NHS
National Services Scotland

Scottish Stroke Care Audit

2015 National Report

Stroke Services in Scottish Hospitals

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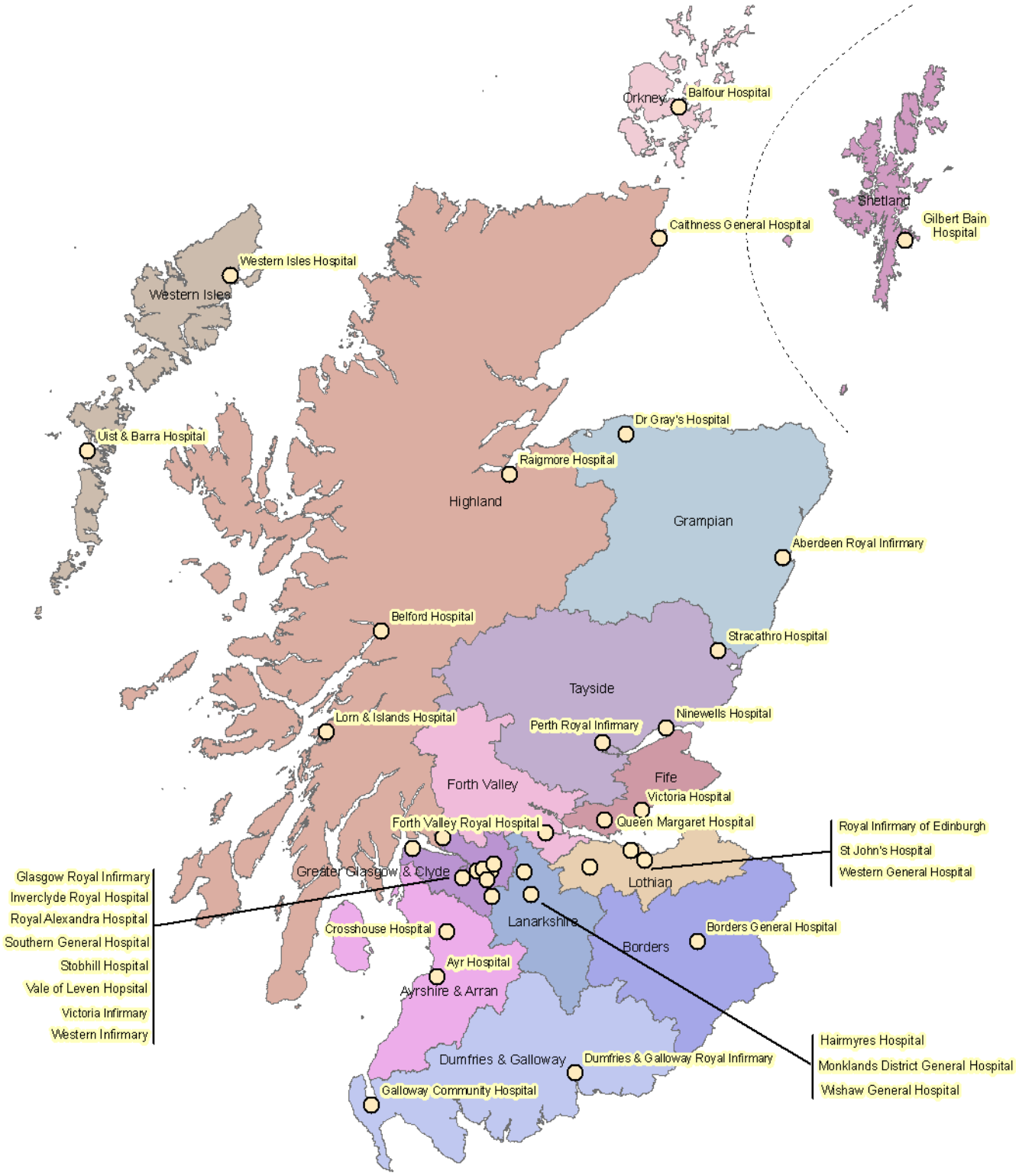
Note

The list of tables and charts above excludes additional content that is only available from the Excel file which supplements this report. The Excel file is available from the Scottish Stroke Care Audit web site at http://www.strokeaudit.scot.nhs.uk. The additional content provides extra detail and covers the topics: length of stay for stroke patients, comparison of initial diagnosis and final diagnosis, the proportion of thrombolysed patients receiving repeat scans, the distribution of time between stroke event and carotid intervention and trends in the annual performance of Health Boards for the main inpatient stroke standards.

Map of Scotland showing all hospitals in Health Boards contributing to the Scottish Stroke Care Audit



1 Introduction

"Stroke has been a clinical priority for NHS Scotland for more than 15 years; and we remain committed to ensuring that people who have had a stroke have access to the best possible care as quickly as possible. As with previous years, the Scottish Stroke Care Audit is one of the tools used to assess the overall success of our stroke priorities, and to highlight and drive real improvements made in stroke care.

The Stroke Improvement Plan[1], published in August 2014 sets out our continued ambition to deliver health and social care that is person-centred, clinically effective and safe, and supports people with longer term care, treatment and recovery in their own communities. Its focus is on working collaboratively towards a common goal of real and lasting improvement.

This year's SSCA report shows that NHS Scotland continues to make improvements for acute stroke care, in particular delivering the 'stroke care bundle' which measures four components of stroke care that every patient admitted to hospital should expect to receive, regardless of where they live in Scotland. Boards set their own improvement aims against the 'bundle', and I am pleased to see that every Board has made improvements in delivering the 'bundle' – a 7% improvement nationally in 2014.

I know that for stroke care, the data collected are used by Boards to identify small tests of changes locally, often leading to improvements in stroke care across Scotland. I would like to congratulate all those involved for their dedication, hard work and enthusiasm in delivering improvements in the care of stroke patients across Scotland.

It is important that all Boards continue to contribute data in order to allow them to benchmark their performance against other boards and to provide a national perspective which will help drive improvement.

We will continue to work together to improve outcomes for those who have had a stroke and their families and carers. And I would encourage all NHS Scotland staff to continue to use Scottish Stroke Care Audit data to deliver the changes that we are seeing to benefit all people living with a stroke."

Jason Leitch
National Clinical Director, NHS Scotland
April 2015

Stroke is a key health issue for the people of Scotland and the Scottish NHS. It is the third commonest cause of death in Scotland and the most common cause of severe physical disability amongst Scottish adults. Nearly 9000 stroke patients were discharged from Scottish hospitals in 2014. Stroke has a significant impact on NHS resources, accounting for approximately 5% of total NHS costs[2]. Societal costs are even higher. The economic cost of stroke to Scotland in terms of lost employment and the cost of support in the community are significant, whilst the impact on family members or friends who care for stroke survivors is huge. There are interesting variations in the ages of patients presenting with stroke depending on Health Board of residence (Table 1). Glasgow and Lanarkshire, in particular, having a younger stroke population. This may represent particular social challenges and indicate a greater need in these areas.

Table 1: Numbers of stroke patients by age, sex, case mix and Health Board of residence, 2014 data (final diagnosis).

Number and *Percentage* of Final Stroke		Health Board of Residence							
		Total	Ayrshire & Arran	Borders	Dumfries & Galloway	Fife	Forth Valley	Grampian	Greater Glasgow & Clyde
Final diagnosis stroke	Number	8 696	688	198	269	677	522	688	1 916
Stroke Type									
Ischaemic	Number	7 557	584	168	226	608	452	588	1 717
	%	*86.9*	*84.9*	*84.8*	*84.0*	*89.8*	*86.6*	*85.5*	*89.6*
Haemorrhagic	Number	969	82	28	39	58	64	85	179
	%	*11.1*	*11.9*	*14.1*	*14.5*	*8.6*	*12.3*	*12.4*	*9.3*
Gender and Mean Age									
Male	Number	4 364	348	94	137	340	262	362	925
	%	*50.2*	*50.6*	*47.5*	*50.9*	*50.2*	*50.2*	*52.6*	*48.3*
Mean Age (years)	Male	70.3	71.3	73.6	73.8	71.3	70.6	71.8	68.0
	Female	75.9	75.5	77.6	77.0	75.9	74.2	75.8	74.8
Age Distribution									
Age <60 years on admission	Number	1 434	108	30	30	96	86	94	390
	%	*16.5*	*15.7*	*15.2*	*11.2*	*14.2*	*16.5*	*13.7*	*20.4*
Age 60-80 years on admission	Number	4 330	348	81	130	358	296	348	937
	%	*49.8*	*50.6*	*40.9*	*48.3*	*52.9*	*56.7*	*50.6*	*48.9*
Age over 80 years on admission	Number	2 932	232	87	109	223	140	246	589
	%	*33.7*	*33.7*	*43.9*	*40.5*	*32.9*	*26.8*	*35.8*	*30.7*
Case Mix									
Independent in Activities of Daily Living?	Number	6 885	553	147	220	532	410	592	1 573
	%	*79.2*	*80.4*	*74.2*	*81.8*	*78.6*	*78.5*	*86.0*	*82.1*
Lived alone at normal place of residence?	Number	3 206	282	60	104	239	193	246	696
	%	*36.9*	*41.0*	*30.3*	*38.7*	*35.3*	*37.0*	*35.8*	*36.3*
Can talk at first assessment?	Number	6 298	540	150	191	552	340	426	1 393
	%	*72.4*	*78.5*	*75.8*	*71.0*	*81.5*	*65.1*	*61.9*	*72.7*
Oriented to time, place and person at first assessment?	Number	5 336	433	105	160	427	310	353	1 300
	%	*61.4*	*62.9*	*53.0*	*59.5*	*63.1*	*59.4*	*51.3*	*67.8*
Can lift both arms off the bed at first assessment?	Number	5 445	466	129	137	432	284	401	1 414
	%	*62.6*	*67.7*	*65.2*	*50.9*	*63.8*	*54.4*	*58.3*	*73.8*
Can walk without help from another person?	Number	4 087	302	89	70	294	236	214	1 444
	%	*47.0*	*43.9*	*44.9*	*26.0*	*43.4*	*45.2*	*31.1*	*75.4*

Number and *Percentage* of Final Stroke		Health Board of Residence							
		Highland	Lanark-shire	Lothian	Orkney	Shetland	Tayside	Western Isles	Outside Scotland/ Not Known/ Other
Final diagnosis stroke	Number	556	995	1 299	42	30	525	21	270
Stroke Type									
Ischaemic	Number	482	891	1 079	28	25	454	15	240
	%	*86.7*	*89.5*	*83.1*	*66.7*	*83.3*	*86.5*	*71.4*	*88.9*
Haemorrhagic	Number	63	98	183	1	4	58	2	25
	%	*11.3*	*9.8*	*14.1*	*2.4*	*13.3*	*11.0*	*9.5*	*9.3*
Gender and Mean Age									
Male	Number	279	526	610	18	15	275	10	163
	%	*50.2*	*52.9*	*47.0*	*42.9*	*50.0*	*52.4*	*47.6*	*60.4*
Mean Age (years)	Male	70.5	68.6	71.3	71.8	69.8	72.5	71.8	67.3
	Female	75.4	76.1	77.4	81.2	79.7	77.4	75.0	74.4
Age Distribution									
Age <60 years on admission	Number	93	190	185	6	3	63	2	58
	%	*16.7*	*19.1*	*14.2*	*14.3*	*10.0*	*12.0*	*9.5*	*21.5*
Age 60-80 years on admission	Number	276	502	611	20	16	251	12	144
	%	*49.6*	*50.5*	*47.0*	*47.6*	*53.3*	*47.8*	*57.1*	*53.3*
Age over 80 years on admission	Number	187	303	503	16	11	211	7	68
	%	*33.6*	*30.5*	*38.7*	*38.1*	*36.7*	*40.2*	*33.3*	*25.2*
Case Mix									
Independent in Activities of Daily Living?	Number	441	816	974	36	28	310	16	237
	%	*79.3*	*82.0*	*75.0*	*85.7*	*93.3*	*59.0*	*76.2*	*87.8*
Lived alone at normal place of residence?	Number	204	385	523	17	11	153	8	85
	%	*36.7*	*38.7*	*40.3*	*40.5*	*36.7*	*29.1*	*38.1*	*31.5*
Can talk at first assessment?	Number	410	723	978	26	23	334	12	200
	%	*73.7*	*72.7*	*75.3*	*61.9*	*76.7*	*63.6*	*57.1*	*74.1*
Oriented to time, place and person at first assessment?	Number	335	651	704	27	19	318	7	187
	%	*60.3*	*65.4*	*54.2*	*64.3*	*63.3*	*60.6*	*33.3*	*69.3*
Can lift both arms off the bed at first assessment?	Number	326	599	837	16	15	196	10	183
	%	*58.6*	*60.2*	*64.4*	*38.1*	*50.0*	*37.3*	*47.6*	*67.8*
Can walk without help from another person?	Number	237	518	306	15	9	201	8	144
	%	*42.6*	*52.1*	*23.6*	*35.7*	*30.0*	*38.3*	*38.1*	*53.3*

The evidence for the benefits of organised specialist stroke care in improving outcomes is clear. The Scottish Stroke Care Audit (SSCA) has been collecting information about stroke care since 2002 and now includes all hospitals managing acute stroke in Scotland. Since its inception the SSCA has helped to drive evidence-based improvements in stroke care which have contributed to falling mortality rates and improved outcomes for Scottish stroke patients.

Comparisons between 2014 – 2015 reports:

Scottish Stroke Care Standard/ clinical area	2013 data	2014 data
Percentage admitted to a Stroke Unit within 1 day of admission.	81%	80%
Percentage with swallow screen on day of admission.	72%	77%
Percentage with brain scan within 24 hours.	87%	90%
Percentage of ischaemic stroke given aspirin within 1 day of admission.	85%	87%
Percentage seen at specialist stroke/TIA clinic within 4 days of receipt of referral.	79%	83%
Percentage thrombolysed within one hour of arrival at hospital.	34%	43%
Percentage receiving carotid intervention within 14 days of the event.	41%	38%

The SSCA has moved its focus more towards service improvement and safety over the last few years. As improvements in performance against most of the Scottish Stroke Care Standards has occurred across Scotland (and this progress has started to plateau), the focus has moved towards measuring stroke care 'bundles'. Instead of measuring how an individual fairs against any one stroke standard, bundles measure how that individual fairs against all relevant Scottish Stroke Care Standards, the drive being to ensure that all patients receive all aspects of high quality, evidence-based care.

The current Scottish Stroke Care Bundle consists of timely Stroke Unit admission, swallow screen, brain scan and aspirin. The number of individuals receiving the appropriate bundle continues to increase, with a rise from 58% to 65% between 2013 and 2014. The variation in performance between Health Boards suggests that there is still lots of potential for improvements in 'bundle performance'.

There remain areas of significant challenge:

The number of Scottish stroke patients receiving thrombolysis within 1 hour of hospital admissions has improved from 34% to 43%, but this is still a considerable distance from the Scottish Stroke Care Standard of 80%.

For Carotid Endarterectomy, there has been no improvement in performance against the 14 day Scottish Stroke Care Standard.

Innovative service redesign is required in both these areas to improve patient care.

1.1 This report

This report summarises data collected via a bespoke electronic database, (eSSCA), in each individual hospital in Scotland managing acute stroke patients. The data presented in this report, unless otherwise stated, are based on final diagnosis of stroke and not initial diagnosis as in the Monthly Reports distributed to Health Boards for management information and quality assurance purposes.

An overview of initial and final diagnosis of stroke is included in the web tables from the SSCA data. In summary, of the 10 236 patients admitted during 2014 with a diagnosis of stroke (initial or final), 7 236 (71%) of these had an initial diagnosis of stroke which was then confirmed. 1,540 (15%) were admitted with an initial diagnosis of stroke which was not confirmed; 1 460 (14%) were not initially diagnosed as a stroke but had a final diagnosis of stroke.

Throughout 2014 the SSCA team continued to review the analysis of the data collected and modified definitions when necessary, therefore calculations in this year's report may not match exactly those presented in previous reports. Individual hospitals' data are displayed in charts. Supplemental detailed charts and tables for this report are available on the SSCA website (http://www.strokeaudit.scot.nhs.uk/reports.html).

In addition to this main report a Public Summary of the National Report will be distributed to Health Boards and other interested organisations. It will also be available on the SSCA website.

1.1.1 Contributions to this report

This year's report has been written by members of the SSCA Report Writing Sub-Group of the Steering Committee with contributions from colleagues within Health Boards across Scotland. In Appendix A we present comments from Health Board Chief Executives in relation to delivery of stroke care in their local areas which has led to improvement in performance against the Scottish Stroke Care Standards.

Each Health Board has a Stroke Managed Clinical Network (MCN) and the audit helps the MCNs plan the work required to improve their local stroke services. All the Stroke MCNs have active involvement from people who have had a stroke and from their families and friends; stroke survivors and their carers are encouraged to look at the audit information and comment on it. There is also voluntary organisation representation on the SSCA Steering Committee and feedback from service users is very welcome.

1.1.2 Scottish Stroke Care Standards (January 2013)

Topic	Scottish Stroke Care Standards, Jan 2013
Access to Stroke Unit	90% within 1 day of admission (Day 0 and 1).
Brain imaging	90% within 24 hours of admission.
Swallow screen	90% on day of admission (Day 0).
Aspirin administration	100% of ischaemic strokes within 1 day of admission (Days 0 and 1).
Delay from receipt of referral to specialist stroke/TIA clinic	80% are assessed within 4 days of receipt of referral (Day 0 being day of receipt of referral).
Thrombolysis	80% receive the bolus within one hour of arrival at hospital.
Carotid Intervention	80% undergoing carotid endarterectomy for symptomatic carotid stenosis have the operation within 14 days of the event that first led them to seek medical assistance.

These standards continue to focus on those parameters which have the best evidence for having an effect on patient outcomes. This report presents hospitals' performance against the Scottish Stroke Care Standards (2013).

1.2 Local Delivery Plan (LDP)

Previously, Scottish Stroke Care Standards data demonstrated that though patients were getting to a Stroke Unit they were not necessarily receiving other key elements of acute stroke care, i.e. swallow screening, brain scanning and aspirin within the recommended time. The focus of current improvement work in stroke is to increase the number of patients (admitted to hospital with a diagnosis of stroke) who receive all the relevant key elements of the Stroke Care Bundle. The Stroke Care Bundle is based on the Scottish Stroke Care Standards (2013) detailed in Section 1.1.2 and includes the most important drivers for improving stroke outcomes, i.e. admission to a Stroke Unit, swallow screen, brain scan and aspirin.

Why use the 'bundle' approach to improve care?

A 'bundle' involves a group of specific interventions/ processes of care that significantly improve patient outcome if done together rather than separately and improves the consistency with which patients are managed. It is sometimes referred to as the 'all or none' measurement.

As noted above the Stroke Care Bundle involves four components. Not all patients are eligible for all four components. An aspirin allergy, for example, would preclude the prescribing of aspirin, so the term 'appropriate' refers to patients receiving the components for which they were eligible. Figure 1 describes the different categories of bundle depending on patients' eligibility.

For the specific components, exclusions are as follows: (1) Stroke Unit admission excludes patients with in-hospital strokes, patients transferred in from another acute hospital or patients discharged within 1 day of admission to hospital (2) aspirin excludes patients with valid contraindications to aspirin and also those receiving a 'non-stroke' final diagnosis who are discharged within 1 day of admission to hospital.

In measuring the proportion of patients receiving an 'appropriate' bundle, patients ineligible for, and therefore not receiving, specific components of the bundle are counted as having received their appropriate bundle provided they received the remaining components for which they were eligible.

Figure 1 : Scottish Stroke Care Bundle flowchart

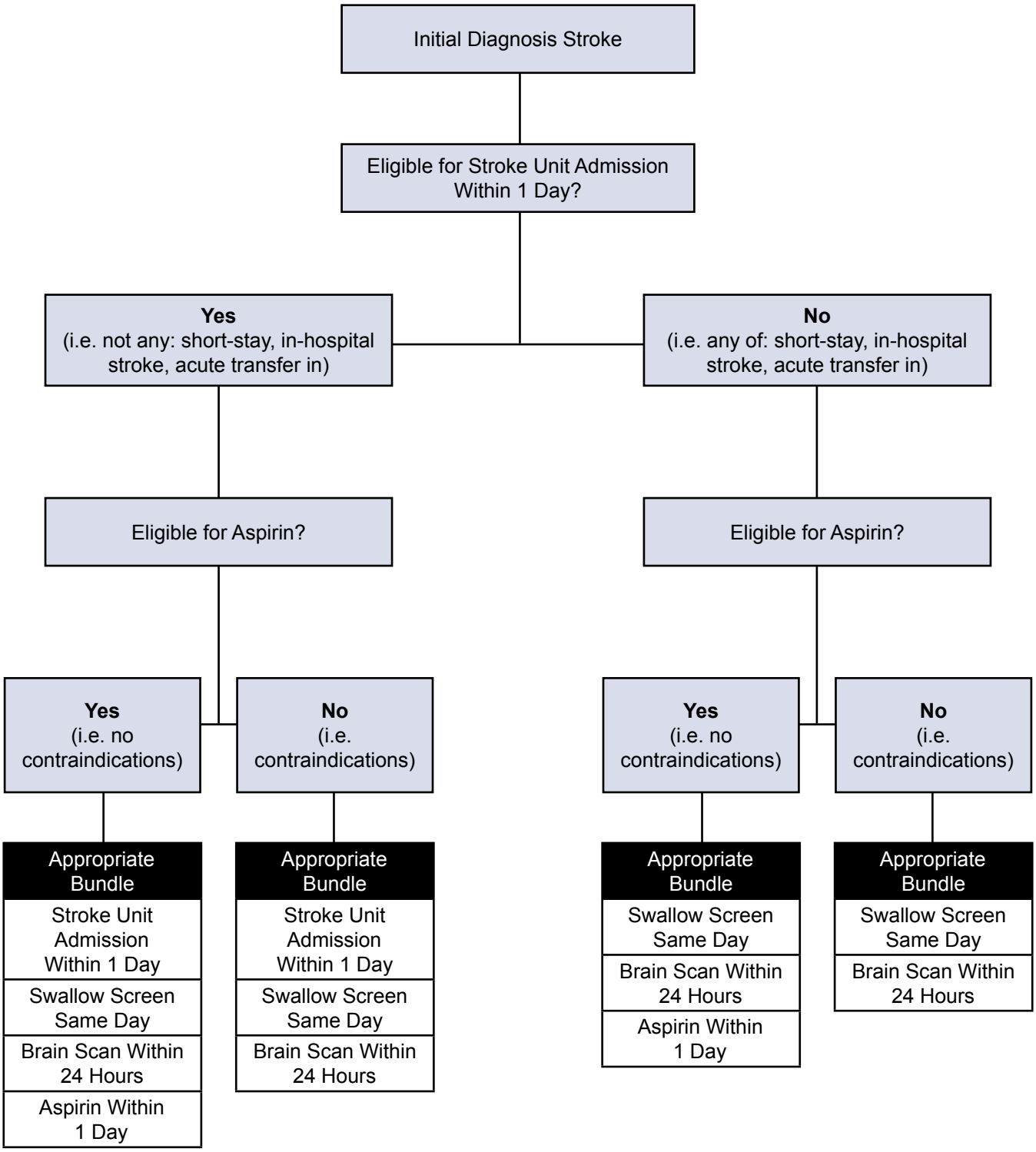
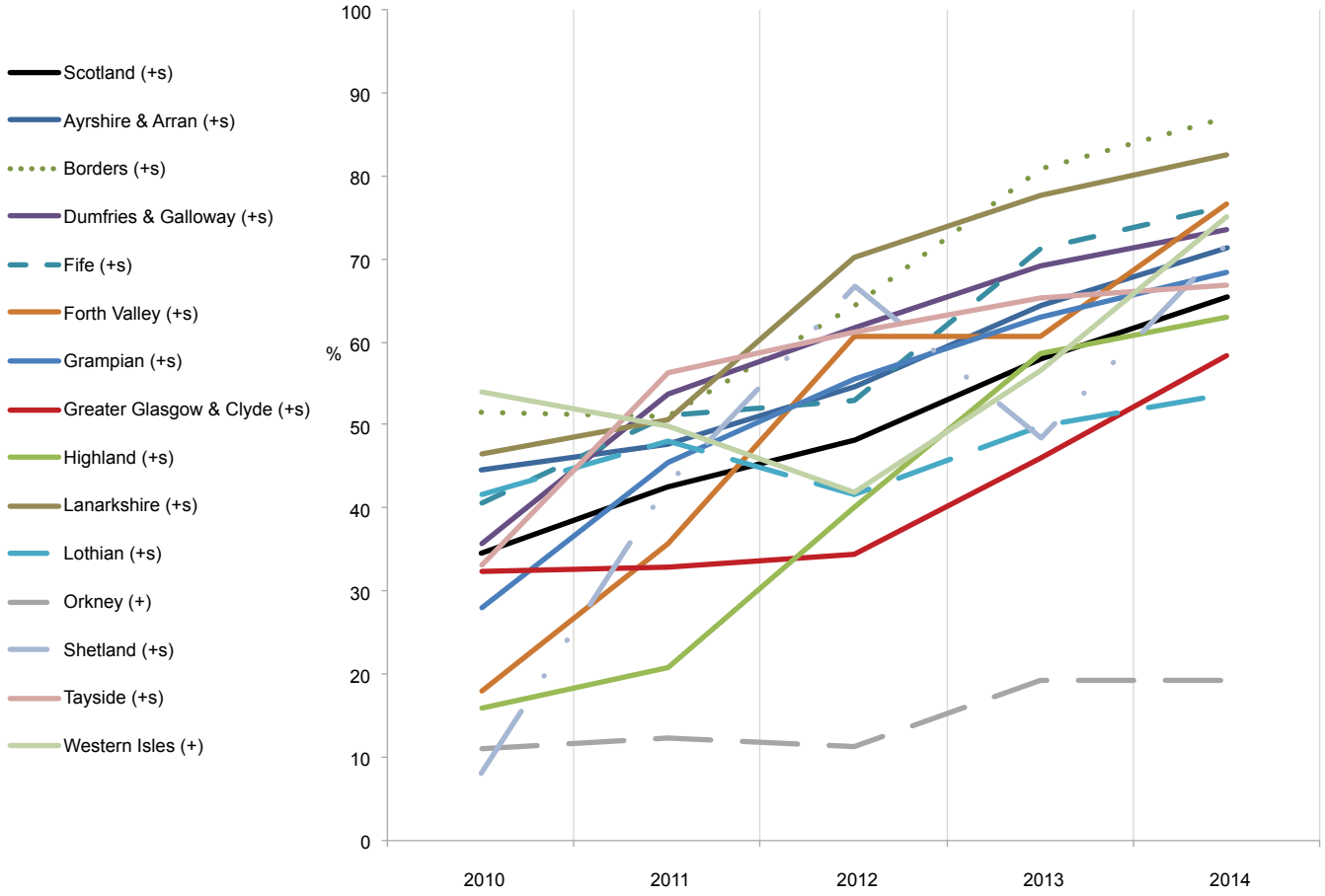


Chart 1a : Trend in percentage of stroke patients receiving an 'appropriate' Stroke Care Bundle (i.e. Stroke Unit admission, swallow screen, brain scan and aspirin), by Health Board, 2010 - 2014 data (based on initial diagnosis).

For bracketed abbreviations in chart legend :

'+' means an increasing trend and '-' means a decreasing trend; 's' means a statistically significant change over time (otherwise no 's').



Health Board percentages	2010	2011	2012	2013	2014
Scotland (+s)	35	42	48	58	65
Ayrshire & Arran (+s)	45	48	55	64	71
Borders (+s)	51	51	64	81	87
Dumfries & Galloway (+s)	36	54	62	69	74
Fife (+s)	41	51	53	71	76
Forth Valley (+s)	18	36	61	61	77
Grampian (+s)	28	46	56	63	69
Greater Glasgow & Clyde (+s)	32	33	34	46	58
Highland (+s)	16	21	40	59	63
Lanarkshire (+s)	46	51	70	78	83
Lothian (+s)	42	48	42	50	54
Orkney (+)	11	12	11	19	19
Shetland (+s)	8	43	67	48	72
Tayside (+s)	33	56	61	65	67
Western Isles (+)	54	50	42	57	75

Chart 1a and accompanying table show the improvements achieved in delivery of the Scottish Stroke Care Bundle from 2010 to 2014. All Health Boards have demonstrated improvements which are statistically significant wherever the numbers of patients admitted is large enough to determine this. Clearly some Health Boards have made much greater improvements than others. Orkney is the clear outlier in 2014, but is expected to dramatically improve performance in 2015 because of the installation of a CT scanner in the main hospital.

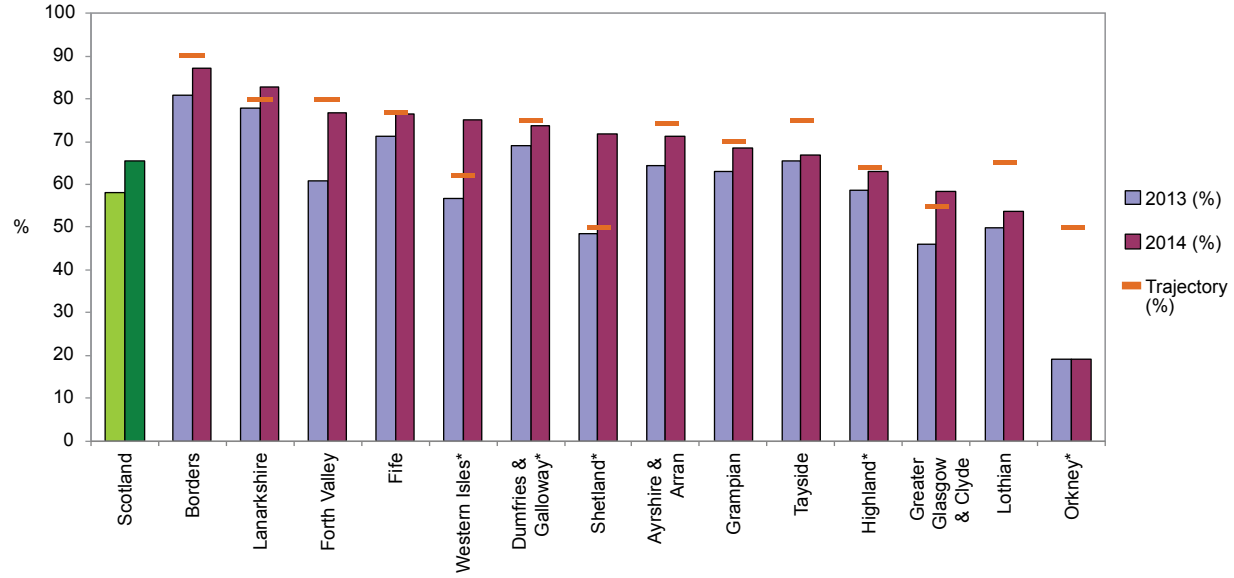
Charts 1b (Health Board) and 1c (Hospital) provide an indicative baseline of performance against the Stroke Care Bundle in 2014.

Health Board performance will continue to be monitored in the SSCA Monthly Reports circulated to Stroke MCNs and will also be monitored in quarterly Health Board Reports submitted to the Scottish Government.

Chart 1b : (Health Board) Percentage of stroke patients receiving an 'appropriate' Stroke Care Bundle (i.e. Stroke Unit admission, swallow screen, brain scan and aspirin) – indicative baseline performance, 2014 data (based on *initial* diagnosis).

Trajectories to be achieved by March 2015 have been set locally by individual Health Boards and are presented on the chart as orange lines.

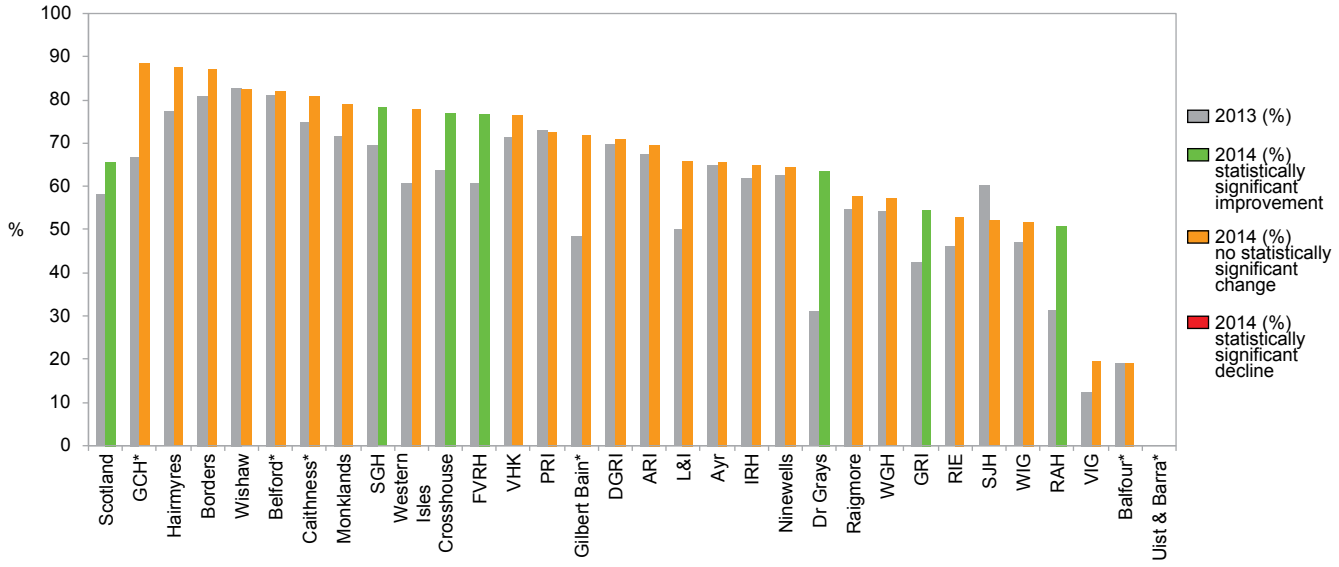
The Scotland columns in the chart are coloured light green and dark green simply to differentiate them from the hospital columns and the colours are not indicative of performance. Light green corresponds to '2013' and dark green corresponds to '2014'.



Notes regarding Charts 1b and 1c:

1. **A 'bundle' involves a group of specific interventions/ processes of care that significantly improve patient outcome if done together rather than separately and this also improves the consistency with which patients are managed - see Section 1.2.**
2. Due to the number of beds within some hospitals in the Health Boards indicated (*) and the small numbers of stroke admissions to these hospitals **it is not practical to have a defined Stroke Unit**. We have confirmed however that a defined stroke pathway is in place in these hospitals and that the Scottish Stroke Care Standard criteria are established within that pathway.
3. **Balfour Hospital, NHS Orkney did not have a CT scanner during the time of the reporting period.** Patients were airlifted to Aberdeen Royal Infirmary and a proportion may have arrived in sufficient time to have brain imaging within 24 hours of admission. A CT scanner has since been installed and is now operational.
4. **Uist & Barra Hospital, NHS Western Isles does not have a CT scanner** but patients are airlifted to Western Isles Hospital and a proportion may arrive in sufficient time to have brain imaging within 24 hours of admission.

Chart 1c : (Hospital) Percentage of stroke patients receiving an 'appropriate' Stroke Care Bundle (i.e. Stroke Unit admission, swallow screen, brain scan and aspirin) – indicative baseline performance, 2014 data (based on *initial* diagnosis).



The cumulative proportions of patients managed in accordance with all four standards which comprise the Stroke Care Bundle have risen significantly from 58% in 2013 to 65% in 2014. This improvement would be expected to translate into better outcomes for stroke patients.

Performance varied considerably between Health Boards (Chart 1b), however it should be noted that every Board has made improvements in delivering the Bundle.

The Stroke Care Bundle approach builds on the improvement and re-design work already started by Health Boards supported by the Stroke Managed Clinical Networks (MCNs) and the Scottish Stroke Improvement Team (see Appendix C for further information).

For 2015/16, the Scottish Stroke Improvement Programme has asked each Health Board to identify and set out their improvement aims and trajectory - and the priority actions to achieve these - in order to improve the effective delivery of the Stroke Care Bundle. These improvement aims should be underpinned by a more detailed local improvement plan which will also include how improvement will be delivered and progress assessed. All patients should expect to experience the same service regardless of where in Scotland they live or receive treatment.

2 Inpatients

During 2014 about 8,700 patients were admitted to hospital with a final diagnosis of stroke and entered into the SSCA – a similar number to 2013 (Table 1). The characteristics of the patients admitted to hospital with a confirmed stroke are shown in Table 1. About 87% of patients had ischaemic strokes, 11% had haemorrhagic strokes and the remainder were of uncertain type. There were similar numbers of men and women and the mean age of patient was about 70 years for men and 76 years for women although this varied across Health Boards. For instance, it is notable that the average age of men admitted with stroke in Greater Glasgow and Clyde was only 68 years. Some of the variation in casemix reflects the different populations and admission rates but some may reflect variation in data collection. The latter is being addressed with further training of audit staff.

2.1 Summary and key findings relating to inpatient data

The most important indicator of the performance of stroke services within a Health Board or hospital is their performance against the Stroke Care Bundle as described in Section 1.2.

The cumulative proportions of patients managed in accordance with all four standards which comprise the Care Bundle has risen significantly from **58%** in 2013 to **65%** in 2014. This improvement would be expected to translate into better outcomes for stroke patients. Performance varied considerably between Health Boards (Chart 1b) and hospitals (Chart 1c). The Borders performed best with 87% and Orkney worst at 19%. Orkney struggled to meet the care bundle because its CT scanner has only recently been installed. All Health Boards demonstrated improvements, but Lothian (54%), Greater Glasgow and Clyde (58%) and Highland (63%) all performed worse than the Scottish average (65%). Each Health Board set its own target for improvement (i.e. trajectory), to be achieved by end of March 2015, but currently only Lanarkshire, Western Isles, Shetland and Greater Glasgow and Clyde are exceeding their target.

The proportion of patients across Scotland accessing a Stroke Unit on the day of admission, or the day after (80%), was similar to that in 2013 (81%) and remains below the standard of 90%. Only ten of the 31 hospitals admitting patients with acute stroke met the Scottish Stroke Care standard of 90% (Chart 2a). Most hospitals demonstrated similar performance to the previous year, although Lorn & Islands improved their performance significantly (57% to 92%). Unfortunately, performance fell significantly in the Western Infirmary in Glasgow (from 84% to 75%) and St John's Hospital, Livingston (from 75% to 59%). The hospitals in Lothian and Highlands continue to struggle to offer early access to Stroke Unit care compared with other areas.

Small hospitals perform well against this standard because their only medical ward fulfills our definition of a Stroke Unit. For larger hospitals the standard is more challenging because stroke patients may be boarded and Stroke Unit beds may be filled with non stroke patients during periods of high bed demand. The number of Stroke Unit beds will be an important determinant of performance but it is clear that there is considerable variation in how well hospitals manage their stroke beds. It is evident that the priority attached to achieving this important standard varies.

After the diagnosis of stroke has been made, a swallow assessment should be done early to allow the patient to receive oral medication, and to take food and fluids safely. The result of this

assessment needs to be clearly recorded to ensure that patients who cannot swallow safely are not put at risk of aspiration with potentially fatal consequences. The proportion of patients in Scotland having a swallow screen on the day of admission continues to rise, from 72% in 2013 to 77% in 2014 (Chart 2b). The standard of 90% is challenging and was met by several smaller hospitals, Galloway Community Hospital (97%), Borders General Hospital (96%), Western Isles Hospital (95%) and Belford hospital (90%) but no large hospitals. Some hospitals, notably Borders General Hospital, Dr Gray's Hospital, Royal Alexandra Hospital, and Glasgow Royal Infirmary achieved significant improvements. Early identification of stroke patients and having nurses trained to initiate a swallow screen and to record the result clearly in the notes in the A&E, medical assessment and Stroke Units is key to improving performance.

An early brain scan is required to exclude alternative causes of stroke symptoms, for example, brain tumours, and to distinguish strokes due to bleeding into the brain from those due to blocked arteries. This is important to allow thrombolysis, anticoagulants and antiplatelet drugs to be given. The standard for brain scanning is 90% within 24 hours. In 2014, 90% of patients had a brain scan within 24 hours compared with 87% in 2013 (Chart 2c), the first time any standard has been achieved across Scotland. Nineteen of the 31 hospitals met the national standard of ≥90%. Crosshouse Hospital improved significantly and scanned 89% in 2014. All hospitals with an onsite scanner scanned > 75% of their patients within 24 hours. The proportion being scanned within 4 hours of arrival rose from 51% in 2013 to 54% in 2014 (Chart 4). Increases in the very early scanning of stroke patients will hopefully increase the numbers of patients who can benefit from thrombolysis, and also reduce the delays to treatment (see Section 5).

Once a brain scan has excluded a bleed into the brain, patients should receive aspirin as soon as possible since this has been shown to improve outcomes. Exceptions are those who have been given thrombolysis, are taking an anticoagulant or an alternative antiplatelet drug or those who are allergic to aspirin. In 2014, 87% of patients with ischaemic stroke, and no well defined contraindication received aspirin on the day of admission or the day after, compared with 85% in 2013 (Chart 2d). The standard for 2015 onwards is that 95% of patients without contraindications should receive aspirin on the day of admission, or the day after. Few hospitals, Wishaw General Hospital (98%), Galloway Community Hospital (97%) and Borders General Hospital (95%) will meet this standard based on their performance in 2014.

There is considerable variation in performance against the individual Scottish Stroke Care Standard between hospitals. There is clearly scope for improving performance and SSCA continues to work with local teams to achieve this.

2.2 Stroke Unit Information

Table 2: Stroke Unit Information.

Hospital Name	Number of acute strokes discharged in 2014	Acute Stroke Unit (ASU) beds	Integrated Stroke Unit (ISU) beds	Stroke Reha-bilitation Unit (SRU) beds on acute site	SRU beds off acute site
Ayr Hospital	296	15	0	15	0
Crosshouse Hospital, Kilmarnock	332	21	0	0	20
Borders General Hospital, Melrose	206	0	12	0	0
Dumfries & Galloway Royal Infirmary (DGRI)	253	9	0	0	0
Galloway Community Hospital (GCH)	39	1	0	0	0
Victoria Hospital, Kirkcaldy (VHK)	618	0	24	0	38
Forth Valley Royal Hospital, Larbert (FVRH)	500	0	30	0	10
Aberdeen Royal Infirmary (ARI)	621	16	0	0	40
Dr Gray's Hospital, Elgin	113	0	8	0	0
Glasgow Royal Infirmary (GRI)	487	38	0	0	12
Inverclyde Royal Hospital, Greenock (IRH)	203	0	17	0	0
Royal Alexandra Hospital, Paisley (RAH)	373	0	30	0	0
Southern General Hospital, Glasgow (SGH)	551	4	30	0	0
Victoria Infirmary, Glasgow[1]	132	0	20*	0	20**
Western Infirmary/Gartnavel General, Glasgow (WIG)	499	14	0	0	20
Belford Hospital, Fort William	29	0	0	0	0
Caithness General Hospital, Wick	68	0	0	0	0
Lorn & Islands Hospital, Oban	46	0	6	0	0
Raigmore Hospital, Inverness	329	0	22	0	0
Hairmyres Hospital, East Kilbride	280	0	24	0	0
Monklands Hospital, Coatbridge	291	0	20	0	0
Wishaw General Hospital	346	0	25	0	0
Royal Infirmary of Edinburgh at Little France (RIE)	861	32	0	0	30
St John's Hospital, Livingston (SJH)	233	0	22	0	0
Western General Hospital, Edinburgh (WGH)	317	0	40	0	0
Balfour Hospital, Orkney	41	0	0	0	0
Gilbert Bain Hospital, Shetland	35	0	0	0	0
Ninewells Hospital, Dundee	384	14	0	0	10
Perth Royal Infirmary (PRI)	195	0	22	0	0
Uist & Barra Hospital, Benbecula	0	0	0	0	0
Western Isles Hospital (WIH)	24	0	6	0	0
TOTALS	**8 702**	**164**	**338**	**15**	**180**

Notes regarding Table 2:

1. *Twenty ISU beds up to September 2014, this then changed to **20 SRU off site beds from September 2014.
2. The column "Number of acute strokes discharged in 2014" is based on inpatients with a final diagnosis of stroke discharged during Jan-Dec 2014 and this cohort of patients differs slightly from the inpatient cohort reported upon elsewhere in this National Report. For inpatients, the report focuses principally on those patients with a final diagnosis of stroke admitted during Jan-Dec 2014. Some patients discharged in 2014 may have been admitted in 2013. Some patients admitted in 2014 may have been discharged in 2015.
3. For details of location of off site beds and generic rehabilitation beds used for stroke patients in some areas please refer to this table on our website http://www.strokeaudit.scot.nhs.uk/Reports/Reports.html.

2.3 Hospital Data

This section presents performance of hospitals against the Scottish Stroke Care Standards in a Red, Amber, Green (RAG) or traffic light chart format.

Performance (decline, no change or improvement against the previous year), is measured as a **statistically significant difference** between the latest year's performance and the previous year's performance at the 95% confidence level.

Charts illustrating performance across the Scottish Stroke Care Standards for admission to Stroke Unit, swallow screening, brain scanning and aspirin in 2013 and 2014, grouped by hospital, are given below.

Differences in performance may reflect real differences in the process of care but also differences in the way these data were collected between hospitals or over time. Although we have attempted to standardise the methods of case ascertainment, data extraction, definition of variables, data entry and analysis, inevitably individuals responsible for aspects of the audit were not always able to adhere strictly to the standards often for very practical reasons. The data used to calculate the figures presented in the charts below can be found in Excel tables on the SSCA website (www.strokeaudit.scot.nhs.uk).

Key to Charts 2a-d and 7:

2013 results

2014 results : statistically significant improvement since 2013

2014 results : no statistically significant change since 2013

2014 results : statistically significant decline in performance since 2013

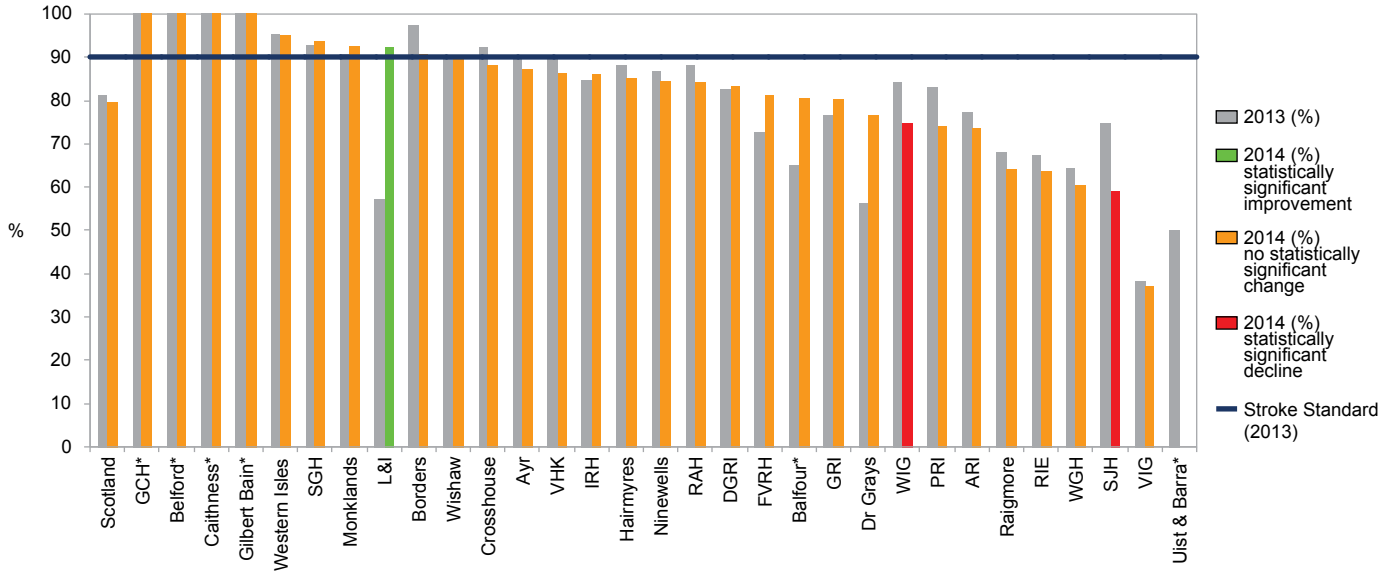
Notes regarding Charts 2a-d:

1. The **data** included in Charts 2a-d:
   - were **extracted** from eSSCA on the **8th April 2015**. Changes/ updates to the data following this date will therefore not feature in these analyses;
   - relate to patients with ***final*** diagnosis of stroke; and
   - are for **calendar years 2013 and 2014** (i.e. 1 January – 31 December).
2. In some instances, data entered into eSSCA are assigned to admitting hospitals other than the main acute hospitals participating in the Scottish Stroke Care Audit. Data for these hospitals are combined with data for their respective main acute hospitals.

Charts 2a – 2d: Performance against Scottish Stroke Care Standards (2013) standards for admission to Stroke Unit, swallow screening, brain scanning and aspirin, by hospital, comparing 2013 and 2014 data (based on *final* diagnosis).

2a. Percentage of stroke patients admitted to a Stroke Unit within 1 day of admission to hospital, 2013 and 2014 data (based on *final* diagnosis).

Horizontal line reflects Scottish Stroke Care Standard (2013) of 90% of stroke patients admitted to a Stroke Unit within 1 day of admission.

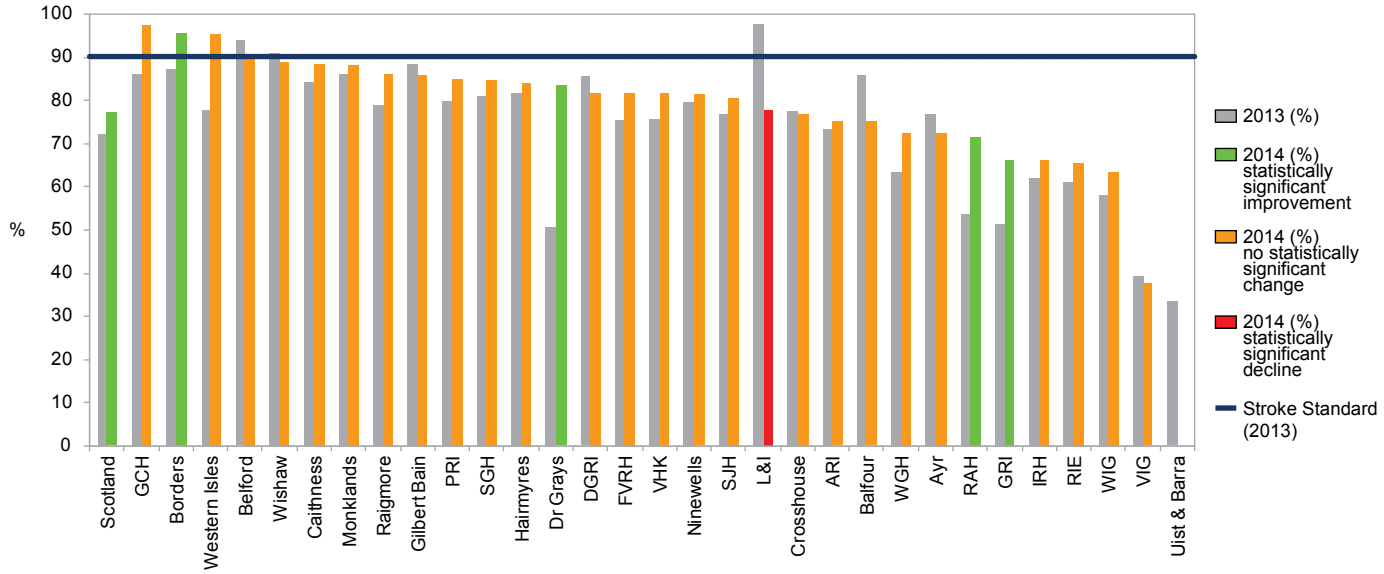


Notes regarding Chart 2a:

1. **The denominator for the admission to Stroke Unit excludes:** in-hospital strokes, patients discharged within 1 day and transfers in from another hospital.
2. Due to the number of beds within some of the hospitals indicated (*) and the small numbers of stroke admissions to these hospitals **it is not practical to have a defined Stroke Unit**. We have confirmed however that a defined stroke pathway is in place in these hospitals and that the Scottish Stroke Care Standards criteria are established within that pathway.

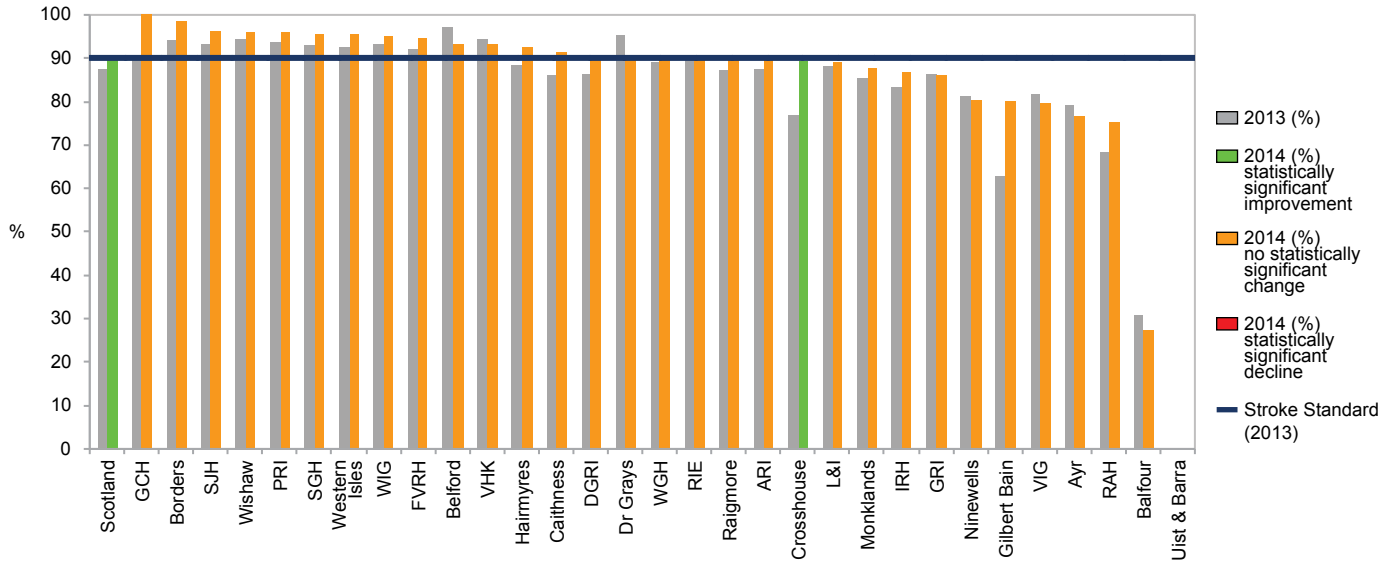
2b. Percentage of stroke patients with a swallow screening on day of admission, 2013 and 2014 data (based on *final* diagnosis).

Horizontal line reflects Scottish Stroke Care Standard (2013) of 90% of stroke patients swallow screened on day of admission.



2c. Percentage of stroke patients with a brain scan within 24 hours of admission, 2013 and 2014 data (based on *final* diagnosis).

Horizontal line reflects Scottish Stroke Care Standard (2013) of 90% of stroke patients to receive a brain scan within 24 hours of admission.

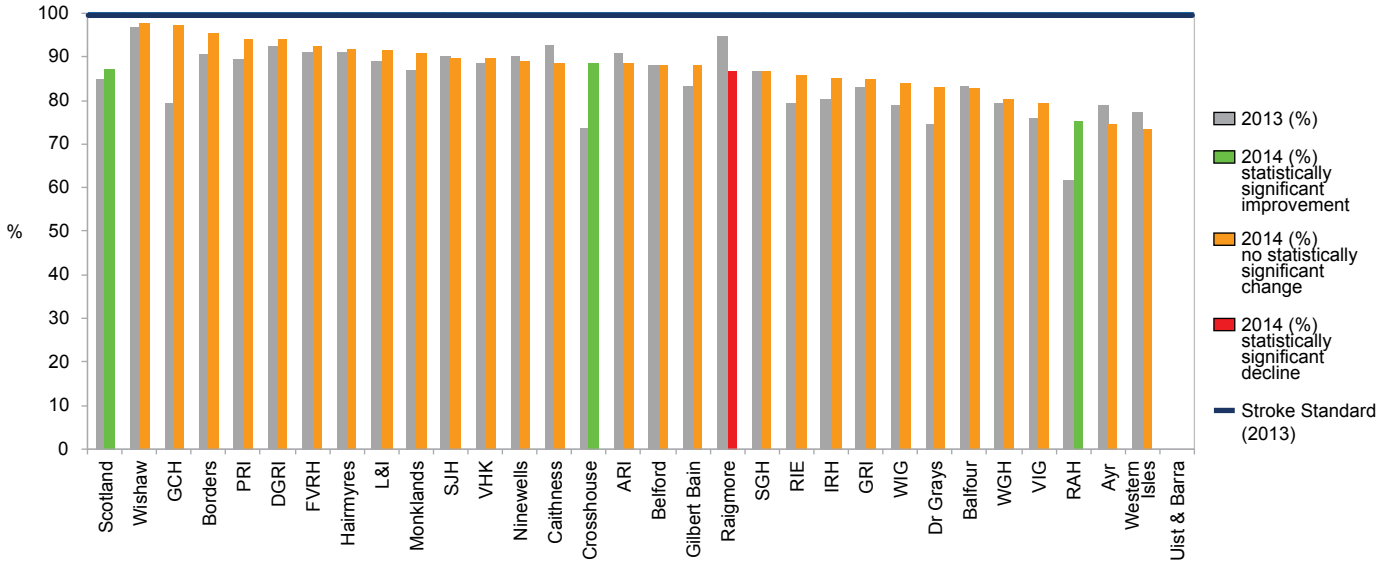


Notes regarding Chart 2c:

1. **Balfour Hospital, NHS Orkney did not have a CT scanner during the time of the reporting period.** Patients were airlifted to Aberdeen Royal Infirmary and a proportion may have arrived in sufficient time to have brain imaging within 24 hours of admission. A CT scanner has since been installed and is now operational.
2. **Uist & Barra Hospital, NHS Western Isles does not have a CT scanner** but patients are airlifted to Western Isles Hospital and a proportion may arrive in sufficient time to have brain imaging within 24 hours of admission.

2d. Percentage of acute ischaemic stroke patients given aspirin in hospital within 1 day of admission, 2013 and 2014 data (based on *final* diagnosis).

Horizontal line reflects Scottish Stroke Care Standard (2013) of 100% of stroke patients to receive aspirin within 1 day of admission.



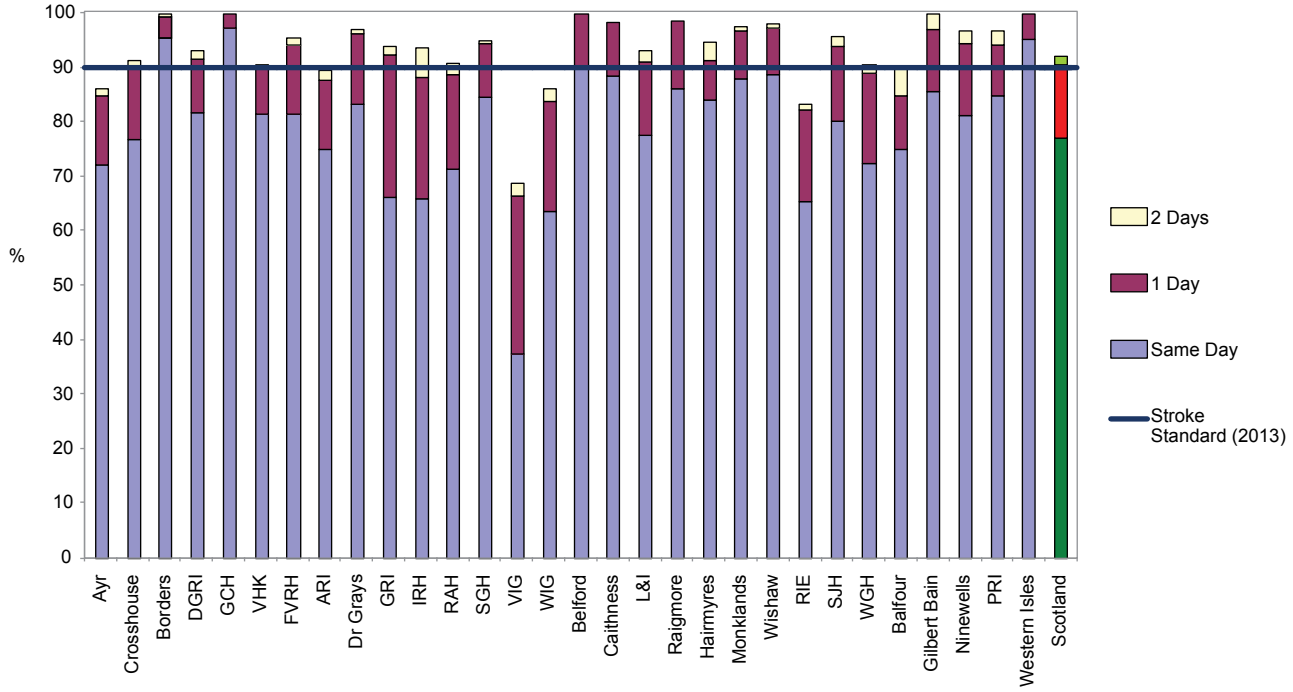
Note regarding Chart 2d:

1. The denominator for the **percentages excludes patients with valid contraindications to aspirin**.

Chart 3: Percentage of stroke patients with a swallow screening by number of days to swallow screening, 2014 data (based on *final* diagnosis).

Horizontal line reflects Scottish Stroke Care Standard (2013) of 90% of stroke patients to receive aspirin within 1 day of admission.

Note that the Scotland column in the chart is coloured green and red simply to differentiate it from the hospital columns and the colours are not indicative of performance. Light green corresponds to '2 Days', red corresponds to '1 Day' and dark green corresponds to 'Same Day'.



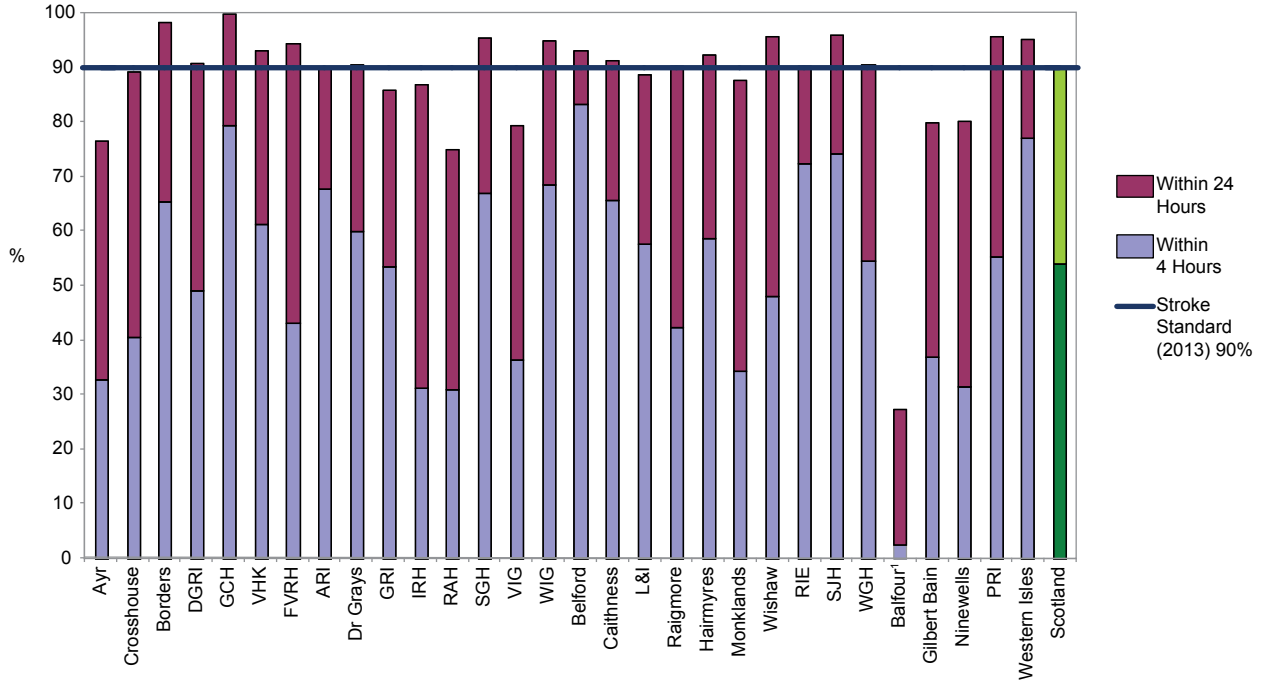
Note regarding Chart 3:

1. In some instances, **data entered into eSSCA are assigned to admitting hospitals other than the main acute hospitals** participating in the Scottish Stroke Care Audit. Data for these hospitals are combined with data for their respective main acute hospitals.

Chart 4: Percentage of stroke patients with a brain scan by number of hours to scan, 2014 data (based on *final* diagnosis).

Horizontal solid line reflects Scottish Stroke Care Standard (2013) of 90% of stroke patients to receive brain imaging within 24 hours of admission.

Note that the Scotland column in the chart is coloured light green and dark green simply to differentiate it from the hospital columns and the colours are not indicative of performance. Light green corresponds to 'Within 24 Hours' and dark green corresponds to 'Within 4 Hours'.



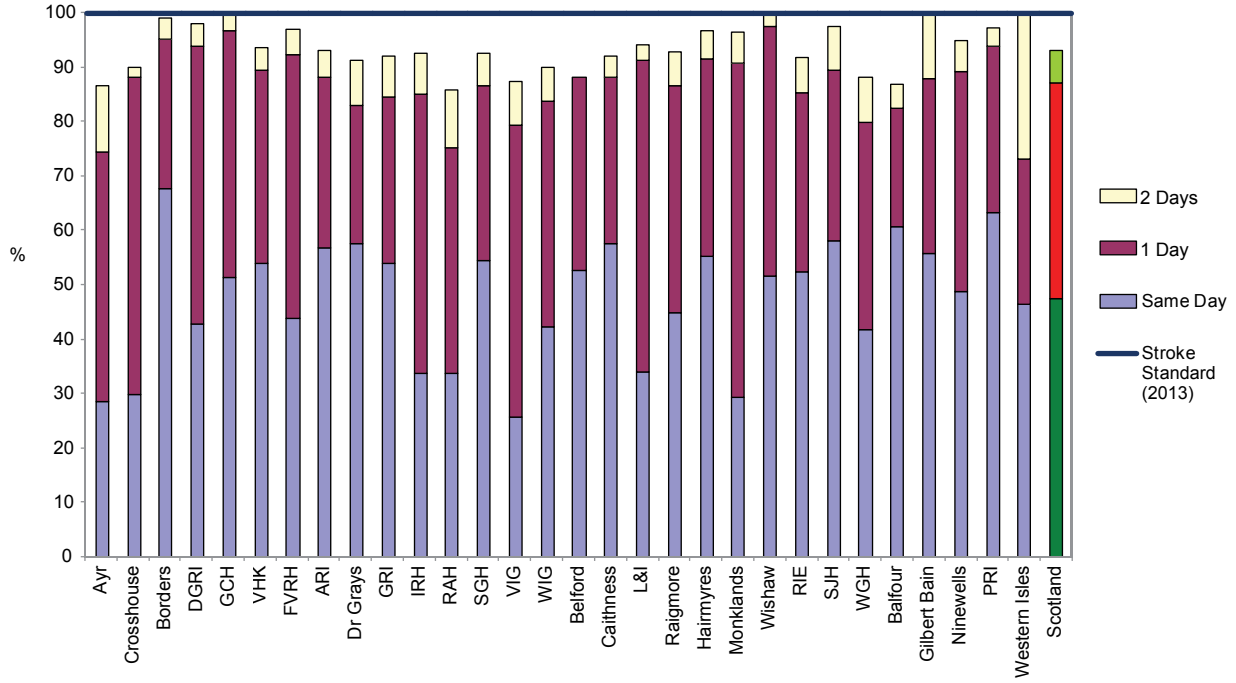
Notes regarding Chart 4:

1. **Balfour Hospital, NHS Orkney did not have a CT scanner during the time of the reporting period.** Patients were airlifted to Aberdeen Royal Infirmary and a proportion may have arrived in sufficient time to have brain imaging within 24 hours of admission. A CT scanner has since been installed and is now operational.
2. In some instances, **data entered into eSSCA are assigned to admitting hospitals other than the main acute hospitals** participating in the Scottish Stroke Care Audit. Data for these hospitals are combined with data for their respective main acute hospitals.

Chart 5: Percentage of acute ischaemic stroke patients given aspirin in hospital by number of days to receipt, 2014 data (based on *final* diagnosis).

Horizontal line reflects Scottish Stroke Care Standard (2013) of 100% of acute ischaemic stroke patients to receive aspirin within 1 day of admission.

Note that the Scotland column in the chart is coloured green and red simply to differentiate it from the hospital columns and the colours are not indicative of performance. Light green corresponds to '2 Days', red corresponds to '1 Day' and dark green corresponds to 'Same Day'.



Notes regarding Chart 5:

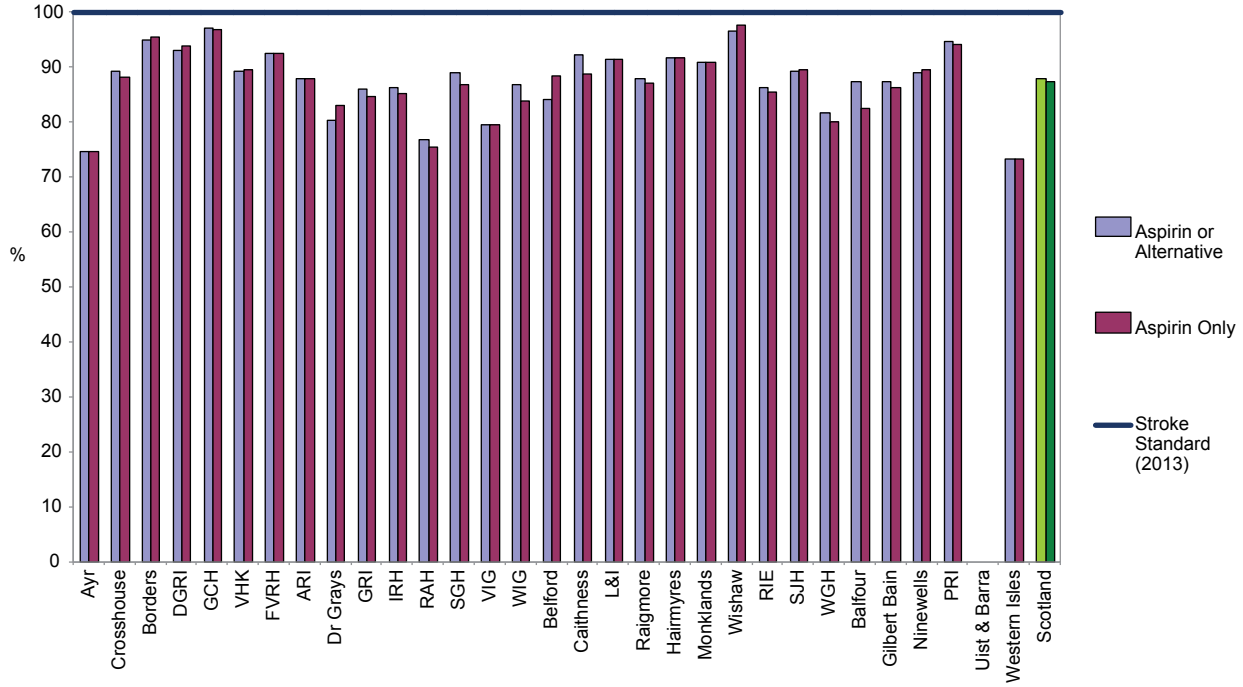
1. In some instances, **data entered into eSSCA are assigned to admitting hospitals other than the main acute hospitals** participating in the Scottish Stroke Care Audit. Data for these hospitals are combined with data for their respective main acute hospitals.
2. The denominator for the percentages excludes patients with valid contraindications to aspirin.

Chart 6: Percentage of ischaemic patients given aspirin or alternative antiplatelets within 1 day of admission, 2014 data (based on *final* diagnosis).

Horizontal line reflects Scottish Stroke Care Standard (2013) of 100% of ischaemic patients to receive aspirin within 1 day of admission.

The denominator for the percentages excludes patients with valid contraindications to aspirin except those with known allergy who are included to allow the aspirin and antiplatelet groups to be combined. This may result in a reduction in the percentages when compared to Chart 5 (aspirin-only) since the two denominator groups are not absolutely identical.

Note that the Scotland columns in the chart are coloured light green and dark green simply to differentiate them from the hospital columns and the colours are not indicative of performance. Light green corresponds to 'Aspirin or Alternative' and dark green corresponds to 'Aspirin Only'.



Note regarding Chart 6:

1. In some instances, **data entered into eSSCA are assigned to admitting hospitals other than the main acute hospitals** participating in the Scottish Stroke Care Audit. Data for these hospitals are combined with data for their respective main acute hospitals.

2.4 Intermittent Pneumatic Compression (IPC)

Patients admitted to hospital with stroke and who are unable to walk independently are at high risk of deep vein thrombosis (DVT) and pulmonary emboli (PE). These can be fatal. A recent large randomised trial[3,4] has shown that Intermittent Pneumatic Compression (IPC) reduces the risk of DVT and improves patients' chances of survival. SIGN, NICE and European guidelines now recommend that IPC should be considered in patients who are immobile after a stroke.

SSCA has been collecting information on the use of IPC in Stroke Units to monitor the extent to which this effective treatment is being implemented. Table 1 shows the total number of patients admitted to each hospital (grouped by Heath Board) in 2014. It also shows the numbers who were unable to walk on admission who might be considered suitable for IPC.

In 2014, 3,883 (48%) of patients admitted with stroke were unable to walk, and were therefore at high risk of DVT and PE. Between 31st January and 31st December 2014 SSCA collected data on whether IPC was offered and documented in the medical records within one week of admission. This question was answered in 2,571 (66%). Of these only 581 patients were offered IPC (23%), but this is only 15% of the 3,883 immobile patients. There is clearly great scope for improving both the use of IPC and its monitoring.

Some hospitals including Ayr, Crosshouse and Borders General hospital have not used IPC in any of their patients. This is because they have not been able to obtain the sleeves because of administrative issues, although the pumps are available free of charge from the manufacturer. The Victoria Hospital, Kirkcaldy has not been recorded as using IPC, but this appears to be a problem with auditing its use. In other hospitals the use is highly variable. For instance, Forth Valley Royal Hospital offered IPC to about 85% of immobile patients which demonstrates that it is possible to achieve high levels of uptake. Barriers to achieving this include: lack of access to IPC sleeves, lack of awareness of the problem of DVT/PE and of the effectiveness of IPC amongst nursing and medical staff. Also, lack of training in the sizing, fitting and monitoring of its use. An online training module has been available since the autumn of 2014 (www.stroketraining.org), and training workshops, funded by the Scottish Government, started in April 2015.

3 Outpatients

3.1 Summary and key findings relating to outpatient data

Twenty hospitals were collecting TIA clinic data in SSCA during 2014 (Chart 7). The hospitals in Greater Glasgow & Clyde were still unable to contribute comprehensive outpatient data to allow them to benchmark their performance against other boards and to provide a national perspective. However, they do produce internal data to monitor their performance.

Data were collected on 3,785 patients with acute cerebrovascular disease seen in the TIA clinics contributing data in 2014, compared with 3,914 in 2013.

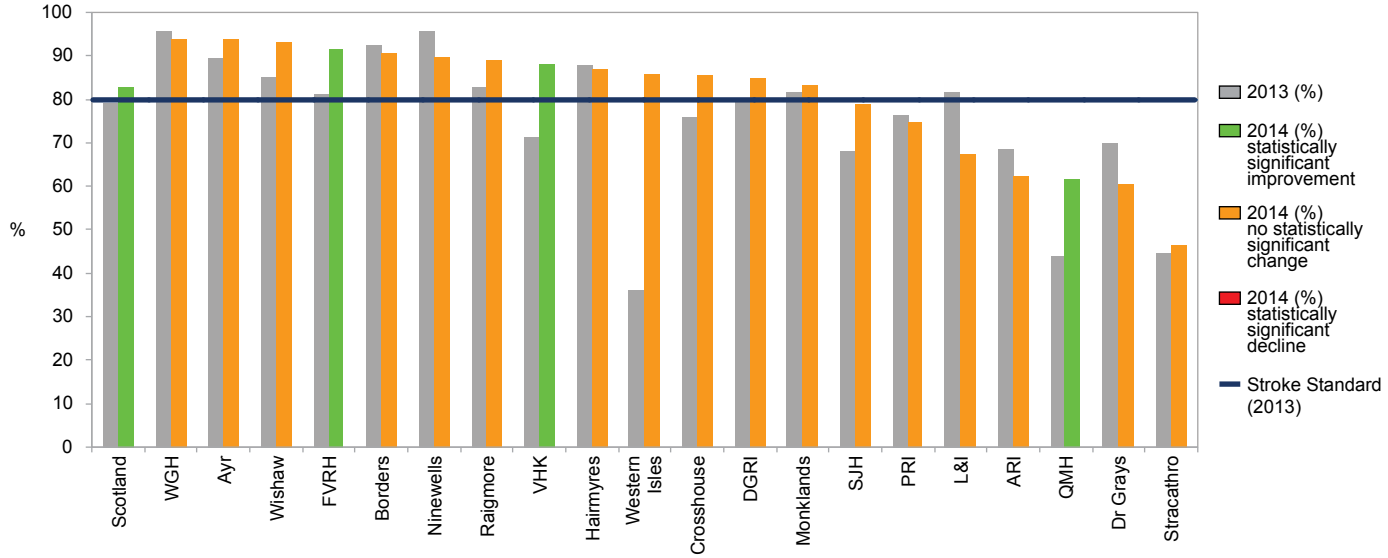
The Scottish Stroke Care Standard states that >= 80% should be seen within 4 days of receipt of referral. Across the participating clinics the proportion meeting this standard rose significantly from 79% in 2013 to 83% in 2014. The number of clinics exceeding the Scottish Stroke Care Standard rose from 11 in 2013, to 13 in 2014. There were significant improvements in Forth Valley Royal Hospital, Victoria Hospital, Kirkcaldy and Queen Margaret Hospital, Dunfermline, although the latter still does not meet the Scottish Stroke Care Standard. Crosshouse and Western Isles hospitals both improved on their 2013 performance and now meet the Scottish Stroke Care Standard. Unfortunately delays increased in Lorn & Islands which did not meet the Scottish Stroke Care Standard in 2014. Only Stracathro hospital saw fewer than 50% of patients within 4 days although more than 80% were seen within a week. Chart 8 shows the proportion of patients seen on the day of referral, the following day, day 2-4 and 5-7. Across Scotland 37% of patients are seen on the day of referral, or the following day.

Of course it is not only important to be able to rapidly assess the patients with TIA and minor stroke but also to complete their investigations quickly so that antiplatelet drugs, anticoagulants and carotid endarterectomy can be started as soon as possible in appropriate cases. This will minimise the risk of stroke. Chart 9 illustrates the average delays from the stroke/TIA which lead to the referral, to the receipt of referral, first appointment offered, attendance and completion of imaging. The average delay from last event to referral to a clinic was about 8 days in 2013 and about 7 days in 2014 but there is marked variation between hospitals. The delays to receipt of referral and first assessment have also reduced slightly. However there are still delays to completing imaging reflecting the fact that not all clinics offer same day access to brain scanning and imaging of carotid arteries. On average it still takes 12 or 13 days from the patient's event to complete their investigations. Plenty of scope for improvement!

3.2 Hospital data

Chart 7: Percentage of patients with definite cerebrovascular diagnosis seen in specialist stroke/TIA clinic with referral to examination time within 4 days, 2013 and 2014 data.

Horizontal line reflects Scottish Stroke Care Standard (2013) of 80% of TIA patients being seen in specialist stroke/TIA clinic within 4 days of receipt of referral.



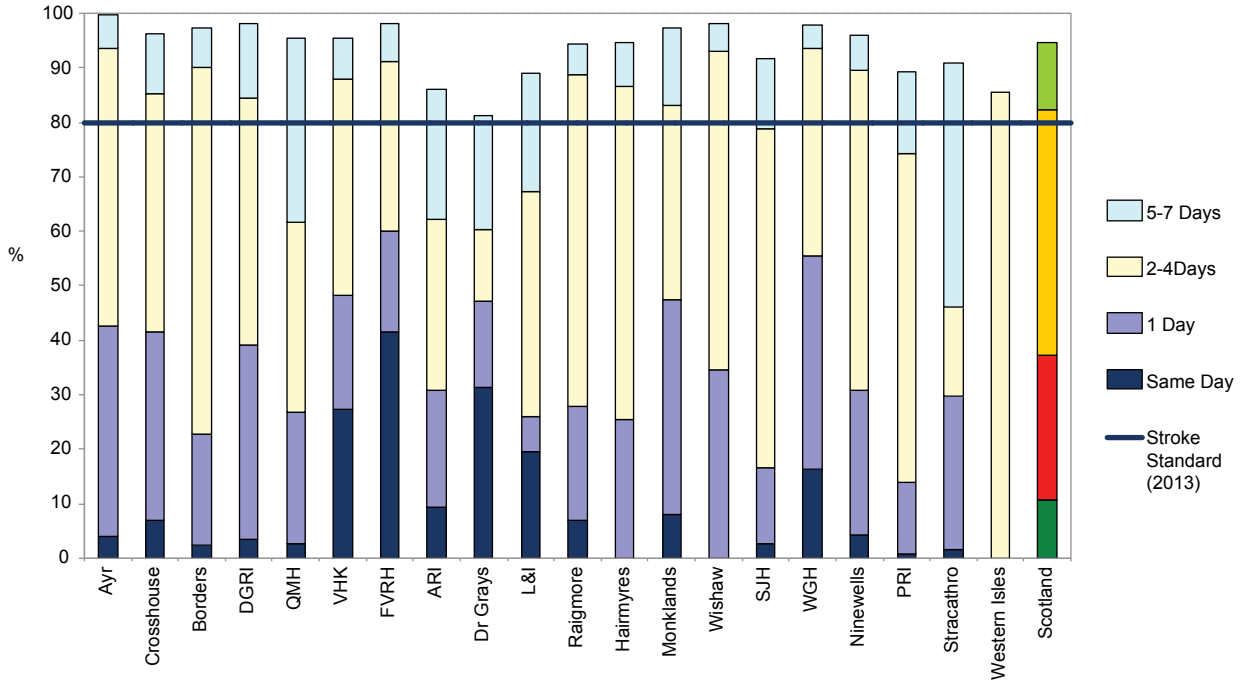
Notes regarding Chart 7:

1. **Data presented are for hospitals using eSSCA where all relevant dates** (last event, referral, referral-received, appointment and examination) **are present and ordered chronologically**.
2. The following **hospitals either do not hold specialist stroke/TIA clinics or do not collect and submit data to SSCA** – Caithness, SGH, WIG, GCH, Belford, GRI, IRH, VI Glasgow, RAH, RIE, Balfour, Gilbert Bain and Uist & Barra. The **omission of these data may affect the estimate of national performance** based on those hospitals contributing to SSCA.
3. For NHS Fife, the outpatient service for patients with suspected cerebrovascular conditions functions as a single service delivered across two sites, Queen Margaret Hospital and Victoria Hospital Kirkcaldy. Chart 7 separates the performance for these hospitals but they should be considered as a single NHS Fife service. The combined performance for 2013 and 2014 shows 60% and 77% respectively, an increase of 17% between the two years.

Chart 8: Percentage of patients with definite cerebrovascular diagnosis seen in specialist stroke/TIA clinic with referral to examination time (days): same day and within 1, 2-4 and 5-7 days, 2014 data.

Horizontal line reflects Scottish Stroke Care Standard (2013) of 80% of TIA patients being seen in a specialist stroke/TIA clinic within 4 days of receipt of referral.

Note that the Scotland column in the chart is coloured green, amber and red simply to differentiate it from the hospital columns and the colours are not indicative of performance. Dark green corresponds to 'Same Day', red corresponds to '1 Day', amber corresponds to '2-4 Days' and light green corresponds to '5-7 Days'.



Notes regarding Chart 8:

1. In some instances, data entered into eSSCA are assigned to admitting hospitals other than the main acute hospitals participating in the Scottish Stroke Care Audit. Data for these hospitals are combined with data for their respective main acute hospitals.
2. The following hospitals either do not hold specialist stroke/TIA clinics or do not collect and submit data to SSCA – Caithness, SGH, WIG, GCH, Belford, GRI, IRH, VI Glasgow, RAH, RIE, Balfour, Gilbert Bain and Uist & Barra. The omission of these data may affect the estimate of national performance based on those hospitals contributing to SSCA.
3. For those hospitals using eSSCA where all relevant dates (last event, referral, referral-received, appointment and examination) are present and ordered chronologically.

Chart 9: Distribution of mean time between stroke event and outpatient imaging, 2013 and 2014 data.

There are instances where elements of the outpatient timeline share the same or similar data point and might not be visible. In these instances the most recent part of the timeline sits on top indicating that the elements have been delivered closely together.

Notes regarding Chart 9:

1. In some instances, data entered into eSSCA are assigned to hospitals other than the main acute hospitals participating in the Scottish Stroke Care Audit. Data for these hospitals are combined with data for their respective main acute hospitals.
2. The following hospitals either do not hold specialist stroke/TIA clinics or do not collect and submit data to SSCA – Caithness, SGH, WIG, GCH, Belford, GRI, IRH, VI Glasgow, RAH, RIE, Balfour, Gilbert Bain and Uist & Barra. The omission of these data may affect the estimate of national performance based on those hospitals contributing to SSCA.
3. For those hospitals using eSSCA where all relevant dates (last event, event to referral, referral received, appointment, attendance and imaging) are present and ordered chronologically.
4. Two records were excluded from the analysis as they are considered to be data anomalies requiring further investigation.

4 Anticoagulation

Oral anticoagulation is recommended for patients with TIA or ischaemic strokes with permanent or paroxysmal atrial fibrillation. Atrial fibrillation, or AF for short, is a common arrhythmia of the heart which leads to an irregular pulse and is associated with a five-fold risk of stroke. In general the strokes associated with AF are more severe and are therefore more likely to lead to hospital admission, death or long term disability. In suitable patients anticoagulation reduces the relative risk of recurrent stroke by at least 60%. This is about three times as effective as aspirin and clopidogrel. Put another way, if the risk of recurrent stroke without treatment was 10% over a given time period, anticoagulation would reduce the risk to about 4%, whilst antiplatelet medication would only reduce the risk to 8%.

For many years the only available oral anticoagulant was Warfarin. Warfarin requires to be closely monitored with regular blood tests. If the blood becomes too thick, then the patients risk of ischaemic stroke increases. If it is too thin then the risk of bleeds, including haemorrhagic stroke, increases. In recent years new oral anticoagulants (NOACs) have become available which do not require blood monitoring, and which have been shown to be at least as effective and safe as Warfarin. There are variations in the guidance produced by different Health Boards with respect to which patients should be offered the new, and more expensive, oral anticoagulants.

Hospitals participating in the SSCA identify patients either admitted to hospital with a stroke, or who attend a specialist stroke/TIA clinic, who are known to have AF and record whether they are receiving oral anticoagulants. This provides an indicator of the level of use of anticoagulants for AF in the population served by that hospital. In 2014, about a quarter of patients admitted to hospital with an ischaemic stroke were identified as being in AF. Only 24% of these patients were receiving anticoagulants (Table 3) with no significant increase since 2013. Of the 289 patients seen in clinics with TIA or stroke with AF, 45% were on oral anticoagulants, compared with 39% in 2013 (Table 4). Although, in many cases the AF may have been new, in many others this represents either a continued failure to identify patients with AF, or a failure to start patients on anticoagulants. Efforts are being made to improve the identification of patients in AF and to help doctors select patients who are likely to benefit from anticoagulation.

SSCA also monitors the proportion of patients in AF discharged from hospital or clinic following a stroke who are started on anticoagulants. In 2014, 58% of inpatients (IP) and 83% of outpatients (OP) with ischaemic stroke or TIA were started on anticoagulants compared with 53% (IP) and 77% (OP) respectively in 2013.

These data appear to show that many patients with AF are still not receiving anticoagulants to help reduce their risk of future stroke. There is significant variation across Scotland which probably reflects different methods of screening for AF, and different guidance on the use of new oral anticoagulants.

4.1 Inpatient data

Table 3: Ischaemic stroke patients with current atrial fibrillation (AF) and anticoagulation on admission or discharge, 2014 data (*final* diagnosis).

Note that some percentages are based on very small numbers of records. Hospital	All ischaemic stroke patients			Ischaemic stroke patients discharged alive		
	With current AF on admission:			With current AF on discharge:		
	Number	Number also on anti-coagulation at admission	Percentage on anti-coagulation at admission	Number	Number with anti-coagulation prescribed or recommended at discharge	Percentage with anti-coagulation prescribed or recommended at discharge
Ayr Hospital	84	16	*19*	65	25	*38*
Crosshouse Hospital, Kilmarnock	100	24	*24*	89	55	*62*
Borders General Hospital, Melrose	78	26	*33*	65	37	*57*
Dumfries & Galloway Royal Infirmary (DGRI)	68	15	*22*	58	47	*81*
Galloway Community Hospital (GCH)	12	3	*25*	11	6	*55*
Victoria Hospital, Kirkcaldy (VHK)	184	42	*23*	163	89	*55*
Forth Valley Royal Hospital, Larbert (FVRH)	129	32	*25*	114	68	*60*
Aberdeen Royal Infirmary (ARI)	166	55	*33*	137	95	*69*
Dr Gray's Hospital, Elgin	27	11	*41*	14	12	*86*
Glasgow Royal Infirmary (GRI)	95	27	*28*	76	43	*57*
Inverclyde Royal Hospital, Greenock (IRH)	48	15	*31*	38	11	*29*
Royal Alexandra Hospital, Paisley (RAH)	92	19	*21*	75	31	*41*
Southern General Hospital, Glasgow (SGH)	141	28	*20*	124	73	*59*
Victoria Infirmary, Glasgow	30	5	*17*	21	14	*67*
Western Infirmary/Gartnavel General, Glasgow (WIG)	142	34	*24*	112	77	*69*
Belford Hospital, Fort William	3	2	*67*	3	1	*33*
Caithness General Hospital, Wick	5	1	*20*	4	2	*50*
Lorn & Islands Hospital, Oban	17	5	*29*	15	8	*53*
Raigmore Hospital, Inverness	56	10	*18*	48	25	*52*
Hairmyres Hospital, East Kilbride	69	17	*25*	57	29	*51*
Monklands Hospital, Coatbridge	68	14	*21*	51	31	*61*
Wishaw General Hospital	30	4	*13*	25	12	*48*

Note that some percentages are based on very small numbers of records. Hospital	All ischaemic stroke patients			Ischaemic stroke patients discharged alive		
	With current AF on admission:			With current AF on discharge:		
	Number	Number also on anti-coagulation at admission	Percentage on anti-coagulation at admission	Number	Number with anti-coagulation prescribed or recommended at discharge	Percentage with anti-coagulation prescribed or recommended at discharge
Royal Infirmary of Edinburgh at Little France (RIE)	189	39	*21*	146	87	*60*
St John's Hospital, Livingston (SJH)	51	13	*25*	39	21	*54*
Western General Hospital, Edinburgh (WGH)	81	21	*26*	63	35	*56*
Balfour Hospital, Orkney	11	3	*27*	10	5	*50*
Gilbert Bain Hospital, Shetland	4	1	*25*	3	1	*33*
Ninewells Hospital, Dundee	94	21	*22*	84	52	*62*
Perth Royal Infirmary (PRI)	51	18	*35*	41	28	*68*
Uist & Barra Hospital, Benbecula	0	0	..	0	0	..
Western Isles Hospital (WIH)	5	0	*0*	4	3	*75*
Scotland	**2 130**	**521**	***24***	**1 755**	**1 023**	***58***

Note regarding Table 3:

1. The source database, eSSCA, captures information about stroke type for inpatients via a question on stroke pathology but also includes an additional variable to indicate a final diagnosis of Transient Ischaemic Attack (TIA). The cohort of patients for Table 3 is based on inpatients with a final diagnosis of either ischaemic stroke or TIA. This group differs from the inpatient cohort used elsewhere in this National Report. The inpatient section of the National Report focuses on patients with any type of stroke (e.g. ischaemic, haemorrhagic), apart from the charts concerning aspirin which relate to ischaemic stroke only, excluding TIA.

4.2 Outpatient data

Table 4: Patients with ischaemic diagnosis, seen in specialist stroke/TIA clinics, with current atrial fibrillation (AF) and on anticoagulation, 2014 data.

Note that some percentages are based on very small numbers of records.	Denominator	Patients with ischaemic diagnosis seen in specialist stroke/TIA clinics during 2014		Patients with ischaemic diagnosis seen in specialist stroke/TIA clinics during 2014	
Hospital	With current AF	With current AF and on anticoagulation prior to assessment at clinic	Percentage on anticoagulation prior to assessment	Number with current AF and anticoagulation continued, commenced or recommended at 1st assessment	Percentage with current AF and anticoagulation continued, commenced or recommended at 1st assessment
Ayr Hospital	15	5	*33*	7	*47*
Crosshouse Hospital, Kilmarnock	13	5	*38*	10	*77*
Borders General Hospital, Melrose	22	9	*41*	19	*86*
Dumfries & Galloway Royal Infirmary (DGRI)	12	7	*58*	11	*92*
Queen Margaret Hospital, Dunfermline	13	8	*62*	13	*100*
Victoria Hospital, Kirkcaldy (VHK)	18	8	*44*	16	*89*
Forth Valley Royal Hospital, Larbert (FVRH)	16	6	*38*	15	*94*
Aberdeen Royal Infirmary (ARI)	39	23	*59*	35	*90*
Dr Gray's Hospital, Elgin	3	0	*0*	2	*67*
Lorn & Islands Hospital, Oban	5	1	*20*	5	*100*
Raigmore Hospital, Inverness	16	7	*44*	12	*75*
Hairmyres Hospital, East Kilbride	9	5	*56*	6	*67*
Monklands Hospital, Coatbridge	17	8	*47*	15	*88*
Wishaw General Hospital	7	4	*57*	6	*86*
St John's Hospital, Livingston (SJH)	18	7	*39*	16	*89*
Western General Hospital, Edinburgh (WGH)	40	15	*38*	32	*80*
Ninewells Hospital, Dundee	12	2	*17*	8	*67*
Perth Royal Infirmary (PRI)	13	8	*62*	12	*92*
Stracathro Hospital, Brechin	1	1	*100*	1	*100*
Western Isles Hospital (WIH)	0	0	..	0	..
Scotland	**289**	**129**	***45***	**241**	***83***

Note regarding Table 4:

1. The source database, eSSCA, captures information about stroke type for outpatients via a question on stroke pathology but also includes additional variables to indicate Transient Ischaemic Attack (TIA), transient monocular blindness (TMB) and retinal artery occlusion (RAO). The cohort of patients for Table 4 is based on outpatients with an ischaemic stroke, TIA, TMB or RAO. This group differs slightly from the outpatient cohort used elsewhere in this National Report because of its restriction to stroke patients with ischaemic events rather than patients with any type of cerebrovascular diagnosis.

5 Thrombolysis

5.1 Summary and key findings relating to thrombolysis

Treatment within four and a half hours of ischaemic stroke with a clot-dissolving treatment (recombinant tissue plasminogen activator (rtPA)) is effective for selected patients with acute ischaemic stroke. Based on pooled study data of this treatment, it is estimated that between 5 and 10 extra people per 100 treated with thrombolysis will be independent 3-6 months later. The earlier the medication can be administered, the more likely the patient is to have a good outcome. Data on all patients thrombolysed in Scotland have been entered into the SSCA prospectively since January 2010, with retrospective data collected for 2009.
This report includes an overview of the delivery of rtPA in 2013 & 2014.

Table 5: Thrombolysis - numbers thrombolysed, 2013 & 2014 data.

Hospital	Number of patients receiving thrombolysis in 2013	Number of patients receiving thrombolysis in 2014
Scotland	**802**	**868**
Ayrshire & Arran	**45**	**49**
Ayr Hospital	26	19
Crosshouse Hospital, Kilmarnock	19	30
Borders	**12**	**10**
Borders General Hospital, Melrose	12	10
Dumfries & Galloway	**34**	**46**
Dumfries & Galloway Royal Infirmary (DGRI)	26	35
Galloway Community Hospital (GCH)	8	11
Fife	**55**	**44**
Victoria Hospital, Kirkcaldy (VHK)	55	44
Forth Valley	**26**	**35**
Forth Valley Royal Hospital, Larbert (FVRH)	26	35
Grampian	**119**	**145**
Aberdeen Royal Infirmary (ARI)	105	133
Dr Gray's Hospital, Elgin	14	12
Greater Glasgow & Clyde	**176**	**203**
Glasgow Royal Infirmary (GRI)	1	1
Inverclyde Royal Hospital, Greenock (IRH)	-	-
Royal Alexandra Hospital, Paisley (RAH)	1	0
Southern General Hospital, Glasgow (SGH)	98	101
Victoria Infirmary, Glasgow	1	0
Western Infirmary/Gartnavel General, Glasgow (WIG)	75	101

Hospital	Number of patients receiving thrombolysis in 2013	Number of patients receiving thrombolysis in 2014
Highland	**44**	**41**
Belford Hospital, Fort William	2	3
Caithness General Hospital, Wick	3	3
Lorn & Islands Hospital, Oban	7	8
Raigmore Hospital, Inverness	32	27
Lanarkshire	**80**	**67**
Hairmyres Hospital, East Kilbride	30	14
Monklands Hospital, Coatbridge	23	26
Wishaw General Hospital	27	27
Lothian	**114**	**149**
Royal Infirmary of Edinburgh at Little France (RIE)	84	99
St John's Hospital, Livingston (SJH)	19	35
Western General Hospital, Edinburgh (WGH)	11	15
Orkney	**1**	**1**
Balfour Hospital, Orkney	1	1
Shetland	**2**	**1**
Gilbert Bain Hospital, Shetland	2	1
Tayside	**88**	**71**
Ninewells Hospital, Dundee	69	49
Perth Royal Infirmary (PRI)	19	22
Western Isles	**6**	**6**
Uist & Barra Hospital, Benbecula	-	-
Western Isles Hospital (WIH)	6	6

Notes regarding Table 5:

1. Note that this table is not directly comparable with Table 6 because it is based on hospital/ Health Board of treatment rather than Health Board of residence, upon which Table 6 is based. Health Boards may treat patients from outside their board area or may treat non-Scottish residents.
2. Records are included if a thrombolysis date is present; a small proportion of these records will not have an associated thrombolysis time recorded.
3. Data for this table are derived from the 'admission hospital' field (inpatient dataset).

The total number of patients receiving rTPA increased from 802 in 2013, to 868 in 2014. In some Health Boards there has been an increase in thrombolysis activity since 2013, probably reflecting a combination of an increase in stroke numbers, service reorganisation and more robust data collection, while in other areas activity has plateaued (Table 5). In order to view these data in the context of the local demand (in particular population size and likely clinical need) we have expressed these results in terms of the population in each region (Table 6). The original annual standard of 5 thrombolysis treatments per 100,000 population was exceeded in 2009, and has continued to increase with the crude rate now standing at 16 for Scotland (Table 6).

Table 6: Thrombolysis – numbers thrombolysed and crude rate per 100,000 by Health Board of residence of patient, 2014 data.

Health Board of Residence[1]	Number of patients receiving thrombolysis in 2014	Mid-Year Population Estimate[2] 2013	Crude Rate per 100,000	Confidence Interval†
Scotland	**832**	**5 327 700**	**15.6**	**14.6 - 16.7**
Ayrshire & Arran	62	372 210	16.7	12.8 - 21.4
Borders	11	113 870	9.7	4.8 - 17.3
Dumfries & Galloway	41	150 270	27.3	19.6 - 37.0
Fife	51	366 910	13.9	10.3 - 18.3
Forth Valley	40	299 680	13.3	9.5 - 18.2
Grampian	138	579 220	23.8	20.0 - 28.2
Greater Glasgow & Clyde	165	1 137 930	14.5	12.4 - 16.9
Highland	39	321 000	12.1	8.6 - 16.6
Lanarkshire	83	652 580	12.7	10.1 - 15.8
Lothian	134	849 700	15.8	13.2 - 18.7
Orkney	2	21 570	9.3	1.1 - 33.5
Shetland	0	23 200	0.0	0.0 - 12.9
Tayside	61	412 160	14.8	11.3 - 19.0
Western Isles	5	27 400	18.2	5.9 - 42.6
Outside Scotland/ Not Known/ Other	36	-	-	-

Notes regarding Table 6:

1. Note that this table is not directly comparable with Table 5 because it is based on Health Board of residence rather than hospital/ Health Board of treatment, upon which Table 5 is based. Health Board residents may travel for treatment at hospitals outside their immediate Health Board area. Also, some patients may be non-Scottish residents.
2. A small proportion of records could not be assigned to a Health Board because they were either for non-Scottish residents or there was insufficient information to allow their assignment to a Health Board (e.g. partial or incorrect postcode).
3. At the time of preparing the table the population estimates used were the latest available from National Records of Scotland (formerly General Register Office for Scotland, which merged with National Archives of Scotland from 1st April 2011). Health Board boundary changes occurred from April 2014. SSCA data were assigned to the area of residence applicable at the date of each patient's hospital admission. For mid-year population estimates the revised Health Board boundaries were used. The issue primarily affects NHS Greater Glasgow & Clyde and NHS Lanarkshire.
4. There are two patients in Table 6 for NHS Orkney. Patients from NHS Orkney are airlifted to NHS Grampian and some patients will arrive in time to have thrombolysis, but they are included in the NHS Grampian data as they are admitted to Aberdeen Royal Infirmary for treatment. Table 6 presents those receiving thrombolysis by Health Board of residence.

† Confidence intervals calculated using method described in: WOODWARD (2005) Epidemiology: study design and data analysis 2nd edition chapter 3 pp 152-154. ISBN 1584884150. For events where N>=100, formula 3.29 (p153) is used to calculate lower/upper 95% confidence limits for the number of events. For events where n<100, the lower/upper 95% confidence limits are taken from a table (http://www.doh.wa.gov/Portals/1/Documents/5500/ConfIntGuide.pdf) showing exact 95% confidence limits from the Poisson distribution. These figures are then used in conjunction with the mid-year population estimates to calculate the lower/upper confidence limits for the crude rates.

Over the past three years regional variation has reduced, reflecting service expansion, increased use of telemedicine and increasing clinician confidence. However, service provision is not yet equal across Scotland. Ongoing initiatives including a local pre-alert policy for the Scottish Ambulance Service, public awareness campaigns and Stroke and TIA Assessment Training (STAT) should help address this.

Table 7: Thrombolysis - numbers thrombolysed as percentage of stroke patients, and as a rate per 100,000 total population, Scotland, 2008-2014.

Year	Number of patients thrombolysed (numerator)	Number of stroke patients (denominator)	Percentage	Number of patients per 100,000 (target is 5)	Mid-year population estimates[1] (Scotland)
2008	260	8 439	*3*	5	5 202 900
2009	411	8 012	*5*	8	5 231 900
2010	543	8 439	*6*	10	5 262 200
2011	648	8 233	*8*	12	5 299 900
2012	669	8 063	*8*	13	5 313 600
2013	802	8 755	*9*	15	5 327 700
2014	868	8 696	*10*	16	5 327 700

Note regarding Table 7:

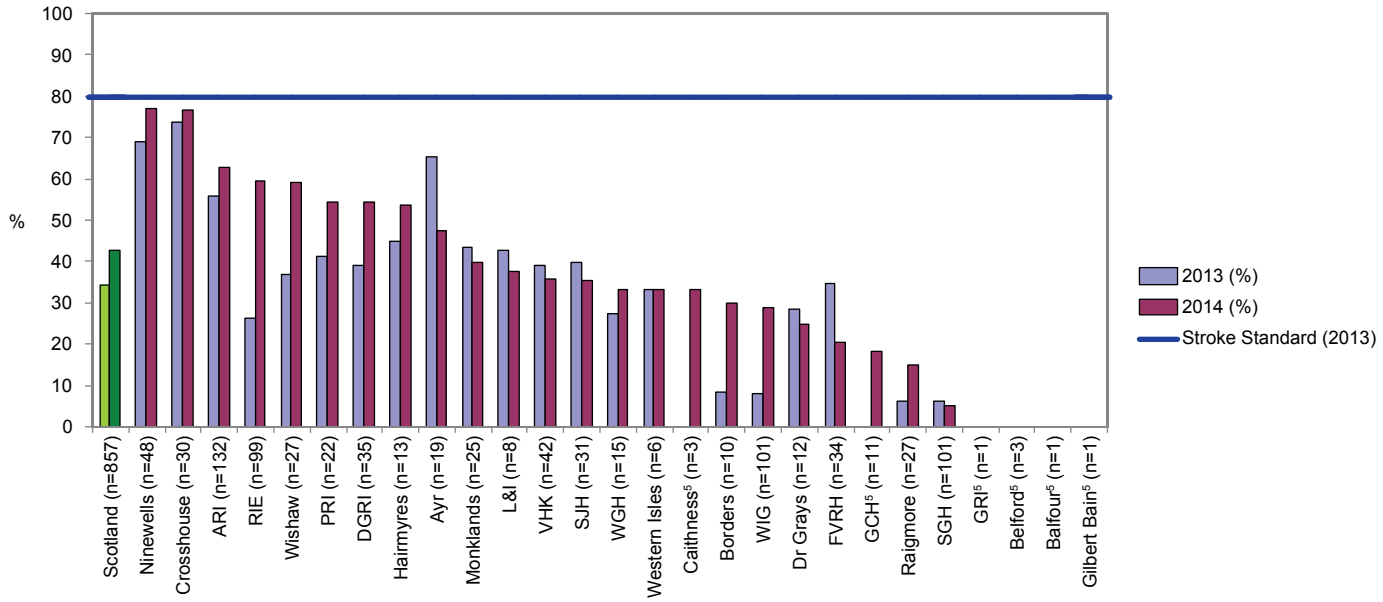
1. Latest available population estimates from National Records of Scotland (formerly General Register Office for Scotland, which merged with National Archives of Scotland from 1st April 2011).

Across Scotland, in 2014 only 43% of patients were treated with rtPA within one hour of arrival at hospital (Chart 10), with a modest improvement from 2013 (34%). No hospital is achieving the standard of 80% treated within one hour of admission, and average door to needle times vary considerably between hospitals (Chart 11). As patients have a better outcome with earlier delivery of treatment, this is an area which will require ongoing attention nationally, with review of service delivery pathways.

Chart 10: Percentage of patients with door-to-needle times for thrombolysis within 1 hour, 2013 and 2014 data.

Horizontal line reflects Scottish Stroke Care Standard (2013) of 80% of stroke patients thrombolysed within 1 hour of arrival at first hospital.

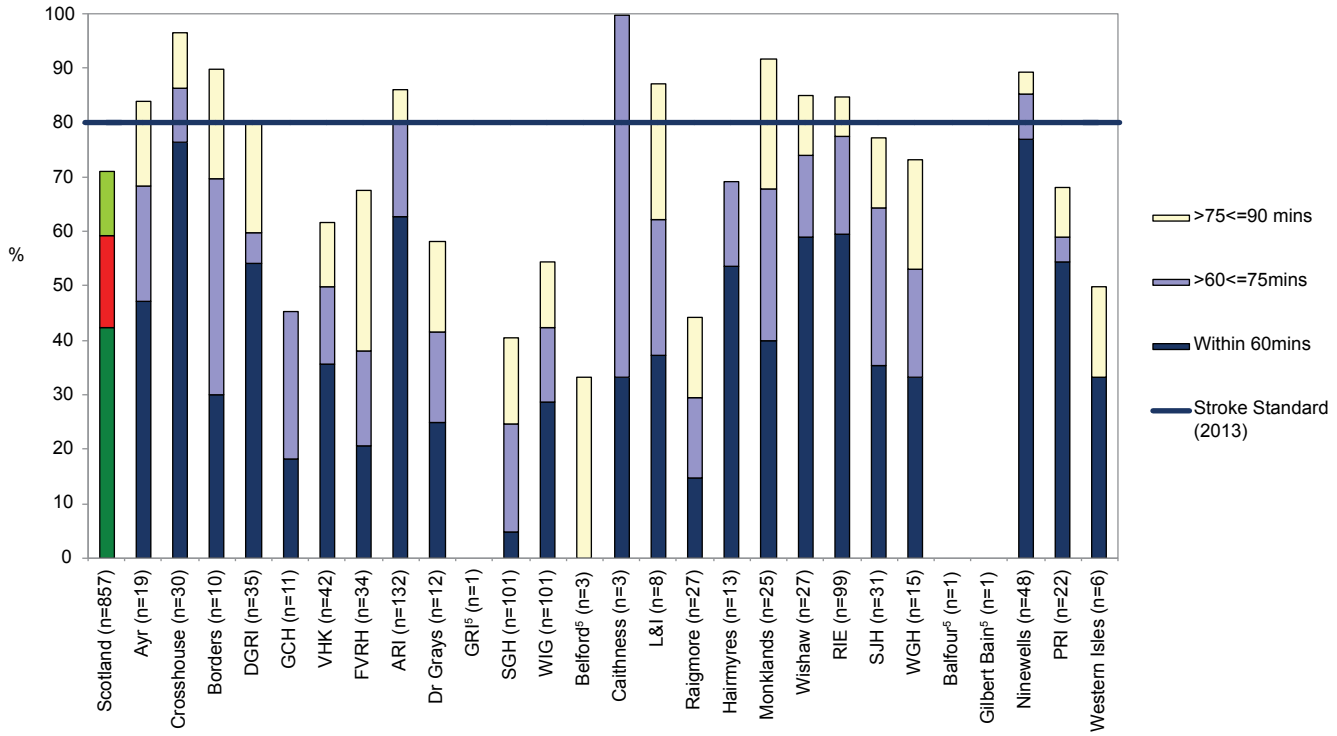
Note that the Scotland columns in the chart are coloured light green and dark green simply to differentiate them from the hospital columns and the colours are not indicative of performance. Light green corresponds to '2013' and dark green corresponds to '2014'.



For notes regarding Chart 10 please see notes regarding Chart 11.

Chart 11: Percentage of patients receiving thrombolysis within 60, 75 & 90 minutes of arrival at first hospital, 2014 data.

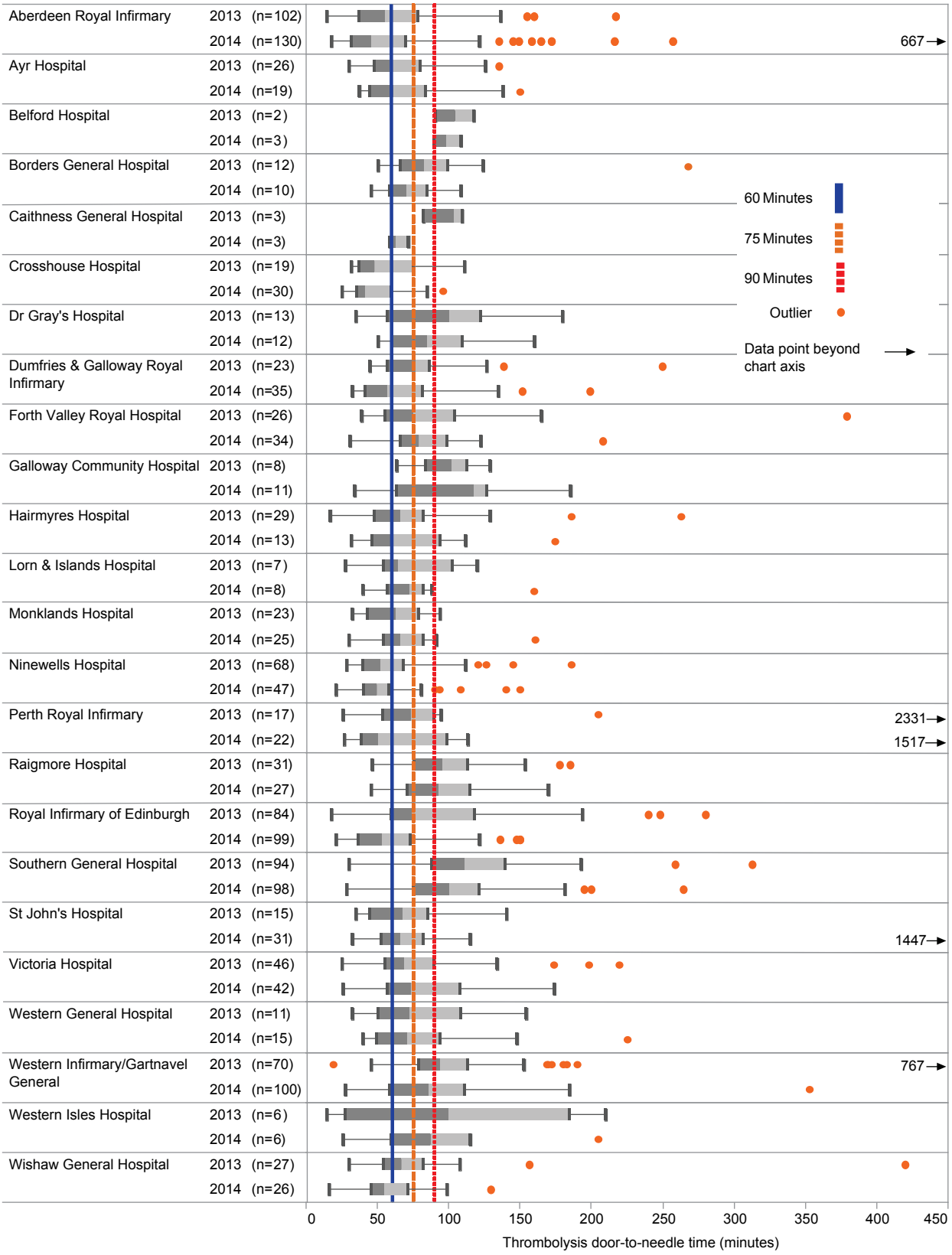
Note that the Scotland column in the chart is coloured green and red simply to differentiate it from the hospital columns and the colours are not indicative of performance. Light green corresponds to '>75<=90 mins', red corresponds to '>60<=75 mins' and dark green corresponds to 'Within 60 mins'.



Notes regarding Charts 10 and 11:

1. Hospitals shown are those that provide a thrombolysis service. See Table 5 for further details. Records included must have date and time of arrival at first hospital and date and time of thrombolysis to permit the calculation of time to thrombolysis and a small proportion of records are missing these data items.
2. Some percentages are based on very small numbers (see numbers in brackets on x-axis) and should be interpreted with caution.
3. Some hospitals (e.g. Southern General Hospital) receive a small number of patients transferred from neighbouring Health Boards which may affect their onset-to-needle time performance.
4. In some instances, data entered into eSSCA are assigned to admitting hospitals other than the main acute hospitals participating in the Scottish Stroke Care Audit. Data for these hospitals are combined with data for their respective main acute hospitals.
5. Some hospitals admitted ischaemic stroke patients for thrombolysis but did not thrombolyse any patients within the time spans included in this chart. These hospitals are included in the chart denominator but show as zero percent with regard to the time spans analysed.
6. A small proportion of records have thrombolysis date recorded but no thrombolysis time. These records are included in the denominator because the presence of a date indicates thrombolysis occurred. The absence of a thrombolysis time, however, prevents the calculation of door-to-needle time so these cases cannot be measured against the 60 minute standard and cannot be confirmed as having achieved it and are assumed not to have done so. This is a slightly different approach from Chart 12 where inclusion in the chart requires both a thrombolysis date and thrombolysis time. As a result, the Chart 10 and Chart 11 denominators, for individual hospitals, may be slightly higher than those in Chart 12.

Chart 12: Thrombolysis door-to-needle time distributions (minutes) by hospital, 2013 and 2014 data.



Notes regarding Chart 12:

1. Hospitals shown are those that provide a thrombolysis service. Records included must have date and time of arrival at first hospital and date and time of thrombolysis to permit the calculation of time to thrombolysis and a small proportion of records are missing these data items. These records have been excluded from Chart 12. This is a slightly different approach from the denominators used in Chart 10 and Chart 11 where records with a thrombolysis date but no thrombolysis time may be included. As a result, the Chart 12 denominators, for individual hospitals, may be slightly lower than those in either Chart 10 or Chart 11.

2. Five hospitals (Balfour Hospital, Gilbert Bain Hospital, Glasgow Royal Infirmary, Royal Alexandra Hospital & Victoria Infirmary) did not thrombolyse a sufficient number of patients to be displayed meaningfully as a box plot.
3. In some instances, data entered into eSSCA are assigned to admitting hospitals other than the main acute hospitals participating in the Scottish Stroke Care Audit. Data for these hospitals are combined with data for their respective main acute hospitals.
4. Some hospitals (e.g. Southern General Hospital) receive a small number of patients transferred from neighbouring Health Boards which may affect their onset-to-needle time performance.
5. The central boxes display the middle 50% of the data which is any data point within the 2nd and 3rd quartiles. The meeting point of the the two boxes is the median. Data outside this is included in the whisker unless the data point is greater than 1.5x the interquartile range (the two grey boxes). These data points are deemed to be outliers and are reported as a point separate from the box and whisker plot.

When exploring the door to needle times in more detail we can see that across Scotland the number (%) receiving thrombolysis is 365 (43%) within 60 minutes of arrival at hospital, 508 (59%) within 75 minutes and 611 (71%) within 90 minutes. This leaves further scope for improvement and emphasises the need for systems, such as thrombolysis pre-alerts, to reduce delays in hospital. Data from the audit and exception reporting allow each centre to reflect on individual performance, and identify any specific issues causing delay.

5.2 Thrombolysis pre-alerts

There continues to be variation in how pre-alert of FAST positive stroke patients is communicated to Accident & Emergency departments. In order to improve this service nationally, the Scottish Government have funded the seconded post of Stroke Improvement Manager in the Scottish Ambulance Service (SAS).

From this, a stroke service improvement plan is under development with the following aims:

- Utilise FAST as the gold standard diagnostic tool across the SAS for all stroke coded calls;
- Establish the thought process whereby ‘last seen well’ time is documented if no definitive onset of symptoms time is available;
- Ensure all FAST positive patients are conveyed to Accident & Emergency departments with a pre-alert preceding the journey;
- Create, in conjunction with IT, specific tools available on in-cab technology which will ensure the use and reporting of FAST and pre-alert to ensure uniformity in service across Scotland;
- Create a pathway that allows follow up assessment by stroke TIA clinic for patients who have suffered TIA symptoms which have resolved prior to SAS assessment. Follow up will be initiated by the attending SAS crew or clinical advisor within the control centre;
- Create a stroke network for the SAS with a dedicated stroke lead for each sub division who will link in with the MCNs to support change.

This work will support stroke patients and ensure that their pre-hospital journey is optimised whilst providing a consistent approach to pre-alert. In the future, SSCA and SAS data can be linked to examine the correlation between pre-alert, thrombolysis and the patient outcome. The SAS Stroke Strategy has now been ratified and is being cascaded to the SAS ‘on the ground’.

6 Carotid Intervention

6.1 Background

Carotid endarterectomy is a surgical procedure which aims to reduce the risk of stroke. The evidence base for effectiveness is strong and it therefore follows that the indication for quality control is strong. In the majority of cases, the indication to intervene is a TIA or minor ischaemic stroke in the relevant cerebral territory. The effectiveness of the procedure diminishes as time passes following the TIA/stroke event. Most benefit is derived from surgery performed within 14 days. For these reasons audit of the process as well as the outcomes associated with this surgery is highly desirable.

Estimates of the numbers of procedures performed based upon SMR01 data are likely to be a good estimate of totals, but the real risk of errors within a non-validated dataset mean that estimated outcomes will be less than 100% reliable and cannot be published without checking each case. The change in numbers since last year is small as might be expected.

6.2 Summary and key findings relating to carotid intervention

The SSCA commenced collecting carotid intervention data in July 2012. The data are entered by participating hospitals into eSSCA.

Table 8: Carotid Endarterectomy - number of patients receiving a carotid endarterectomy in acute hospitals in Scotland during Jan-Dec 2014.

Health Board of residence	Hospital providing carotid intervention service										
	Aberdeen Royal Infirmary	Ayr Hospital	Dumfries & Galloway Royal Infirmary	Forth Valley Royal Hospital	Hairmyres Hospital	Ninewells Hospital	Raigmore Hospital	Royal Infirmary of Edinburgh	Victoria Hospital	Western Infirmary/ Southern General	Total
Scotland	**20**	**40**	**25**	**24**	**43**	**5**	**20**	**65**	**12**	**85**	**339**
Ayrshire & Arran	0	40	1	0	0	0	0	0	0	0	41
Borders	0	0	0	0	0	0	0	12	0	0	12
Dumfries & Galloway	0	0	24	0	0	0	0	0	0	0	24
Fife	0	0	0	0	0	1	0	1	12	0	14
Forth Valley	0	0	0	24	0	0	0	0	0	0	24
Grampian	19	0	0	0	0	0	0	0	0	0	19
Greater Glasgow & Clyde	0	0	0	0	1	0	0	0	0	73	74
Highland	0	0	0	0	0	0	20	0	0	2	22
Lanarkshire	0	0	0	0	42	0	0	0	0	10	52
Lothian	0	0	0	0	0	0	0	52	0	0	52
Orkney	0	0	0	0	0	0	0	0	0	0	0
Shetland	1	0	0	0	0	0	0	0	0	0	1
Tayside	0	0	0	0	0	4	0	0	0	0	4
Western Isles	0	0	0	0	0	0	0	0	0	0	0
Outside Scotland/ Not Known/ Other	2	5	2	1	5	2	2	8	1	30	58
Total	**22**	**45**	**27**	**25**	**48**	**7**	**22**	**73**	**13**	**115**	**397**

Notes regarding Table 8:

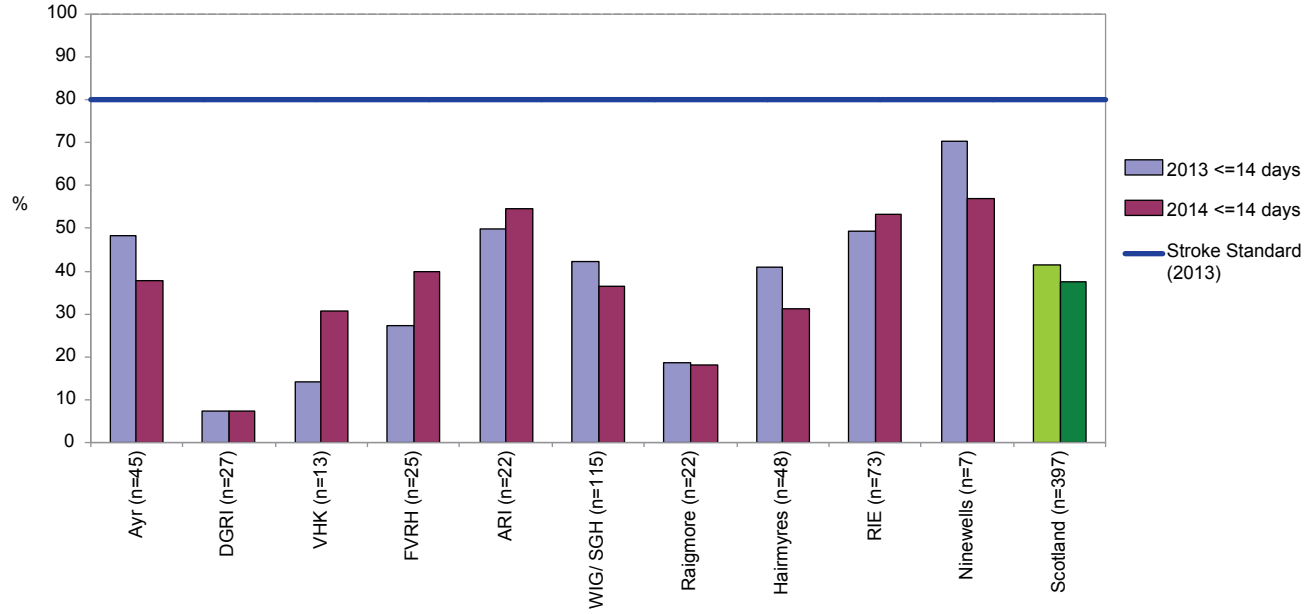
1. Hospitals shown are those that provide a carotid intervention service and have submitted data to eSSCA for 2014.
2. Carotid intervention procedures in Greater Glasgow and Clyde are carried out by a single team of surgeons on two sites - Western Infirmary Glasgow (WIG) and Southern General Hospital (SGH).
3. A small proportion of records could not be assigned to a Health Board of residence because they were either for non-Scottish residents or there was insufficient information to allow their assignment to a Health Board (e.g. partial or incorrect postcode).
4. Health Board boundary changes occurred from April 2014. SSCA data were assigned to the area of residence applicable at the date of each patient's carotid intervention. For mid-year population estimates the revised Health Board boundaries were used. The issue primarily affects NHS Greater Glasgow & Clyde and NHS Lanarkshire.

The SMR01 estimates for carotid endarterectomy indicate some variation in the number of procedures performed per 100,000 population. However these need some consideration before interpreting them. Some Health Boards do not offer carotid endarterectomy and therefore their cases will appear in another boards' figures.

Chart 13: Percentage of patients undergoing a carotid intervention within 14 days of the event that led the patient to first seek medical assistance, 2013 and 2014 data.

Horizontal line reflects Scottish Stroke Care Standard (2013) of 80% of patients undergoing carotid endarterectomy for symptomatic carotid stenosis have the operation within 14 days of the stroke event.

Note that the Scotland columns in the chart are coloured light green and dark green simply to differentiate them from the hospital columns and the colours are not indicative of performance. Light green corresponds to '2013' and dark green corresponds to '2014'.



Notes regarding Chart 13:

Bracketed number on chart x-axis indicates number of patients in denominator for 2014.

1. **Hospitals shown are those that provide a carotid intervention service and have submitted data to eSSCA for 2014.**
2. Patients in Borders, Orkney, Shetland & Western Isles are treated in other Health Boards as part of their respective carotid intervention pathways.
3. Carotid intervention procedures in Greater Glasgow and Clyde are carried out by a single team of surgeons on two sites - Western Infirmary Glasgow (WIG) and Souther General Hospital (SGH).

The only part of the process audited in this cycle is the proportion of cases performed within 14 days of the index event. The proportion of cases operated within 14 days of the presenting event in 2014 is **38%** (149/397). This is less than 2013 data (41%). The apparent variation in procedural rates per 100,000 population may be explained by differing indications.

6.3 Future work

The reporting of the process audit data relating to the delay to surgery will continue. This is a valid, clinically important measure. Case linkages may allow an examination of length of stay post-operatively and the re-admission and death rates following carotid intervention. Increasing the detail in the data collected and analysed will allow separation of asymptomatic from symptomatic indications.

6.4 Carotid pathway in Health Boards across Scotland

The carotid pathway features as a priority action on the Scottish Stroke Improvement Plan (2014)[1]. Although most Health Boards offer access to carotid endarterectomy there is variance in the pathway and in local delivery. Over the coming year there will be continued focus by the stroke MCNs on developing an equitable pathway across the clinical area and improve performance in the number of patients receiving appropriate intervention within 14 days of symptom onset. An Improvement workshop, funded by the Scottish Government, will take place in October 2015.

7 Use of SSCA data in research

The Research Subgroup of the SSCA Steering Committee continues to oversee the use of SSCA data in research. The datasets are primarily available for researchers based in Scotland who have contributed to the audit, but open to other researchers also.

This section of the report briefly outlines work undertaken by Chest Heart & Stroke Scotland (CHSS) Fellow Dr Melanie Turner to date using the SSCA dataset.

Information about the SSCA Research Subgroup and forms for requesting data are available on the SSCA website (http://www.strokeaudit.scot.nhs.uk/Research.html).

7.1 CHSS funded research: Using routine data to answer important questions about the optimal care of stroke and TIA patients in Scotland.

There are a number of on-going projects which utilise, or will utilise, the SSCA dataset.

Funding from CHSS has facilitated on-going analysis of an updated SSCA dataset, which has been linked to include SMR01 and National Records of Scotland mortality data. The researchers have examined the Stroke Unit organisational audit for Scotland to determine whether stroke service characteristics may impact case mix adjusted outcomes. These will be compared to other countries which have contributed patients to the INTERSTROKE study. The INTERSTROKE study is an international case control study recruiting over 13,000 acute stroke patients from 100 hospitals across 32 countries.[6] The aim is to establish which service characteristics best explain outcome variations across countries. Initial analysis of the Scottish dataset has been performed and outcomes will be presented at the SSCA national meeting. Additional ongoing studies include review of thrombolysis outcomes in Scotland, further assessment of the differences in mortality rates between hospitals and a review of outpatient outcomes depending on clinic diagnosis.

Two papers have been published since the last report.[7,8] Further information on these and further publications will be available on the SSCA website. Three posters were presented at the European Stroke Organisation Conference in Glasgow in April 2015. These looked at thrombolysis outcomes in the Scottish population, outcomes in the outpatient population, and the evidence that mortality after stroke has dropped since the audit commenced.

Additional projects include a linkage to the PACS dataset to assess outcomes in patients with intracerebral haemorrhage (PI: Professor Rustam Salman Al-Shahi, University of Edinburgh), linkage to the SCI-DC Diabetes dataset to look at the impact of diabetes on stroke and outcomes (PI: Professor Sarah Wild, University of Edinburgh), and a linkage between SSCA and the Scottish Renal Registry (PI: Mark Findlay, University of Glasgow). Further information on how to gain access to the SSCA dataset for research purposes is available on the SSCA website

For further information relating to any of this work please contact m.e.turner@abdn.ac.uk.

8 Where Next?

8.1 What is planned for 2015-16?

Review of the Scottish Stroke Care Standards:

It is essential that the Scottish Stroke Care Standards remain current to provide healthcare professionals in Scotland with advice and guidance to support the provision of high quality care for patients with stroke and transient ischaemic attack (TIA). In 2015, the SSCA Steering Committee will review the content of the stroke standards and update or make recommendations as required.

Routine reporting:

Distribution of Monthly Reports to Stroke MCNs reflecting activity for the previous month/ quarter and performance against Scottish Stroke Care Standards continues with the inclusion of the bundle analysis. They are based on ***initial*** diagnosis of stroke.

Distribution of Quarterly Reports to Stroke MCNs and colleagues at the Scottish Government reflecting activity for the previous quarter relating to performance against the Stroke Care Bundle based on ***initial*** diagnosis of stroke.

Distribution of the Annual Report Cumulative Summary Reports commenced in January 2014. These reports provide Stroke MCNs with an indicative view of the data that will appear in the next Annual National Report. They are based on ***final*** diagnosis of stroke as is the Annual National Report.

The reports continue to be modified to maximise reliability and usefulness to the clinical teams.

Rehabilitation Audit:

A third rehabilitation pilot has been completed. The pilot will be evaluated and a report produced outlining results of the data collection but more importantly an overview of the practicalities of carrying out the audit using the user defined fields in eSSCA.

Depending on the outcome of the third pilot, the plan would then be to roll out to the remaining sites across Scotland in 2015 for an agreed period of time.

Organisational Audit:

The 2014-15 template was completed by Stroke MCNs and discussed at the 2014-15 Health Board Stroke MCN Annual Review Meetings.

There has been interest in the use of these data from a variety of sources. Requests for information from the Organisational Audit will be considered using the already established Information Request process.

The SSCA National Meeting:

The 2015 SSCA Annual National Meeting will be held on **Tuesday 25th August 2015** at the Royal College of Physicians, Queen Street, Edinburgh. Further information can be found on the SSCA website (http://www.strokeaudit.scot.nhs.uk/Meetings/main.htm).

Quality assurance (QA) of SSCA data:

A high standard of data quality is essential to ensure the SSCA database is accurate, consistent and comparable across time, and between hospitals. This will ensure decisions to improve quality of care and service provision at hospital, Health Board and national level are based on correct information. Without quality, it would be impossible to interpret results with any accuracy or conviction.

The data quality processes undertaken by SSCA will be incorporated into the following:

At point of data entry;

Central validation; and

Case note validation.

At point of data entry:

eSSCA, the stroke audit data collection tool, currently carries out robust data Quality Assurance processes at point of entry.

Central Validation:

Central validation processes are being further developed to ensure that records with a high proportion of responses marked as 'unknown' or 'not recorded' are identified and queried locally. Duplicate records, unlinked records and events that remain open for longer than three months will also be flagged and validation queries generated.

Case note validation:

An agreed proforma and process is now in place to commence case note validation. This will allow confirmation of the accuracy of the SSCA data. Findings of case note validation will be shared with the Audit Coordinators and Stroke MCNs.

Case Ascertainment:

Services have increasingly cross checked their SSCA data with routine coding of the Scottish Morbidity Record (SMR01) based on International Classification of Disease 10th revision (ICD10) codes I61, I63 and I64. Any increase in the number of strokes entered into SSCA may reflect improvement in case ascertainment rather than increasing numbers of hospital discharges with stroke. Hopefully, this process will not only lead to more robust case ascertainment in SSCA but greater accuracy of routine coding in the future

Pre-hospital care:

Development of a Pre-Hospital Dataset is ongoing. Work continues to marry data flows in the pre-hospital setting, i.e. Scottish Ambulance Service and NHS24. The proposal is to have a joined dataset held by ISD that can be linked to the SSCA data for further analysis of the patients' pre-hospital journeys. This work has been delayed due to competing priorities.

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Appendix A: Responses from Chief Executives

During the preparation of this report the Health Board Chief Executives were asked to provide an example of a change that they have put in place to improve the delivery of stroke care within their local area.

The Chief Executives responses are noted (by Health Board) below:

NHS AYRSHIRE AND ARRAN

NHS Ayrshire and Arran has improved performance on delivery of the Scottish Stroke Care Bundle and is on target to achieve the LDP trajectory for 2014/15.

The implementation of regular exception report meetings with all the clinicians involved in the stroke bundle pathway has facilitated the identification of areas for improvement to the patient's journey and achievement of compliance with the stroke bundle.

By having dedicated Hyper Acute Stroke Units (HASU), the admission to Stroke Unit standard has been consistently met over a number of years. The recent reduction is likely to be reflective of system wide demand and capacity pressures

Work is continuing to improve our performance against the swallow assessment, and a dysphagia Learnpro module has been developed to provide particular training to Stroke Unit nurses. HASU nurses are now supportive in identifying stroke patients in Accident and Emergency and Medical Admissions who require to have a swallow assessment.

Regarding the number of patients who receive a brain scan (CT) within 24 hours of admission, teaching sessions are provided to all new doctors on the protocol for ordering a CT scan for stroke patients; in addition, there has been some flexibility in additional CT scanning at weekends. A training programme is ongoing to increase the numbers of radiographers with CT scanning skills and this work will support improved performance against the aspirin standard.

In relation to patients receiving thrombolysis within 60 minutes of their arrival at hospital, we continually review the patient pathway to identify areas for development to reduce our door to needle time. We have been working with our colleagues from NHS Lanarkshire to develop a joint thrombolysis rota using telemedicine for out of hours to allow implementation of a local 24/7 thrombolysis service to our patients from April 2015.

NHS BORDERS

NHS Borders have continued to use the Stroke Care Bundle as a focus for improvements in the quality of stroke patient care. The Stroke Care Bundle Sticker is now embedded in practice at the Borders General Hospital. We continue to use exception reporting and audit to identify areas of potential improvement.

Despite staff changes this year, the senior members of the stroke team - medical, nursing and managerial - have worked cohesively to ensure that timely transfer to the Borders Stroke Unit. Our aim has been to achieve consistency throughout the week and ensure that the referral pathway is robust and not person dependent. Protocols have been reviewed to facilitate patient flow during peak periods of activity for the hospital.

The need to complete swallow assessments in the Emergency Department (ED) was identified last year. Emergency Department training to maintain skills has continued. A link nurse in the ED and Stroke Nurse support has been pivotal to maintaining the swallow screening rate.

Radiology has continued to provide CT scanning and Doppler in timely manner. The use of the swallow screening, the Stroke Care Bundle sticker and a rolling educational program have improved aspirin administration.

The specialist stroke/TIA clinic team have continued to aim to reduce the time to assessment, identifying delays from first GP contact to the referral receipt. Support for on line referral has been amended. In-hospital referrals are now made to a single email address. Patients complete CT scan and Doppler on the day of NVC assessment.

Our thrombolysis door to needle time has improved but consistency has been difficult to achieve due to the small number of patients treated and inadequate staff referral confidence. We plan for this year to concentrate on education and training, particularly for the Emergency Department and medical staff.

NHS DUMFRIES AND GALLOWAY (D&G)

NHS Dumfries & Galloway continues to provide a high quality service. We have achieved our Stroke Care Bundle trajectory (76% for the year) with the biggest improvement within Galloway Community Hospital where 88% of patients have received all 4 components of the bundle. This is as a result of excellent communication and team working.

We have also achieved the standards for the One Stop Neurovascular Clinic (85%) and CT scanning (GCH 100%, DGRI 91%).

A key focus for improvement in 2014 has been the door to needle time for thrombolysis which has improved from 39% in 2013 to 54% in 2014. The team are now delivering the bolus immediately post CT within the CT department. Currently this is only within the in-hours period but we are now seeking to roll out to the weekend and out-of-hour periods.

Another area of focus has been carotid intervention as fewer than 10% of patients receive carotid intervention within 14 days. Although no real impact is evident within the 2014 data, as from November 2014 we have improved the patient pathway. The change has involved improving scanning arrangements and communication between all the teams involved, and sharing the data through exception reporting. It is anticipated that this improvement will continue and be reflected in the 2015 data.

Aspirin prescribing has improved across both sites (GCH 97%, DGRI 94%) mainly due to implementation of checklist and a proactive stroke team. However there continue to be challenges for admission to the Stroke Unit in DGRI (83%) and swallow assessment especially in DGRI (82%). These areas will therefore be a focus for improvement in the coming year.

Given our limited resources the Stroke MCN would like to acknowledge the wider support from the medical, surgical, emergency and radiology teams as well as the Lothian Hub.

NHS FIFE

The stroke team have worked hard on improving stroke care and performance in all aspects, but particularly on improving Bundle Compliance, and access to out patient clinics.

Bundle performance is fed back weekly looking at reason for failure. A particular challenge is water swallow screening. Whilst, as an individual item, performance improved from 76% in 2013 to 82% in 2014, it was found that though screening by A&E staff improved significantly, patients admitted by GPs directly into the Admissions Unit were not being screened. Training WSST champions worked well in A&E and now requires implementation in other areas.

The outpatient performance across Fife has improved significantly by 17%, an increase from 60% to 77%. Our TIA clinic is a first available appointments system, though is still measured as 2 individual hospitals which helps identify some of the problems faced including patient's reluctance to travel because of where and when the clinic is. We hope to restructure clinics later in 2015 and improve the TIA service for patients who present via A&E and acute admission units. A total of 891 patients attended clinics but only 444 had a final diagnosis of an ischaemic event. Of these patients 192 had been inpatients requiring further investigations or confirmation of diagnosis.

Staff continue to work hard on:

- raising awareness of TIA clinics;
- giving clear guidance on referral pathways and management;
- distributing a Patient Information Leaflet about TIA and the importance of attending the clinic for GPs to give to patients during their consultation;
- screening and triage of referrals appropriately, including to a nurse led TIA clinic and a "probable non stroke clinic";
- checking RMS regularly;
- encouraging GP's to use the stroke hotline which should reduce the number of non stroke patients referred to the TIA clinics.

NHS Forth Valley (FV)

Forth Valley's performance against the Scottish Stroke Care Standards improved between 2013 and 2014 in all areas measured by the Stroke Care Bundle. In part this is due to the creation of the local Stroke Care Improvement Group. This multi-disciplinary group has worked hard to improve the stroke service with the use of quality improvement charts and exception reporting to highlight issues and challenges. Stroke audit data is also displayed monthly in various clinical areas on their data display day.

The Stroke Care Bundle has been an important focus during 2014. Our planned trajectory of 80% was achieved for 6 months during 2014 with the Board attaining 77% by December 2014. We further have raised the awareness of the stroke bundle; for example training was also carried out in ITU and HDU regarding the Stroke Care Bundle.

Hospital capacity and flow is a key factor in meeting the target for admissions to the Stroke Unit within one day. Ongoing improvements include: holding a stroke bed in the Stroke Unit until 8pm each day; the Emergency Department alerting the nurse in charge of the Stroke Unit to any patients admitted with a stroke; and the electronic identification of patients across the hospital who have had a stroke, to improve their flow into the Stroke Unit.

Performance against the swallow screen standard improved during 2014. This was due to the Stroke team undertaking some work within the Emergency Department, ITU and HDU to increase the numbers of staff trained in carrying out initial swallow screening assessments. Furthermore a LearnPro Module for Swallow Screening is also being developed for staff training.

The Forth Valley Stroke Care Improvement Group will continue to address the ongoing challenges including medical staffing, the delivery of stroke thrombolysis and carotid intervention.

NHS GRAMPIAN

NHS Grampian acknowledges that there have been areas of improvement in the provision of stroke care, but also areas which require further attention.

1. **Stroke flow:** It is acknowledged that the current configuration of stroke services will not allow us to meet the 90% target. The need for a radical review of stroke beds has been acknowledged and will be resolved over the course of the summer. Performance at Dr Gray's has improved.
2. **CT scanning:** Performance in Grampian against brain imaging standards has continued to improve, consistently achieving the standard. The proximity of the CT scanner to the Emergency Department in ARI, along with increased flexibility of radiology staffing out of normal working hours has contributed to this.
3. **Thrombolysis:** Performance is satisfactory, and we are treating over 20 per 100,000 population. At ARI this is due to a well coordinated team effort involving SAS, A&E and a consultant led acute stroke team. Door to needle time has improved: local work has demonstrated that pre-alert is associated with an odds ratio of 11 for likelihood of thrombolysis within one hour of arrival.
4. **Swallow screen and aspirin:** Performance against the aspirin standard has also improved. Swallow screen remains problematic. Ongoing exception reporting has identified some of the issues which are preventing achievement of the standards. Lack of access to Stroke Unit means other components of the bundle are less likely to be achieved and represent the main reason why patients do not have a timely swallow screen recorded. Work to improve assessment of swallow in A&E and encourage better recording is ongoing.
5. **Outpatients – stroke clinics:** Early identification of patients for daily medical clinics has resulted in an improvement at Dr Gray's Hospital. At ARI, although there is daily clinic provision, referrals continue to increase. Exception reporting has identified some areas which can be addressed to try to reduce time to review. Once patients do attend clinic, investigations are usually performed the same day.

NHS GREATER GLASGOW & CLYDE (GG&C)

Stroke Units across NHSGGC continue to place a strong emphasis on improving acute stroke care. The 2014 data shows significantly improved stroke bundle performance at 3 out of 5 hospitals in NHSGGC and improved performance in the remaining 2 hospitals. A particular focus for 2014 has been improving swallow test performance. This work has been championed by the NHSGGC Stroke MCN and has involved clinical and general managers working closely together to agree actions for improving performance. The following actions were taken forward at all NHSGGC hospitals:

- General Manager for stroke services met with clinical and General Managers in each hospital to raise awareness of the importance of the swallow test and support staff to deliver the swallow test as early as possible after admission
- Training provided for staff within medical and stroke wards delivered jointly by the stroke nurse specialists and speech and language therapists.
- Enhanced presence of stroke nurse specialist staffing on medical wards to prompt continued focus on the swallow test.
- Weekly exception reporting of detailed swallow performance shared with Lead Nurses and General Managers across medical and stroke wards.

- New Stroke and TIA Assessment Training (STAT) programme implemented within NHSGGC for nursing staff within stroke wards and Emergency Departments. This programme is specifically aimed at improving stroke recognition and management of acute stroke and TIA and has evaluated well within NHSGGC, in particular with Emergency Department staff.

NHSGGC is currently undertaking a major redesign of many aspects of acute stroke care. During 2014 the Victoria Infirmary stopped taking acute stroke admissions. This change was put in place ahead of the wider changes to Glasgow hospitals in 2015 which will see stroke services across Glasgow streamlined and strengthened with the opening of the new South Glasgow University Hospital.

NHS HIGHLAND

During 2014 NHS Highland Stroke Services have been working to improve services for people with stroke. Below is highlighted some of the work which has been taking place:

- The **Thrombolysis** pathway has been redeveloped; in booklet format it has been updated to include additional sections on quality and clinical governance. It is being trialled at Raigmore before being rolled out.
- **GP Advice Card** aimed at supporting decision making - this credit card sized guide will help guide on whether to admit patients or refer to the Rapid Access Clinic.
- In addition to the **training** courses run by the team in NHS Highland, staff have been involved with a number of other initiatives. Staff from Highland, Western Isles and Grampian completed the Stroke and TIA Assessment Training (STAT). Locally this is led by Dr MacAden (Consultant in Stroke and Rehabilitation) and Linda Campbell (Stroke Coordinator). To date they have delivered a four sessions. Training has also taken place with the Scottish Ambulance Service (SAS) and the AMAU at Raigmore. This has not only helped reinforce the correct patient pathway it has also helped to raise the profile of the Scottish Stroke Care Standards and Audit.
- In the last year three **research** studies have been published using NHS Highland's SSCA data, all of which will help to improve patient care: Satellite Ultrasound for Rural Stroke (SURS) the Epidemiology of Stroke Patients and their Primary Care in the Highlands of Scotland and Anticoagulation for Recurrent Stroke Prevention in Patients with AF – A Single Centre Clinical Review
- The Highland Quality Approach aims to transform the way we design and deliver safe, effective and person centred services. In 2013 the Stroke Unit at Raigmore was the subject of a Rapid Process Improvement Week **(RPIW)**. Those involved looked at care in the first 24 hours. A second RPIW is now planned for June 2015. Utilising Lean methodology the RPIW will look at patient flow through the Stroke Unit; its use of beds and the transfer of patients to community hospital and home.

NHS LANARKSHIRE

When thrombolysis was first introduced locally in NHS Lanarkshire, approximately 7 years ago, our focus was on delivering this treatment safely. At least half of our assessments are completed using telemedicine (52% in January to December 2014) and whilst this allows an equitable service over a large catchment area it does bring attendant risks and requires a robust governance process. More recently, over the last three to four years, our focus has moved to delivering this intervention quickly as well as safely. Whilst the majority of our patients are treated within 75 minutes of hospital arrival (71% in 2014), increasing the number thrombolysed within 60 minutes has proved challenging, despite a number of changes to the patient pathway to try

to improve performance. In an effort to reduce door to needle times, we introduced a pathway change at Wishaw General Hospital in 2014. The Stroke Unit nurses now carry a 'Thrombolysis DECT Phone'. The nurses are prealerted, using this phone, to any FAST positive ambulance stand-bys so that they can be waiting for the patient in the Emergency Department on arrival. They then work with the ED team to assess the patient and pull them through the pathway as quickly as possible, whilst liaising with the on call thrombolysis consultant. This change has led to a significant improvement against the 60 minute target between 2013 and 2014 at the Wishaw site. Such has been the impact that we have introduced the same model in Hairmyres and Monklands in early 2015. We have also introduced a system where the thrombolysis nurse is permitted to request CT scans, to again streamline the process. With these changes we hope to see similar gains in all three sites by next year's report.

NHS LOTHIAN

NHS Lothian increased performance against the stroke bundle from 50% (2013) to 54% in 2014. Exception reporting improvement methodology continues to be used on each of the three acute sites to review stroke pathways for improvement opportunities.

At the Royal Infirmary of Edinburgh, the introduction of a nominated consultant as the daily stroke team lead has enabled them to lead the thrombolysis team and triage stroke patients pre-alerted by SAS, as well as being contact for other sites needing this expertise. Improvements to pre-alert, CT ordering times and increasing senior assessment all contributed to a significant reduction in the median door to needle time.

At the Western General Hospital in early 2014 a Stroke Patient Tracker was introduced to aid outreach nurses in delivering and ensuring each of the stroke standards were delivered. This one page document clearly outlines all new patients who have arrived at the hospital and which of the standards are still to be met and by when. The tracker forms part of the ward handover ensuring actions required to meet the standards are not lost between shifts. This along with a number of other process improvements contributed to an improvement in performance against the Swallow standard.

St John's Hospital Stroke Unit also undertook a number of improvement activities throughout 2014 reviewing their Integrated Care Pathway, strengthening their pre-alert system and achieving greater buy-in at the front-door. Their new 'stroke nurse of the day' rota in the Medical Assessment Unit has improved ownership of the standards and performance against scanning, swallow and aspirin.

A Lothian Stroke Programme Board has recently been established to lead pan-Lothian Stroke improvement activities with a particular focus on achieving the Stroke Standards. This Board will be clinician led and will report back to the Health Board on their recommendations in October 2015.

NHS ORKNEY

In February 2015, a CT scanner became operational in the Balfour Hospital. This facility, combined with remote decision support from NHS Grampian allows treatment for stroke that was not possible previously.

When a patient is offered for admission to the Balfour Hospital with recent onset neurological symptoms suggestive of stroke, the hospital team is alerted before the patient arrives. The Consultant on call for stroke in the Aberdeen Royal Infirmary is also informed in advance. After initial assessment, a CT head scan is performed. The scan is reviewed remotely by the stroke consultant in Aberdeen Royal Infirmary. If there is no evidence of parenchymal changes, and the

onset of symptoms is within the time window, thrombolysis is considered. In discussion with the stroke consultant, the patient is prepared for this intervention. When indicated, signs such as high blood pressure will be treated before thrombolysis is undertaken.

Any complication of the procedure is discussed with the stroke consultant on call, and the timing of follow up scans is negotiated with the service in Aberdeen, appropriate to the clinical course of the patient.

The patient remains in the Balfour Hospital during the acute phase of stroke, and for the period of rehabilitation. We have seen significant improvement of neurological deficits in response to thrombolysis, and, to date, have had no significant complications such as bleeding.

If the CT scanning with decision support had not become available for our patients, thrombolysis would not be possible in our remote and rural setting because of the narrow time window available for this intervention.

NHS SHETLAND

Stroke performance in Shetland continues to be at a high standard, with improvements noted when measured against the Scottish Stroke Care Standards and the Stroke Care Bundle.

In 2013 our Radiology Department Manager was successful in obtaining funding from the Stroke Improvement Fund, for provision of clinical support and training to develop a local carotid ultrasound scanning service, where a vacancy had remained unfilled for some time.

Year 2 funding was granted in 2014 to continue the project. Carotid Ultrasound Scans can now be carried out locally in a timely fashion, which has improved the service provided to patients post stroke. Previously, during the vacancy, scans could only be undertaken when there was a visiting sonographer available, or by attending hospital on the Scottish Mainland.

CT scanning targets remain challenging to meet when stroke patients are admitted to A&E out of hours and outwith the Thrombolysis timeframe. Most of our Radiographers are now CT trained, but if an urgent CT scan is not possible, it is performed at the next available opportunity.

Discussions with the Radiology Department at ARI have been helpful in decreasing times for agreeing and reporting scans, especially out of hours. We have now agreed that consultant requests for urgent scans can be ordered by junior doctors and verified by senior Radiology trainees. This has made earlier scanning easier.

NHS TAYSIDE

Improving stroke care and performance against the Scottish Stroke Care Standards is a priority for the Stroke Managed Clinical Network (MCN). There has been a particular focus in improving the inpatient journey across the service, utilising small tests of change. Ninewells Hospital has consistently achieved the performance in admissions to a Stroke Unit in the last nine months. Inpatient flow challenges in Perth Royal Infirmary (PRI) did impact on the percentage of stroke patients admitted to the Stroke Unit. Exception reporting methodology continues to be crucial to the improvement plan for stroke care and services.

Tayside has previously introduced the stroke care bundle; including admission to the Stroke Unit, swallow assessment, prompt CT scanning and Aspirin administration. The standard for swallow screen is close to being achieved and we have identified CT scanning and appropriate Aspirin prescribing as priorities for improvement over the next 12 months in Ninewells. PRI has consistently achieved the standard for CT scanning.

Our thrombolysis performance is among the best in Scotland. This is due to a well co-ordinated team effort. The standard for carotid intervention in Tayside is above the Scottish average. The data collection process will be reviewed due to small numbers.

Ninewells has excellent performance in providing access to out patient neurovascular clinics in the last twelve months. An enhanced service to increase medical capacity is due to commence in PRI in August 2015.

Education and development of the stroke multi-disciplinary team continues and the Stroke MCN has worked in conjunction with Chest Heart & Stroke Scotland and The Stroke Association to deliver stroke specific training. This includes Stroke and TIA Assessment Training (STAT) and FAST awareness.

This continuous improvement and monitoring work, as well as ongoing educational investment is fundamental to achieving and sustaining improvement to enhance patient outcomes for stroke.

NHS WESTERN ISLES

NHS Western Isles has, once again, made significant progress in the last 12 months in respect of the SSCA. The following are areas of change which have made a positive impact:

- The MCN has promoted the Stroke Bundle principles throughout the hospital and are delighted to see the improvement that has already happened in the last 12 months. This is primarily a reflection of the Clinical Leadership shown by the nursing staff in A+E and the Stroke Unit. Their leadership and empowerment has allowed a consistent approach to be delivered regardless of other changes in personnel.
- The MCN have been instrumental in updating the local Integrated Care Pathway to allow staff to safely transfer patients to the Stroke Unit within 24 hours of thrombolysis. This has ensured that the delivery of dedicated stroke rehabilitation can occur timeously.
- Training and education of healthcare staff in the swallow assessment has led to NHS Western Isles achieving the target of >90% of patients receiving a swallow assessment on the day of admission: a significant improvement in this area in the last year.
- The stroke team are mindful of the relatively low percentage of patients receiving aspirin within one day of admission. Although a Patient Group Directive is now in place it is clear that more education will need to be focussed in this area in the coming year and the MCN intends to take on this area to ensure improvements continue.
- Finally, the MCN have worked with our colleagues who provide a remote, video consultation service for patients with a suspected TIA. We are delighted to see a significant improvement in the delivery of this standard.

The above developments will ensure that NHS Western Isles continues to ensure that patients receive the best possible stroke care in spite of the challenges of rurality.

Following publication of the 2014 SSCA National Report Moranne MacGillivray (SSCA National Clinical Coordinator, ISD) and Katrina Brennan (Scottish Stroke Improvement Plan Lead, Scottish Government) visited all Health Boards in Scotland to meet with stroke clinical teams, stroke MCNs, radiologists, senior managers/ executives, planners and other relevant personnel with input to stroke care locally. The meetings were held between October 2014 and April 2015.

The meetings were well attended in all Health Boards. There was evidence of improvements in practice in some areas and many actions were being taken forward to further improve the delivery of stroke care locally. However, in some areas there was still significant work required to ensure that hospitals in Scotland continue to improve performance against the Scottish Stroke Care Standards.

A follow-up process has been agreed as part of the Scottish Stroke Improvement Team, see Appendix C.

Moranne and Katrina will continue to work with Health Boards throughout 2015/16 to improve delivery of stroke care across Scotland.

Appendix B: Organisational Structure of SSCA

The Scottish Stroke Care Audit is a national audit within the Scottish Healthcare Audits of the National Information & Intelligence Department (NI&I) at the Information Services Division (ISD) of NHS National Services Scotland (NSS).The audit has its own Steering Committee reporting directly to the National Advisory Committee for Stroke (NACS) at the Scottish Government and providing strategic direction and clinical input to the audit team, optimising the use of the data. See the SSCA website (http://www.strokeaudit.scot.nhs.uk/about/SteerGp.htm) for details of the Steering Committee.

The organisational structure of the SSCA is:

Professor Martin Dennis	Chairman of the Steering Committee/ Lead Clinician
Moranne MacGillivray	National Clinical Co-ordinator
Debbie Hamilton	Regional Coordinator
David Murphy	Senior Information Analyst
Neil Perkins	Information Analyst
Martin O'Neill	Principal Analyst

Hazel Dodds (Clinical Coordinator) left the SSCA during 2014 to take up a new position within ISD. The SSCA team and the wider stroke community would like to take this opportunity to thank Hazel for her contribution to the development of the SSCA over recent years and wish her well in her new venture.

Funding of £167k for the central coordination of the SSCA for 2014/15 was provided by NACS. Funding for the SSCA data collection has been included in each Health Board's general allocation. Each Health Board is expected to continue to collect the audit data. Auditors are employed in each Health Board and are supported by their Stroke MCN. Staffing levels vary widely between hospitals. Auditors' responsibilities include case ascertainment, data collection, completion of forms and data entry. Since June 2012 all Health Boards have entered data into eSSCA. Prior to this all Health Boards data were entered into the Scottish Stroke Care Audit System (SSCAS) other than NHS Lanarkshire. In NHS Lanarkshire a locally developed system (Stroke Audit In Lanarkshire (SAIL)) was used to collect inpatient and outpatient data. Data from SAIL (up to June 2012) were sent directly to ISD on a monthly basis and are included in National Reporting. Data validation is built into the computer systems, with additional local validation at point of data entry and centrally during analysis.

The information presented in this report highlights the variation in the quality of stroke services across Scotland.

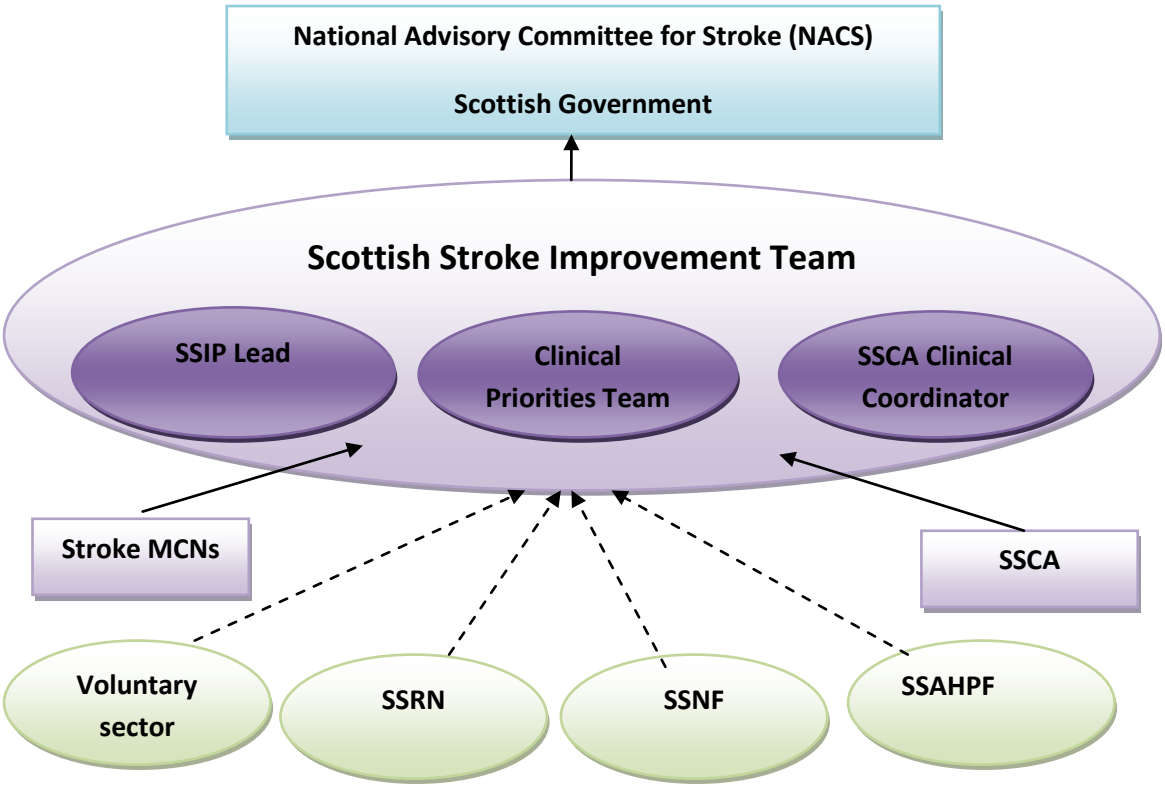
Appendix C: Scottish Stroke Improvement Team

Through improvement work, our ambition is to deliver world-leading stroke care which is consistently person centred, clinically effective and safe. One of the key factors for success is that we are committed to patient safety and, in particular, to avoiding infection and harm, using consistent and reliable improvement methods. One of the triple aims of the 2020 vision is to further improve the quality of care we provide with one of the focuses being to improve our approach to supporting and treating people with stroke.

Through the Scottish Stroke Care Audit (SSCA) and the regular monitoring against the Scottish Stroke Care Standards and priority actions the Stroke Improvement Team will map performance and encourage the stroke MCNs to develop action plans, test change and implement improvement methodologies.

These methodologies are already embedded using the outputs of the SSCA data to drive improvement in the delivery of the Stroke Care Bundle for all patients (see Section 1.2.1).

Structure



Key: **SSIP** (Scottish Stroke Improvement Programme)
SSCA (Scottish Stroke Care Audit)
MCN (Managed Clinical Network)
SSRN (Scottish Stroke Research Network)
SSNF (Scottish Stroke Nurse Forum)
SSAHPF (Scottish Stroke Allied Health Professional Forum)

For further information regarding the Scottish Stroke Improvement Team please refer to the SSCA website Quality Improvement page (http://www.strokeaudit.scot.nhs.uk/Quality.html).

Appendix D: Additional Information

Additional information is available on the SSCA website:

- Aims, objectives and methods of the audit.
  http://www.strokeaudit.scot.nhs.uk/about.htm

- Audit documentation, e.g. data collection forms.
  http://www.strokeaudit.scot.nhs.uk/about/Resources.html

- Core dataset definitions.
  http://www.strokeaudit.scot.nhs.uk/about/Resources.html

- Current Steering Group members.
  http://www.strokeaudit.scot.nhs.uk/about/SSCA_Steering_Committee_Members_2015.pdf

- Contact details of Project Team.
  http://www.strokeaudit.scot.nhs.uk/contact.htm

- Previous Annual National Reports.
  http://www.strokeaudit.scot.nhs.uk/Reports/Reports.html

- Information on requesting SSCA data for research purposes.
  http://www.strokeaudit.scot.nhs.uk/Research.html

- Information on Quality Improvement and the Scottish Stroke Care Standards.
  http://www.strokeaudit.scot.nhs.uk/Quality.html

- Information for patients and carers.
  http://www.strokeaudit.scot.nhs.uk/Patients.html

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This report is also available as an Easy Access Public Summary, this version of the report can be found on the SSCA website (http://www.strokeaudit.scot.nhs.uk/reports.html).

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