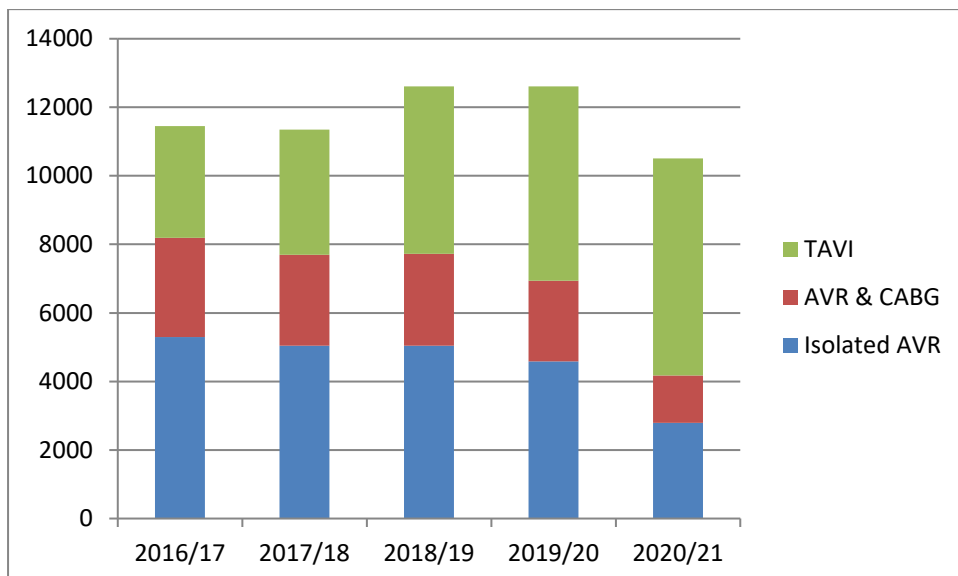
Crude Mortality rate (%) following isolated CABG (including emergencies) - by UK region



Region	First time isolated CABG (incl Emergency and Salvage)							
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
UK (excl Scotland)	1.47	1.16	1.03	1.17	1.14	1.12	1.13	1.4
England	1.48	1.17	1.01	1.2	1.17	1.15	1.16	1.44
Northern Ireland	1.39	0.73	1.52	0.27	0.3	0.34	0	1.16
Wales	1.2	1.42	0.97	0.94	1	0.61	1.04	0



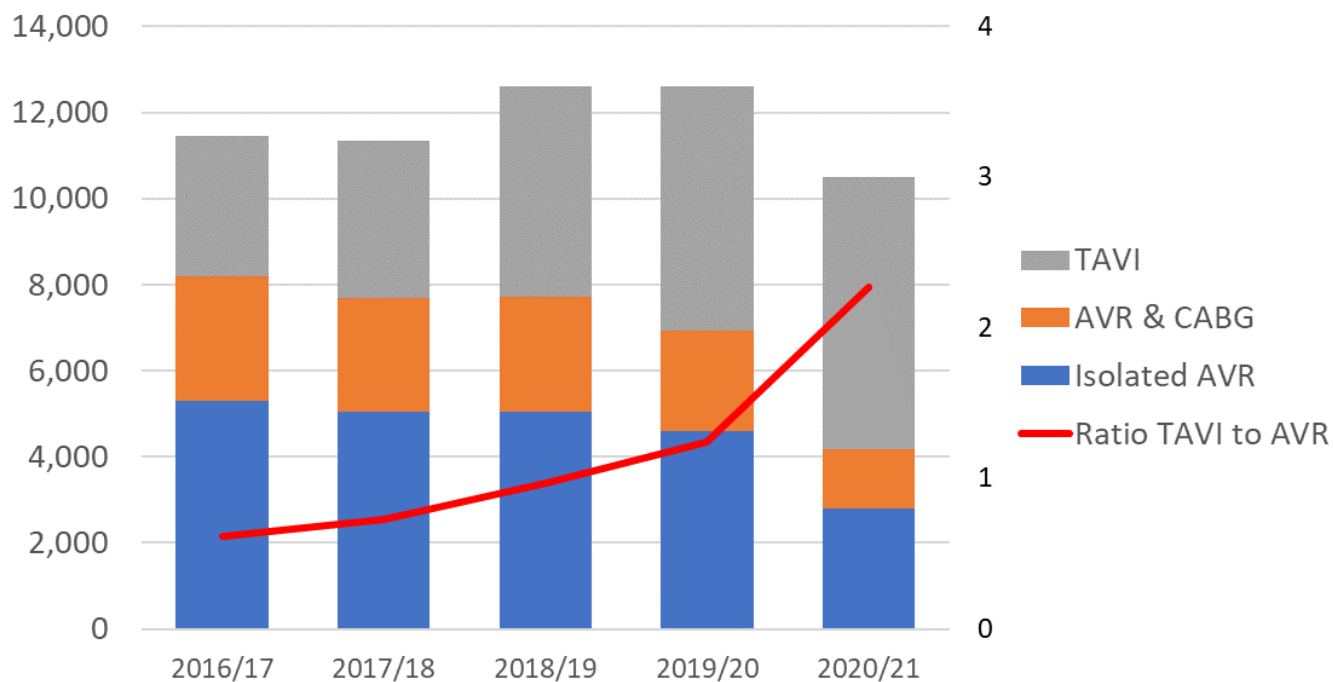
Trends in AVR and TAVI numbers – UK (excluding Scotland)



	2016/17	2017/18	2018/19	2019/20	2020/21
Isolated AVR	5297	5041	5039	4584	2790
AVR & CABG	2896	2657	2682	2352	1388
TAVI	3254	3655	4887	5676	6328

UK data – excluding Scotland

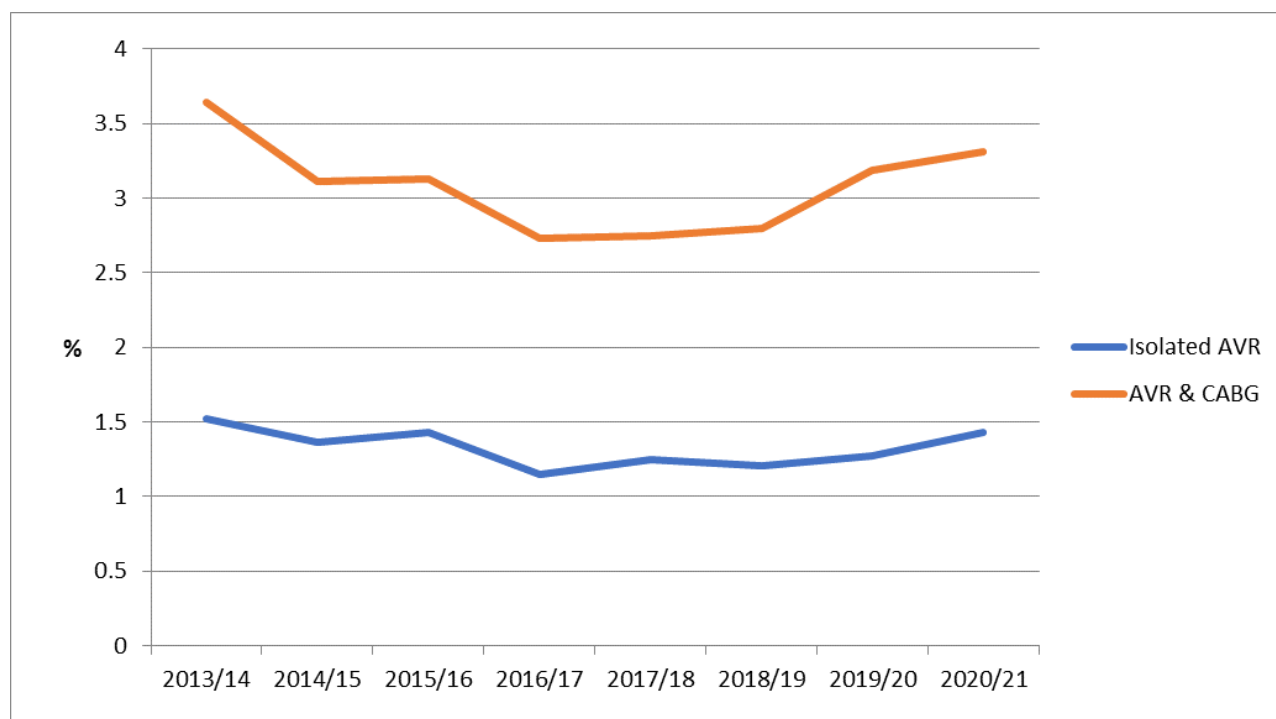
Ratio of TAVI to AVR – UK (excluding Scotland), by year



TAVI transcatheter aortic valve implantation; AVR aortic valve replacement

	2016/17	2017/18	2018/19	2019/20	2020/21
Isolated AVR	5297	5041	5039	4584	2790
AVR & CABG	2896	2657	2682	2352	1388
TAVI	3254	3655	4887	5676	6328
Ratio TAVI to AVR	0.61	0.73	0.97	1.24	2.27

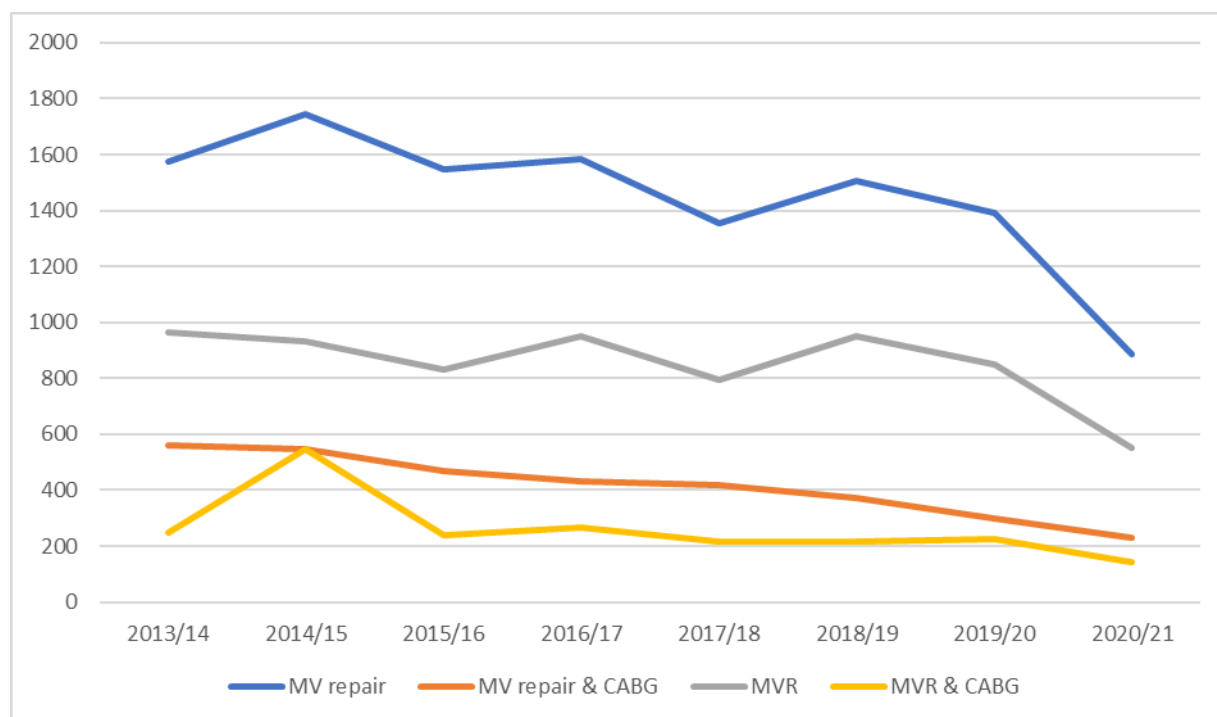
Crude mortality rates (%) after isolated AVR and AVR & CABG (including emergencies) – UK (excluding Scotland) by year



AVR aortic valve replacement; AVR & CABG combined AVR & coronary artery bypass grafting

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Isolated AVR	1.52	1.36	1.43	1.15	1.25	1.21	1.27	1.43
AVR & CABG	3.64	3.11	3.13	2.73	2.75	2.8	3.19	3.31

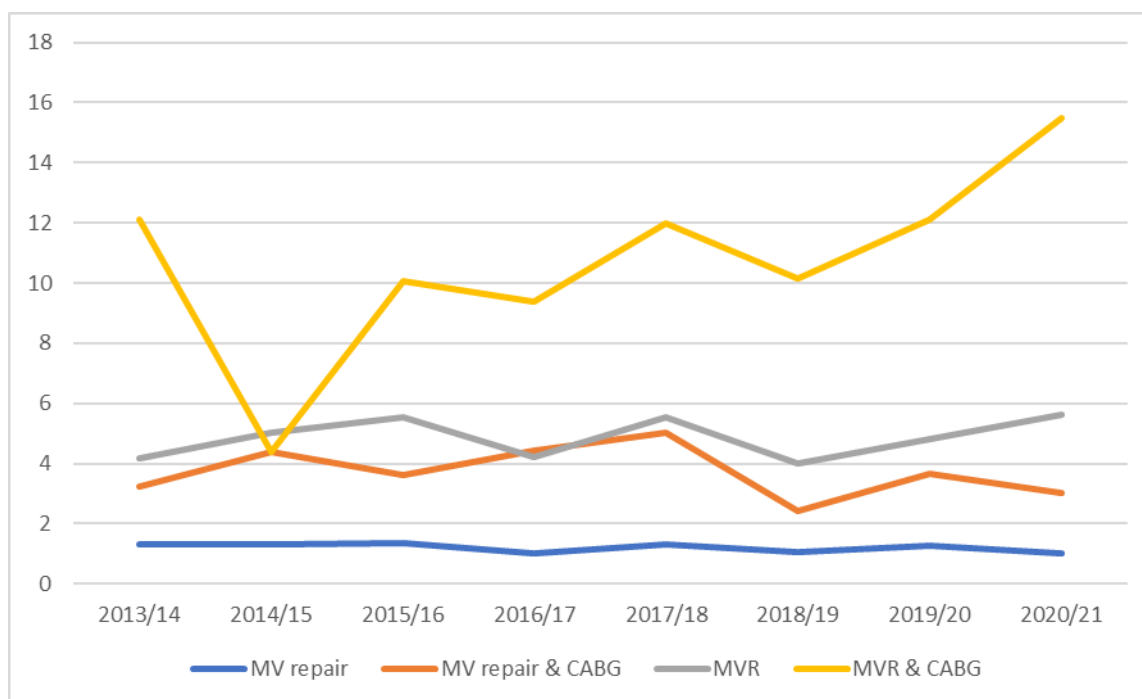
Numbers of Mitral operations (repairs and replacements with/without CABG) - UK (excluding Scotland) by year



MV mitral valve; MVR mitral valve replacement

	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21
MV repair	1576	1746	1545	1585	1353	1504	1392	886
MV repair & CABG	559	545	469	431	417	372	300	232
MVR	962	933	832	951	794	950	850	553
MVR & CABG	248	545	238	267	217	217	223	142

Crude mortality rates (%) after Mitral operations (with/without CABG) – UK (excluding Scotland) by year

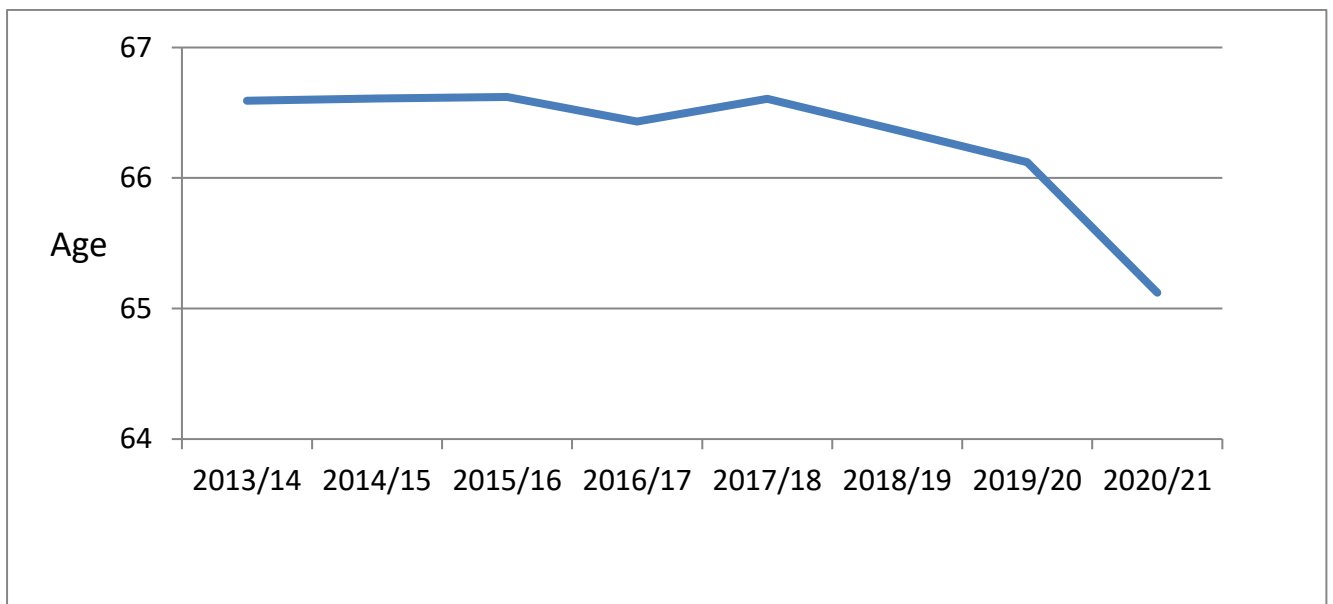


MV mitral valve; MVR mitral valve replacement

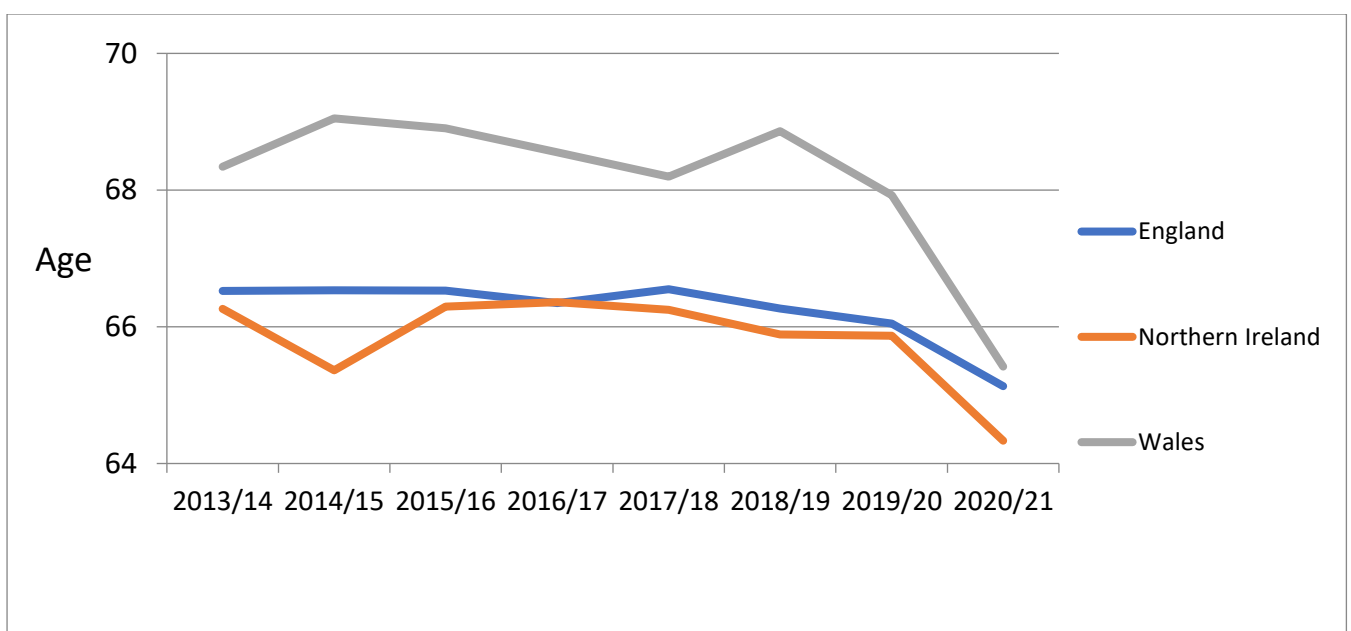
	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21
MV repair	1.3	1.3	1.4	1.0	1.3	1.1	1.3	1.0
MV repair & CABG	3.2	4.4	3.6	4.4	5.0	2.4	3.7	3.0
MVR	4.2	5.0	5.5	4.2	5.5	4.0	4.8	5.6
MVR & CABG	12.1	4.4	10.1	9.4	12.0	10.1	12.1	15.5

Age and Sex data

Age (mean) of patients undergoing cardiac surgery (all procedures) – by UK, region & hospital



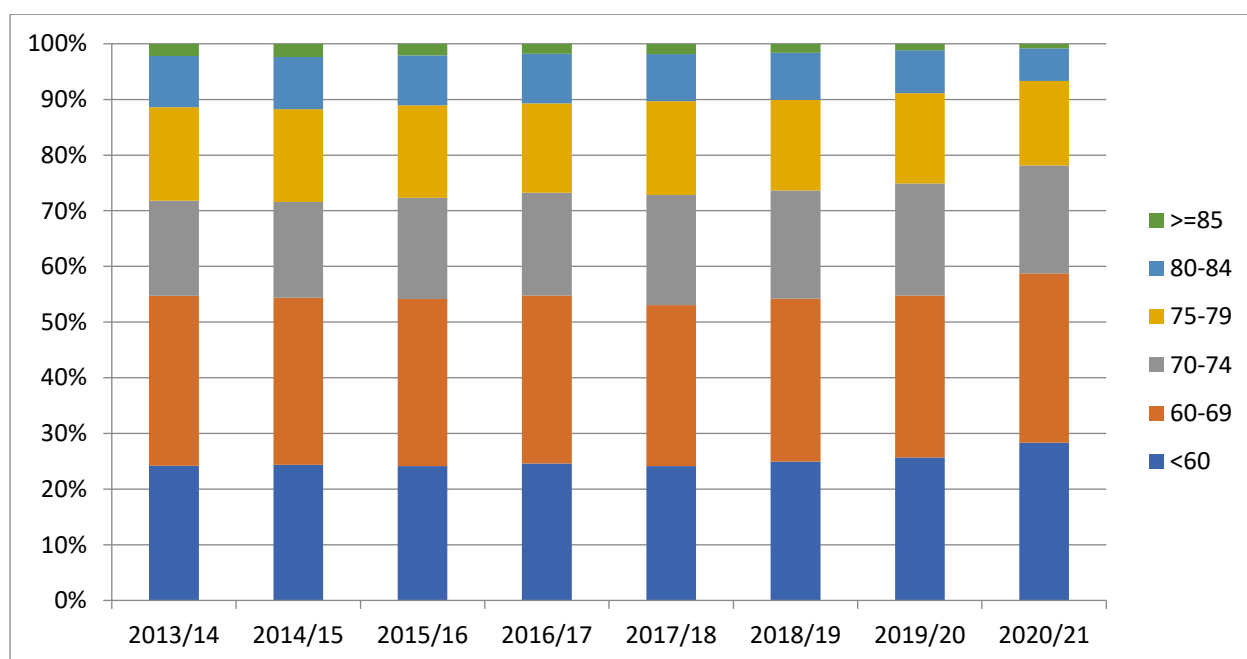
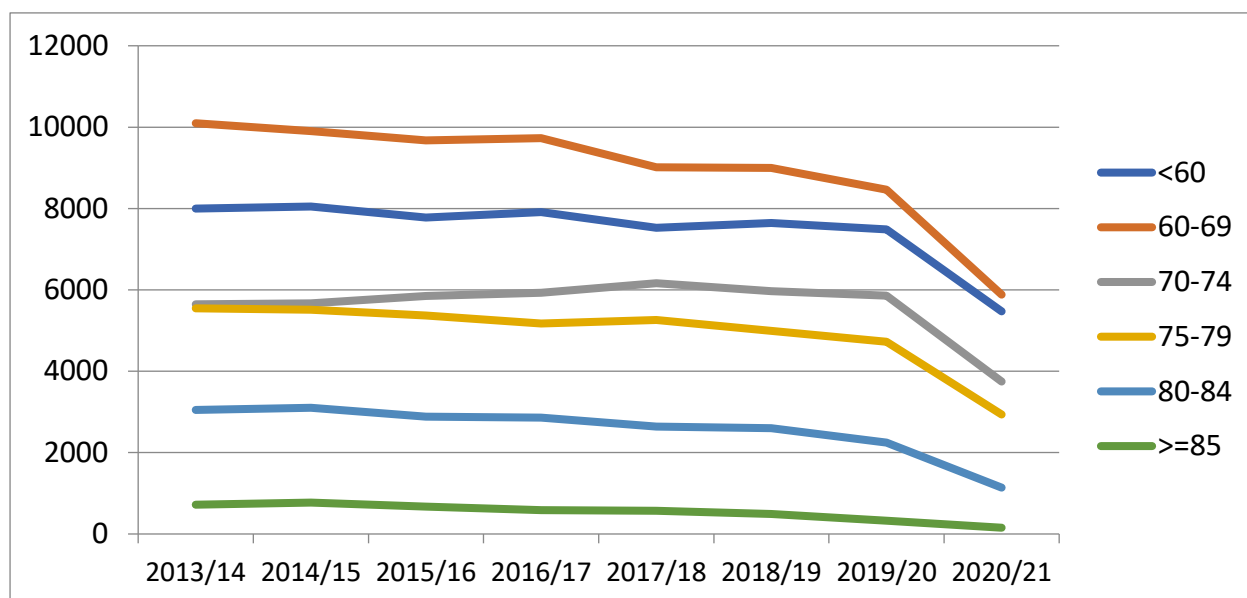
Nations	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
UK (excl Scotland)	66.6	66.6	66.6	66.4	66.6	66.4	66.1	65.1
England	66.5	66.5	66.5	66.3	66.5	66.3	66.0	65.1
Northern Ireland	66.3	65.4	66.3	66.4	66.2	65.9	65.9	64.3
Wales	68.3	69.0	68.9	68.6	68.2	68.9	67.9	65.4



Hospital	2018/19	2019/20	2020/21
Spire Southampton Hospital (PP)	69.9	70.4	68.6
Papworth Hospital	69.3	69.3	68.5
Southampton General Hospital	69.3	70.3	68.2
Derriford Hospital	68.4	68.6	67.7
Blackpool Victoria Hospital	67.6	67.7	67.4
Royal Sussex County Hospital	68.1	68.6	67.0
Basildon Hospital	68.3	67.3	66.7
Nottingham City Hospital	68.1	67.7	66.7
Freeman Hospital	67.9	68.3	66.6
Castle Hill Hospital	68.2	67.2	66.6
Morrison Hospital	70.4	69.7	66.5
University Hospital of North Staffordshire	67.4	67.0	66.2
Spire St Anthony's Hospital (PP)	65.3	64.1	66.2
Glenfield Hospital	67.1	66.0	65.9
Liverpool Heart and Chest Hospital	66.0	66.8	65.7
Wythenshawe Hospital	65.9	65.5	65.6
University Hospital of Wales	67.8	66.4	65.5
Northern General Hospital	67.2	66.7	65.3
University Hospital Coventry	67.0	66.7	65.3
Royal Victoria Hospital	66.1	66.1	65.0
John Radcliffe Hospital	66.2	65.1	65.0
Royal Brompton Hospital	64.2	64.6	65.0
James Cook University Hospital	66.5	66.8	64.6
New Cross Hospital	65.6	66.0	64.4
St George's Hospital	66.6	66.9	64.3
Leeds General Infirmary	65.2	64.5	64.2
Hammersmith Hospital	64.1	63.5	64.2
Harefield Hospital	66.0	65.1	64.2
King's College Hospital	65.8	64.4	64.1
Cromwell Hospital (PP)	66.7	62.9	64.0
St Thomas' Hospital	64.5	65.4	63.9
Manchester Royal Infirmary	65.3	65.4	63.7
Bristol Royal Infirmary	65.7	64.5	63.6
Queen Elizabeth Hospital	64.5	64.5	63.4
Barts and the London	63.5	63.0	62.9

Ranked by mean age in 2020/21.

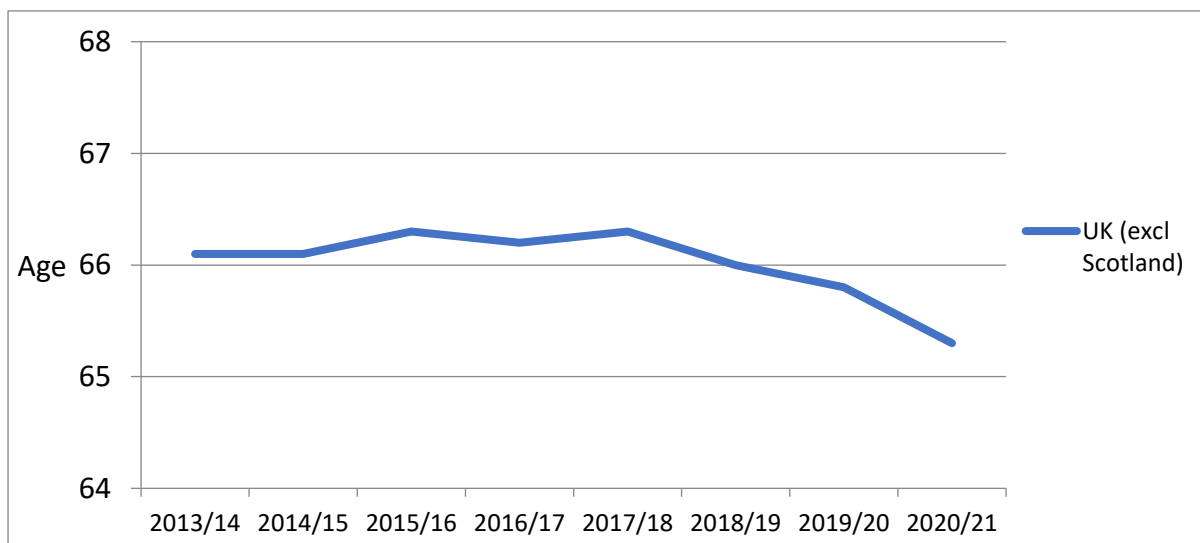
Age distribution of patients undergoing cardiac surgery (all procedures) – UK



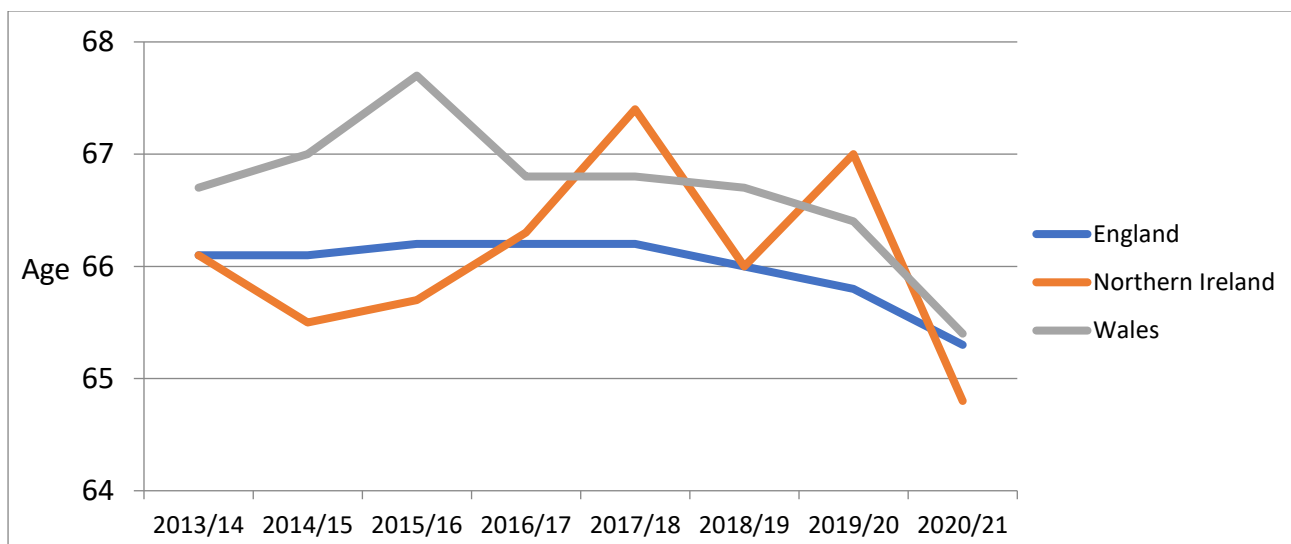
Age	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
<60	7995	8049	7780	7912	7530	7647	7485	5472
60-69	10096	9905	9673	9732	9017	8998	8460	5883
70-74	5644	5673	5851	5931	6164	5972	5859	3747
75-79	5547	5510	5373	5176	5258	4994	4728	2937
80-84	3048	3102	2882	2860	2642	2597	2250	1140
>=85	717	772	672	584	568	490	330	154

Numbers of patients. Excludes Scotland.

Age (mean) of patients undergoing isolated CABG surgery - by UK, region & hospital



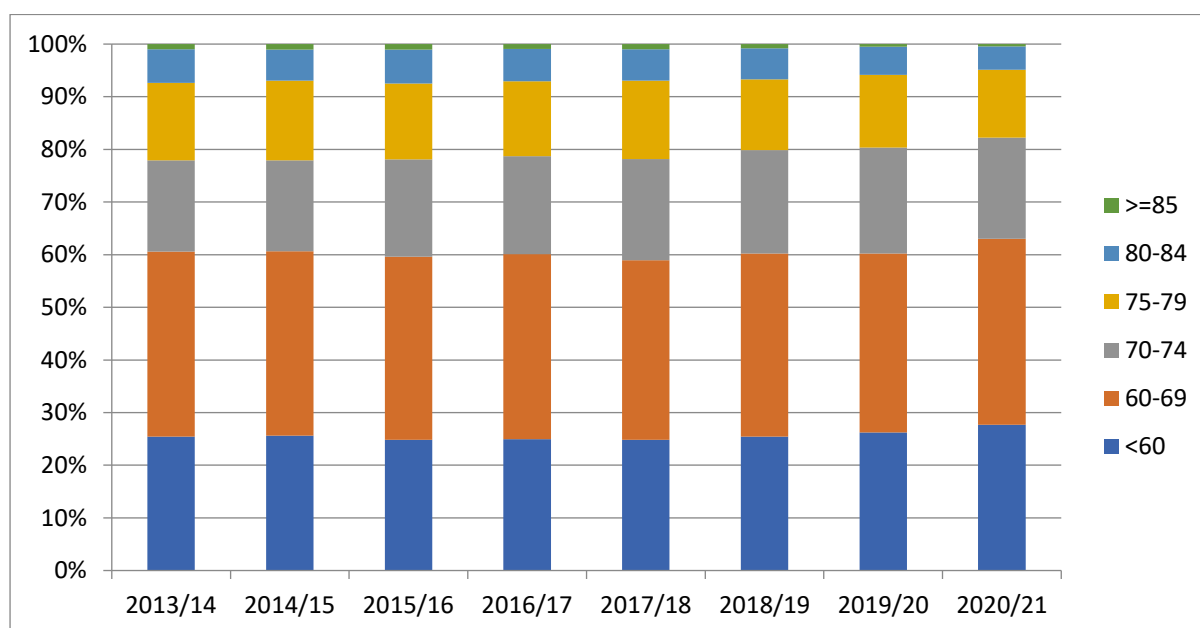
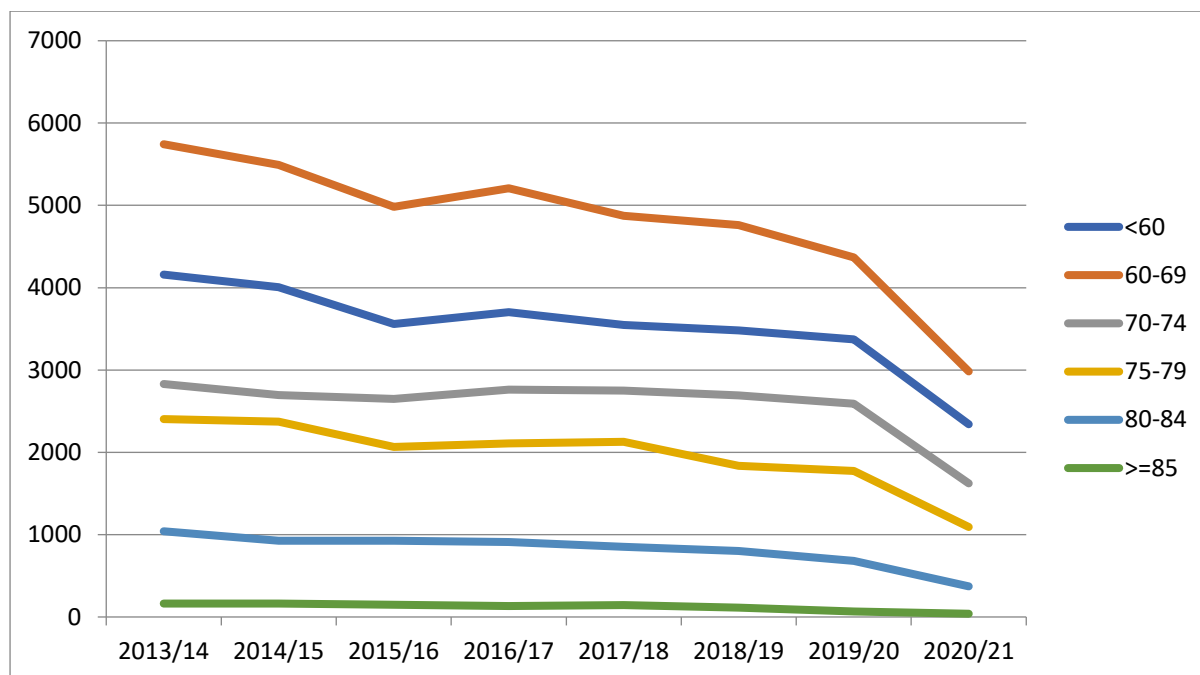
Nations	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21
UK (excl Scotland)	66.1	66.1	66.3	66.2	66.3	66.0	65.8	65.3
England	66.1	66.1	66.2	66.2	66.2	66.0	65.8	65.3
Northern Ireland	66.1	65.5	65.7	66.3	67.4	66.0	67.0	64.8
Wales	66.7	67.0	67.7	66.8	66.8	66.7	66.4	65.4



Hospital	2018/19	2019/20	2020/21
Spire St Anthony's Hospital (PP)	64.5	65.7	72.5
Papworth Hospital	68.4	68.9	68.6
Morrison Hospital	67.7	67.6	68.0
Cromwell Hospital (PP)	66.5	62.2	67.9
Nottingham City Hospital	67.3	66.7	67.7
Spire Southampton Hospital (PP)	66.2	67.7	67.0
University Hospital of North Staffordshire	67.0	66.0	67.0
Royal Sussex County Hospital	66.8	66.6	66.9
Derriford Hospital	66.9	67.7	66.8
Freeman Hospital	68.1	67.0	66.8
Southampton General Hospital	67.5	68.8	66.8
Northern General Hospital	65.9	66.4	66.1
Blackpool Victoria Hospital	66.2	66.1	66.1
Glenfield Hospital	66.4	65.6	66.0
Basildon Hospital	66.9	65.9	65.9
Castle Hill Hospital	68.2	66.6	65.6
Bristol Royal Infirmary	67.0	65.5	65.6
St Thomas' Hospital	66.4	66.0	65.5
Royal Brompton Hospital	65.6	65.9	65.5
Liverpool Heart and Chest Hospital	65.8	66.0	65.4
University Hospital Coventry	65.4	66.4	65.2
St George's Hospital	66.4	66.7	65.1
Royal Victoria Hospital	65.9	67.0	65.0
James Cook University Hospital	65.8	66.3	64.8
Wythenshawe Hospital	65.8	64.4	64.8
Harefield Hospital	66.0	64.9	64.5
Leeds General Infirmary	65.0	64.1	64.0
New Cross Hospital	64.3	65.0	63.8
John Radcliffe Hospital	65.0	64.7	63.6
Queen Elizabeth Hospital	64.0	64.2	63.6
Manchester Royal Infirmary	64.2	65.0	63.5
Barts and the London	64.1	63.5	63.5
Hammersmith Hospital	63.7	64.3	63.3
University Hospital of Wales	65.9	64.8	62.9
King's College Hospital	64.8	64.0	62.9

Ranked by mean age in 2020/21.

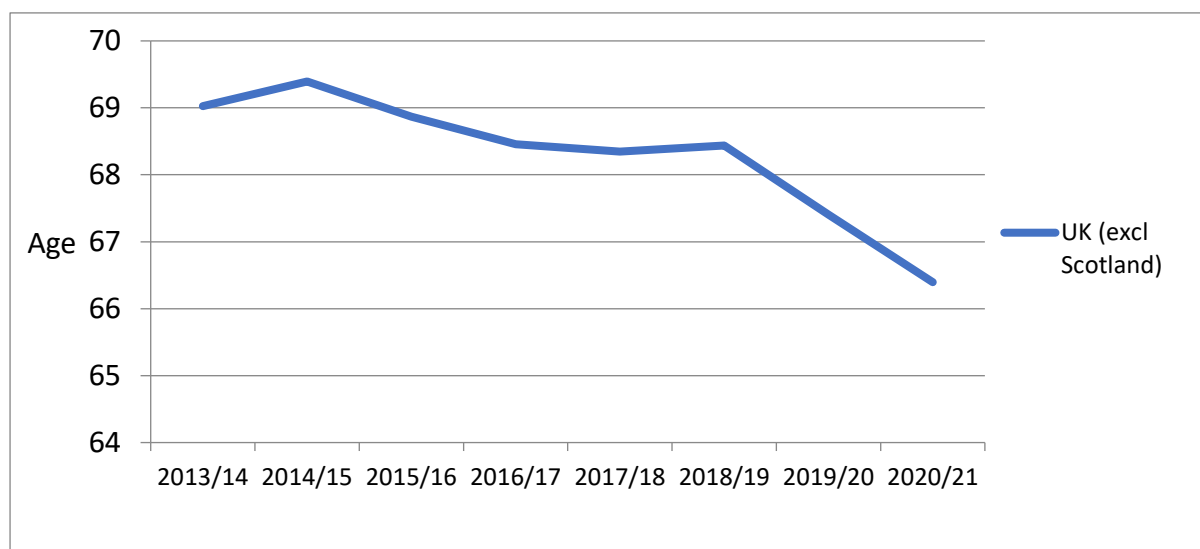
Age distribution of patients undergoing isolated CABG - UK



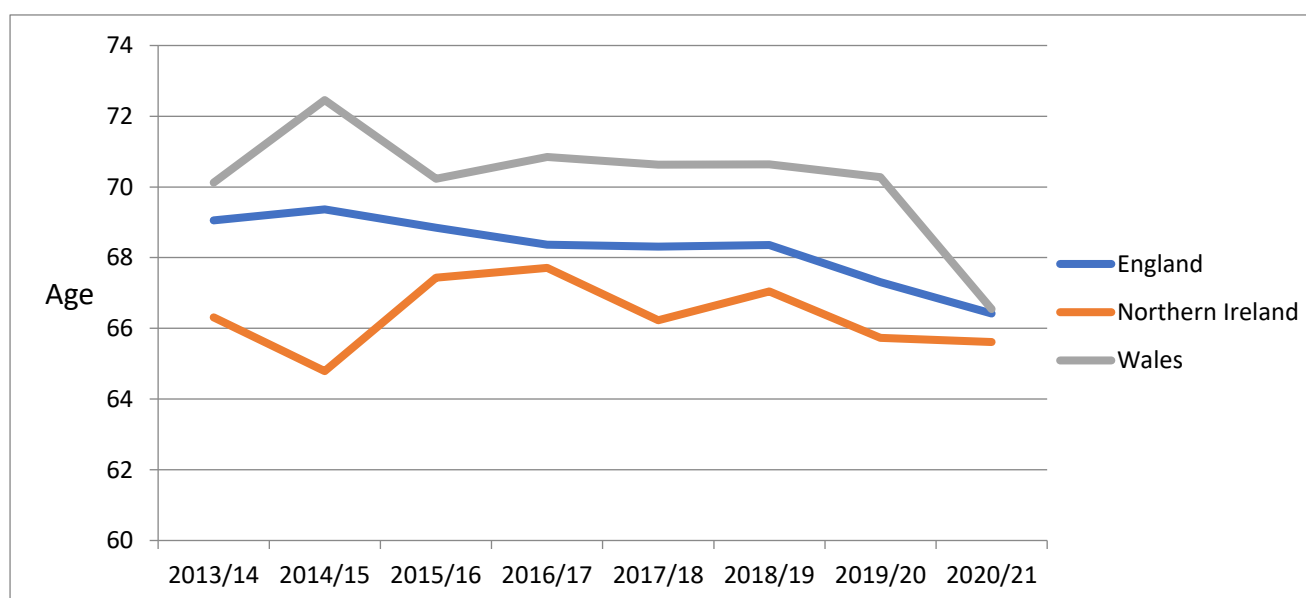
Age	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
<60	4159	4006	3558	3702	3547	3482	3371	2341
60-69	5743	5491	4982	5206	4873	4759	4368	2983
70-74	2830	2697	2650	2762	2749	2692	2591	1623
75-79	2404	2371	2067	2110	2128	1836	1774	1093
80-84	1041	925	928	912	851	803	682	372
>=85	163	163	147	134	143	113	66	39

Numbers of patients. Excludes redo CABG. Excludes Scotland.

Age (mean) of patients undergoing isolated AVR surgery – by UK, region & hospital



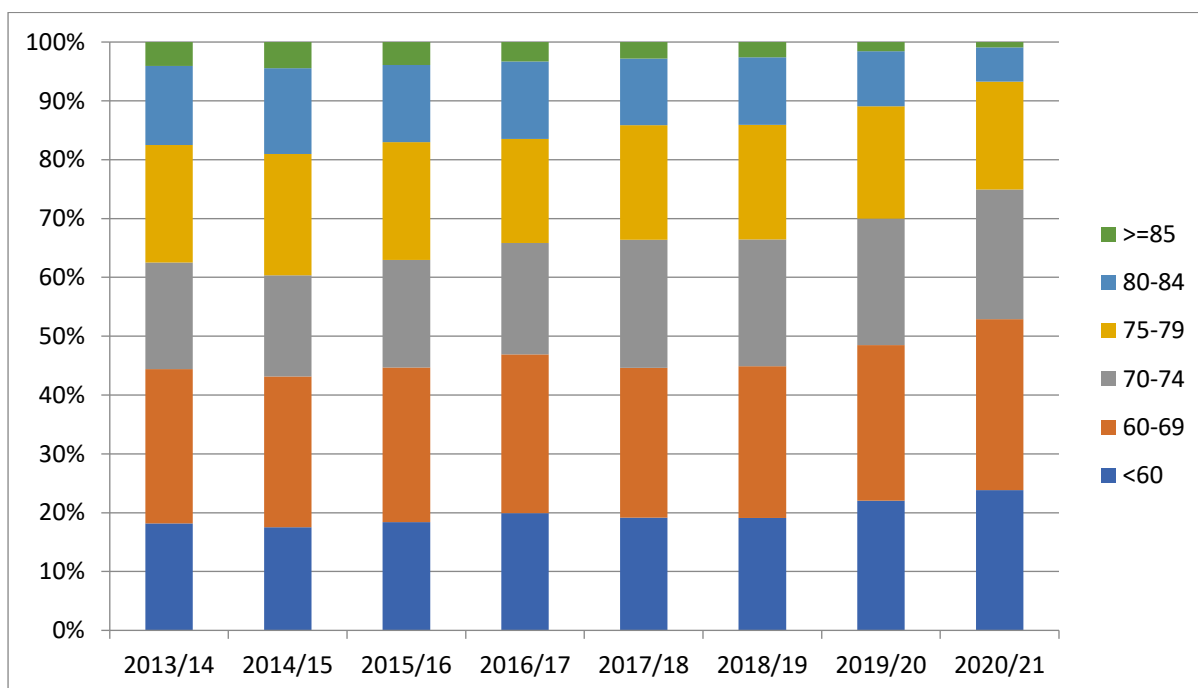
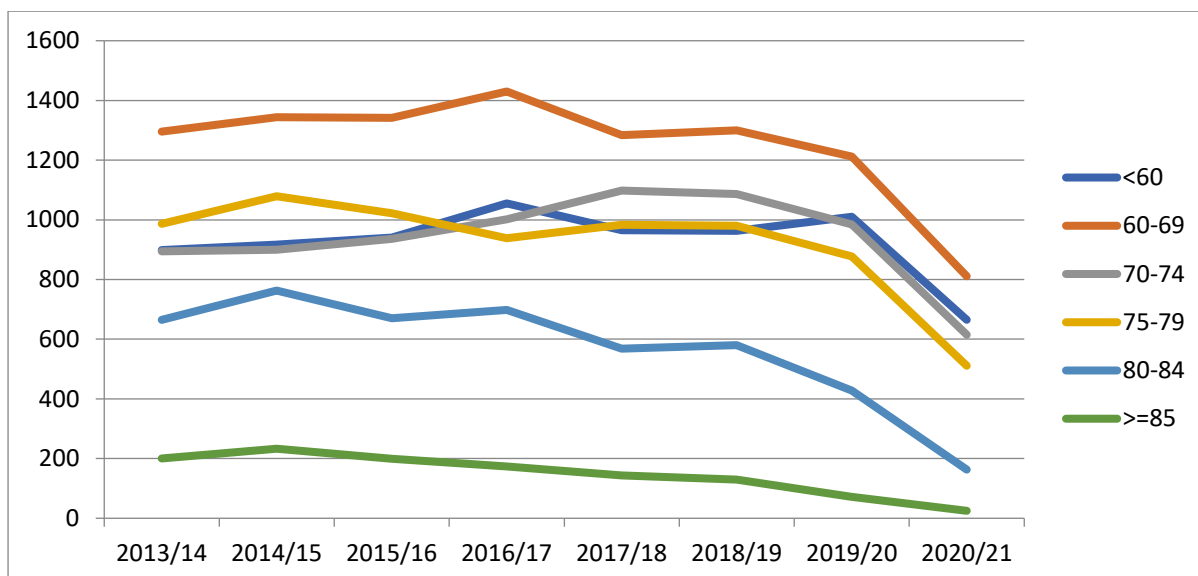
Nations	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
UK (excl Scotland)	69.0	69.4	68.9	68.5	68.3	68.4	67.4	66.4
England	69.1	69.4	68.8	68.4	68.3	68.4	67.3	66.4
Northern Ireland	66.3	64.8	67.4	67.7	66.2	67.0	65.7	65.6
Wales	70.1	72.5	70.2	70.8	70.6	70.6	70.3	66.5



Hospital	2018/19	2019/20	2020/21
Castle Hill Hospital	70.0	69.1	70.8
Blackpool Victoria Hospital	69.0	69.9	70.5
Spire St Anthony's Hospital (PP)	69.0	60.7	70.0
Southampton General Hospital	70.4	71.4	70.0
Spire Southampton Hospital (PP)	72.9	72.2	69.2
Basildon Hospital	71.0	70.3	68.9
Freeman Hospital	68.8	69.8	68.7
Morrison Hospital	71.9	71.2	68.0
University Hospital Coventry	68.2	65.7	67.6
Nottingham City Hospital	69.1	67.9	67.6
Papworth Hospital	71.2	68.9	67.6
Northern General Hospital	69.8	66.9	67.0
Bristol Royal Infirmary	69.0	66.5	66.9
Wythenshawe Hospital	67.9	68.2	66.9
St George's Hospital	68.5	68.2	66.8
Glenfield Hospital	70.2	67.0	66.7
Liverpool Heart and Chest Hospital	68.9	69.1	66.5
Royal Sussex County Hospital	68.3	68.4	66.5
Derriford Hospital	70.1	70.0	66.4
St Thomas' Hospital	66.2	67.3	66.3
University Hospital of Wales	69.2	69.5	66.1
Royal Victoria Hospital	67.1	66.0	66.1
University Hospital of North Staffordshire	69.0	67.1	65.7
James Cook University Hospital	66.6	67.6	65.5
Leeds General Infirmary	66.2	65.6	65.3
Royal Brompton Hospital	64.6	65.5	65.2
John Radcliffe Hospital	67.3	64.7	64.9
King's College Hospital	67.3	65.4	64.8
Hammersmith Hospital	64.6	64.3	64.7
Barts and the London	66.2	63.0	64.0
Harefield Hospital	67.1	65.9	63.8
Queen Elizabeth Hospital	66.7	66.0	63.3
Manchester Royal Infirmary	64.9	65.8	63.2
Cromwell Hospital (PP)	59.3	69.0	62.7
New Cross Hospital	66.8	65.3	60.2

Ranked by mean age in 2020/21.

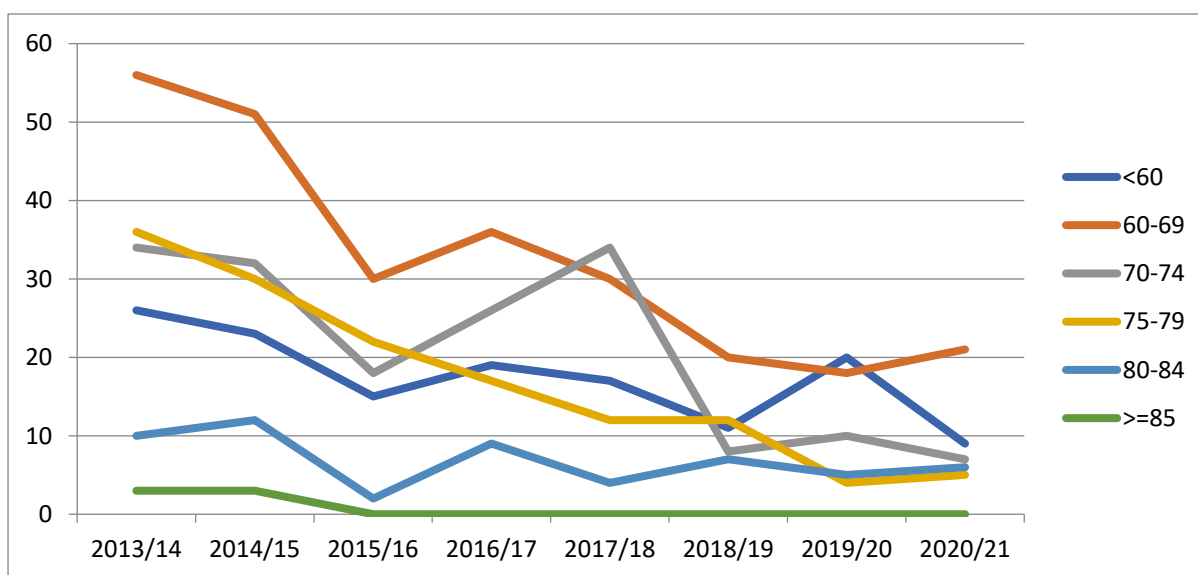
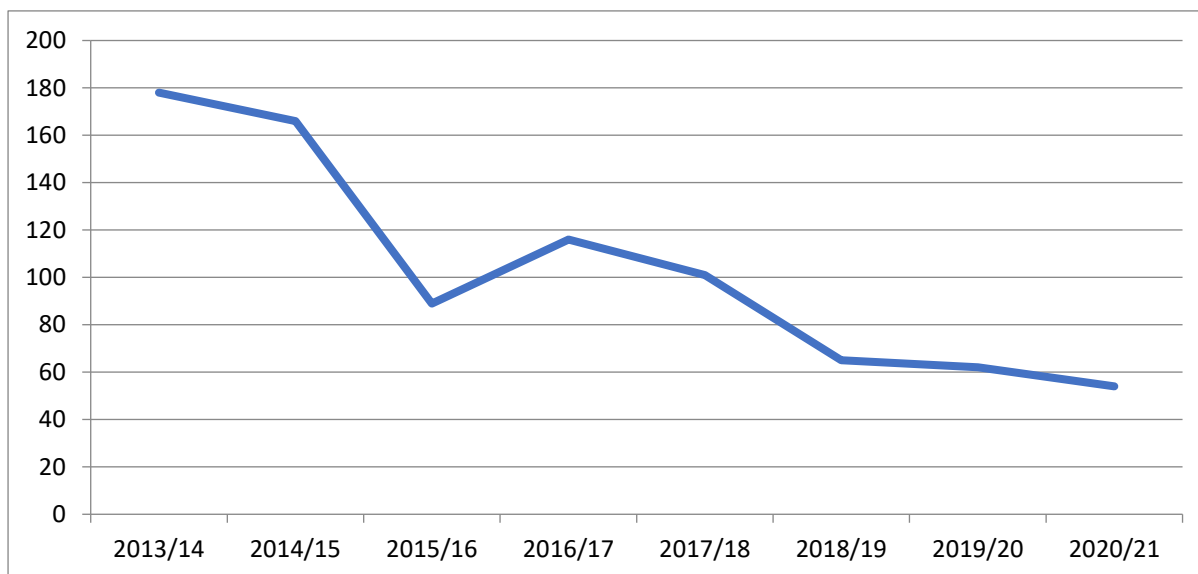
Age distribution of patients undergoing isolated AVR - UK



Age	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
<60	899	917	940	1055	965	963	1010	665
60-69	1296	1344	1342	1430	1284	1300	1212	811
70-74	894	900	936	1002	1098	1086	985	615
75-79	987	1079	1022	938	983	980	877	511
80-84	665	763	670	698	568	580	428	163
>=85	200	233	199	174	143	130	72	25

Numbers of patients. Excludes Scotland.

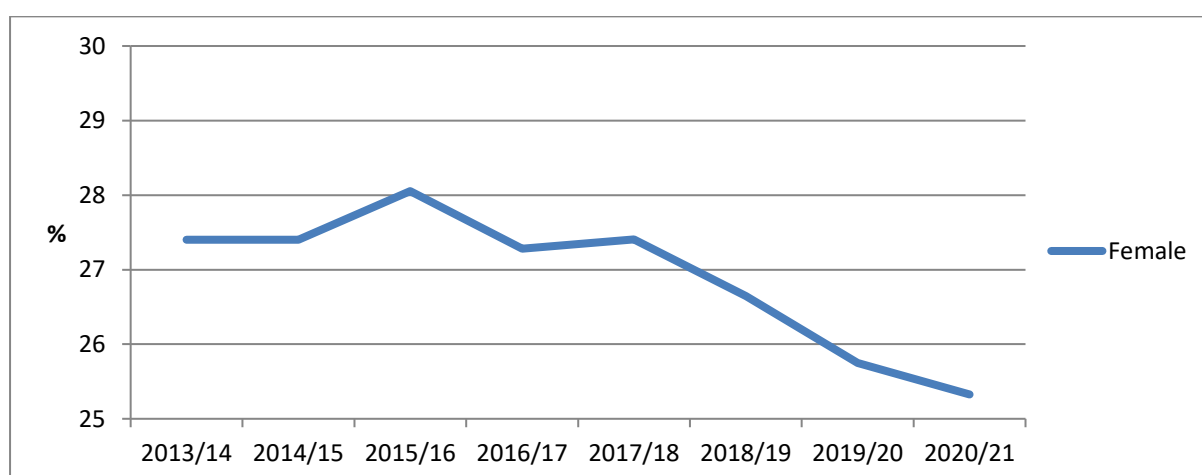
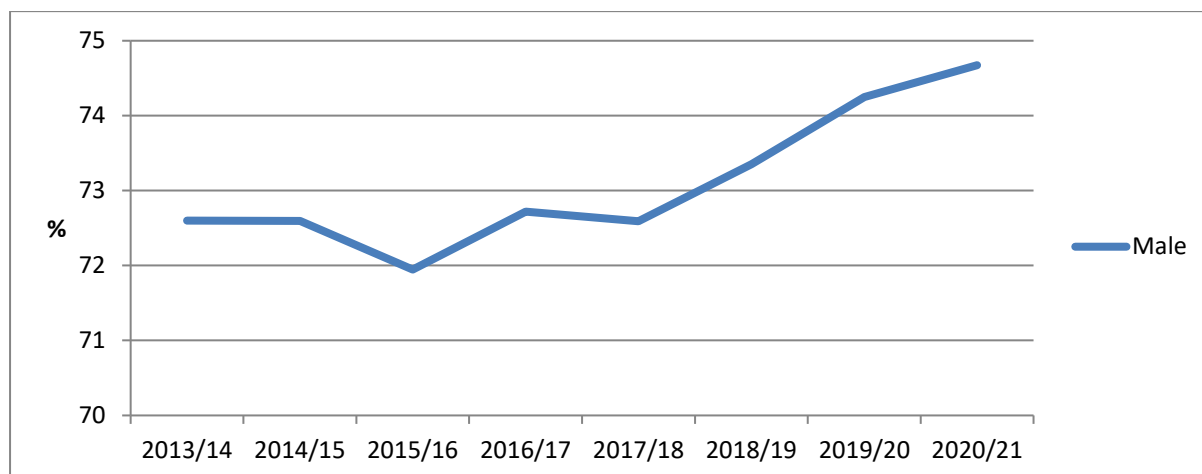
Numbers and Age distribution of patients undergoing redo isolated CABG – UK



Age	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
<60	26	23	15	19	17	11	20	9
60-69	56	51	30	36	30	20	18	21
70-74	34	32	18	26	34	8	10	7
75-79	36	30	22	17	12	12	4	5
80-84	10	12	2	9	4	7	5	6
>=85	3	3	0	0	0	0	0	0
Totals	165	151	87	107	97	58	57	48

Redo isolated CABG. UK (excluding Scotland)

Sex of patients undergoing cardiac surgery (all procedures) by UK & region



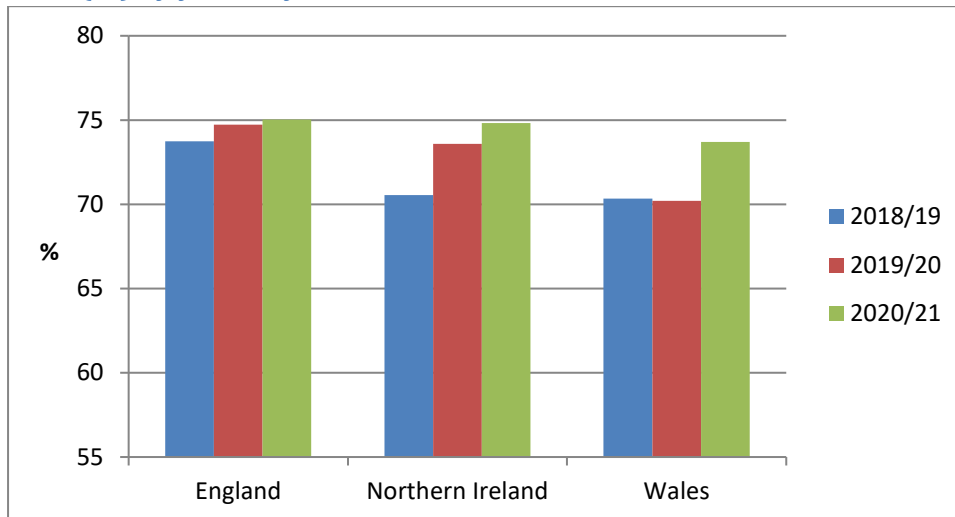
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Male	72.6	72.6	71.9	72.7	72.6	73.4	74.3	74.7
Female	27.4	27.4	28.1	27.3	27.4	26.6	25.7	25.3

UK data – excluding Scotland

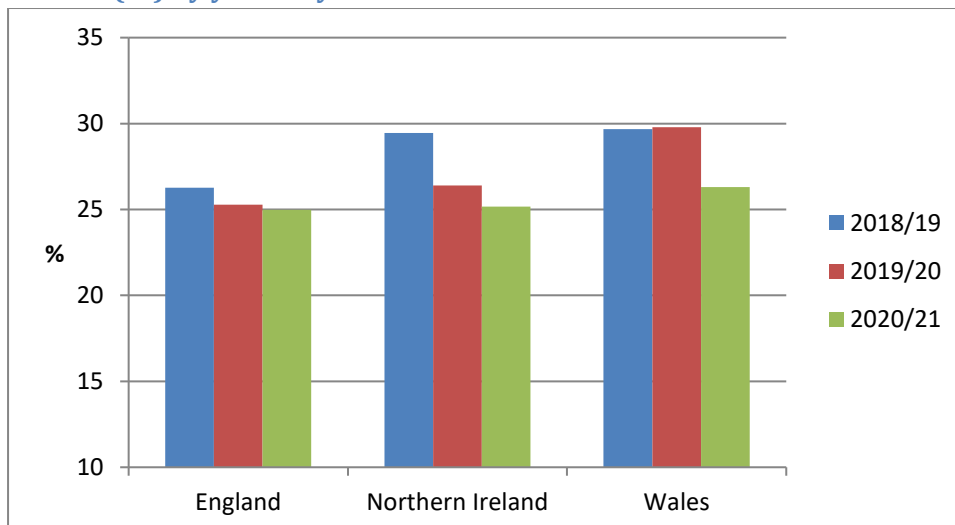
Nations	Male - All procedures (n)			Female - All procedures (n)		
	2018/19	2019/20	2020/21	2018/19	2019/20	2020/21
UK	21369	20451	13310	7702	7001	4443
England	19984	19061	12549	7120	6448	4178
Northern Ireland	508	563	324	212	202	109
Wales	877	827	437	370	351	156

Nations	Male - All procedures (%)			Female - All procedures (%)		
	2018/19	2019/20	2020/21	2018/19	2019/20	2020/21
UK	73.5	74.5	75.0	26.5	25.5	25.0
England	73.7	74.7	75.0	26.3	25.3	25.0
Northern Ireland	70.6	73.6	74.8	29.4	26.4	25.2
Wales	70.3	70.2	73.7	29.7	29.8	26.3

Male (%) by year - by nation



Female (%) by year - by nation

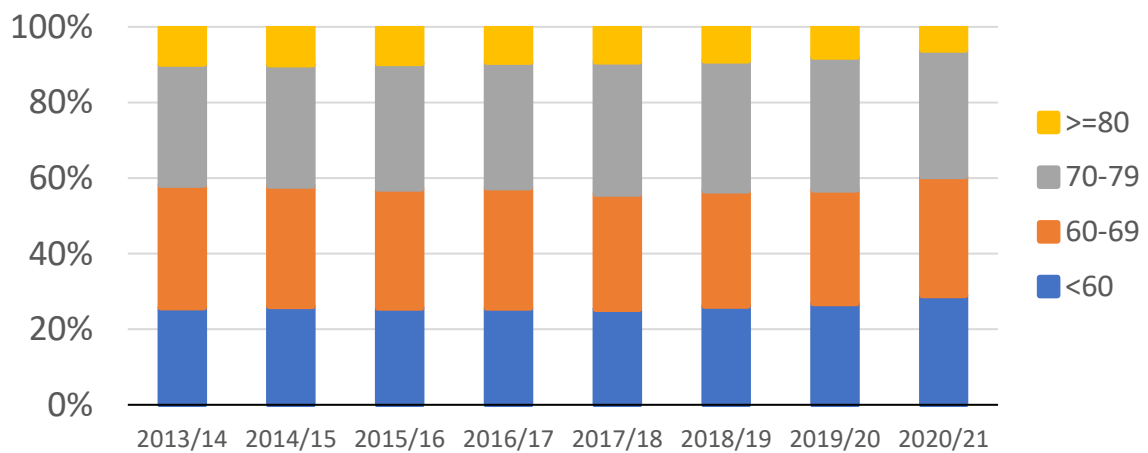
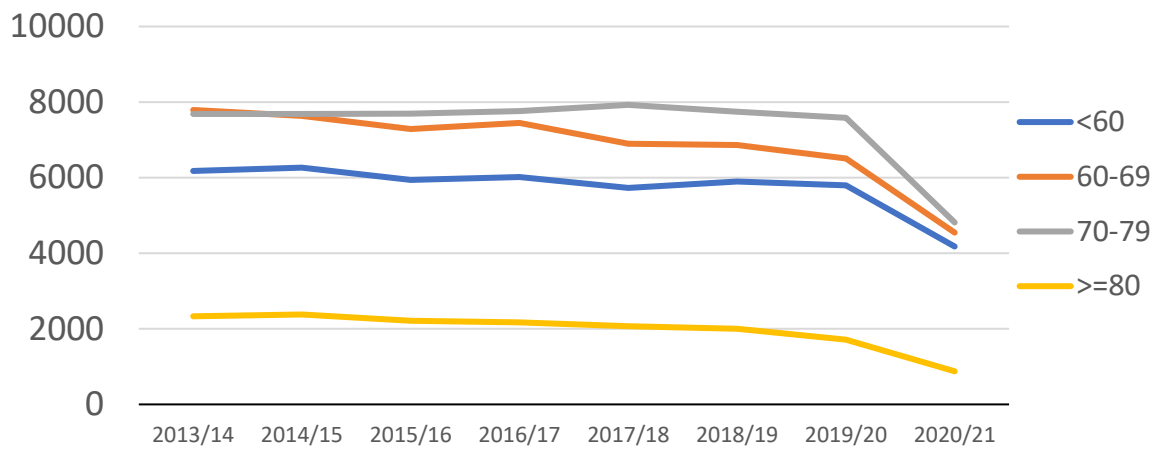


Proportion of female patients (%) – all procedures (by unit)

Hospital	Female - All procedures (%)		
	2018/19	2019/20	2020/21
Cromwell Hospital (PP)	18.2	6.7	34.8
King's College Hospital	27.9	24.4	30.1
University Hospital of Wales	31.0	29.7	28.8
Bristol Royal Infirmary	27.8	27.7	28.2
Freeman Hospital	26.9	26.2	28.0
Royal Sussex County Hospital	24.1	24.8	27.2
St George's Hospital	25.4	20.8	27.1
University Hospital Coventry	24.9	24.1	27.0
Blackpool Victoria Hospital	30.3	27.4	26.9
Northern General Hospital	29.9	25.6	26.7
Papworth Hospital	29.4	28.3	26.7
Spire Southampton Hospital (PP)	23.3	26.1	26.3
Royal Brompton Hospital	24.3	22.2	25.9
Castle Hill Hospital	24.2	21.8	25.7
Glenfield Hospital	26.1	25.6	25.6
Barts and the London	26.3	26.1	25.6
Nottingham City Hospital	25.1	28.0	25.4
Liverpool Heart and Chest Hospital	26.4	25.4	25.4
Royal Victoria Hospital	29.4	26.4	25.2
Harefield Hospital	23.9	24.0	24.5
Queen Elizabeth Hospital	22.5	25.9	24.4
Derriford Hospital	25.4	26.2	24.4
St Thomas' Hospital	29.4	28.7	24.3
University Hospital of North Staffordshire	24.8	21.8	23.4
John Radcliffe Hospital	23.6	22.6	23.2
Hammersmith Hospital	26.4	25.4	23.2
Southampton General Hospital	28.6	26.8	23.0
Morrison Hospital	28.4	29.9	22.8
Leeds General Infirmary	22.2	23.8	22.3
James Cook University Hospital	25.6	24.9	22.3
Wythenshawe Hospital	24.3	23.4	22.3
New Cross Hospital	25.0	25.0	21.7
Basildon Hospital	27.0	25.5	19.9
Manchester Royal Infirmary	28.1	23.7	19.8
Spire St Anthony's Hospital (PP)	17.2	12.3	15.4

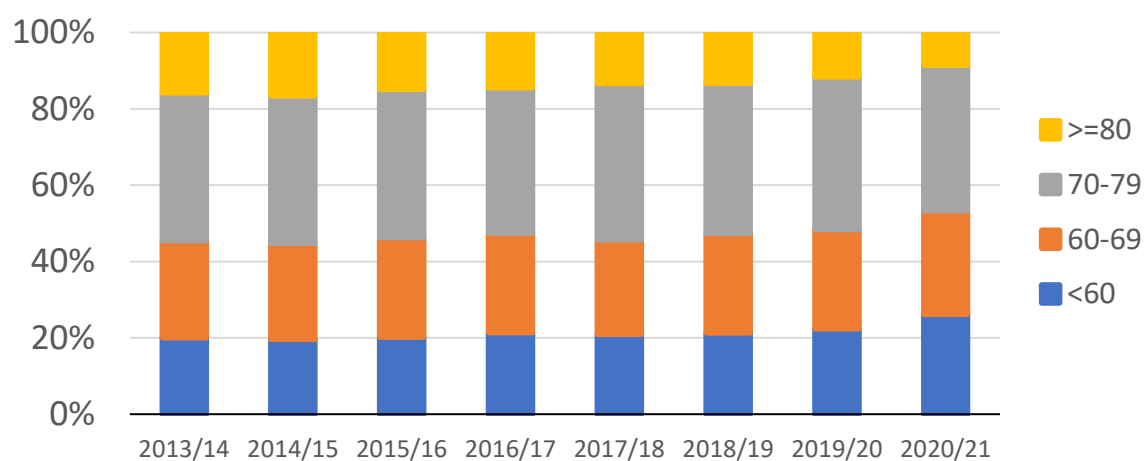
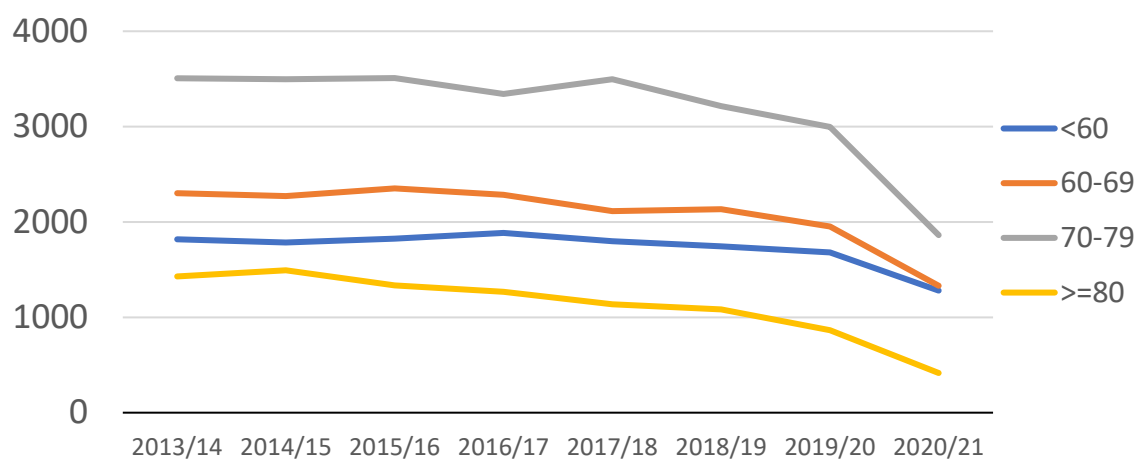
Ranked by proportion of female patients 2020/21

Age distribution of male patients having cardiac surgery (all procedures) – UK



Age	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
<60	6175	6265	5939	6017	5730	5898	5796	4178
60-69	7791	7633	7290	7445	6901	6862	6505	4546
70-79	7682	7685	7691	7765	7926	7746	7585	4815
>=80	2335	2380	2213	2175	2073	2003	1715	876

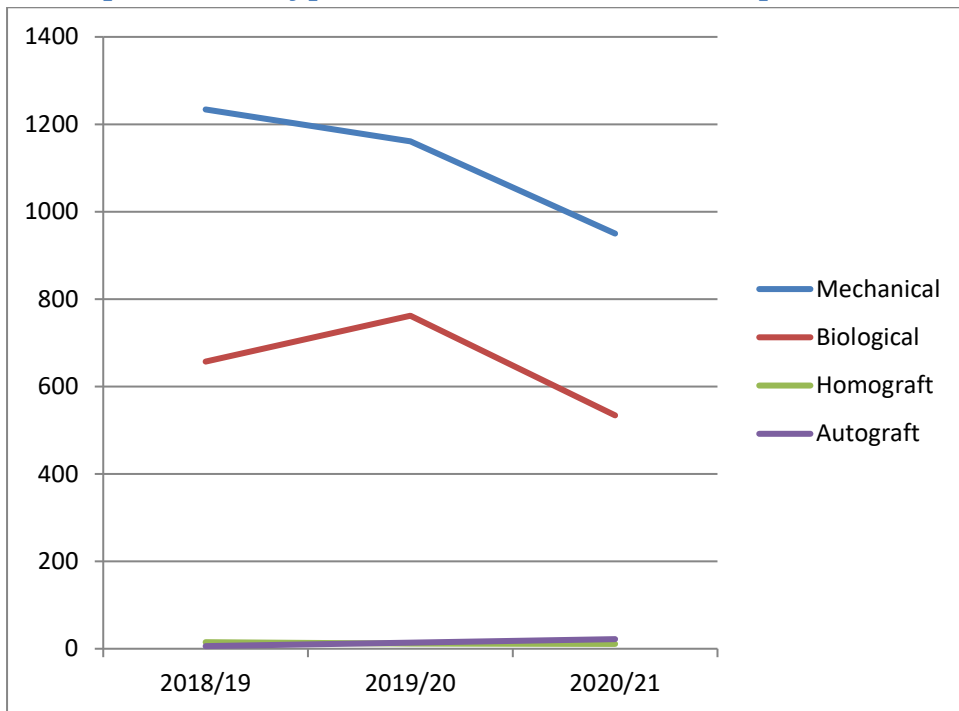
Age distribution of female patients having cardiac surgery (all procedures) - UK



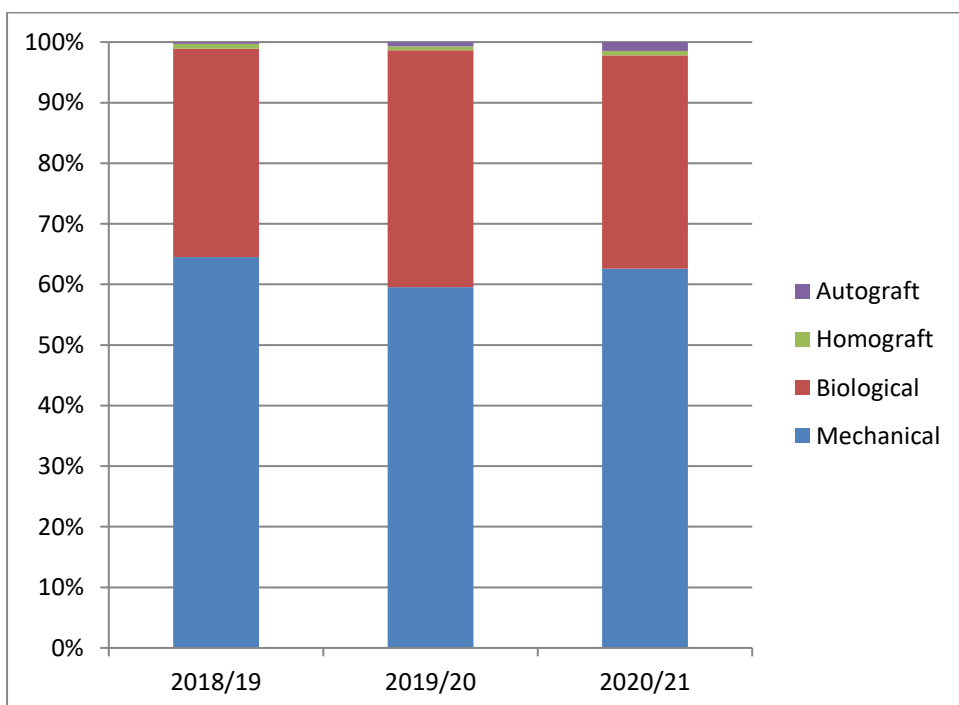
Age	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
<60	1817	1783	1825	1885	1797	1745	1679	1280
60-69	2302	2271	2352	2286	2114	2134	1952	1331
70-79	3507	3498	3509	3341	3496	3215	2997	1862
>=80	1429	1493	1334	1268	1137	1083	863	416

Valve Surgery

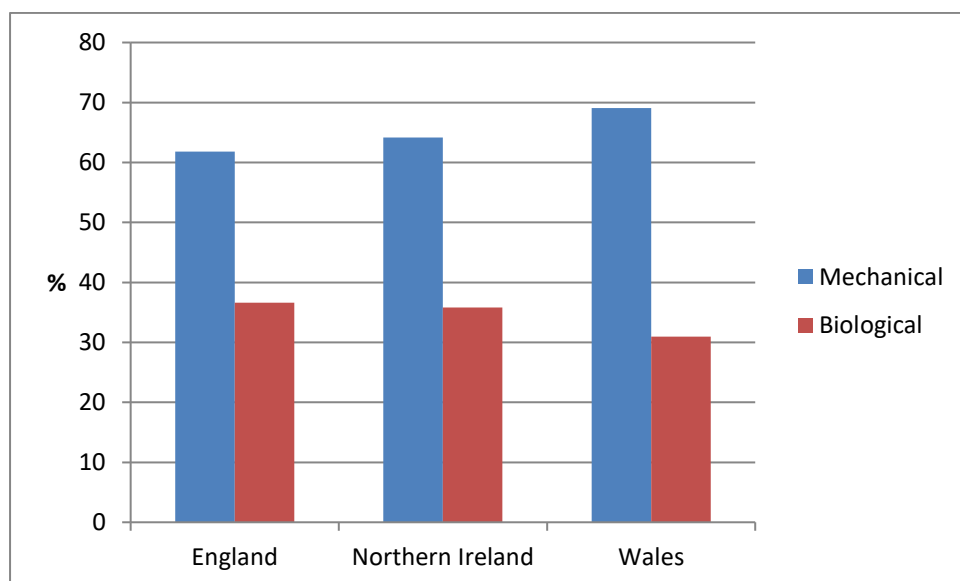
Valve prosthesis types used for isolated AVR in patients <60 – UK by year



UK (excl Scotland)	2018/19	2019/20	2020/21
Mechanical	1234	1161	950
Biological	657	762	534
Homograft	15	12	11
Autograft (Ross)	6	14	22



Proportion of bioprosthetic valves used for isolated AVR in patients <60 years old (3-year aggregate 2018/21)



Nations	Mechanical	Biological	Homograft	Autograft (Ross)
UK (excl Scotland)	62.2%	36.3%	0.7%	0.8%
England	61.8%	36.6%	0.8%	0.9%
Northern Ireland	64.2%	35.8%	0%	0%
Wales	69.1%	30.9%	0%	0%

3 years - 2018/21. Ross procedures performed by congenital surgeons on adults not included if submitted to National Congenital Heart Disease Audit (NCHDA) at NICOR.

Hospital	Total AVR (n)	% Bioprosthetic
Castle Hill Hospital	119	10.1%
Northern General Hospital	189	10.6%
University Hospital of North Staffordshire	137	12.4%
Barts and the London	506	17.0%
St George's Hospital	93	17.2%
Leeds General Infirmary	171	18.1%
New Cross Hospital	145	23.4%
University Hospital of Wales	145	24.1%
Wythenshawe Hospital	142	25.4%
Queen Elizabeth Hospital	138	26.8%
James Cook University Hospital	157	28.0%
University Hospital Coventry	97	29.9%
John Radcliffe Hospital	163	30.7%
Bristol Royal Infirmary	246	31.7%
Liverpool Heart and Chest Hospital	285	33.0%
Freeman Hospital	123	35.8%
Royal Victoria Hospital	201	35.8%
Derriford Hospital	169	36.1%
Blackpool Victoria Hospital	128	37.5%
Papworth Hospital	333	40.8%
Basildon Hospital	95	41.1%
Morrison Hospital	91	41.8%
Spire St Anthony's Hospital (PP)	13	46.2%
Hammersmith Hospital	92	47.8%
St Thomas' Hospital	215	51.2%
Royal Sussex County Hospital	77	55.8%
Glenfield Hospital	213	55.9%
Southampton General Hospital	48	62.5%
Royal Brompton Hospital	189	66.1%
Spire Southampton Hospital (PP)	3	66.7%
King's College Hospital	125	67.2%
Harefield Hospital	221	71.5%
Nottingham City Hospital	107	73.8%
Manchester Royal Infirmary	114	77.2%
Cromwell Hospital (PP)	8	100.0%

Data for 3 years from 2018/21 in patients <60 years old. Ranked by lowest %.

Incisions used for isolated AVR – UK (excluding Scotland)

UK	2018/19	2019/20	2020/21
Sternotomy	3104	3314	2168
Partial Sternotomy	380	467	202
Mini-thoracotomy	81	92	47
Other	23	10	14
Missing	1420	680	318

Multiple options are allowed (so totals may not equal total cases performed). Surgical incision was a new dataset field in NACSA from April 2017 (compliance with data submission has been improving each year).

Proportion (%) of isolated AVR via an incision other than a median sternotomy – by UK region and year

Nation	2018/19	2019/20	2020/21
UK (excl Scotland)	13.2	14.3	10.6
England	12.7	14.7	10.8
Northern Ireland	NA	NA	NA
Wales	21.1	8.2	6.6

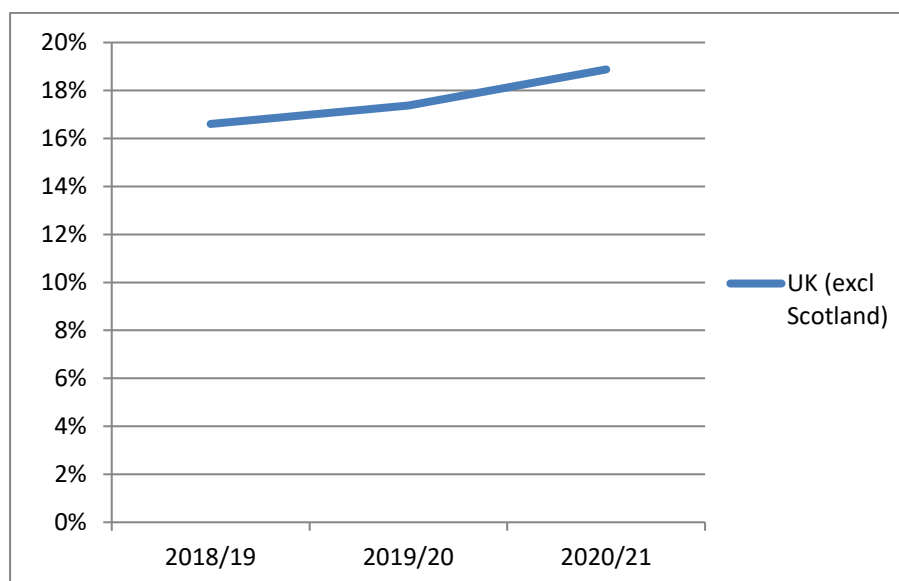
NA no data available.

Proportion (%) of isolated AVR operations via an incision other than a median sternotomy – by hospital and year

Hospital	2018/19	2019/20	2020/21
KCH. King's College Hospital	42	55	58
CRO. Cromwell Hospital (PP)	0	0	57
STH. St Thomas' Hospital	38	38	37
HH. Harefield Hospital	36	38	29
NHB. Royal Brompton Hospital	13	19	27
BAS. Basildon Hospital	25	17	21
CHN. Nottingham City Hospital	15	12	20
GEO. St George's Hospital	20	29	19
VIC. Blackpool Victoria Hospital	33	23	18
STO. University Hospital of North Staffordshire	6	2	16
NGS. Northern General Hospital	NA	28	14
BHL. Liverpool Heart and Chest Hospital	9	16	13
SCM. James Cook University Hospital	31	23	11
NCR. New Cross Hospital	4	14	11
MOR. Morriston Hospital	19	6	11
RSC. Royal Sussex County Hospital	NA	0	10
BRI. Bristol Royal Infirmary	29	18	9
WYT. Wythenshawe Hospital	0	15	8
QEB. Queen Elizabeth Hospital	8	4	6
UHW. University Hospital of Wales	23	11	4
BAL. Barts and the London	4	4	3
PAP. Papworth Hospital	1	8	0
SGH. Southampton General Hospital	8	12	0
GRL. Glenfield Hospital	3	6	0
FRE. Freeman Hospital	10	2	0
MRI. Manchester Royal Infirmary	0	1	0
ANT. Spire St Anthony's Hospital (PP)	0	0	0
HAM. Hammersmith Hospital	0	0	0
RAD. John Radcliffe Hospital	0	0	0
WAL. University Hospital Coventry	0	0	0
PLY. Derriford Hospital	NA	0	0
CHH. Castle Hill Hospital	0	NA	NA
CBS. Spire Southampton Hospital (PP)	NA	NA	NA
LGI. Leeds General Infirmary	NA	NA	NA
RVB. Royal Victoria Hospital	NA	NA	NA

PP private hospital. NA no data available. Ranked by highest 2020/21.

Proportion of bioprosthetic valves used for isolated MVR in patients <60 years old

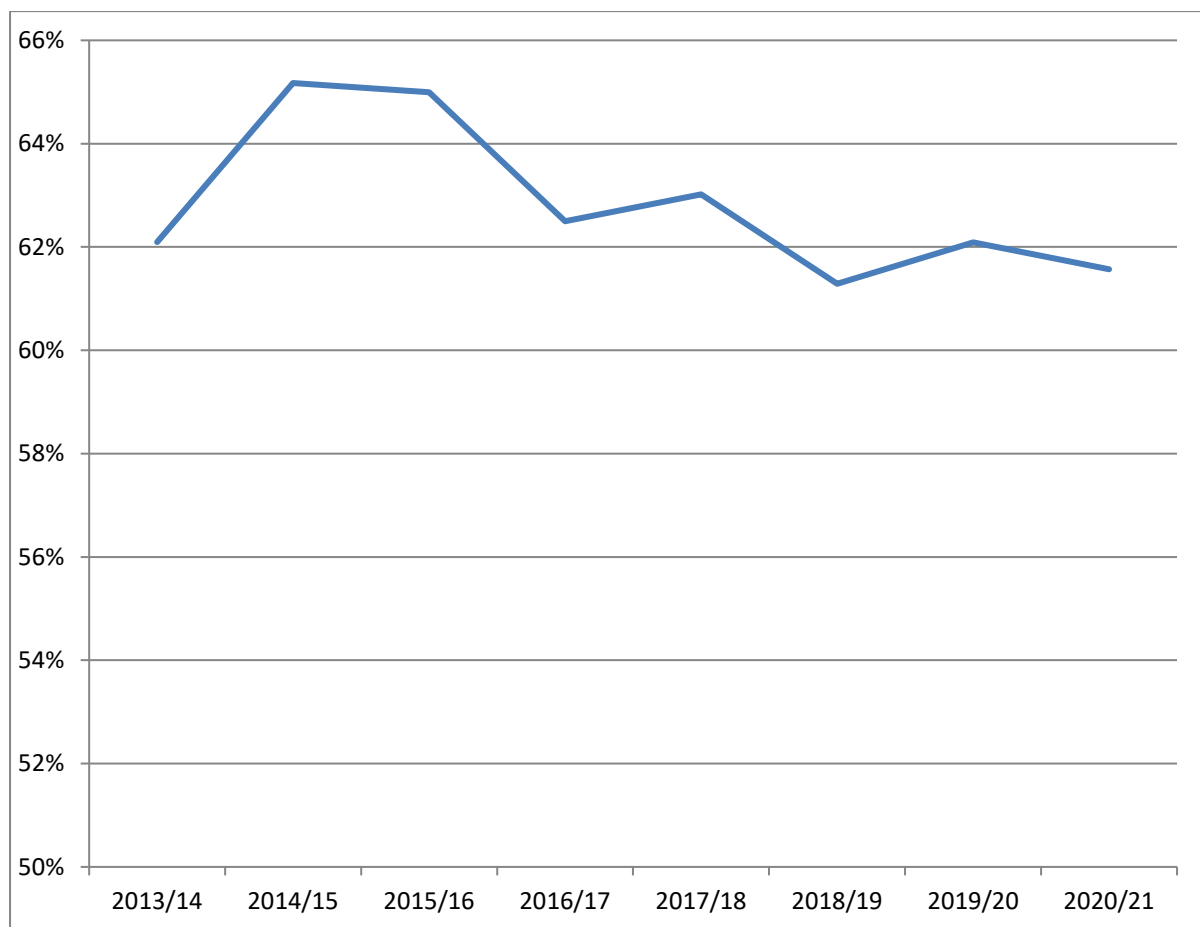


UK (excl Scotland)	2018/19	2019/20	2020/21
Mechanical MVR	452	428	318
Biological MVR	90	90	74
% Biological	16.6%	17.4%	18.9%

Hospital	Total MVR (n)	% Bioprosthetic valve
Royal Victoria Hospital	25	0%
University Hospital Coventry	18	0%
Derriford Hospital	40	5.0%
Wythenshawe Hospital	50	6.0%
Barts and the London	178	7.3%
Morrison Hospital	27	7.4%
John Radcliffe Hospital	25	8.0%
Leeds General Infirmary	58	8.6%
Northern General Hospital	58	8.6%
Royal Brompton Hospital	45	8.9%
Castle Hill Hospital	21	9.5%
St George's Hospital	35	11.4%
New Cross Hospital	42	11.9%
University Hospital of Wales	42	11.9%
Blackpool Victoria Hospital	33	12.1%
St Thomas' Hospital	56	14.3%
Bristol Royal Infirmary	55	14.5%
James Cook University Hospital	29	17.2%
University Hospital of North Staffordshire	22	18.2%
Liverpool Heart and Chest Hospital	85	18.8%
Glenfield Hospital	47	19.1%
Freeman Hospital	38	21.1%
Papworth Hospital	71	22.5%
Basildon Hospital	20	25.0%
Queen Elizabeth Hospital	28	25.0%
Hammersmith Hospital	55	27.3%
Harefield Hospital	67	28.4%
Southampton General Hospital	24	29.2%
King's College Hospital	51	41.2%
Royal Sussex County Hospital	17	41.2%
Manchester Royal Infirmary	50	46.0%
Nottingham City Hospital	40	50.0%
Spire St Anthony's Hospital (PP)	0	
Spire Southampton Hospital (PP)	0	
Cromwell Hospital (PP)	0	

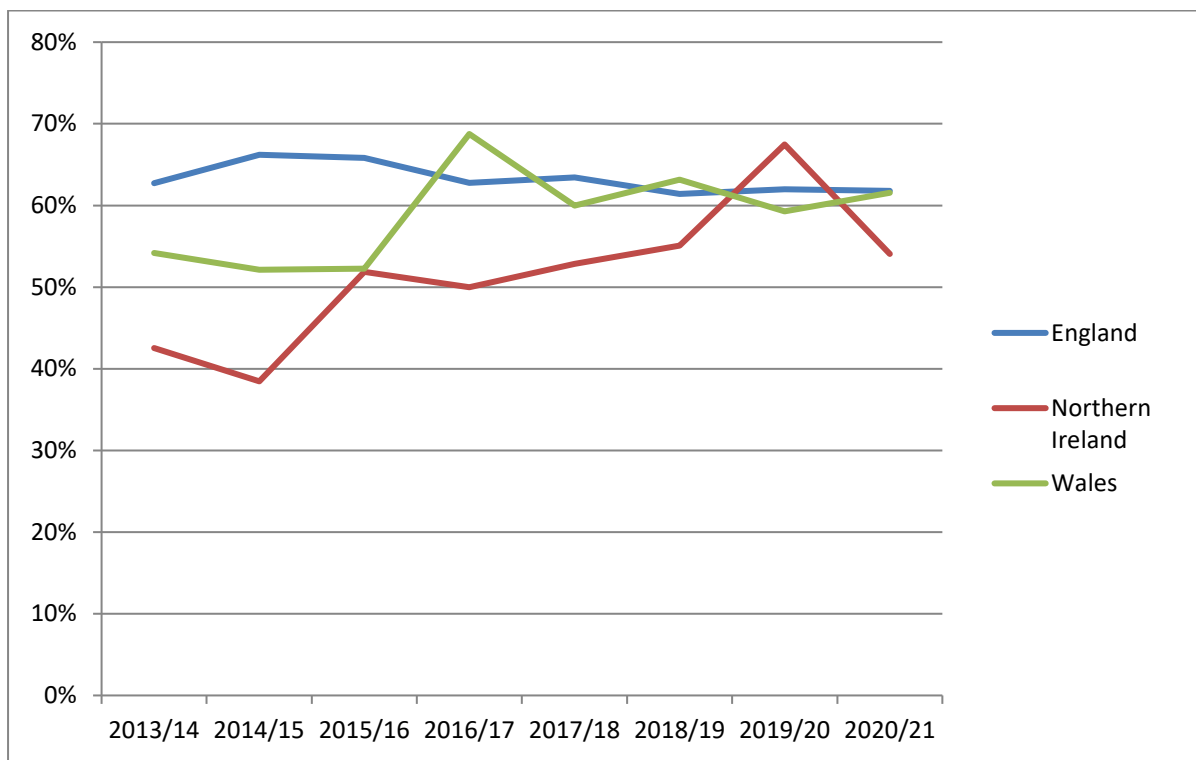
Data for 3 years from 2018/21 in patients <60 years old. Ranked by lowest %.

Mitral valve repair rate (%) as proportion of all isolated mitral procedures



UK (excl Scotland)	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21
MV repair	2557	2699	2500	2710	2483	2474	2272	1440
MVR	962	933	832	951	794	950	850	553
Repair rate (%)	62.1%	65.2%	65.0%	62.5%	63.0%	61.3%	62.1%	61.6%

Isolated mitral repair as proportion of all isolated mitral procedures. Excludes cases with concomitant procedures (CABG etc)



Nation	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21
England	62.7%	66.2%	65.8%	62.8%	63.4%	61.4%	62.0%	61.8%
Northern Ireland	42.6%	38.5%	51.9%	50.0%	52.9%	55.1%	67.5%	54.1%
Wales	54.2%	52.1%	52.3%	68.8%	60.0%	63.2%	59.3%	61.5%

Mitral repair rate (%). Isolated mitral repair as proportion of all isolated mitral procedures. Excludes cases with concomitant procedures (CABG etc)

Hospital	Isolated first-time mitral repair (n)			Mitral repair rate (%)		
	2018/19	2019/20	2020/21	2018/19	2019/20	2020/21
Spire St Anthony's Hospital (PP)	7	3	2	87.5%	75.0%	100.0%
Spire Southampton Hospital (PP)	0	0	9	NA	NA	100.0%
Cromwell Hospital (PP)	0	0	1	NA	NA	100.0%
Basildon Hospital	48	46	22	65.8%	74.2%	84.6%
Bristol Royal Infirmary	108	72	50	71.1%	74.2%	83.3%
University Hospital Coventry	79	75	32	90.8%	89.3%	82.1%
Blackpool Victoria Hospital	58	72	47	67.4%	73.5%	77.0%
Northern General Hospital	64	52	39	60.4%	65.8%	76.5%
Royal Brompton Hospital	46	53	61	65.7%	68.8%	76.3%
Papworth Hospital	139	112	106	70.6%	67.5%	73.6%
New Cross Hospital	31	45	22	57.4%	65.2%	71.0%
John Radcliffe Hospital	48	52	26	72.7%	73.2%	70.3%
Liverpool Heart and Chest Hospital	83	82	42	52.2%	57.7%	70.0%
Morrison Hospital	25	16	16	62.5%	61.5%	69.6%
Queen Elizabeth Hospital	26	36	18	68.4%	70.6%	66.7%
James Cook University Hospital	49	26	31	80.3%	57.8%	66.0%
Harefield Hospital	43	55	44	62.3%	66.3%	64.7%
Freeman Hospital	35	28	23	64.8%	58.3%	60.5%
Derriford Hospital	56	69	39	66.7%	71.1%	60.0%
St Thomas' Hospital	73	65	23	68.9%	65.0%	57.5%
University Hospital of Wales	23	32	24	63.9%	58.2%	57.1%
Wythenshawe Hospital	45	27	15	70.3%	73.0%	55.6%
Royal Sussex County Hospital	38	30	15	77.6%	65.2%	55.6%
Castle Hill Hospital	17	20	11	47.2%	57.1%	55.0%
Royal Victoria Hospital	38	56	20	55.1%	67.5%	54.1%
King's College Hospital	38	37	19	57.6%	72.5%	50.0%
University Hospital of North Staffordshire	20	16	8	51.3%	51.6%	47.1%
Manchester Royal Infirmary	12	14	7	24.0%	33.3%	46.7%
St George's Hospital	22	13	13	59.5%	54.2%	46.4%
Barts and the London	67	67	40	36.6%	40.1%	43.5%
Southampton General Hospital	38	24	13	70.4%	64.9%	41.9%
Nottingham City Hospital	12	14	13	34.3%	42.4%	41.9%
Glenfield Hospital	56	22	16	60.2%	45.8%	41.0%
Hammersmith Hospital	33	33	14	52.4%	40.2%	40.0%
Leeds General Infirmary	27	28	5	38.6%	38.9%	9.8%

Isolated mitral repair as proportion of all isolated mitral procedures. Excludes cases with concomitant procedures (CABG etc). Ranked by highest repair rate in 2020/21. PP private hospital.

Incisions used for Mitral Valve Surgery – UK (excluding Scotland)

UK	2018/19	2019/20	2020/21
Sternotomy	1504	1648	1087
Partial sternotomy	16	29	5
Thoracotomy	52	32	20
Mini-thoracotomy	215	226	159
Robotic	13	14	8
Other	25	17	1
Missing	637	308	136

Multiple options are allowed (so totals may not equal total cases performed). Surgical incision was a new dataset field in NACSA from April 2017 (compliance with data submission has been improving each year).

Proportion (%) of Mitral Valve operations via an incision other than a median sternotomy – by UK region and year

Nations	2018/19	2019/20	2020/21
UK (excl Scotland)	15.7	14.7	14.2
England	16.2	15.1	14.9
Northern Ireland	NA	NA	NA
Wales	4.5	3.8	0

NA no data available.

Proportion (%) of Mitral Valve operations via an incision other than a median sternotomy – by hospital and year

Hospital	2018/19	2019/20	2020/21
VIC. Blackpool Victoria Hospital	61	55	72
SCM. James Cook University Hospital	37	30	33
BHL. Liverpool Heart and Chest Hospital	44	38	32
HH. Harefield Hospital	33	39	30
NHB. Royal Brompton Hospital	0	4	29
HAM. Hammersmith Hospital	41	38	29
RSC. Royal Sussex County Hospital	NA	NA	26
STH. St Thomas' Hospital	33	25	26
CHN. Nottingham City Hospital	17	21	24
BAS. Basildon Hospital	24	11	19
NGS. Northern General Hospital	0	11	16
BRI. Bristol Royal Infirmary	16	14	12
STO. University Hospital of North Staffordshire	0	0	6
WYT. Wythenshawe Hospital	0	0	4
PAP. Papworth Hospital	11	17	4
PLY. Derriford Hospital	NA	6	3
KCH. King's College Hospital	17	6	0
UHW. University Hospital of Wales	11	6	0
GEO. St George's Hospital	0	4	0
QEB. Queen Elizabeth Hospital	5	2	0
NCR. New Cross Hospital	8	1	0
ANT. Spire St Anthony's Hospital (PP)	13	0	0
FRE. Freeman Hospital	4	0	0
GRL. Glenfield Hospital	3	0	0
BAL. Barts and the London	0	0	0
MOR. Morriston Hospital	0	0	0
MRI. Manchester Royal Infirmary	0	0	0
RAD. John Radcliffe Hospital	0	0	0
SGH. Southampton General Hospital	0	0	0
WAL. University Hospital Coventry	0	0	0
CRO. Cromwell Hospital (PP)	NA	NA	0
CHH. Castle Hill Hospital	0	0	NA
CBS. Spire Southampton Hospital (PP)	NA	NA	NA
LGI. Leeds General Infirmary	NA	NA	NA
RVB. Royal Victoria Hospital	NA	NA	NA

PP Private Hospital. Ranked by highest in 2020/21. NA no data available.

Outcomes – Hospital Survival Rates after Cardiac Surgery (COP)

Explanation of Outlier analysis/Forest plots

Outlier methodology for Clinical Outcomes Publication (COP)

A random effects (RE) methodology is used to infer the outlier status of each hospital. Further technical details are available from NICOR. The results are displayed graphically using a forest plot.

Forest plot

Vertical axis: Hospital identifier code and in parentheses: number of procedures performed and completeness of survival data (i.e. the percentage of patients for whom survival data are available).

Horizontal axis: Percentage Survival whilst in hospital for operation (Overall for UK; and Observed, Predicted, model-based Risk-Adjusted for each hospital).

More specifically, the following quantities are presented:

1. Overall UK In-Hospital Survival [dashed vertical line]: the overall proportion of patients who survive across all hospitals in the UK. In the attached graphs it is around 98.2% for All Cardiac surgery and 99.0% for Isolated CABG.

2. Observed Survival per hospital [square]: The proportion of patients who survived after surgery in each hospital. (Data are presented for All Cardiac operations and for Isolated CABG operations).

3. Predicted Survival per hospital [cross]: The Predicted Survival, using the modified EuroSCORE logistic mortality model to account for case-mix. For example, a high predicted survival (relative to the overall UK survival) suggests that the hospital performs surgery on relatively low-risk patients.

4. Survival probability (RE model) for outlier detection [full circle]: Survival for each hospital, derived from a random effects model after accounting for case-mix. This estimate and the corresponding horizontal bar provide an indication of whether the hospital is an ‘outlier’ after taking into account observed and predicted survival.

Quantities 1 and 2 do not require any statistical modelling. Calculation of the quantities 3 and 4 require the application of the modified EuroSCORE logistic mortality model to predict the outcome and of a random effects model for the detection of outliers.

Display of outliers

Hospitals with outcomes within limits of acceptable variability are assumed to demonstrate ‘usual’ or ‘normal performance’. A hospital is said to be an outlier when its performance deviates from usual, normal performance.

Black full circles indicate hospitals with normal performance (performance ‘within expected limits’).

Red or Green full circles indicate hospitals with worse (red) or better (green) performance than normal at the 3SD level. A hospital with lower risk-adjusted survival than usual at the 3SD level is called an '*Alarm*'.

For the purposes of public reporting only 3SD outliers are displayed on the published forest plots. (2SD outliers are notified by SCTS and NICOR, but their results are not displayed).

The confidence intervals for the Survival probability (RE model) for outlier detection (solid horizontal bars) indicate whether a hospital is a potential outlier at a given significance level:

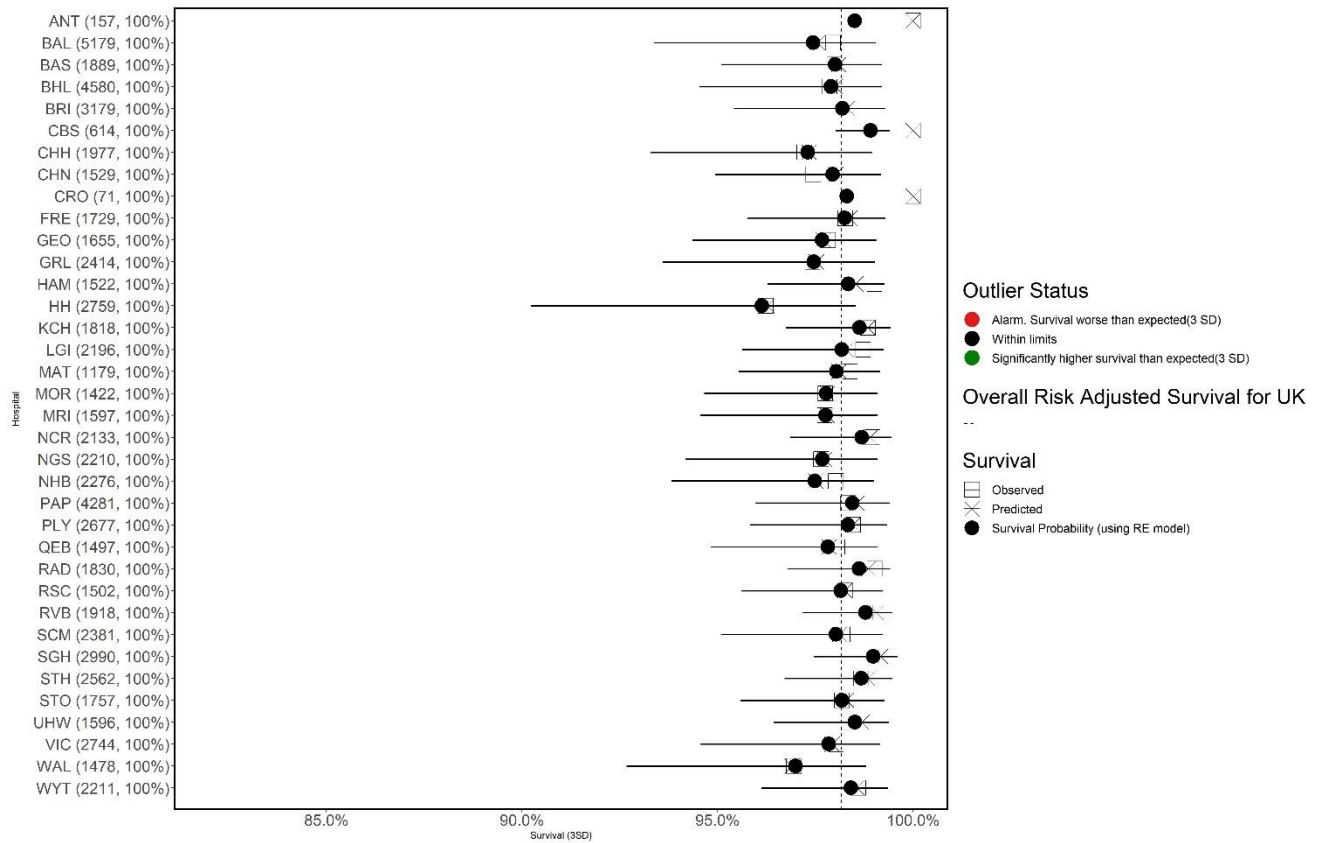
If the confidence interval for a hospital crosses the vertical Overall Survival dashed line, then the performance of that hospital does not deviate from normal performance.

If the confidence interval fails to cross the vertical Overall UK Survival dashed line, then the hospital is either performing significantly better (Green), or significantly worse (Red) than normal. Such hospitals are potential outliers at the 3 SD level.

The length of each confidence interval relates to the estimate of the Survival probability (RE model) for each hospital, after accounting for case-mix, relative to the variation in survival across all UK hospitals. The confidence intervals are not symmetric due to the inverse log-odds transformation. The length of the confidence interval shortens as survival approaches 100%.

Note: The validity of the outlier process relies on having an adequate number of patients per hospital. Although there is no exact guideline for this figure, simulation studies suggest that for the settings considered (survival of 98%) the minimum number of observations to ensure the validity of the tests is 200. Thus, hospitals with fewer than 200 patients will not have horizontal bars placed around their survival estimate and will not be assigned an outlier status.

Risk Adjusted Survival after All Adult Cardiac Surgery - UK Hospital Level Forest Plot (3 years 1/4/2018 to 31/3/2021)

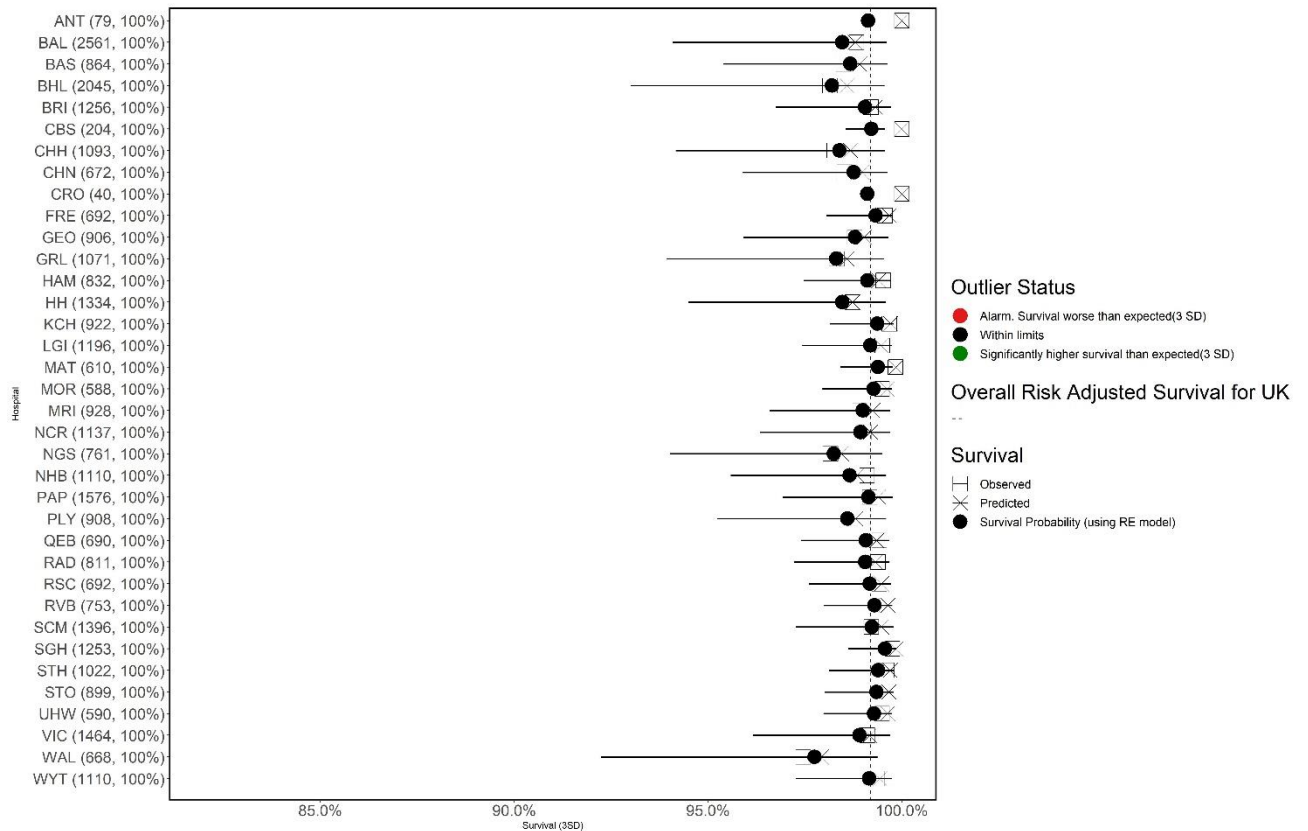


For **Hospital Codes** see Appendix.

For the 3 years (2018/21) there were no hospitals that were 3SD positive or negative “Alarm” outliers in the UK. Every hospital has survival rates for all cardiac surgery in this period that was “as expected”.

The UK survival rate following All Cardiac surgery was 98.16% for this period. (This excludes emergency cases).

Risk Adjusted Survival after Isolated CABG Surgery - UK Hospital Level Forest Plot (3 years 1/4/2018 to 31/3/2021)



For **Hospital Codes** see Appendix.

For the 3 years (2018/21) there were no hospitals that were 3SD positive or negative “Alarm” outliers in the UK. Every hospital has survival rates for isolated CABG surgery in this period that was “as expected”.

The UK survival rate following isolated CABG surgery was 99.04% for this period.

Errors in reporting deaths by hospitals – comparison of hospital reported deaths versus ONS death certificate records

Cases reported to NACSA 2018/21	80,821
Unreported deaths in NACSA 2018/21 (ONS vs reported)	8
Proportion cases in dataset with incorrect death status	0.0098%
Hospitals with missing death(s)	6
Emergency cases (not reported in COP)	3
Elective/Urgent cases	3/2
Time to death post op (mean)	26.6 days
Time to death post op (range)	5 to 78 days

In-hospital death is a compulsory dataset field within the NACSA audit (defined as a death during the same admission as the operation was performed, irrespective of how long after surgery this occurs). The mortality outcomes within this report and within the COP (Clinical Outcomes Publication) are based on hospital reported outcome. This allows much quicker analysis than with acquiring ONS data, and even allows real-time tracking of mortality using NICOR's online tools (available to audit leads in each hospital).

To ensure this data is correct it is cross-checked with ONS death certificates. For the last 3 years only eight discrepancies were found (where a hospital has reported patient as leaving hospital alive, but death certificates show that the patient had died by that date). Deaths occurring after discharge from hospital are not counted. (Although these are used for longer-term outcome monitoring).

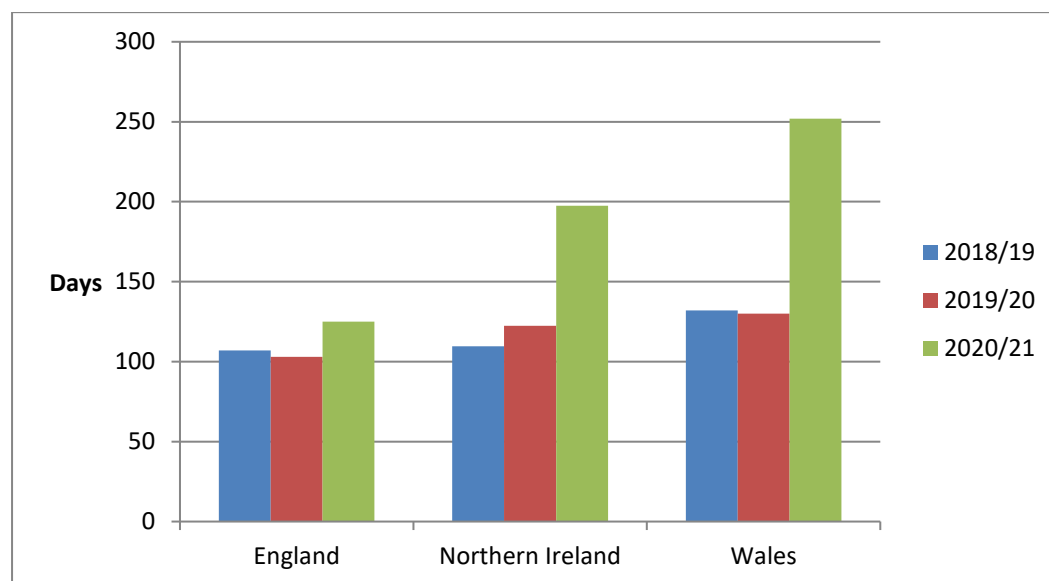
Hospitals with missing (unreported) in-hospital deaths – 3-year aggregate 2018/21

Hospital	Unreported death(s) in NACSA 2018/21
Bristol Royal Infirmary	2
John Radcliffe Hospital	2
Harefield Hospital	1
King's College Hospital	1
Derriford Hospital	1
University Hospital Coventry	1

Defined as death on ONS death certificate by date of hospital discharge, but not reported as dead within NACSA dataset. All remaining hospitals within the audit had no unreported deaths during the 3 years.

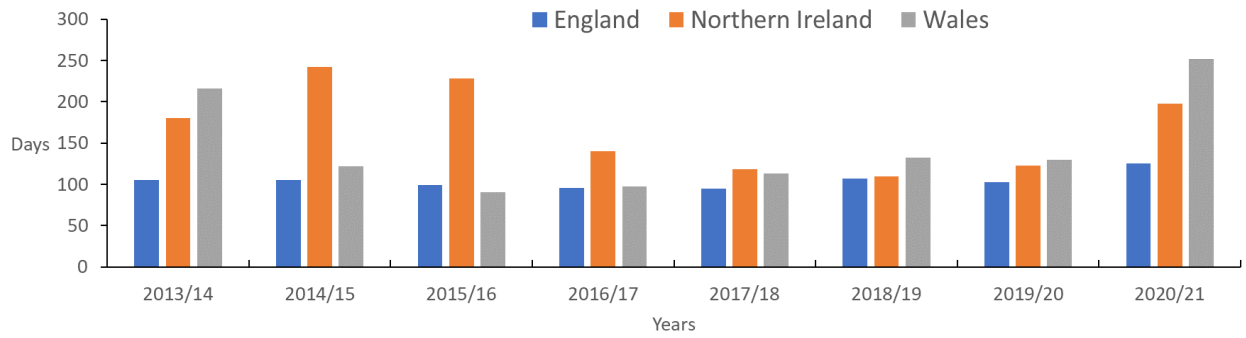
Non-mortality Performance/Outcome metrics

Elective CABG waiting time - from angio to op date (mean days)



Nations	2018/19	2019/20	2020/21	Change (% 20/21 of 19/20)
UK (excl Scotland)	108	104	127	122%
England	107	103	125	121%
Northern Ireland	109.5	122.5	197.5	161%
Wales	132	130	252	194%

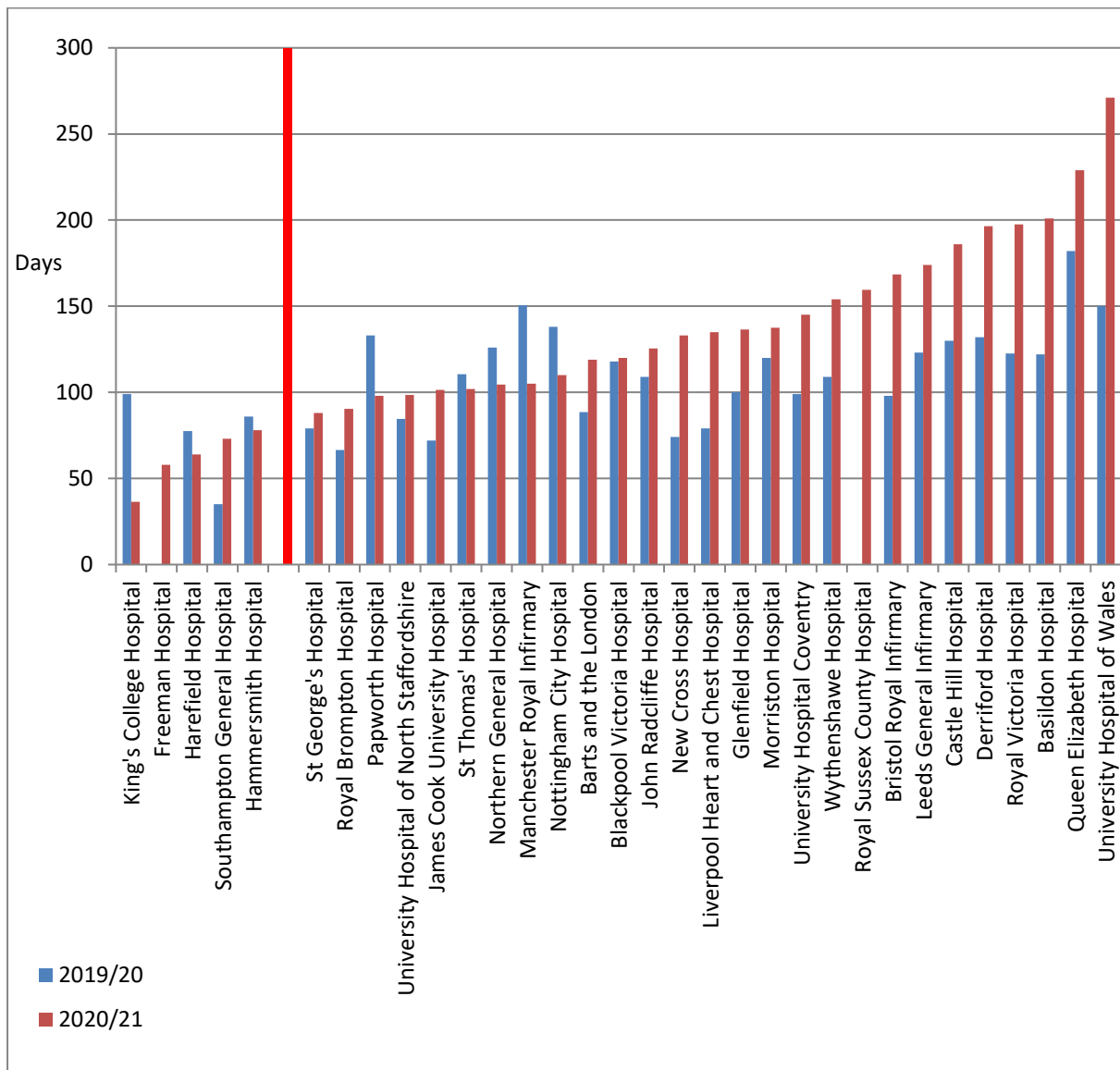
Trends of Elective Waiting Time (Days) from 2013/14 to 2020/21



Nations	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21
England	105	105	99	96	95	107	103	125
Northern Ireland	180.5	242.5	228	140.5	118.5	109.5	122.5	197.5
Wales	216	122	90.5	97	113	132	130	252

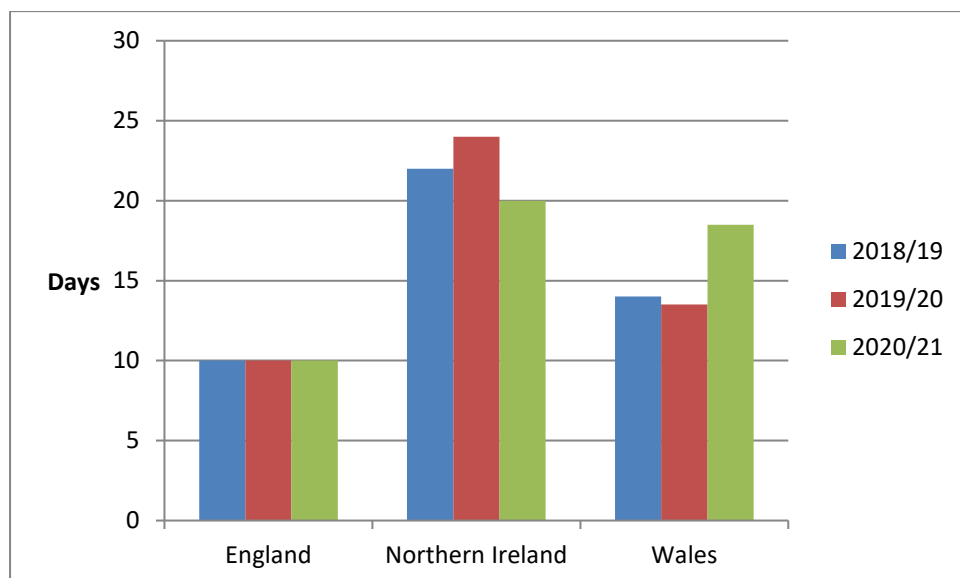
Hospital	Completeness (%)	2018/19	2019/20	2020/21	Change (% 20/21 of 19/20)
Cromwell Hospital (PP)	100	14	22	19.5	89%
King's College Hospital	37	154	99	36.5	37%
Freeman Hospital	12	87	NA	58	NA
Harefield Hospital	72	101	77.5	64	83%
Southampton General Hospital	91	88	35	73	209%
Hammersmith Hospital	66	79	86	78	91%
Spire St Anthony's Hospital (PP)	98	20	15	82	547%
St George's Hospital	99	76	79	88	111%
Royal Brompton Hospital	98	63	66.5	90.5	136%
Papworth Hospital	10	147	133	98	74%
University Hospital of North Staffordshire	71	116	84.5	98.5	117%
James Cook University Hospital	100	50	72	101.5	141%
St Thomas' Hospital	99	123	110.5	102	92%
Northern General Hospital	99	125	126	104.5	83%
Manchester Royal Infirmary	76	117	150.5	105	70%
Nottingham City Hospital	99	99	138	110	80%
Spire Southampton Hospital (PP)	13	67	64.5	118	183%
Barts and the London	80	85.5	88.5	119	134%
Blackpool Victoria Hospital	97	112	118	120	102%
John Radcliffe Hospital	85	100	109	125.5	115%
New Cross Hospital	98	76	74	133	180%
Liverpool Heart and Chest Hospital	10	67	79	135	171%
Glenfield Hospital	100	106	100	136.5	137%
Morrison Hospital	57	88	120	137.5	115%
University Hospital Coventry	62	75	99	145	146%
Wythenshawe Hospital	95	123.5	109	154	141%
Royal Sussex County Hospital	13	NA	NA	159.5	NA
Bristol Royal Infirmary	87	111.5	98	168.5	172%
Leeds General Infirmary	97	148	123	174	141%
Castle Hill Hospital	96	200	130	186	143%
Derriford Hospital	100	141	132	196.5	149%
Royal Victoria Hospital	58	109.5	122.5	197.5	161%
Basildon Hospital	99	107	122	201	165%
Queen Elizabeth Hospital	99	175	182	229	126%
University Hospital of Wales	97	142.5	150	271	181%

Standard is <12 weeks. Ranked by shortest in 2020/21. Green if <12 weeks. Red if >18 weeks. Data completeness yellow if <90%, red if <80%.



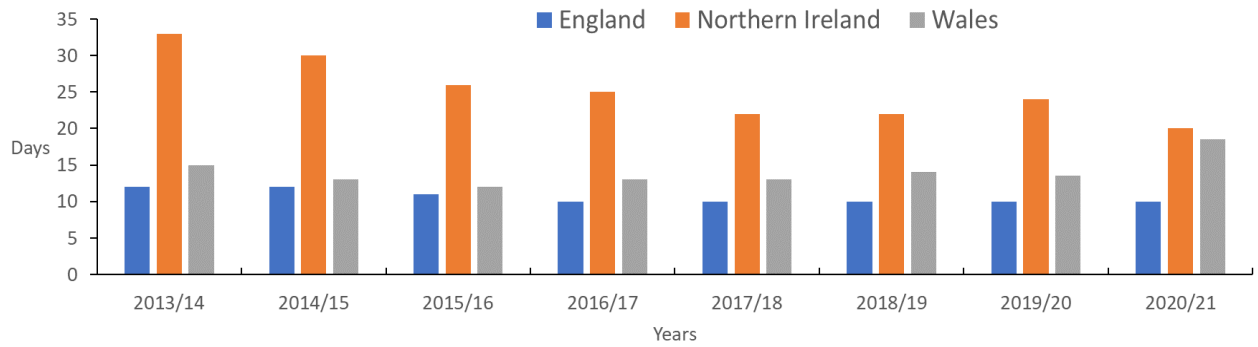
Target <84 days. (Hospitals to the left of the red bar achieved the target in 2020/21). Ranked by waiting time in 2020/21.

Urgent (inpatient) CABG waiting time – from angio to op date (mean days)



Nations	2018/19	2019/20	2020/21	Change (% 20/21 of 19/20)
UK	11	11	10	91%
England	10	10	10	100%
Northern Ireland	22	24	20	83%
Wales	14	13.5	18.5	137%

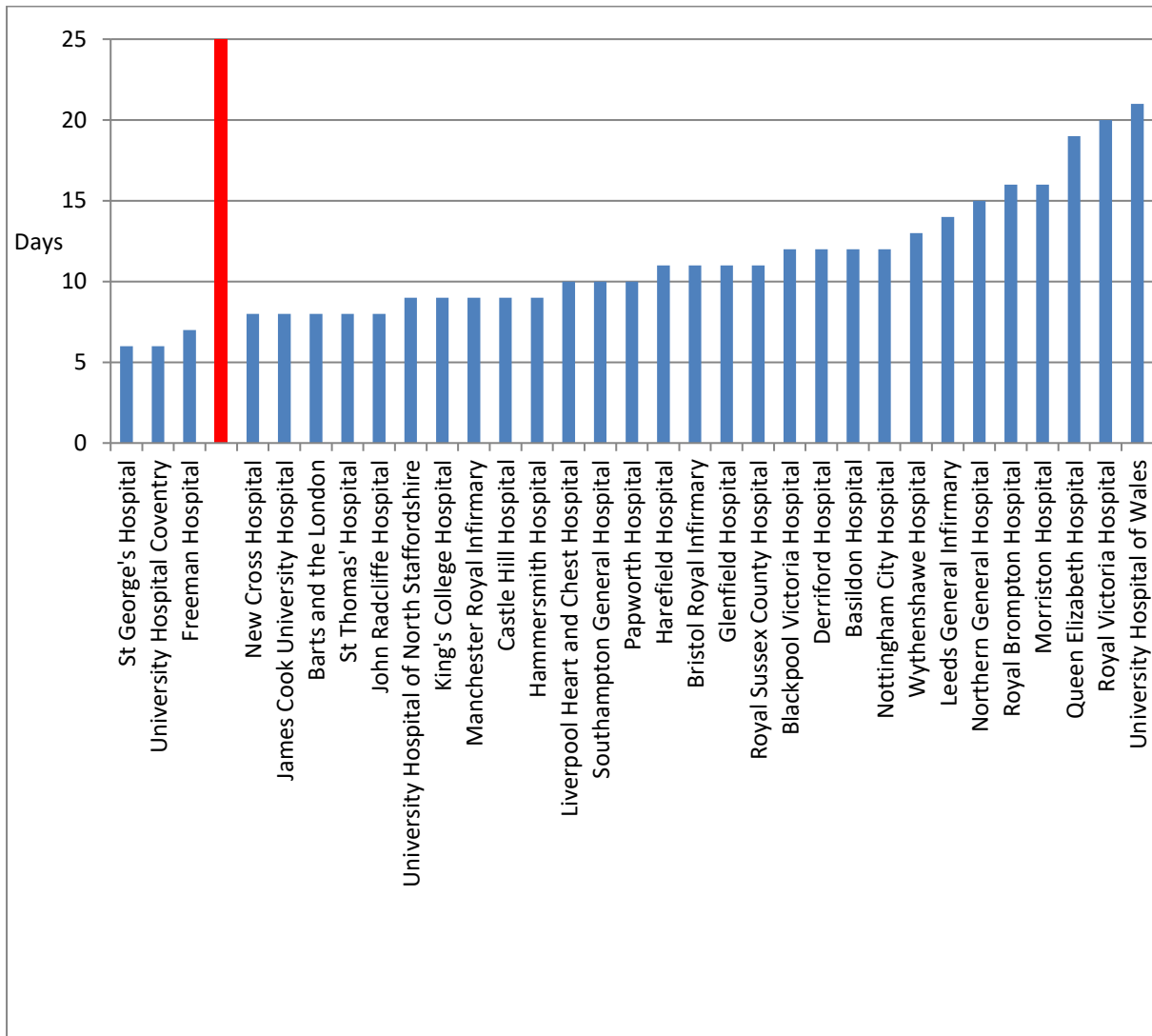
Trends of Urgent Waiting Time (Days) from 2013/14 to 2020/21



Nations	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21
England	12	12	11	10	10	10	10	10
Northern Ireland	33	30	26	25	22	22	24	20
Wales	15	13	12	13	13	14	13.5	18.5

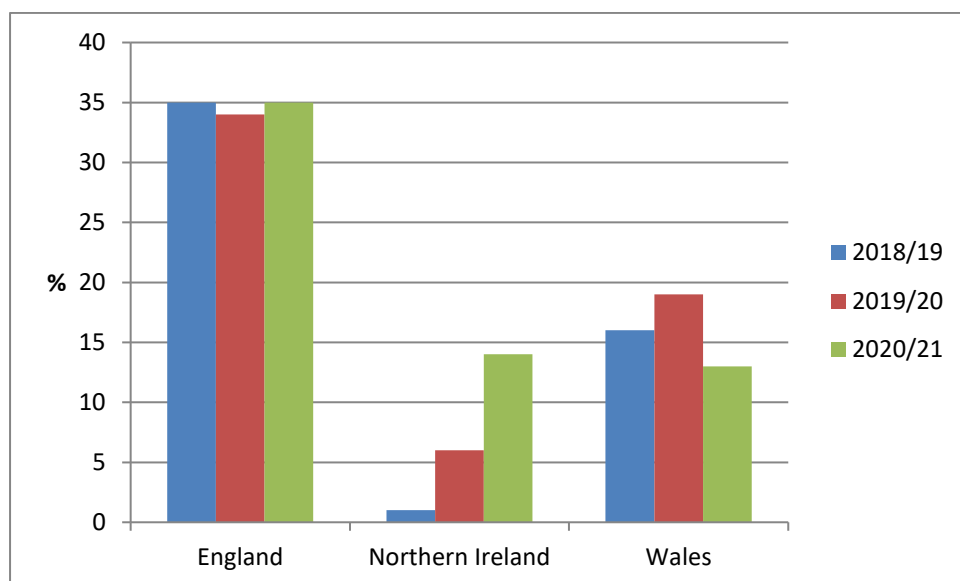
Hospital	Completeness (%)	2018/19	2019/20	2020/21	Change (% 20/21 of 19/20)
St George's Hospital	99	7	7	6	86%
University Hospital Coventry	77	7	7	6	86%
Freeman Hospital	20	8	2	7	350%
New Cross Hospital	98	7	7	8	114%
James Cook University Hospital	100	7	8	8	100%
Barts and the London	87	8	8	8	100%
St Thomas' Hospital	100	11	10	8	80%
John Radcliffe Hospital	90	12	10	8	80%
University Hospital of North Staffordshire	80	7	7	9	129%
King's College Hospital	31	9	8	9	113%
Manchester Royal Infirmary	90	8.5	10	9	90%
Castle Hill Hospital	100	13	11	9	82%
Hammersmith Hospital	66	11	12	9	75%
Liverpool Heart and Chest Hospital	9	8	8	10	125%
Southampton General Hospital	89	11	10	10	100%
Papworth Hospital	13	14	10	10	100%
Cromwell Hospital (PP)	100	4	22	10	45%
Harefield Hospital	78	7	9	11	122%
Bristol Royal Infirmary	88	12	9	11	122%
Glenfield Hospital	99	11	11.5	11	96%
Royal Sussex County Hospital	16	NA	NA	11	NA
Blackpool Victoria Hospital	98	11	12	12	100%
Derriford Hospital	100	17.5	13	12	92%
Basildon Hospital	98	13	14	12	86%
Nottingham City Hospital	99	14	14	12	86%
Wythenshawe Hospital	98	11	13	13	100%
Leeds General Infirmary	97	16	14	14	100%
Northern General Hospital	98	16.5	15	15	100%
Royal Brompton Hospital	97	11	11	16	145%
Morrison Hospital	54	11.5	12	16	133%
Queen Elizabeth Hospital	100	17	17	19	112%
Royal Victoria Hospital	62	22	24	20	83%
University Hospital of Wales	99	14	14	21	150%
Spire St Anthony's Hospital (PP)	100	3	8	24	300%
Spire Southampton Hospital (PP)	31	14.5	12	NA	NA

Ranked by mean waiting time 2020/21. Green if achieve target of 7 days. Red if worse than UK mean of 10 days. Data completeness yellow if <90%, red if <80%.



Target is 7 days. Hospitals to left of red bar achieve the target.

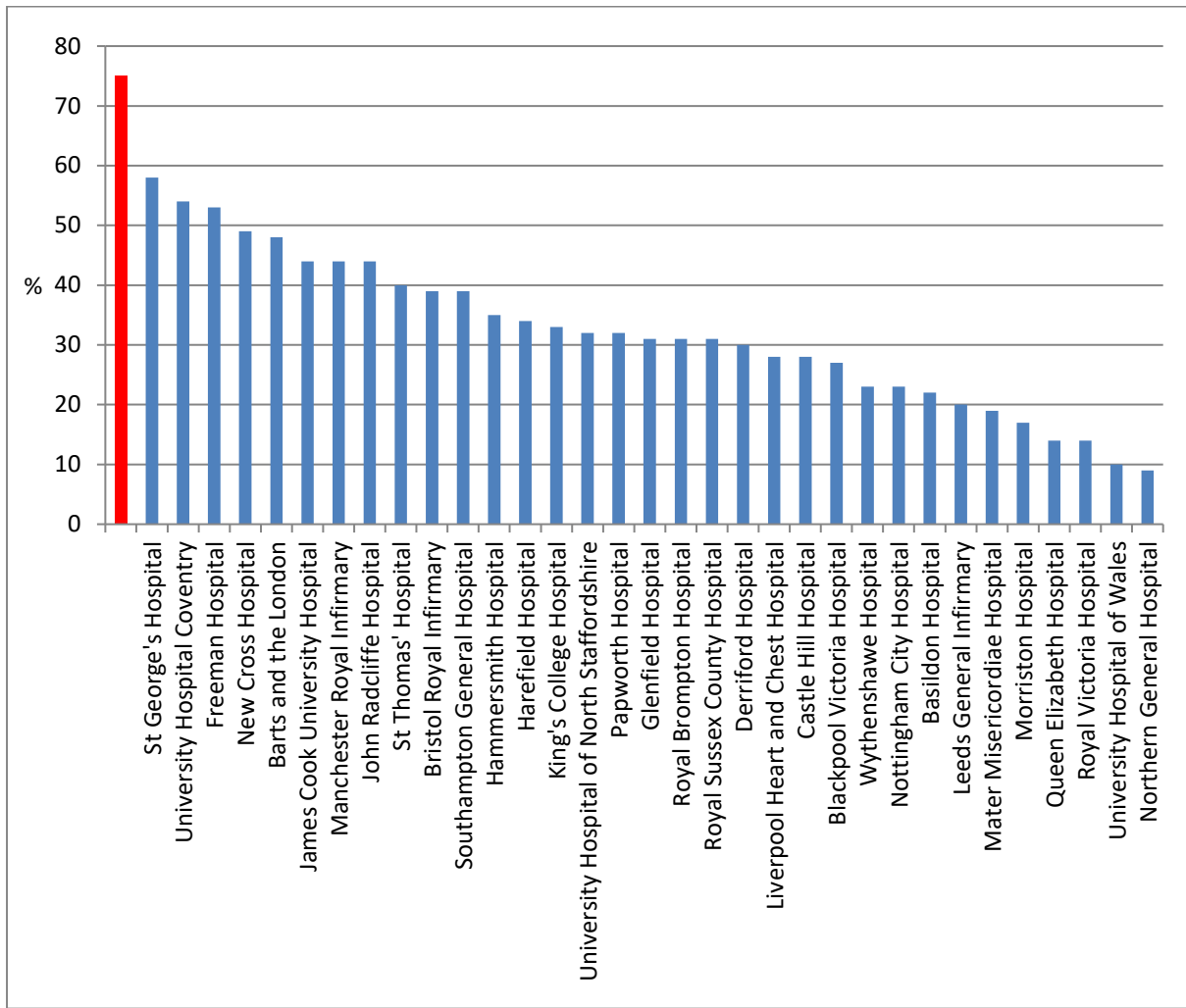
Proportion (%) of Urgent (IHU) CABG performed within 7 days of angiogram



Nations	2018/19	2019/20	2020/21
England	35	34	35
Northern Ireland	1	6	14
Wales	16	19	13

Hospital	2018/19	2019/20	2020/21
St George's Hospital	57	57	58
University Hospital Coventry	56	52	54
Freeman Hospital	47	100*	53
New Cross Hospital	51	54	49
Barts and the London	48	50	48
James Cook University Hospital	63	46	44
Manchester Royal Infirmary	41	36	44
John Radcliffe Hospital	30	35	44
St Thomas' Hospital	33	30	40
Bristol Royal Infirmary	32	43	39
Southampton General Hospital	29	34	39
Hammersmith Hospital	27	29	35
Harefield Hospital	54	41	34
King's College Hospital	46	42	33
University Hospital of North Staffordshire	55	56	32
Papworth Hospital	33	33	32
Glenfield Hospital	28	27	31
Royal Brompton Hospital	31	25	31
Royal Sussex County Hospital	NA	NA	31
Derriford Hospital	13	26	30
Liverpool Heart and Chest Hospital	35	44	28
Castle Hill Hospital	11	23	28
Blackpool Victoria Hospital	29	23	27
Wythenshawe Hospital	24	19	23
Nottingham City Hospital	23	19	23
Basildon Hospital	22	20	22
Leeds General Infirmary	17	17	20
Mater Misericordiae Hospital	30	19	19
Morrison Hospital	23	26	17
Queen Elizabeth Hospital	9	11	14
Royal Victoria Hospital	1	6	14
University Hospital of Wales	14	15	10
Northern General Hospital	8	6	9
Cromwell Hospital (PP)	75	50	NA
Spire St Anthony's Hospital (PP)	90	33	NA
Spire Southampton Hospital (PP)	NA	NA	NA

Target is 75%. No hospital achieved target in 2020/21. Ranked by highest in 2020/21. For data quality/completeness see previous hospital level table for Urgent CABG waiting times. (very poor data quality/compliance)*



Target 75% (red bar). No hospital achieved target.

Post op length of stay (PLOS) following CABG (mean days)

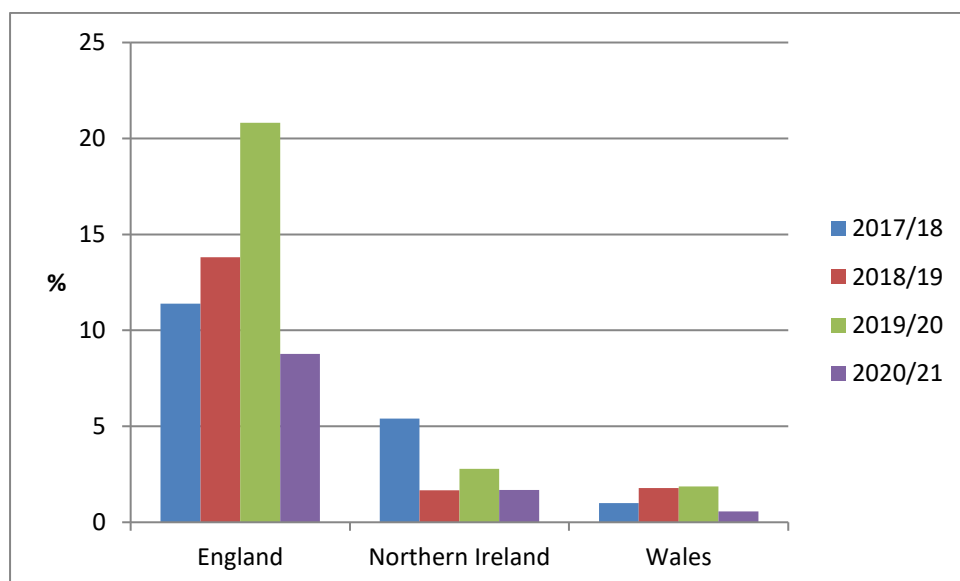


Region	2018/19	2019/20	2020/21
UK (excl Scotland)	7.7	7.9	7.9
England	7.6	7.8	7.9
Northern Ireland	9.2	8.5	8.1
Wales	9.6	9.2	9.1

Hospital	2018/19	2019/20	2020/21
Spire Southampton Hospital (PP)	5.9	6.4	5.6
Spire St Anthony's Hospital (PP)	7.2	7.5	5.8
Royal Sussex County Hospital	6.1	6.8	5.9
New Cross Hospital	6.5	6.5	6.0
James Cook University Hospital	6.3	6.7	6.1
Cromwell Hospital (PP)	6.0	19.0	6.2
Derriford Hospital	6.7	7.3	6.3
Queen Elizabeth Hospital	8.1	8.4	6.4
Royal Brompton Hospital	7.0	6.7	6.6
St George's Hospital	7.3	7.7	6.8
King's College Hospital	9.0	8.0	7.0
Bristol Royal Infirmary	7.9	7.5	7.1
Barts and the London	7.7	7.9	7.2
Basildon Hospital	7.5	7.0	7.4
Harefield Hospital	7.4	8.1	7.5
Northern General Hospital	8.0	7.5	7.5
Glenfield Hospital	6.9	7.9	7.6
Wythenshawe Hospital	7.0	8.1	7.7
Castle Hill Hospital	7.7	8.2	7.7
Liverpool Heart and Chest Hospital	8.0	8.6	7.7
Papworth Hospital	7.7	7.9	7.8
Manchester Royal Infirmary	9.4	10.8	8.0
Freeman Hospital	7.2	7.9	8.0
University Hospital of North Staffordshire	8.0	7.2	8.1
University Hospital Coventry	7.4	7.5	8.1
Royal Victoria Hospital	9.2	8.5	8.1
Blackpool Victoria Hospital	8.1	7.3	8.2
University Hospital of Wales	9.5	8.8	8.2
Hammersmith Hospital	8.1	7.3	8.3
St Thomas' Hospital	8.2	6.9	8.4
Leeds General Infirmary	7.7	9.0	8.7
Nottingham City Hospital	7.3	7.9	8.8
Morrison Hospital	9.6	9.6	10.0
Southampton General Hospital	9.3	9.2	10.3
John Radcliffe Hospital	7.5	7.3	20.8

Ranked by shortest in 2020/21. Green if better than UK average (7.9 days)

Proportion (%) of patients with days of surgery admission (DOSA) for elective cardiac surgery (CABG)



Region	2017/18	2018/19	2019/20	2020/21
UK (excl Scotland)	NA	13.1	19.6	8.3
England	11.4	13.8	20.8	8.8
Northern Ireland	5.4	1.7	2.8	1.7
Wales	1	1.8	1.9	0.6

UK data pre 2018 included Scotland – so not presented here

Hospital	2018/19	2019/20	2020/21
Papworth Hospital	22.3	36.6	38.2
Harefield Hospital	22.1	56.4	24.4
Blackpool Victoria Hospital	71.5	71.1	24.2
Freeman Hospital	15.9	15.2	19.2
Bristol Royal Infirmary	17.4	71.3	18.5
John Radcliffe Hospital	17.3	29.0	16.9
Hammersmith Hospital	1.6	0.7	6.0
Royal Sussex County Hospital	1.2	0.8	5.9
Queen Elizabeth Hospital	2.5	5.3	4.9
Manchester Royal Infirmary	1.3	4.2	4.8
Basildon Hospital	6.5	3.7	4.0
University Hospital of North Staffordshire	17.0	21.4	3.7
Derriford Hospital	3.8	4.1	3.6
Wythenshawe Hospital	1.0	4.4	3.4
King's College Hospital	9.3	10.1	2.2
University Hospital Coventry	8.6	13.5	1.7
Royal Victoria Hospital	1.7	2.8	1.7
Barts and the London	5.8	0.9	1.6
Morrison Hospital	2.9	2.0	1.5
New Cross Hospital	1.4	1.5	1.2
Leeds General Infirmary	5.3	4.9	1.2
Spire Southampton Hospital (PP)	0.6	0.0	1.1
Southampton General Hospital	38.7	26.9	0.7
Royal Brompton Hospital	8.2	18.2	0.5
Nottingham City Hospital	0.3	0.3	0.5
St George's Hospital	6.7	3.1	0.5
St Thomas' Hospital	3.2	31.4	0.4
Northern General Hospital	0.5	0.7	0.3
James Cook University Hospital	47.4	51.1	0
Liverpool Heart and Chest Hospital	23.7	35.6	0
Cromwell Hospital (PP)	36.4	18.2	0
Spire St Anthony's Hospital (PP)	5.3	5.7	0
University Hospital of Wales	0.6	1.7	0
Glenfield Hospital	0.3	0	0
Castle Hill Hospital	0	0	0

Ranked by highest 2020/21. Target is >50% (no hospital met in 2020/21). Red if below UK mean (8.3%) in 2020/21.

Reoperation for bleeding (%) following CABG surgery



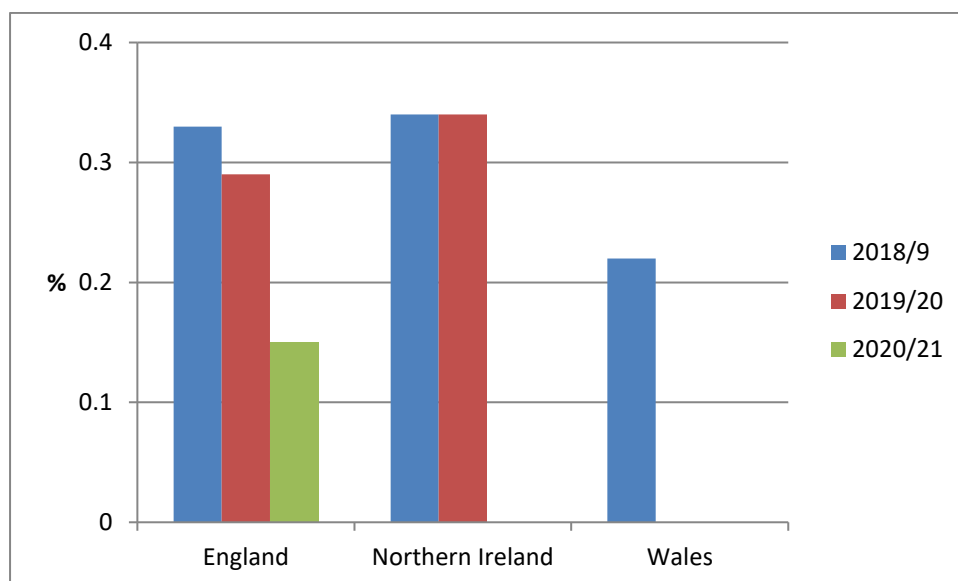
Nations	2018/19	2019/20	2020/21
UK (excl Scotland)	2.23	1.78	1.78
England	2.22	1.83	1.78
Northern Ireland	3.45	1.37	1.18
Wales	1.73	0.87	2.28

UK	2018/21 aggregate (unit level data)
1st quartile	1.00%
Median	1.89%
3rd quartile	2.70%

Hospital	Data completeness (%)	2018/19	2019/20	2020/21
Hammersmith Hospital	100	1.53	0	0
Northern General Hospital	100	0.34	0.32	0
Spire St Anthony's Hospital (PP)	97	2.13	4.35	0
King's College Hospital	86	1.38	0.53	0.52
Nottingham City Hospital	100	1.14	1.9	0.52
St George's Hospital	100	3.58	2.54	0.64
Wythenshawe Hospital	100	0.46	1.35	0.67
Harefield Hospital	99	0.89	1.35	0.73
Papworth Hospital	100	0.46	1.26	0.82
Queen Elizabeth Hospital	100	3.62	1.89	0.84
St Thomas' Hospital	96	1.47	0.46	0.97
Basildon Hospital	91	4.67	1.91	0.99
Royal Victoria Hospital	100	3.45	1.37	1.18
Freeman Hospital	92	2.02	0.45	1.23
Liverpool Heart and Chest Hospital	100	2.5	2.17	1.42
Bristol Royal Infirmary	99	2.49	2.77	1.52
Barts and the London	100	2.28	1.72	1.53
University Hospital of Wales	94	0.9	0.44	1.85
Glenfield Hospital	100	2.33	2.52	1.96
University Hospital of North Staffordshire	97	1.46	1.25	1.99
Leeds General Infirmary	100	1.01	1.77	2.02
Royal Brompton Hospital	100	4.44	2.55	2.09
University Hospital Coventry	98	3.35	0.41	2.19
John Radcliffe Hospital	100	3.28	2.46	2.67
Southampton General Hospital	100	2.02	0.92	2.7
Morrison Hospital	100	2.5	1.27	2.7
James Cook University Hospital	100	1.54	2.87	2.87
Royal Sussex County Hospital	100	4.24	3.31	2.96
New Cross Hospital	100	3.87	3.13	3.11
Blackpool Victoria Hospital	100	2.08	1.21	3.2
Manchester Royal Infirmary	100	1.32	1.86	3.26
Castle Hill Hospital	100	2.18	3.33	3.49
Derriford Hospital	3	76.92*	87.5*	83.33*
Spire Southampton Hospital (PP)	97	NA	NA	NA
Cromwell Hospital (PP)	100	NA	NA	NA

Ranked by rates in 2020/21. Data completeness yellow if <90%, red if <80%. Rates reported for completed data only (* very poor data compliance). Green if in top quartile (compared to UK aggregate 2018/21), red if in bottom quartile in 2020/21.

Deep Sternal Wound Infection (DSWI) rate (%) following CABG (requiring surgical debridement or reoperation)



Nations	2018/9	2019/20	2020/21
UK	0.33	0.28	0.14
England	0.33	0.29	0.15
Northern Ireland	0.34	0.34	0
Wales	0.22	0	0

UK	2018/21 aggregate (unit level data)
1st quartile	0%
Median	0%
3rd quartile	0.41%

Hospital	Data completeness (%)	2018/9	2019/20	2020/21
Liverpool Heart and Chest Hospital	100	0	0	0
Northern General Hospital	100	0	0	0
James Cook University Hospital	100	0	0	0
Spire St Anthony's Hospital (PP)	97	0	0	0
Spire Southampton Hospital (PP)	97	0	0	0
University Hospital of Wales	94	0	0	0
Basildon Hospital	91	0	0	0
St Thomas' Hospital	96	0.29	0	0
Southampton General Hospital	100	0.4	0	0
Morrison Hospital	100	0.42	0	0
Hammersmith Hospital	100	0.61	0	0
St George's Hospital	100	0.77	0	0
King's College Hospital	86	0.92	0	0
Leeds General Infirmary	100	0.2	0.22	0
Castle Hill Hospital	100	0.49	0.22	0
Wythenshawe Hospital	100	0.23	0.27	0
Royal Victoria Hospital	100	0.34	0.34	0
Royal Sussex County Hospital	100	0.71	0.37	0
Queen Elizabeth Hospital	100	0.33	0.38	0
University Hospital Coventry	98	0.74	0.41	0
Bristol Royal Infirmary	99	0.21	0.46	0
Nottingham City Hospital	100	0.38	0.47	0
New Cross Hospital	100	0.22	0.48	0
Freeman Hospital	92	0.4	1.35	0
Cromwell Hospital (PP)	100	0	11.11	0
Derriford Hospital	3	7.69	12.5	0*
Barts and the London	100	0.31	0.43	0.15
Blackpool Victoria Hospital	100	0.95	1.01	0.23
Harefield Hospital	99	0.22	0.67	0.24
Papworth Hospital	100	0.31	0	0.27
Manchester Royal Infirmary	100	1.06	0	0.47
Glenfield Hospital	100	0	0.46	0.49
University Hospital of North Staffordshire	97	0.29	0	0.5
Royal Brompton Hospital	100	0	0.26	0.7
John Radcliffe Hospital	100	0	0.7	1.07

Ranked by rates in 2020/21. Data completeness yellow if <90%, red if <80%. Green if in top quartile (compared to UK aggregate 2018/21), red if in bottom quartile in 2020/21. (* very poor data compliance).

New post-operative any neurological event (CVA and TIA combined) rate (%) following CABG



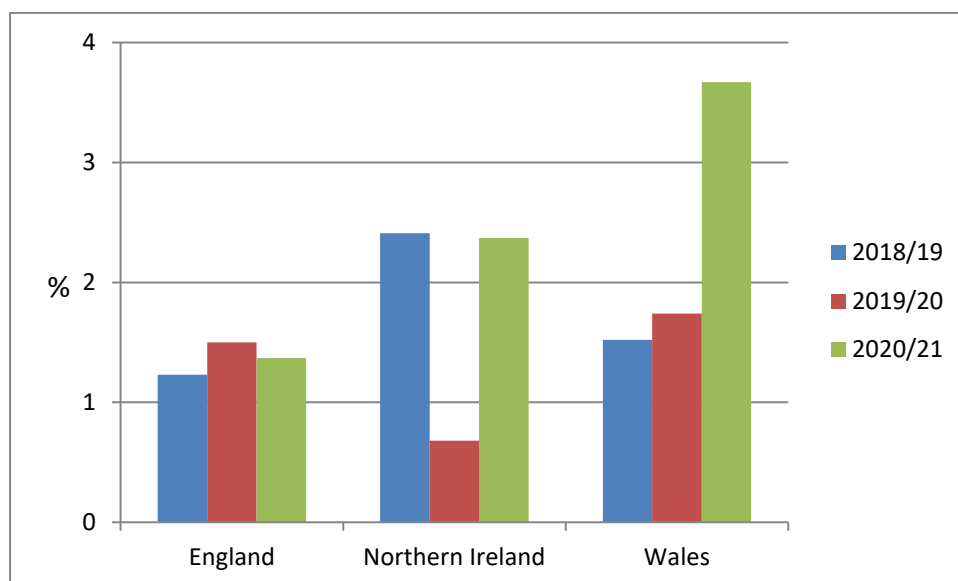
Nations	2018/19	2019/20	2020/21
UK (excl Scotland)	0.83	0.77	0.6
England	0.79	0.76	0.58
Northern Ireland	1.72	1.02	1.18
Wales	1.3	0.87	0.91

UK	2018/21 aggregate (unit level data)
1st quartile	0.4%
Median	0.72%
3rd quartile	1.13%

Hospital	Data completeness (%)	2018/19	2019/20	2020/21
Manchester Royal Infirmary	100	0.27	0	0
Hammersmith Hospital	100	0.31	0	0
John Radcliffe Hospital	90	1.37	0	0
Spire St Anthony's Hospital (PP)	97	2.13	0	0
University Hospital of Wales	94	0.9	0.45	0
St Thomas' Hospital	96	0.9	0.46	0
New Cross Hospital	100	0.86	0.72	0
Papworth Hospital	100	0.62	1.26	0
Bristol Royal Infirmary	99	1.66	0.46	0.3
Wythenshawe Hospital	99	0.47	0.54	0.34
Derriford Hospital	100	0.58	0.34	0.38
Leeds General Infirmary	100	0.4	0.44	0.4
Blackpool Victoria Hospital	100	0.19	1.21	0.46
Glenfield Hospital	100	1.16	0.69	0.49
University Hospital of North Staffordshire	96	0.89	0.94	0.49
Liverpool Heart and Chest Hospital	100	0.66	1.28	0.61
Royal Brompton Hospital	100	1.64	0.51	0.7
Southampton General Hospital	98	0.2	0.69	0.71
Harefield Hospital	99	0.45	0.9	0.72
University Hospital Coventry	80	0.65	0.82	0.74
Royal Sussex County Hospital	100	3.18	2.95	0.74
Queen Elizabeth Hospital	100	0.99	1.51	0.84
Barts and the London	100	0.83	0.97	0.92
Nottingham City Hospital	100	0.38	0.47	1.04
Royal Victoria Hospital	100	1.72	1.02	1.18
Freeman Hospital	92	1.21	0.45	1.23
St George's Hospital	100	1.02	1.13	1.27
Castle Hill Hospital	100	0.73	1.11	1.31
James Cook University Hospital	100	0.96	0.76	1.43
King's College Hospital	81	1.37	0.28	1.78
Morrison Hospital	100	1.67	1.27	1.8
Northern General Hospital	100	NA	NA	NA
Cromwell Hospital (PP)	98	NA	NA	NA
Spire Southampton Hospital (PP)	96	NA	NA	NA
Basildon Hospital	0	NA	NA	NA

Ranked by rates in 2020/21. Data completeness yellow if <90%, red if <80%. Green if in top quartile (compared to UK aggregate 2018/21). Lower quartile units not highlighted. Some care is needed in interpreting this data, as higher reporting units may be collecting the data more carefully. (Likewise, very low rates may be unreliable due to under-reporting. Many more units reported no cases in 2020/21 than in previous years).

New post-operative kidney failure (requiring renal support therapy) following CABG (%)



Nations	2018/19	2019/20	2020/21
UK	1.3	1.5	1.5
England	1.2	1.5	1.4
Northern Ireland	2.4	0.7	2.4
Wales	1.5	1.7	3.7

UK	2018/21 aggregate (unit level data)
1st quartile	0.83%
Median	1.42%
3rd quartile	1.98%

Hospital	Data completeness (%)	2018/19	2019/20	2020/21
King's College Hospital	77	1.85	0.61	0
John Radcliffe Hospital	91	3.05	1.89	0
James Cook University Hospital	100	0.19	1.34	0.29
Liverpool Heart and Chest Hospital	100	1.18	0.89	0.4
Freeman Hospital	92	2.42	1.8	0.62
Wythenshawe Hospital	100	0.92	1.08	0.68
Royal Brompton Hospital	100	1.87	2.04	0.7
Southampton General Hospital	98	0.2	0.69	0.71
Royal Sussex County Hospital	100	0	1.47	0.75
Queen Elizabeth Hospital	100	1.64	2.26	0.84
Derriford Hospital	100	0.88	4.03	1.15
Blackpool Victoria Hospital	98	0.95	0.62	1.18
Bristol Royal Infirmary	99	0.62	1.39	1.22
Harefield Hospital	99	0.9	2.71	1.44
University Hospital of North Staffordshire	96	1.19	0	1.46
University Hospital Coventry	80	1.3	0.83	1.47
New Cross Hospital	100	1.08	0.96	1.56
Nottingham City Hospital	99	1.52	0.95	1.57
Morrison Hospital	100	0.42	2.12	1.8
Manchester Royal Infirmary	100	0.79	1.54	1.84
St Thomas' Hospital	96	0.6	0.46	1.94
Glenfield Hospital	100	1.63	1.83	1.96
Leeds General Infirmary	100	1.01	1.77	2.02
Barts and the London	100	2.79	2.69	2.14
Castle Hill Hospital	100	0.97	1.56	2.18
Royal Victoria Hospital	100	2.41	0.68	2.37
Papworth Hospital	100	2.01	1.8	2.72
Basildon Hospital	100	1.99	3.36	3.77
St George's Hospital	100	1.28	2.54	4.46
University Hospital of Wales	94	2.7	1.34	5.61
Hammersmith Hospital	0	NA	NA	NA
Northern General Hospital	0	NA	NA	NA

Ranked by rates in 2020/21. Data completeness yellow if <90%, red if <80%. Green if in top quartile (compared to UK aggregate 2018/21), red if in bottom quartile in 2020/21.

Dual Consultant Operations

Nations	2018/19	2019/20	2020/21	
UK	0	117	193	Number of DCO Cases
England		117	193	
Northern Ireland		0	0	
Wales		0	0	
UK	0	0.41	1.02	% of total cases
England		0.44	1.08	
Northern Ireland		0	0	
Wales		0	0	
UK	0	36	33	Deaths (n)
England		36	33	
Northern Ireland		0	0	
Wales		0	0	
UK		30.8	17.1	Mortality (%)
England		30.8	17.1	
Northern Ireland				
Wales				
UK		27.1	20.1	Predicted mortality (%) (EuroSCORE logistic)
England		27.1	20.1	
Northern Ireland				
Wales				

Dual Consultant Operating (DCO) was a concept introduced to the audit in April 2019 (hence why no cases for the 2018/19 year).

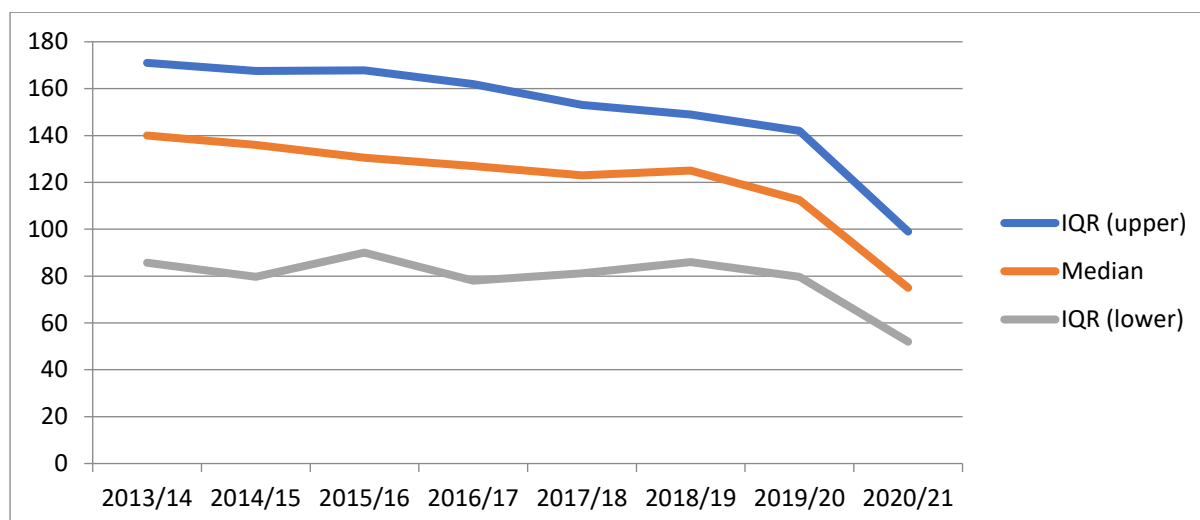
DCO was introduced to optimise patient care for those undergoing very high-risk procedures and to avoid potential risk averse behaviour by surgeons. To be recorded as a DCO case a unit must document a properly constituted MDT has taken place to discuss each patient. Patients may only be prospectively allocated as a DCO case – it cannot be done peri or post operatively. Emergency patients are excluded (as it is not possible to undergo an MDT in these situations, and these cases are already excluded from an individual consultant’s outcome reporting/analysis).

Hospital	Number of DCO cases	% Total cases	Deaths (n)	Mortality (%)	Predicted mortality (%)
Spire St Anthony's Hospital (PP)	1	7.69	0	0	4.6
Barts and the London	8	0.56	2	25.0	27.5
Basildon Hospital					
Liverpool Heart and Chest Hospital	5	0.45	0	0	51.8
Bristol Royal Infirmary					
Spire Southampton Hospital (PP)					
Castle Hill Hospital	7	1.69	2	28.6	31.0
Nottingham City Hospital					
Cromwell Hospital (PP)					
Freeman Hospital	2	0.37	0	0	30.2
St George's Hospital					
Glenfield Hospital	19	3.49	4	21.1	28.0
Hammersmith Hospital	3	0.93	0	0	17.5
Harefield Hospital	62	6.83	10	16.1	11.5
King's College Hospital	8	1.94	0	0	6.8
Leeds General Infirmary					
Morrison Hospital					
Manchester Royal Infirmary	3	0.85	2	66.7	42.6
New Cross Hospital	2	0.38	1	50.0	34.9
Northern General Hospital	18	3.47	2	11.1	19.4
Royal Brompton Hospital	13	2.07	3	23.1	21.9
Papworth Hospital	5	0.44	1	20.0	8.7
Derriford Hospital	11	1.33	3	27.3	26.3
Queen Elizabeth Hospital	2	0.64	0	0	5.2
John Radcliffe Hospital	14	2.93	2	14.3	26.4
Royal Sussex County Hospital	2	0.61	1	50.0	46.2
Royal Victoria Hospital					
James Cook University Hospital	4	0.63	0	0	13.0
Southampton General Hospital					
St Thomas' Hospital					
University Hospital of North Staffordshire	1	0.22	0	0	6.0
University Hospital of Wales					
Blackpool Victoria Hospital	2	0.25	0	0	25.9
University Hospital Coventry					
Wythenshawe Hospital	1	0.16	0	0	10.2

Data for last year only (2020/21). Predicted mortality calculated by EuroSCORE logistic %

Consultant caseloads and Surgical training

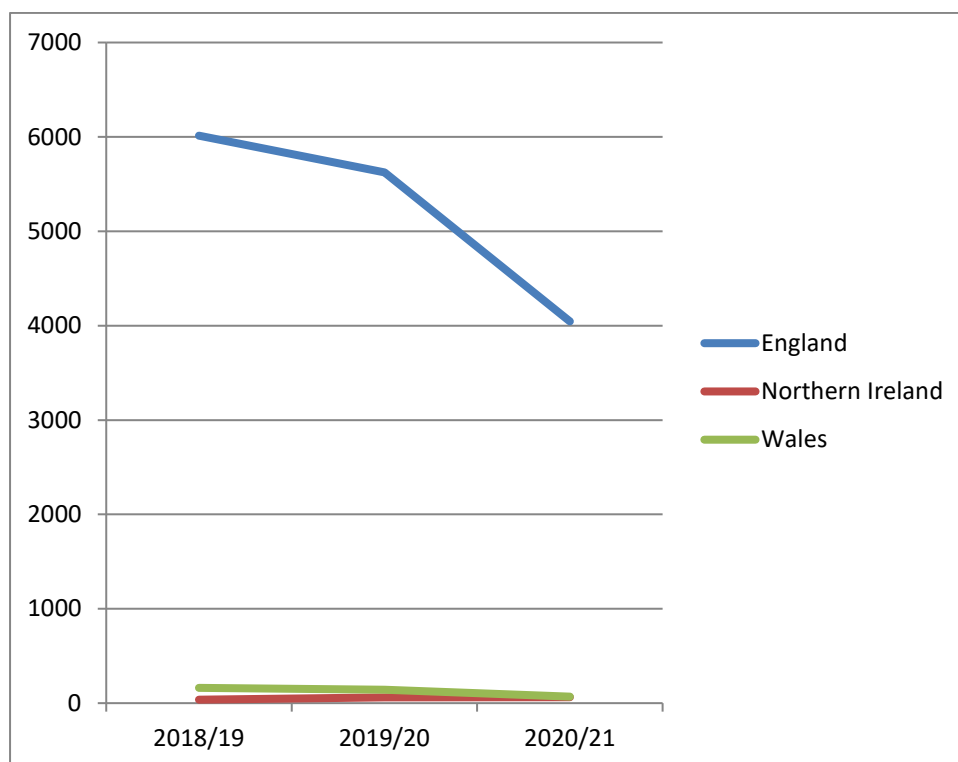
Numbers of cardiac operations performed each year per consultant – UK



	2013 / 14	2014 / 15	2015 / 16	2016 / 17	2017 / 18	2018 / 19	2019 / 20	2020 / 21
Consultant Surgeons (UK excl Scotland)	252	260	250	263	262	265	264	257
Surgeons performing >33 cases/yr	231	232	225	233	234	230	236	218
Mean (cases/yr)	131.1	126.9	128.9	122.4	119.0	115.8	110.3	75.2
IQR (upper)	171	168	168	162	153	149	142	99
Median	140	136	130.5	127	123	125	112.5	75
IQR (lower)	86	80	90	78	81	86	80	52

These counts include all cases for which an individual consultant is responsible - as per the Clinical Outcomes Publication (COP). However, these counts also include emergencies (which are excluded from the COP analysis). Publication of a surgeon's outcomes in COP requires >99 cases in 3 years.

Number of cardiac operations performed by surgeon other than consultant (trainees) in UK – past 3 years

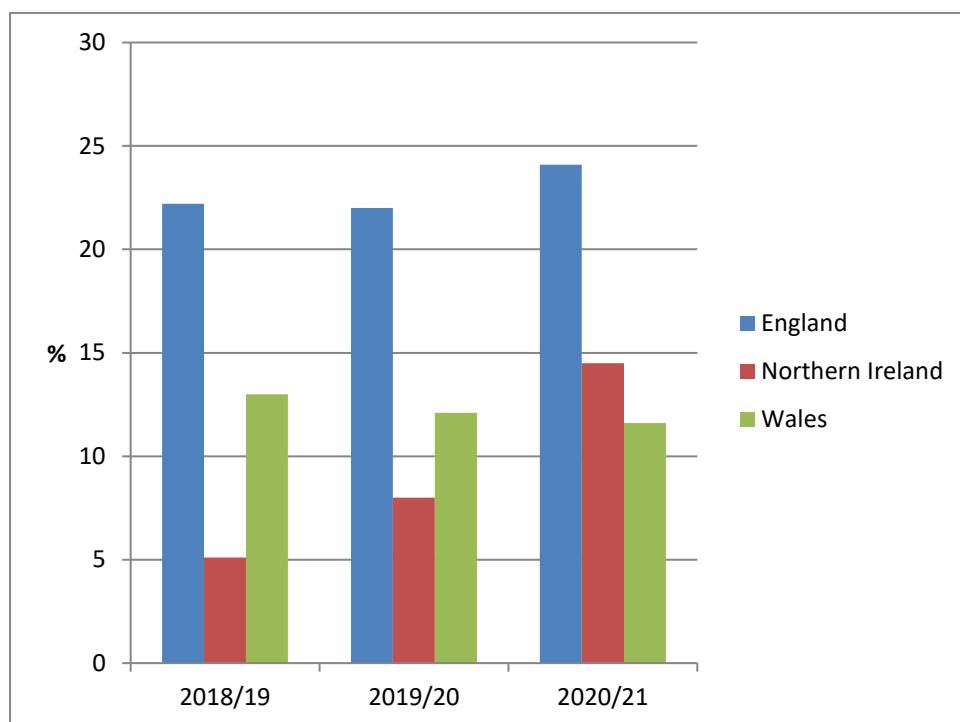


Nation	Trainee Cases (n)		
	2018/19	2019/20	2020/21
England	6013	5623	4045
Northern Ireland	37	61	63
Wales	162	142	69

Trainee case defined within the data as 'First Operator' GMC number not the same as 'Responsible Consultant' GMC number. This will include both registrars with a national training number (NTN) and Trust Fellows etc. In some hospitals it will also include post-CCT/CESR doctors who are fully trained, but not working as consultants.

The GMC number of the Consultant responsible for the case is an obligatory field within the dataset. Cases where no GMC number has been recorded for the First Operator are excluded from these counts. (Data on the count/% of missing data is contained in hospital level table below).

Proportion (%) of cardiac operations performed by surgeon other than consultant (trainees) in UK – past 3 years



Nation	Trainee Cases (%)		
	2018/19	2019/20	2020/21
England	22.2	22	24.1
Northern Ireland	5.1	8	14.5
Wales	13	12.1	11.6

Number and proportion (%) of cardiac operations performed by Consultant - by hospital

Hospital	Total Cases	First Operator Blank	First Operator Blank (%)	Total by Consultant	Case by Consultant (%)
Spire St Anthony's Hospital (PP)	157	0	0	157	100
Cromwell Hospital (PP)	71	0	0	71	100
Leeds General Infirmary	2196	7	0.3	2113	96.2
University Hospital of Wales	1596	10	0.6	1528	95.7
Manchester Royal Infirmary	1597	1	0.1	1462	91.5
Nottingham City Hospital	1529	0	0	1353	88.5
University Hospital Coventry	1478	0	0	1306	88.4
Royal Victoria Hospital	1918	105	5.5	1652	86.1
Liverpool Heart and Chest Hospital	4580	82	1.8	3919	85.6
St Thomas' Hospital	2562	0	0	2150	83.9
Northern General Hospital	2210	8	0.4	1811	81.9
Glenfield Hospital	2414	0	0	1945	80.6
Harefield Hospital	2759	182	6.6	2223	80.6
Basildon Hospital	1889	0	0	1511	80
University Hospital of North Staffordshire	1757	10	0.6	1387	78.9
St George's Hospital	1655	257	15.5	1295	78.2
James Cook University Hospital	2381	0	0	1856	78
Derriford Hospital	2677	204	7.6	2086	77.9
Royal Sussex County Hospital	1502	0	0	1161	77.3
Wythenshawe Hospital	2211	16	0.7	1710	77.3
King's College Hospital	1818	33	1.8	1382	76
Blackpool Victoria Hospital	2744	16	0.6	2086	76
New Cross Hospital	2133	0	0	1620	75.9
Castle Hill Hospital	1977	2	0.1	1437	72.7
Royal Brompton Hospital	2276	6	0.3	1618	71.1
Morrison Hospital	1422	111	7.8	996	70
Papworth Hospital	4281	107	2.5	2860	66.8
John Radcliffe Hospital	1830	203	11.1	1219	66.6
Spire Southampton Hospital (PP)	614	224	36.5	376	61.2
Queen Elizabeth Hospital	1497	3	0.2	896	59.9
Barts and the London	5179	14	0.3	3035	58.6
Freeman Hospital	1729	4	0.2	950	54.9
Southampton General Hospital	2990	282	9.4	1237	41.4
Hammersmith Hospital	1522	32	2.1	609	40
Bristol Royal Infirmary	3179	3179	100	0	0
Mater Misericordiae Hospital	1179	1179	100	0	0

Aggregate data for 3 years - 2018/21. (Defined as First Operator GMC number the same as Responsible Consultant GMC number). Ranked by highest proportion performed (%).

Number and proportion (%) of cardiac operations performed by a surgeon other than consultant surgeons (trainees) – by hospital

Hospital	Total Cases	Total Cases by Trainee	Cases by Trainee (%)	Trainee Cases with Consultant as First Assistant	% Trainee cases supervised by Consultant
Barts and the London	5179	2130	41.1	977	45.9
Southampton General Hospital	2990	1471	49.2	268	18.2
Papworth Hospital	4281	1314	30.7	1043	79.4
Hammersmith Hospital	1522	881	57.9	116	13.2
Freeman Hospital	1729	775	44.8	603	77.8
Royal Brompton Hospital	2276	652	28.6	365	56.0
Blackpool Victoria Hospital	2744	642	23.4	428	66.7
Queen Elizabeth Hospital	1497	598	39.9	398	66.6
Liverpool Heart and Chest Hospital	4580	579	12.6	417	72.0
Castle Hill Hospital	1977	538	27.2	421	78.3
James Cook University Hospital	2381	525	22	392	74.7
New Cross Hospital	2133	513	24.1	436	85.0
Wythenshawe Hospital	2211	485	21.9	401	82.7
Glenfield Hospital	2414	469	19.4	278	59.3
St Thomas' Hospital	2562	412	16.1	372	90.3
John Radcliffe Hospital	1830	408	22.3	272	66.7
King's College Hospital	1818	403	22.2	289	71.7
Northern General Hospital	2210	391	17.7	284	72.6
Derriford Hospital	2677	387	14.5	277	71.6
Basildon Hospital	1889	378	20	142	37.6
University Hospital of North Staffordshire	1757	360	20.5	289	80.3
Harefield Hospital	2759	354	12.8	321	90.7
Royal Sussex County Hospital	1502	341	22.7	242	71.0
Morrison Hospital	1422	315	22.2	304	96.5
Nottingham City Hospital	1529	176	11.5	98	55.7
University Hospital Coventry	1478	172	11.6	157	91.3
Royal Victoria Hospital	1918	161	8.4	137	85.1
Manchester Royal Infirmary	1597	134	8.4	100	74.6
St George's Hospital	1655	103	6.2	79	76.7
Leeds General Infirmary	2196	76	3.5	70	92.1
University Hospital of Wales	1596	58	3.6	55	94.8
Spire Southampton Hospital (PP)	614	14	2.3	0	0
Spire St Anthony's Hospital (PP)	157	0	0	0	
Bristol Royal Infirmary	3179	0*	0	0	NA
Cromwell Hospital (PP)	71	0	0	0	
Mater Misericordiae Hospital	1179	0*	0	0	NA

Aggregate data for 3 years - 2018/21. (Trainee defined as 'First Operator' GMC number not the same as 'Responsible Consultant' GMC number. This will include both national trainees (NTN) and Trust Fellows etc. In some hospitals this will include post-CCT/CESR doctors not in consultant posts). Ranked by highest total cases performed by trainee.

(* No GMC number recorded for First Operator)

Appendix

NICOR Hospital Codes

ANT. Spire St Anthony's Hospital (PP)
BAL. Barts and the London
BAS. Basildon Hospital
BHL. Liverpool Heart and Chest Hospital
BRI. Bristol Royal Infirmary
CBS. Spire Southampton Hospital (PP)
CHH. Castle Hill Hospital
CHN. Nottingham City Hospital
CRO. Cromwell Hospital (PP)
ERI. Royal Infirmary of Edinburgh
FRE. Freeman Hospital
GEO. St George's Hospital
GJH. Golden Jubilee Hospital
GRL. Glenfield Hospital
HAM. Hammersmith Hospital
HH. Harefield Hospital
HHW. Wellington Hospital North (PP)
HSC. Harley Street Clinic (PP)
KCH. King's College Hospital
LBH. London Bridge Hospital (PP)
LGI. Leeds General Infirmary
MOR. Morriston Hospital
MRI. Manchester Royal Infirmary
NCR. New Cross Hospital
NGS. Northern General Hospital
NHB. Royal Brompton Hospital
PAP. Papworth Hospital
PLY. Derriford Hospital
QEB. Queen Elizabeth Hospital
QEP. Queen Elizabeth Hospital (private) (PP)
RAD. John Radcliffe Hospital
RIA. Aberdeen Royal Infirmary
RSC. Royal Sussex County Hospital
RVB. Royal Victoria Hospital
SCM. James Cook University Hospital
SGH. Southampton General Hospital
STH. St Thomas' Hospital
STO. University Hospital of North Staffordshire
UCL. University College Hospital
UHW. University Hospital of Wales
VIC. Blackpool Victoria Hospital
WAL. University Hospital Coventry
WYT. Wythenshawe Hospital

PP Private (Patient) Hospitals

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National Institute of Cardiovascular Outcomes Research (NICOR)

NICOR is a partnership of clinicians, IT experts, statisticians, academics and managers who, together, are responsible for six cardiovascular clinical audits (the National Cardiac Audit Programme – NCAP) and a number of new health technology registries, including the UK TAVI registry. Hosted by Barts Health NHS Trust, NICOR collects, analyses and interprets vital cardiovascular data into relevant and meaningful information to promote sustainable improvements in patient well-being, safety and outcomes. It is commissioned by the Healthcare Quality Improvement Partnership (HQIP) with funding from NHS England and GIG Cymru /NHS Wales.



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Society for Cardiothoracic Surgery in Great Britain & Ireland

The SCTS is an affiliated group of the Royal College of Surgeons of England and has charitable status. The Charity's objects are to enable surgeons to achieve and maintain the highest standards of surgical practice and patient care.



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HQIP is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing and National Voices. Its aim is to promote quality improvement in patient outcomes, and in particular, to increase the impact that clinical audit, outcome review programmes and registries have on healthcare quality in England and Wales. HQIP holds the contract to commission, manage and develop the National Clinical Audit and Patient Outcomes Programme (NCAPOP), comprising around 40 projects covering care provided to people with a wide range of medical, surgical and mental health conditions. The programme is funded by NHS England, the Welsh Government and, with some individual projects, other devolved administrations and crown dependencies.



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