Scottish Stroke Care Audit

2014 National Report

Stroke Services in Scottish Hospitals

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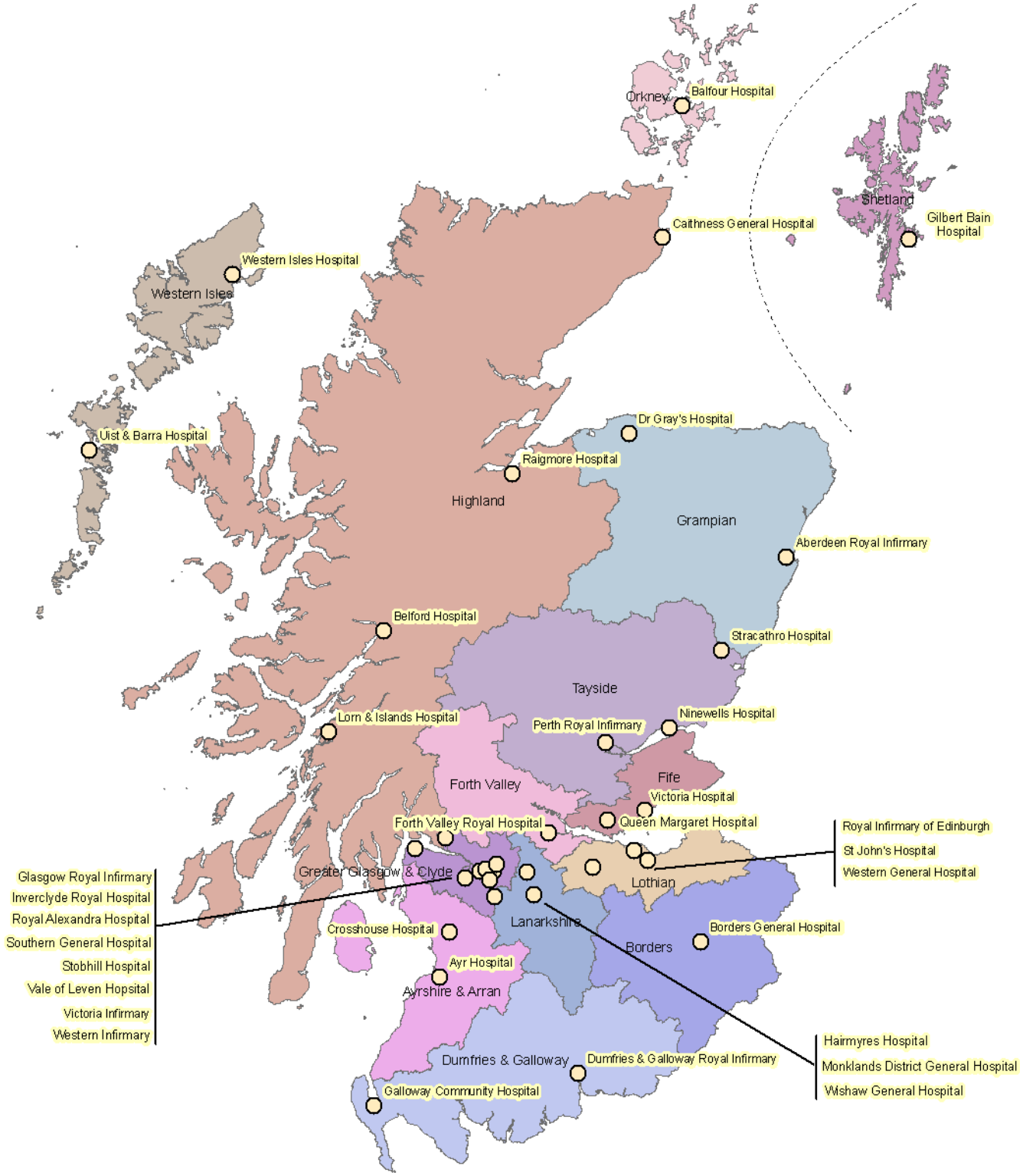


1 Introduction

"Stroke continues to be a clinical priority for NHS Scotland and, as with previous years, the Scottish Stroke Care Audit has been a vital tool in helping us to assess the overall success of 'Our Better Heart Disease and Stroke Care Action Plan', launched in 2009.

In keeping with the continual drive towards improvement, the Stroke Care Standards were updated in January 2013 and work is currently underway to refresh the Stroke Action Plan priorities.

This year's Audit shows that NHS Scotland is continuing to make marked improvements across the full range of indicators for acute stroke care – in particular the key elements of the 'stroke care bundle'. The bundle measures four key components of stroke care that every patient admitted to hospital should expect to receive, regardless of where they live in Scotland. NHS Scotland has achieved a 10% improvement in 2013 in delivering the key elements of the stroke care bundle. The audit also continues to monitor progress against the previous HEAT target – stroke unit access – and I'm delighted to see this has improved by 4% in 2013.

These significant achievements are the result of dedication, hard work and enthusiasm, and I would like to take this opportunity to congratulate all of the NHS Scotland staff who have helped make this possible.

However, we are all aware that more needs to be done. Underpinning our commitment to ensure people who experience a stroke receive the best possible care, the stroke care bundle is now included in NHS Boards' Local Delivery Plans (LDPs) for 2014/15. The Plans focus on the priorities (of which stroke is one) for Scotland and support delivery of the Scottish Government's national performance framework, the Health and Social Care Outcomes, and the 2020 vision for high quality and sustainable health and social care."

Dr Aileen Keel CBE
Acting Chief Medical Officer
May 2014

Stroke is a key health issue for the people of Scotland and the Scottish National Health Service (NHS). It is the third commonest cause of death in Scotland and the most common cause of severe physical disability amongst Scottish adults. More than 8,000 stroke patients were discharged from Scottish hospitals in 2013. Stroke has a significant impact on NHS resources accounting for approximately 5% of total NHS costs.[1] 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.

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 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.

Improvements between 2013 – 2014 reports:

Scottish Stroke Care Standard/ clinical area	2012 data	2013 data
Percentage admitted to a Stroke Unit within 1 day of admission.	78%	82%
Percentage with swallow screen on day of admission.	67%	72%
Percentage with brain scan within 24 hours.	83%	87%
Percentage of ischaemic stroke given aspirin within 1 day of admission.	76%	85%
Percentage seen at neurovascular/ stroke clinic within 4 days of receipt of referral.	67%	79%
Number of ischaemic stroke patients thrombolysed.	669	802

The SSCA has moved its focus more towards service improvement and safety over the last two years. As improvements in performance against all of the Scottish Stroke Care Standards have occurred across Scotland, 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 Stroke Care Bundle consists of timely Stroke Unit admission, swallow screen, brain scan and aspirin. The proportion of individuals receiving the appropriate bundle has increased from **48%** to **58%** between 2012 and 2013. The wide variation in performance between Health Boards suggests that there is still large potential for improvements in 'bundle performance'. Performance against the Stroke Care Bundle is further described in Section 1.2.2.

There remain areas of significant challenge:

The number of appropriate Scottish stroke patients receiving thrombolysis within 1 hour of arrival at hospital has improved from **29%** to **34%**, but this is still a considerable distance from the Scottish Stroke Care Standard of 80%.

For Carotid Endarterectomy, only **42%** of stroke patients had their operation within the 14 day Scottish Stroke Care Standard which again is still a considerable distance from the standard of 80%.

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

The Scottish Government recognises the key role of the SSCA in measuring performance against the Scottish Stroke Care Standards and monitoring Health Boards' progress against the 2009 Better Heart Disease and Stroke Care Action Plan's aims[2].

The SSCA publishes an Annual National Report which is based mainly on ***final*** diagnosis of stroke. This report is sent to Health Boards, Healthcare Improvement Scotland (HIS), the Scottish Government, voluntary organisations and other interested parties as well as being made publicly available on the SSCA website (http://www.strokeaudit.scot.nhs.uk/reports.html).

In 2010 the SSCA started producing monthly reports based on ***initial*** diagnosis of stroke for Stroke Managed Clinical Networks (MCNs) in Health Boards and individual hospitals to increase awareness of the stroke standards, facilitate timely review of local performance and drive improvement in stroke care locally.

The SSCA will continue to work with all Health Boards to monitor stroke service performance, develop new audit fields as treatment changes and progresses, and help NHS Scotland provide the best care possible for people who have had a stroke.

The purpose of this report is to summarise the SSCA data for 2013 in the context of both previous performance and national standards, and help drive further improvements in service provision.

We hope you find the report interesting and informative.

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 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 Organisational structure of the Scottish Stroke Care Audit

The Scottish Stroke Care Audit is a national audit within the Scottish Healthcare Audits of the National Intelligence & Information 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
Hazel Dodds	National Clinical Co-ordinator
Moranne MacGillivray	Quality Assurance Manager
David Murphy	Senior Information Analyst
Neil Perkins	Information Analyst
Martin O'Neill	Principal Analyst

Lee Barnsdale (Principal Analyst) and Alan Reekie (Senior Information Analyst) left the SSCA during 2013 to take up new positions within ISD. The SSCA team and the wider stroke community would like to take this opportunity to thank Lee and Alan for their contribution to the development of the SSCA over recent years and wish them well in their new ventures.

Funding of £167k for the central coordination of the SSCA for 2013/14 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.

1.2 This report

This year's report includes data for 2013 for Scotland overall and for each individual hospital managing acute stroke patients in Scotland. 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.

An overview of initial and final diagnosis of stroke is included in the web tables from the SSCA data. In summary, of the **10,233** patients admitted during 2013 with a diagnosis of stroke (initial or final), **7,503 (73%)** of these had an initial diagnosis of stroke which was then confirmed. **1,536 (15%)** were admitted with an initial diagnosis of stroke which was not confirmed; **1,194 (12%)** were not initially diagnosed as a stroke but had a final diagnosis of stroke.

Throughout 2013 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 suitable for members of the public will be distributed to Health Boards and other interested organisations. It will also be available on the SSCA website.

1.2.1 Scottish Stroke Care Standards (2013)

A review of the NHS Quality Improvement Scotland (QIS) standards for stroke care took place in 2012. This review was undertaken by the SSCA Steering Committee in collaboration with Stroke MCNs and Healthcare Improvement Scotland (HIS). The revised standards were endorsed by the NACS at the Scottish Government and implemented in January 2013.

Topic	Scottish Stroke Care Standards, Jan 2013
Access to Stroke Unit services	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 neurovascular clinic	80% are examined 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.

For further information relating to the changes to the stroke care standards please refer to the SSCA website (http://www.strokeaudit.scot.nhs.uk/Quality/Scotiish_Stroke_Care_Standards.html)

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).

1.2.2 Local Delivery Plan (LDP)

The 2013 SSCA Annual National Report provided information relating to performance against the stroke admission HEAT target (April 2011 – March 2013). This target allowed 9% more people to receive prompt access to a Stroke Unit. However Scottish Stroke Care Standards data demonstrated that though patients were getting to a Stroke Unit they were not necessarily also receiving the 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 1.2.1 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.

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. A flow chart in Appendix B of this report 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.

Charts 1a (Health Board) and 1b (Hospital) provide an indicative baseline of performance against the Stroke Care Bundle in 2013.

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 1a : (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, 2013 data (based on *initial* diagnosis).

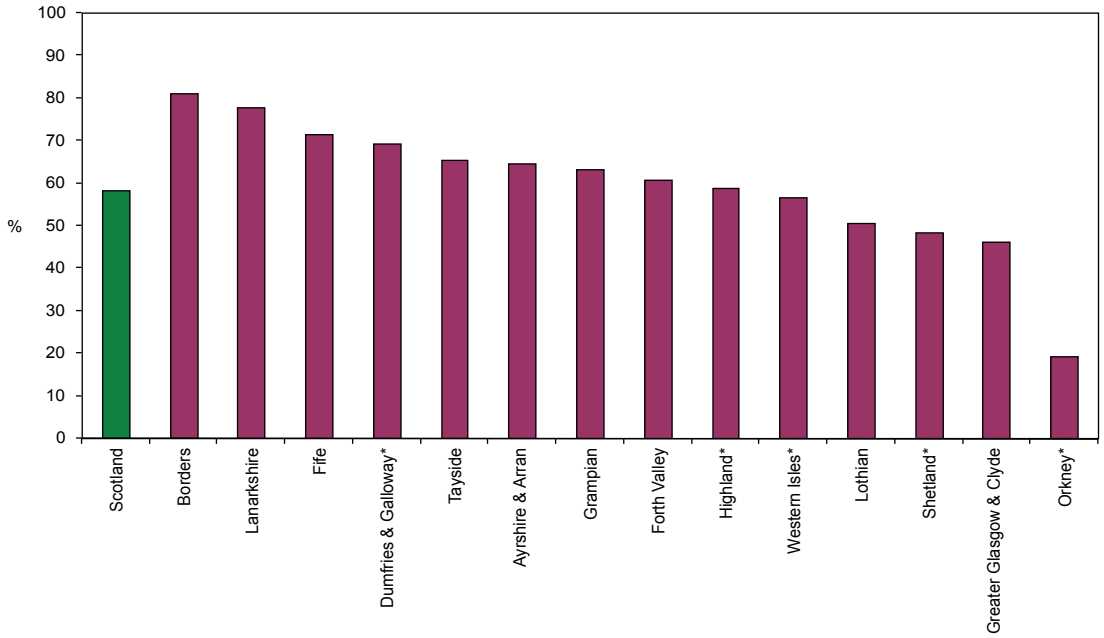
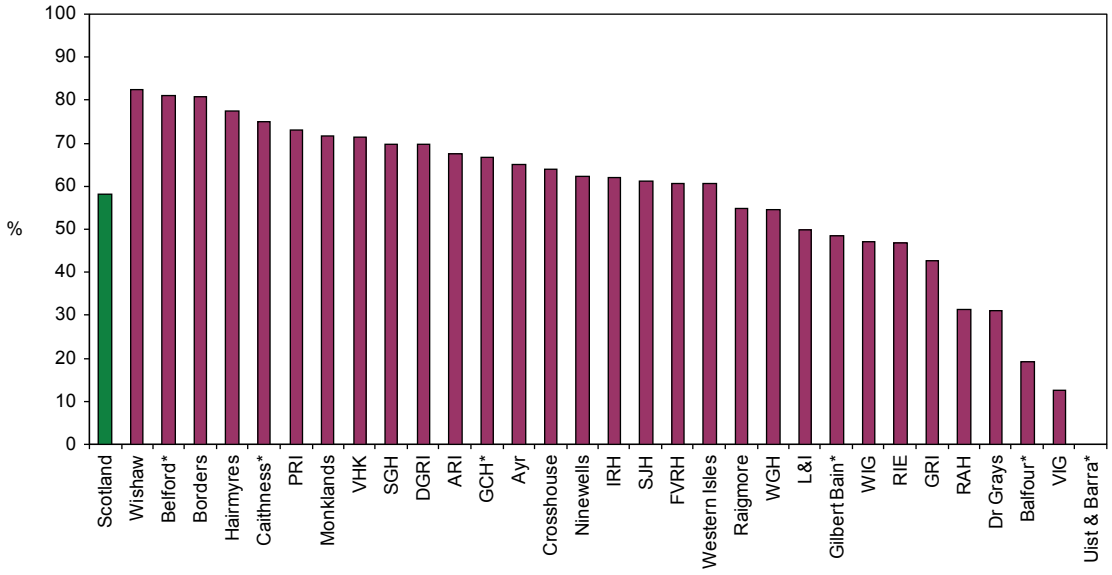


Chart 1b : (Hospital) Percentage of stroke patients receiving an 'appropriate' Stroke Care Bundle (i.e. Stroke Unit admission, swallow screen, brain scan and aspirin) – indicative baseline performance, 2013 data (based on *initial* diagnosis).



Notes regarding Charts 1a and 1b:

1. Due to the number of beds within some 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 Standard criteria are established within that pathway.
2. Balfour Hospital, NHS Orkney does not have a CT scanner but patients, where appropriate, are airlifted to Aberdeen Royal Infirmary and a proportion may arrive in sufficient time to have brain imaging within 24 hours of admission.
3. Uist & Barra Hospital, NHS Western Isles does not have a CT scanner but patients, where appropriate, are airlifted to Western Isles Hospital and a proportion may arrive in sufficient time to have brain imaging within 24 hours of admission.
4. For full hospital names please refer to Table 1 on page 12.

The cumulative proportions of patients managed in accordance with all four standards which comprise the Stroke Care Bundle have risen significantly from **48%** in 2012 to **58%** in 2013. This improvement would be expected to translate into better outcomes for stroke patients.

Performance varied considerably between Health Boards (Chart 1a). NHS Borders performed best with 81% and NHS Orkney worst at 19%. NHS Orkney struggled to meet the Stroke Care Bundle because its CT scanner has not yet been installed. The small Island Health Boards were not able to demonstrate statistically significant changes against the previous year's performances because of their very small numbers of strokes. All larger Health Boards, apart from NHS Forth Valley demonstrated improvements, and NHS Forth Valley (61%) performed better than the Scottish average (58%).

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).

In 2014/15, it is expected that each Health Board will identify and set out in the LDP their improvement aims and the priority actions they need to take to achieve these in order to improve the effective delivery of the Stroke Care Bundle. These improvement aims are expected to 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 Future Plans

2.1 What happened in 2013-2014 and what is planned for 2014-15?

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 from November 2013. 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:

The first rehabilitation pilot was completed in 2013 (Sept – Nov). The pilot was 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.

Following the evaluation it was agreed to revise the questions and run a second pilot in the same sites for a further two months (April – May 2014). A report detailing outcomes of the second pilot will be circulated to participating sites and the SSCA Steering Group in July 2014.

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

Organisational Audit:

The 2013-14 template was completed by Stroke MCNs and discussed at the 2013-14 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.

Following review of the 2013-14 template, it was revised and a new 2014-15 template created which will be circulated to Stroke MCNs in the summer of 2014 for completion ahead of the 2014-15 Health Board Stroke MCN Annual Review Meetings.

The SSCA National Meeting:

The 2014 SSCA Annual National Meeting will be held on **Tuesday 2nd September 2014** 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 as appropriate with a short summary of outcomes provided in the 2015 SSCA Annual National Report.

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.

3 Inpatients

During 2013 about 8,700 patients were admitted to hospital with a final diagnosis of stroke and entered into the SSCA – about 600 more than in 2012.

3.1 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 10 (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.

3.2 Summary and key findings relating to inpatient data

During the last year the emphasis has shifted from improving performance against the HEAT target which focused only on early admission to a Stroke Unit to improving performance against a Stroke Care Bundle. As described in Section 1 this measures the proportion of patients who are managed in accordance with several of the Scottish Stroke Care Standards i.e. early access to Stroke Unit care, early swallow screen, brain imaging and aspirin for patients with ischaemic stroke.

The proportion of patients accessing a Stroke Unit on the day of admission, or the day after, rose significantly from **78%** to **82%**. Twelve of the 31 hospitals admitting patients with acute stroke met the Scottish Stroke Care Standard of 90% (Chart 2a). Most hospitals demonstrated either improvement over the previous year or at least maintained their good performance. The Borders General Hospital, Crosshouse Hospital, Victoria Hospital, Kirkcaldy, Royal Alexandra Hospital and Western Infirmary Glasgow all had statistically significant increases in proportions accessing Stroke Unit care early. Unfortunately, Forth Valley Royal Hospital saw a significant fall from **83%** in 2012 to **73%** in 2013. The hospitals in NHS Lothian and Highland 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 fulfils 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. However, it is clear that there is considerable variation in how well hospitals manage their stroke beds. The challenge is to discharge patients, or to move patients on to downstream Stroke Unit beds, to ensure an Acute Stroke Unit bed is always available. Whilst direct admission is ideal, many hospitals do not have sufficient medical or nursing staff to make this safe out of hours. Therefore, in many places, patients remain in Medical Admission Units over night until the next day. Inadequate provision of community care, rehabilitation and nursing home places continues to put pressure on the Acute Stroke Units.

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 **67%** in 2012 to **72%** in 2013 (Charts 2b and 3). The standard of 90% is clearly challenging since only Lorn & Islands Hospital, Belford Hospital (both with very small numbers of patients) and Wishaw General Hospital have met this standard so far. Some hospitals, notably Belford, Borders General, Raigmore, Royal Alexandra Hospitals and Victoria Hospital Kirkcaldy achieved large improvements of more than 10%. Early identification of stroke patients and having nurses trained to initiate a swallow screen and to record the result clearly in the patient 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 in 2012 was that 80% should have a brain scan on the day of admission. From January 2013 the standard for brain scanning changed to 90% within 24 hours since exact times of admission and scan are now routinely collected.

In 2013, **87%** of patients had a brain scan within 24 hours compared with **83%** in the previous year (Charts 2c and 4). Thirteen of the 31 hospitals met the national standard of ≥90%. Ayr, Crosshouse and Royal Alexandra Hospitals scanned <80%, but all improved their performance against the previous year. Hopefully this trend will continue so that they will attain the national standard of 90% during 2014. All hospitals with an onsite scanner scanned >60% of their patients within 24 hours. The proportion being scanned within 4 hours of arrival rose from **44%** in 2012 to **51%** in 2013. 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.

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 include those who have been given thrombolysis, are taking an anticoagulant or an alternative antiplatelet drug or those who are allergic to aspirin. In 2013, **85%** of patients with ischaemic stroke, and no well defined contraindication received aspirin on the day of admission or the day after, compared with only **76%** in 2012 (Charts 2d and 5). All hospitals either maintained or significantly improved their performance. Whilst achieving the 100% standard is practically unachievable because of the occurrence of occasional good clinical reasons for not giving aspirin, it is noteworthy that 11 of 31 hospitals gave aspirin to ≥90% in 2013, compared with only three in 2012. In 2012 the Royal Alexandra Hospital gave early aspirin to only **40%** of their patients, in 2013 this had risen to **62%** but this is still much lower than any other hospital in Scotland. This is in part attributable to their delays in scanning patients. There are still some cases recorded where patients receive an antiplatelet other than aspirin (Chart 6).

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

3.3 Stroke Unit Information

Table 1: Stroke Unit Information.

Hospital Name	Number of acute strokes discharged in 2013	Acute Stroke Unit (ASU) beds	Integrated Stroke Unit (ISU) beds	Stroke Rehabilitation Unit (SRU) beds on acute site	SRU beds off acute site
Ayr Hospital	335	15	0	15	0
Crosshouse Hospital, Kilmarnock	343	21	0	0	20
Borders General Hospital, Melrose	213	0	12	0	0
Dumfries & Galloway Royal Infirmary (DGRI)	242	9	0	0	0
Galloway Community Hospital (GCH)	50	1	0	0	0
Victoria Hospital, Kirkcaldy (VHK)	621	0	24	0	38
Forth Valley Royal Hospital, Larbert (FVRH)	490	0	30	0	10
Aberdeen Royal Infirmary (ARI)	550	16	0	0	40
Dr Gray's Hospital, Elgin	87	0	8	0	0
Glasgow Royal Infirmary (GRI)	532	38	0	0	12
Inverclyde Royal Hospital, Greenock (IRH)	196	0	17	0	0
Royal Alexandra Hospital, Paisley (RAH)	399	0	30	0	0
Southern General Hospital, Glasgow (SGH)	497	4	30	0	0
Victoria Infirmary, Glasgow	168	0	20	0	0
Western Infirmary/Gartnavel General, Glasgow (WIG)	465	14	0	0	20
Belford Hospital, Fort William	35	0	0	0	0
Caithness General Hospital, Wick	64	0	0	0	0
Lorn & Islands Hospital, Oban	41	0	6	0	0
Raigmore Hospital, Inverness	330	0	22	0	0
Hairmyres Hospital, East Kilbride	296	0	20	0	0
Monklands Hospital, Coatbridge	275	0	20	0	0
Wishaw General Hospital	345	0	25	0	0
Royal Infirmary of Edinburgh at Little France (RIE)	811	22	0	0	41
St John's Hospital, Livingston (SJH)	198	0	22	0	0
Western General Hospital, Edinburgh (WGH)	289	0	40	0	0
Balfour Hospital, Orkney	40	0	0	0	0
Gilbert Bain Hospital, Shetland	33	0	0	0	0
Ninewells Hospital, Dundee	469	14	0	0	10
Perth Royal Infirmary (PRI)	191	0	22	0	0
Uist & Barra Hospital, Benbecula	3	0	0	0	0
Western Isles Hospital (WIH)	26	0	6	0	0
TOTALS	**8,634**	**154**	**354**	**15**	**191**

Notes regarding Table 1:

1. The column “Number of acute strokes discharged in 2013” is based on inpatients with a final diagnosis of stroke **discharged** during Jan-Dec 2013 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 2013. Some patients discharged in 2013 may have been admitted in 2012. Some patients admitted in 2013 may have been discharged in 2014.
2. 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.

3.4 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 (if one was to measure performance 100 times, one's confidence interval would be expected to include the true proportion 95 out of these 100 times).

Charts illustrating performance across the Scottish Stroke Care Standards for admission to Stroke Unit, swallow screening, brain scanning and aspirin in 2012 and 2013, grouped by hospital, are given below.

This method builds on last year's approach and examines the difference in percentages between years, and the confidence interval for this difference, rather than comparing the confidence intervals for each year. We also included an adjustment to reduce the risk of a statistically significant difference being observed purely by chance as a result of repeating the process for thirty or so hospitals.

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:

2012 results

2013 results : statistically significant improvement since 2012

2013 results : no statistically significant change since 2012

2013 results : statistically significant decline in performance since 2012

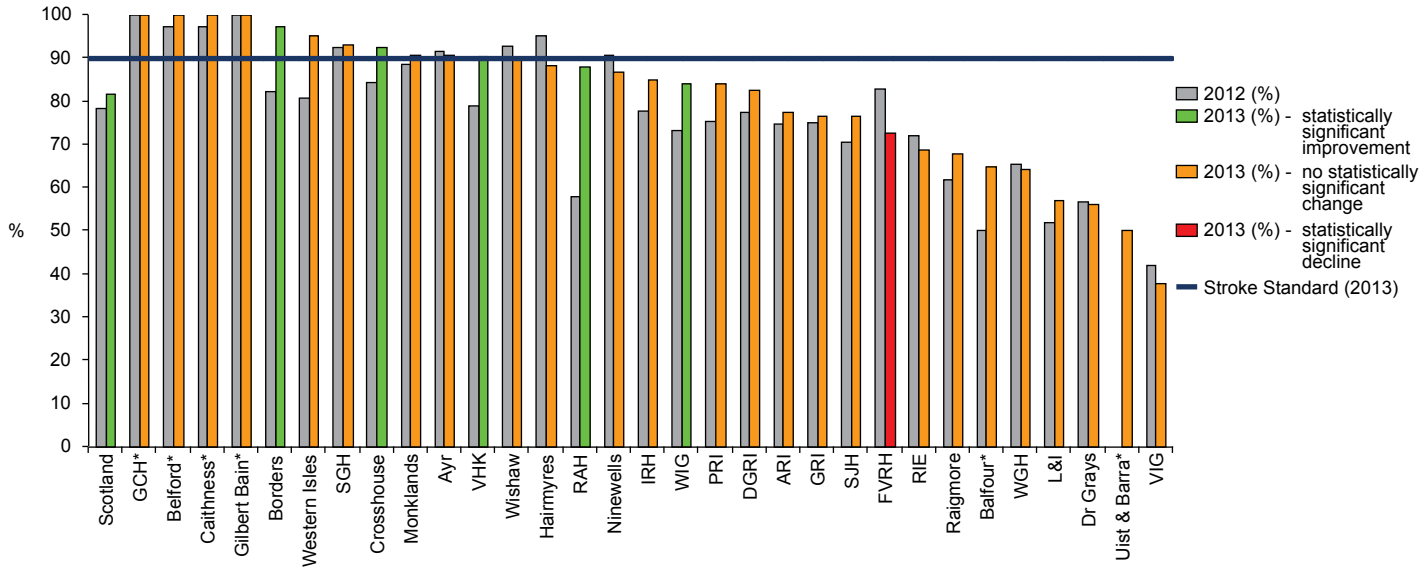
Notes regarding Charts 2a-d:

1. The **data** included in Charts 2a-d:
   - were **extracted** from eSSCA on the **4th April 2014**. 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 2012 and 2013** (i.e. 1 January – 31 December).
2. The data presented for Victoria Hospital Kirkcaldy are combined with Queen Margaret Hospital data. Forth Valley Royal Hospital data include information from Stirling Community Hospital. Aberdeen Royal Infirmary data are combined with Woodend General Hospital. Glasgow Royal Infirmary data are combined with Stobhill Hospital. Royal Alexandra Hospital data are combined with Vale of Leven General Hospital.

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 2012 and 2013 data (based on *final* diagnosis).

2a. Percentage of stroke patients admitted to a Stroke Unit within 1 day of admission to hospital, 2012 and 2013 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.

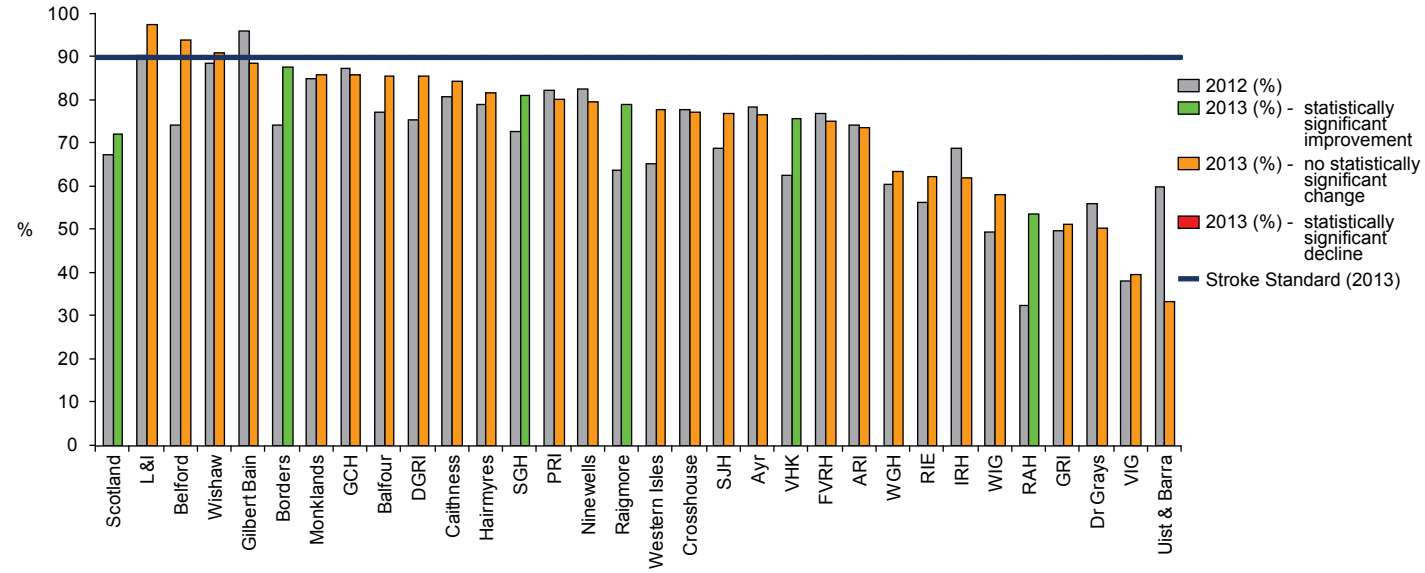


Notes regarding Chart 2a:

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.
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.

2b. Percentage of stroke patients with a swallow screening on day of admission, 2012 and 2013 data (based on *final* diagnosis).

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

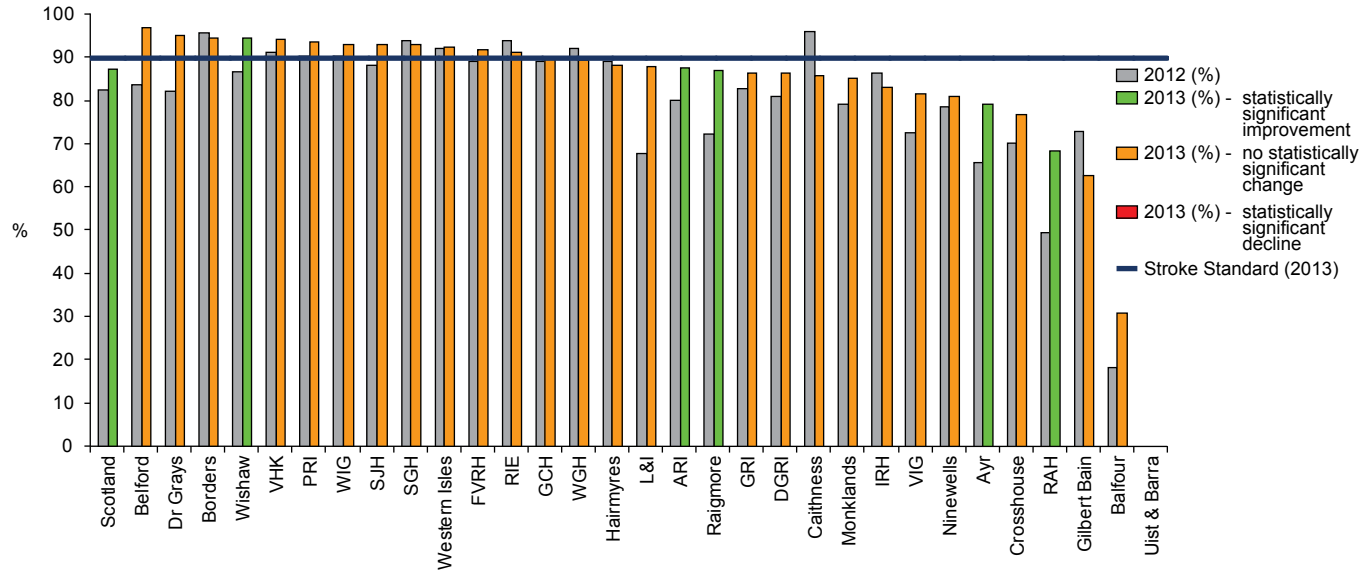


Note regarding Chart 2b:

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.

2c. Percentage of stroke patients with a brain scan within 24 hours of admission, 2012 and 2013 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.

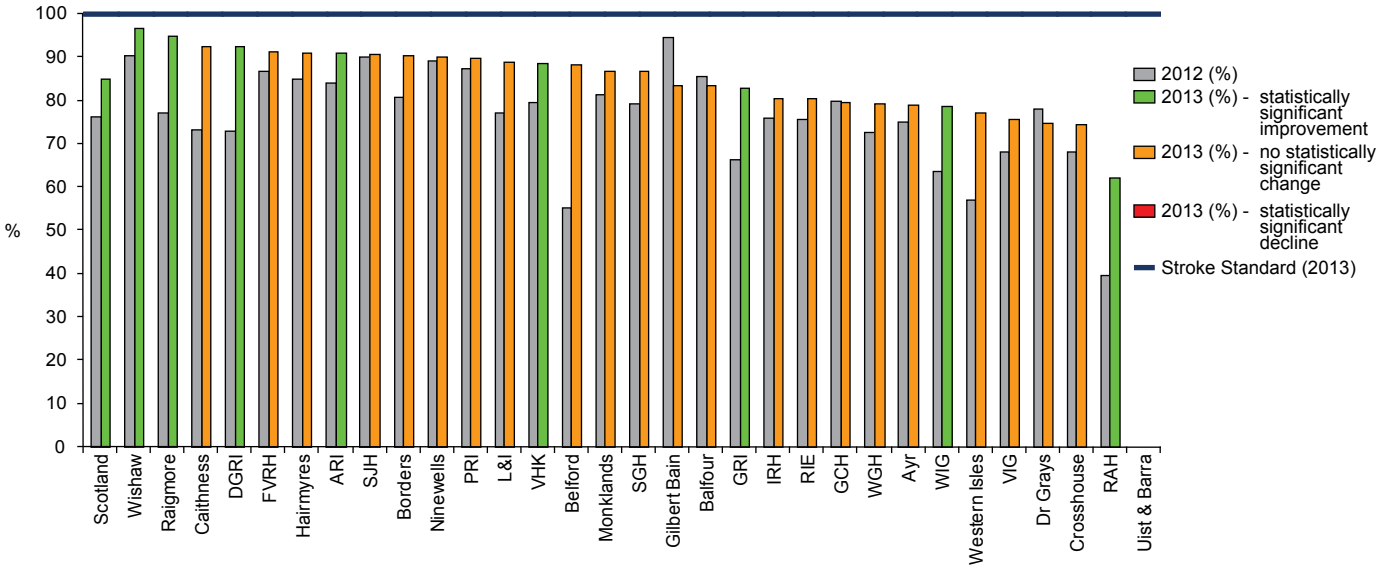


Notes regarding Chart 2c:

1. Balfour and Uist & Barra Hospitals do not have a CT scanner but patients, where appropriate are airlifted to another hospital and may arrive in sufficient time to have brain imaging within 24 hrs of admission.
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.

2d. Percentage of acute ischaemic stroke patients given aspirin in hospital within 1 day of admission, 2012 and 2013 data (based on *final* diagnosis).

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

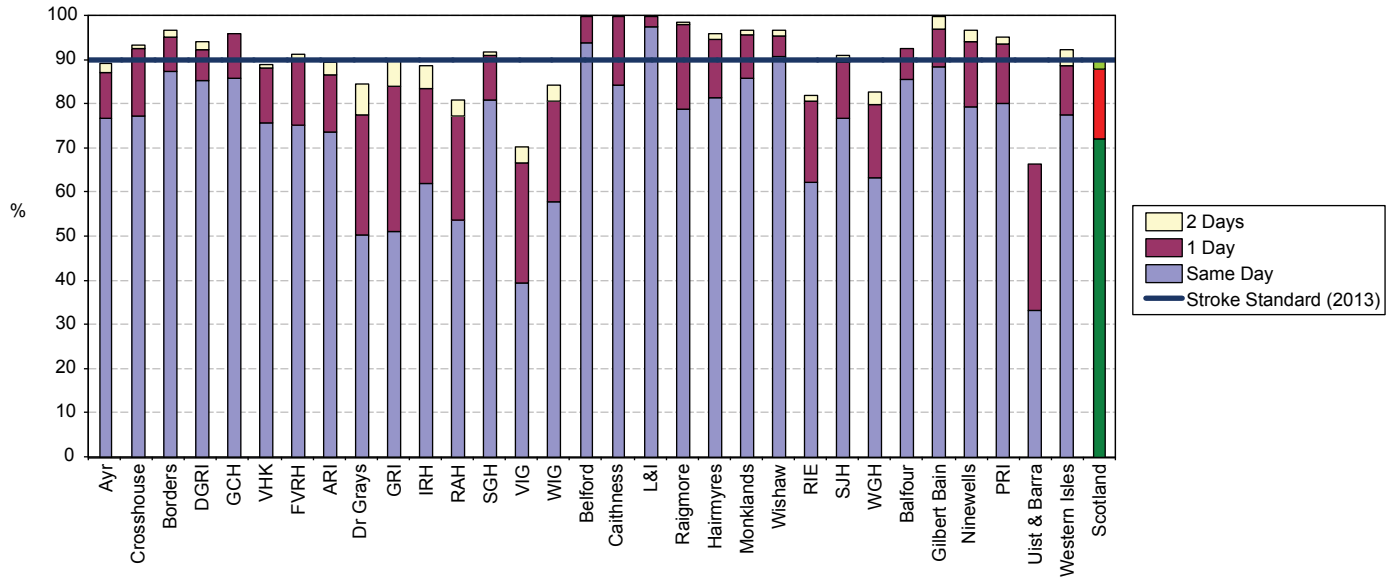


Notes regarding Chart 2d:

1. The denominator for the percentages excludes patients with valid contraindications to aspirin. New contraindications were introduced in 2012, e.g. end of life pathway, post thrombolysis bleed and admitted already on alternative antiplatelet.
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 3: Percentage of stroke patients with a swallow screening by number of days to swallow screening, 2013 data (based on *final* diagnosis).

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

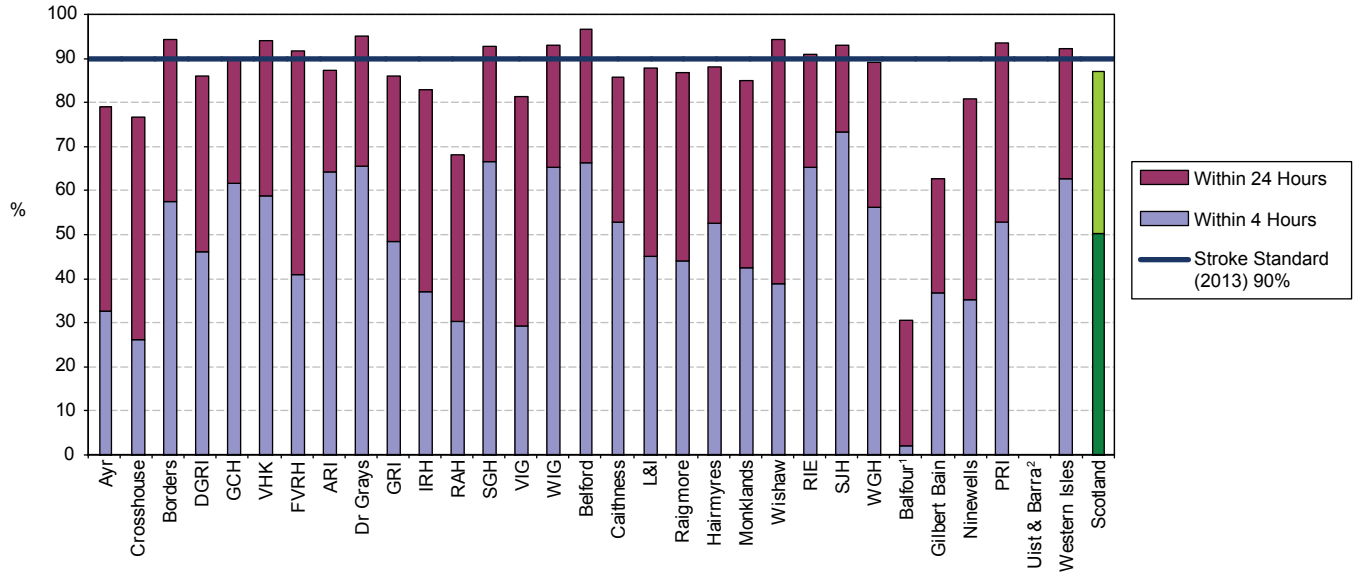


Note regarding Chart 3:

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, 2013 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.



Notes regarding Chart 4:

1. Balfour Hospital, NHS Orkney does not have a CT scanner. Patients, where appropriate, are airlifted to Aberdeen Royal Infirmary and a proportion may arrive in sufficient time to have brain imaging within the required Scottish Stroke Care Standard.
2. Uist & Barra Hospital, NHS Western Isles does not have a CT scanner. Patients, where appropriate, are airlifted to Western Isles Hospital and a proportion may arrive in sufficient time to have brain imaging within the required Scottish Stroke Care Standard.
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.

Chart 5: Percentage of acute ischaemic stroke patients given aspirin in hospital by number of days to receipt, 2013 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.
The denominator for the percentages excludes patients with valid contraindications to aspirin. New contraindications were introduced in 2012, e.g. end of life pathway, post thrombolysis bleed and admitted already on alternative antiplatelet.

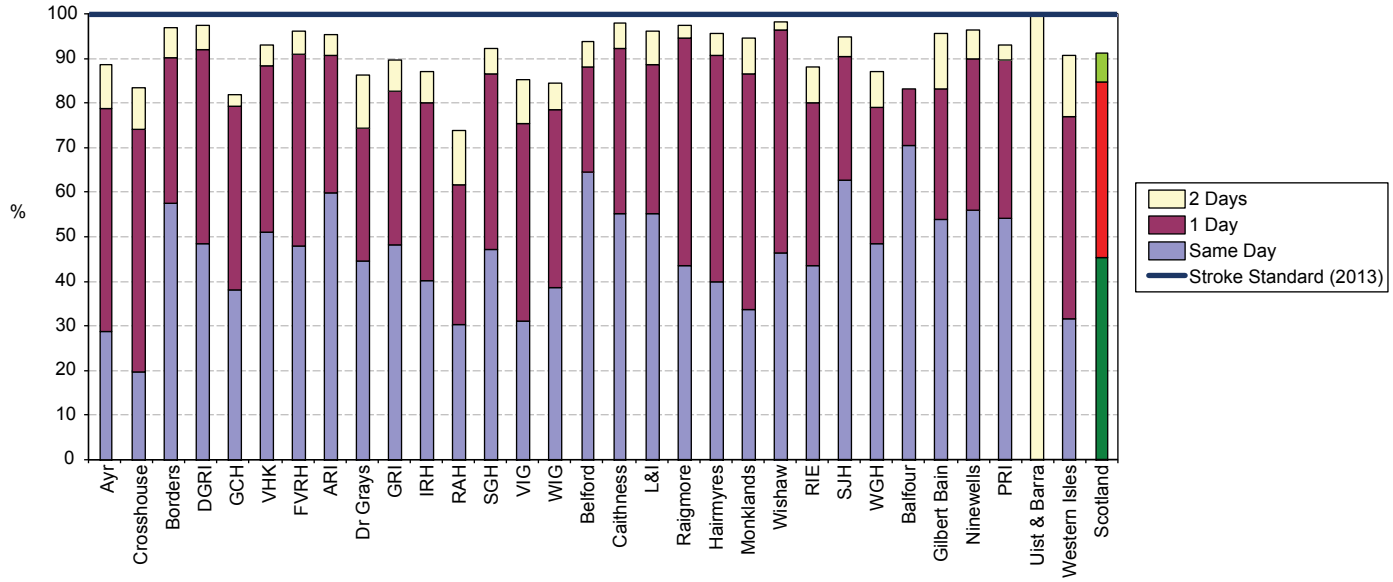
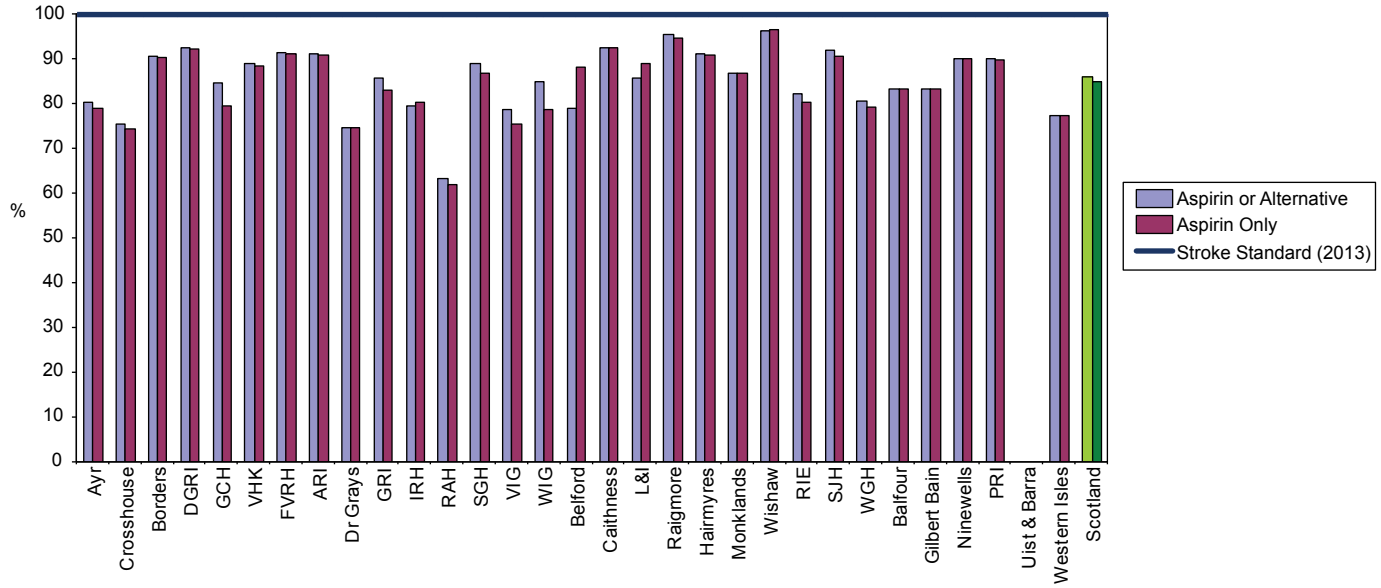


Chart 6: Percentage of ischaemic patients given aspirin or alternative antiplatelets within 1 day of admission, 2013 data (based on *final* diagnosis).

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 regarding Charts 5 and 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.

4 Outpatients

4.1 Summary and key findings relating to outpatient data

Twenty hospitals were collecting neurovascular clinic data in SSCA during 2013, the hospitals in NHS Greater Glasgow & Clyde and two hospitals in NHS Highland were still unable to contribute comprehensive outpatient data to allow them to benchmark their performance against other Health Boards and to provide a national perspective.

Data were collected on 3910 patients with acute cerebrovascular disease seen in the neurovascular clinics contributing data in 2013, compared with 4122 in 2012.

The national standard was revised at the beginning of 2013. The current 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 from **67%** in 2012 to **79%** in 2013. Eleven of the 20 clinics exceeded this standard (Charts 7 and 8). However, there is still variation between Health Boards and hospitals which means that some hospitals need to reduce delays. Western Isles, Stracathro and Queen Margaret Hospitals see fewer than 50% of patients within 4 days. Queen Margaret Hospital, is part of a single service within NHS Fife, for further information please refer to the notes regarding Charts 7/8 on page 19 (note 3).

4.2 Hospital data

Chart 7: Percentage of patients with definite cerebrovascular diagnosis seen in neurovascular clinic with referral to examination time within 4 days, 2012 and 2013 data.

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

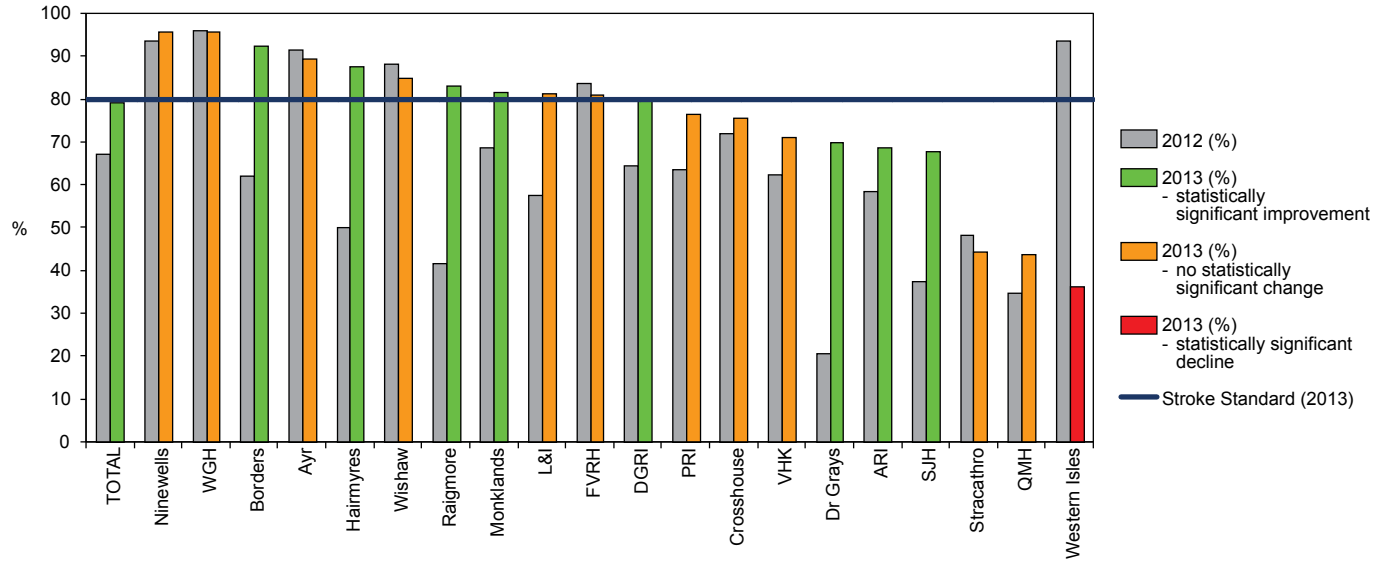
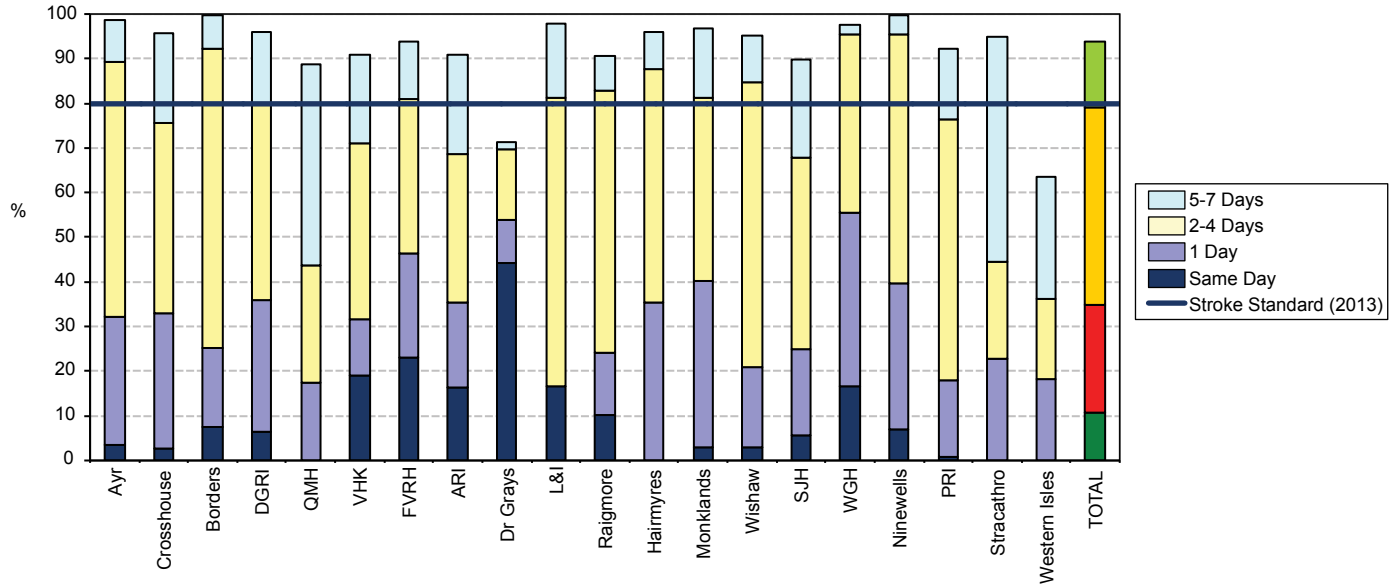


Chart 8: Percentage of patients with definite cerebrovascular diagnosis seen in neurovascular clinic with referral to examination time (days): same day and within 1, 2-4 and 5-7 days, 2013 data.

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



Notes regarding Charts 7 and 8:

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 neurovascular 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 2012 and 2013 shows 48% and 60% respectively , an increase of 12% between the two years.
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 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 antiplatelet medication including 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. Because patients' responses to warfarin vary hugely, and may vary depending on their diet and other medications, 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, increase. In recent years new oral anticoagulants have become available which do not require blood monitoring, and which have been shown to be at least as effective and safe as warfarin. Their introduction has meant that many more people can potentially now benefit from oral anticoagulation. For cost reasons, in Scotland the use of the new oral anticoagulants is generally focused on patients who for one reason or another may not be suitable for treatment with warfarin.

Hospitals participating in the SSCA identify patients either admitted to hospital with a stroke, or who attend a neurovascular 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 2013, 2,134 (24%) of 8,962 patients admitted to hospital with an ischaemic stroke were identified as being in AF. Only 23% of these patients were receiving anticoagulants (Table 2) with no significant increase since 2011. Of the 3,754 patients seen in clinics with TIA or stroke, 8% were in AF. 39% of these patients were on anticoagulants, the same percentage as in 2011 (Table 3). 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 now being made to improve the identification of patients in AF and to help doctors select patients who are likely to benefit from anticoagulation.

SSCA monitors the proportion of patients in AF discharged from hospital or clinic following a stroke who are started on anticoagulants. In 2013, 53% of inpatients (IP) and 77% of outpatients (OP) with ischaemic stroke or TIA were started on anticoagulants. In 2011 and 2012 the percentages were 50% (IP) and 79% (OP) and 50% (IP) and 83% (OP) respectively.

These data appear to show that many patients with AF are still not receiving anticoagulants to help reduce their risk of future stroke. This represents an important opportunity for improving treatment.[3]

5.1 Inpatient data

Table 2: Ischaemic stroke patients with current atrial fibrillation (AF) and anticoagulation on admission or discharge, 2013 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	71	11	15	53	22	42
Crosshouse Hospital, Kilmarnock	101	25	25	91	48	53
Borders General Hospital, Melrose	59	23	39	47	25	53
Dumfries & Galloway Royal Infirmary (DGRI)	85	26	31	76	56	74
Galloway Community Hospital (GCH)	12	1	8	11	8	73
Victoria Hospital, Kirkcaldy (VHK)	177	40	23	150	75	50
Forth Valley Royal Hospital, Larbert (FVRH)	113	30	27	93	53	57
Aberdeen Royal Infirmary (ARI)	148	34	23	121	70	58
Dr Gray's Hospital, Elgin	17	7	41	14	10	71
Glasgow Royal Infirmary (GRI)	141	37	26	114	64	56
Inverclyde Royal Hospital, Greenock (IRH)	43	11	26	36	8	22
Royal Alexandra Hospital, Paisley (RAH)	113	27	24	90	29	32
Southern General Hospital, Glasgow (SGH)	131	23	18	106	69	65
Victoria Infirmary, Glasgow	48	11	23	35	17	49
Western Infirmary/Gartnavel General, Glasgow (WIG)	122	14	11	92	50	54
Belford Hospital, Fort William	6	1	17	5	1	20
Caithness General Hospital, Wick	7	1	14	5	3	60
Lorn & Islands Hospital, Oban	10	1	10	6	3	50
Raigmore Hospital, Inverness	71	17	24	58	28	48
Hairmyres Hospital, East Kilbride	72	24	33	62	25	40
Monklands Hospital, Coatbridge	72	22	31	63	33	52

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
Wishaw General Hospital	28	2	7	20	12	60
Royal Infirmary of Edinburgh at Little France (RIE)	197	38	19	151	66	44
St John's Hospital, Livingston (SJH)	35	13	37	31	13	42
Western General Hospital, Edinburgh (WGH)	67	13	19	54	30	56
Balfour Hospital, Orkney	4	1	25	4	2	50
Gilbert Bain Hospital, Shetland	10	1	10	8	0	0
Ninewells Hospital, Dundee	113	29	26	90	63	70
Perth Royal Infirmary (PRI)	52	13	25	43	29	67
Uist & Barra Hospital, Benbecula	0	0		0	0	
Western Isles Hospital (WIH)	9	3	33	8	5	63
Scotland	**2134**	**499**	**23**	**1737**	**917**	**53**

Note regarding Table 2:

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 2 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.

5.2 Outpatient data

Table 3: Patients with ischaemic diagnosis, seen in neurovascular clinics, with current atrial fibrillation (AF) and on anticoagulation, 2013 data.

Note that some percentages are based on very small numbers of records. Hospital	Denominator	Patients with ischaemic diagnosis seen in neurovascular clinics during 2013		Patients with ischaemic diagnosis seen in neurovascular clinics during 2013	
	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	14	3	21	5	36
Crosshouse Hospital, Kilmarnock	10	4	40	8	80
Borders General Hospital, Melrose	3	1	33	2	67
Dumfries & Galloway Royal Infirmary (DGRI)	11	4	36	10	91
Queen Margaret Hospital, Dunfermline	14	5	36	11	79
Victoria Hospital, Kirkcaldy (VHK)	12	4	33	11	92
Forth Valley Royal Hospital, Larbert (FVRH)	26	10	38	20	77
Aberdeen Royal Infirmary (ARI)	54	13	24	41	76
Dr Gray's Hospital, Elgin	10	3	30	6	60
Lorn & Islands Hospital, Oban	5	1	20	5	100
Raigmore Hospital, Inverness	18	10	56	13	72
Hairmyres Hospital, East Kilbride	20	9	45	15	75
Monklands Hospital, Coatbridge	16	12	75	14	88
Wishaw General Hospital	14	9	64	11	79
St John's Hospital, Livingston (SJH)	14	3	21	11	79
Western General Hospital, Edinburgh (WGH)	46	22	48	40	87
Ninewells Hospital, Dundee	6	1	17	4	67
Perth Royal Infirmary (PRI)	11	5	45	9	82
Stracathro Hospital, Brechin	4	0	0	2	50
Western Isles Hospital (WIH)	0	0	..	0	..
Scotland	**308**	**119**	**39**	**238**	**77**

Note regarding Table 3:

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 3 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.

6 Thrombolysis

6.1 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, it is estimated that, between 5 and 10 extra people per 100 treated with thrombolysis are 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. The NHS QIS standard revised in June 2009 was for a treatment rate of at least 5 patients per 100,000 population per year. If there are 8,000 new ischaemic strokes per year in Scotland, this equates to at least 3% of all new patients. This report includes an overview of the delivery of rtPA from 2009 to 2013 (Table 4).

Table 4: Thrombolysis - numbers thrombolysed, 2009-2013 data.

Hospital	Number of patients receiving thrombolysis in 2013	Number of patients receiving thrombolysis in 2012	Number of patients receiving thrombolysis in 2011	Number of patients receiving thrombolysis in 2010	Number of patients receiving thrombolysis in 2009
Scotland	**802**	**669**	**648**	**543**	**411**
Ayrshire & Arran	**45**	**28**	**16**	**11**	**7**
Ayr Hospital	26	15	11	7	7
Crosshouse Hospital, Kilmarnock	19	13	5	4	0
Borders	**12**	**11**	**9**	**1**	**0**
Borders General Hospital, Melrose	12	11	9	1	0
Dumfries & Galloway	**34**	**26**	**14**	**21**	**4**
Dumfries & Galloway Royal Infirmary (DGRI)	26	23	10	17	3
Galloway Community Hospital (GCH)	8	3	4	4	1
Fife	**55**	**31**	**32**	**18**	**8**
Victoria Hospital, Kirkcaldy (VHK)	55	31	32	18	8
Forth Valley	**26**	**21**	**24**	**10**	**13**
Forth Valley Royal Hospital, Larbert (FVRH)	26	21	24	10	13
Grampian	**119**	**89**	**98**	**74**	**77**
Aberdeen Royal Infirmary (ARI)	105	83	85	70	68
Dr Gray's Hospital, Elgin	14	6	13	4	9
Greater Glasgow & Clyde	**175**	**194**	**202**	**211**	**193**
Glasgow Royal Infirmary (GRI)	1	2	1	1	0
Inverclyde Royal Hospital, Greenock (IRH)	0	0	0	0	0

Hospital	Number of patients receiving thrombolysis in 2013	Number of patients receiving thrombolysis in 2012	Number of patients receiving thrombolysis in 2011	Number of patients receiving thrombolysis in 2010	Number of patients receiving thrombolysis in 2009
Royal Alexandra Hospital, Paisley (RAH)	1	5	4	7	5
Southern General Hospital, Glasgow (SGH)	97	90	96	103	109
Victoria Infirmary, Glasgow	1	0	0	0	0
Western Infirmary/Gartnavel General, Glasgow (WIG)	75	97	101	100	79
Highland	**44**	**35**	**46**	**39**	**34**
Belford Hospital, Fort William	2	3	3	0	0
Caithness General Hospital, Wick	3	5	4	5	2
Lorn & Islands Hospital, Oban	7	4	0	0	0
Raigmore Hospital, Inverness	32	23	39	34	32
Lanarkshire	**80**	**55**	**53**	**44**	**13**
Hairmyres Hospital, East Kilbride	30	13	17	0	0
Monklands Hospital, Coatbridge	23	19	12	20	0
Wishaw General Hospital	27	23	24	24	13
Lothian	**114**	**73**	**72**	**81**	**43**
Royal Infirmary of Edinburgh at Little France (RIE)	84	46	39	32	16
St John's Hospital, Livingston (SJH)	19	15	19	16	4
Western General Hospital, Edinburgh (WGH)	11	12	14	33	23
Orkney	**1**	**0**	**0**	**1**	**0**
Balfour Hospital, Orkney	1	0	0	1	0
Shetland	**2**	**0**	**2**	**0**	**0**
Gilbert Bain Hospital, Shetland	2	0	2	0	0
Tayside	**89**	**96**	**75**	**29**	**18**
Ninewells Hospital, Dundee	69	74	56	20	13
Perth Royal Infirmary (PRI)	20	22	19	9	5
Western Isles	**6**	**10**	**5**	**3**	**1**
Uist & Barra Hospital, Benbecula	0	0	0	0	0
Western Isles Hospital (WIH)	6	10	5	3	1

Notes regarding Table 4:

1. Note that this table is not directly comparable with Table 5 because it is based on hospital/ NHS board of treatment rather than NHS board of residence, upon which Table 5 is based. NHS 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).
4. Figures from previous years are a composite of (a) data entered into eSSCA and (b) numbers notified to the SSCA from local reporting sources but not entered in to eSSCA. As a result of the combination of sources, there may be some slight differences in figures previously reported because updates to eSSCA will occur on a daily basis but changes to local reports may not be communicated to SSCA.

The total number of patients receiving rTPA increased from 669 in 2012, to 802 in 2013. In some Health Boards there has been an increase in thrombolysis activity since 2012, 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 4). 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 5). 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 15 for Scotland (Table 6).

Table 5: Thrombolysis – numbers thrombolysed and crude rate per 100,000 by Health Board of residence of patient, 2013 data.

Health Board of Residence[1]	Number of patients receiving thrombolysis in 2013	Mid-Year Population Estimate[2] 2012	Crude Rate per 100,000
Scotland	**773**	**5,313,600**	**14.5**
Ayrshire & Arran	55	373,189	14.7
Borders	14	113,707	12.3
Dumfries & Galloway	33	150,828	21.9
Fife	58	366,219	15.8
Forth Valley	31	299,099	10.4
Grampian	117	573,420	20.4
Greater Glasgow & Clyde	143	1,217,025	11.7
Highland	46	319,811	14.4
Lanarkshire	88	572,520	15.4
Lothian	106	843,733	12.6
Orkney	1	21,530	4.6
Shetland	1	23,210	4.3
Tayside	76	411,749	18.5
Western Isles	4	27,560	14.5
Outside Scotland/ Not Known/ Other	29	-	-

Notes regarding Table 5:

1. Note that this table is not directly comparable with Table 4 because it is based on NHS board of residence rather than hospital/ NHS board of treatment , upon which Table 4 is based. NHS board residents may travel for treatment at hospitals outside their immediate NHS board area. Also, some patients may be non-Scottish residents.
2. 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).
3. 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).
4. There is one patient in Table 5 for NHS Orkney. Patients from NHS Orkney, where appropriate, 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 5 presents those receiving thrombolysis by Health Board of residence.

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) training should help address this.

Table 6: Thrombolysis - numbers thrombolysed as percentage of stroke patients, and as a rate per 100,000 total population, Scotland, 2008-2013.

Year	Number of patients thrombolysed (numerator)	Number of stroke patients (denominator)	Percentage	Number of patients per 100,000 (target is 5)
2008	260	8,439	3%	5
2009	411	8,012	5%	8
2010	543	8,439	6%	10
2011	648	8,233	8%	12
2012	669	8,063	8%	13
2013	802	8,697	9%	15

Across Scotland, in 2013 only 34% of patients were treated with rtPA within one hour of arrival at hospital (Chart 9), with only modest improvement from 2012 (29%). No hospital is achieving the standard of 80% treated within one hour of admission, and both the average and the range of door-to-needle times vary considerably between hospitals (Charts 10 and 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 9: Percentage of patients with door-to-needle times for thrombolysis within 1 hour, 2012 and 2013 data.

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

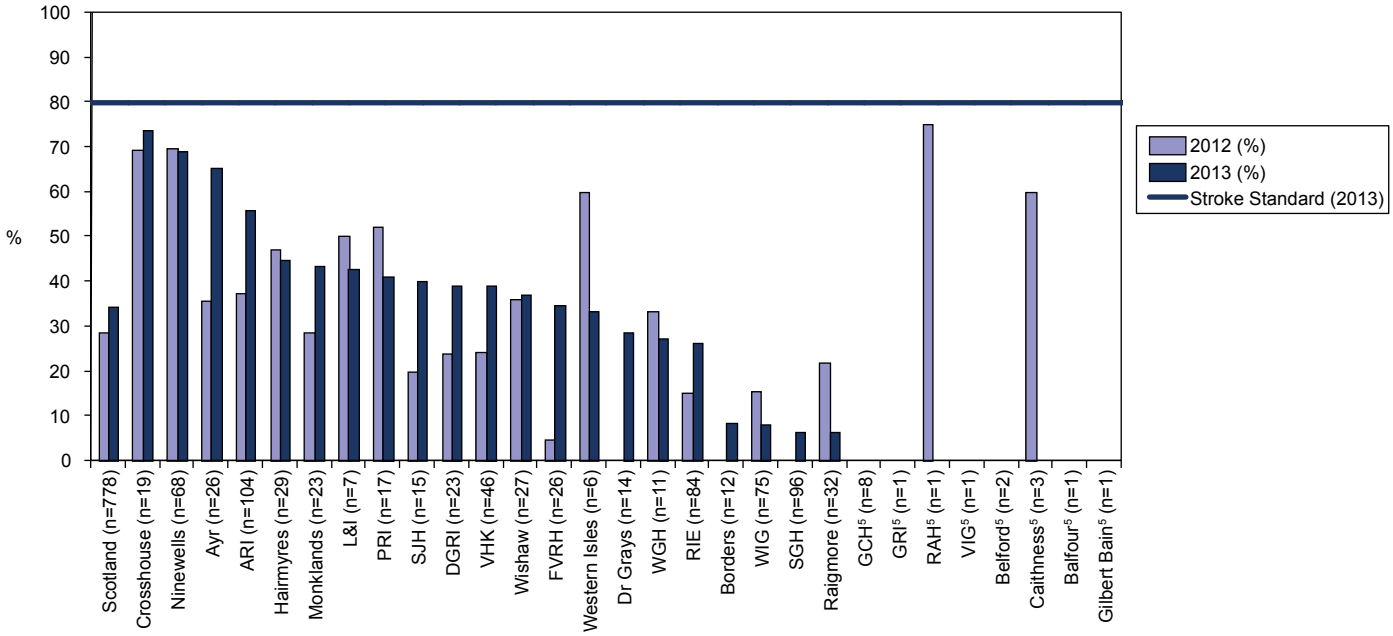
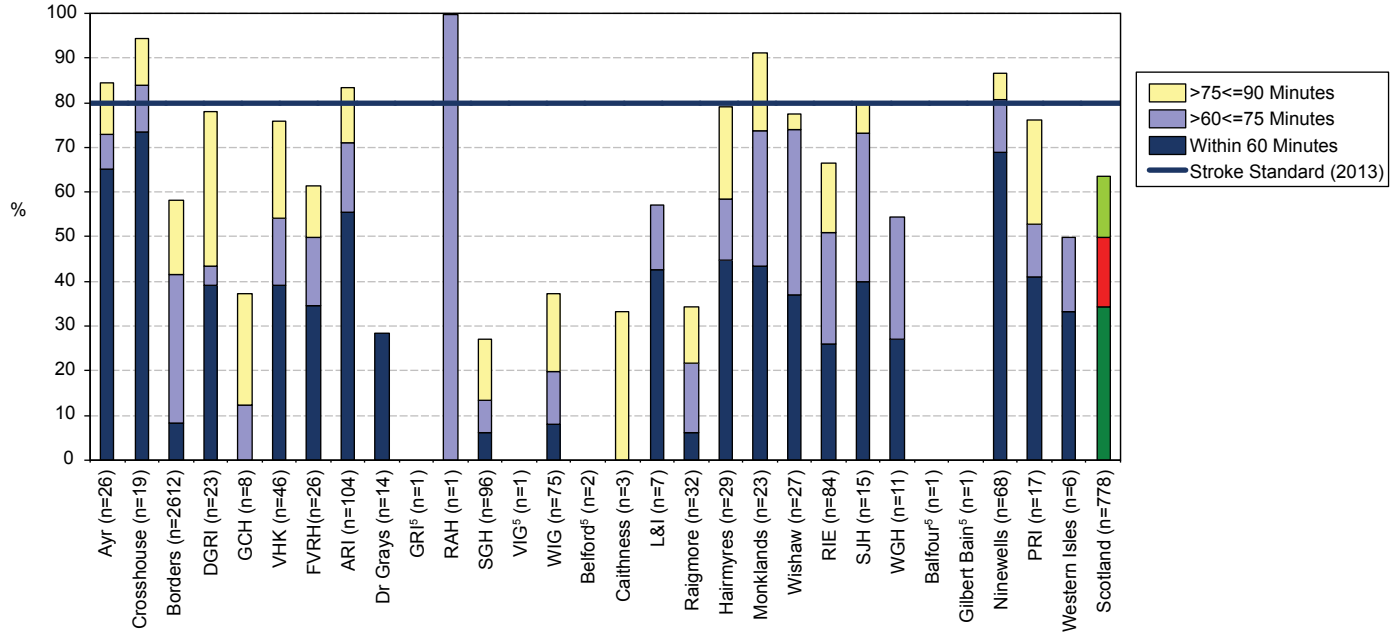


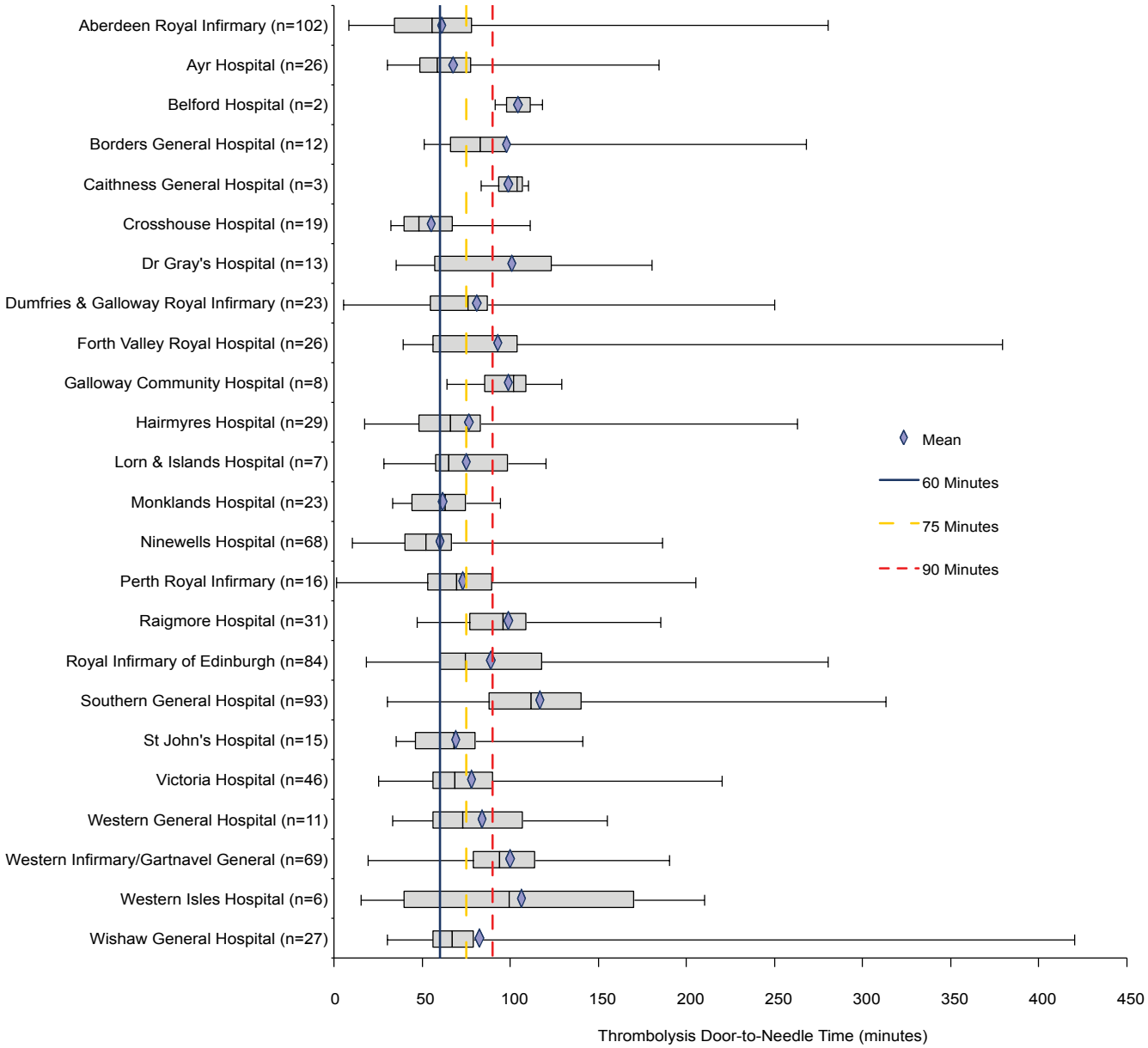
Chart 10: Percentage of patients receiving thrombolysis within 60, 75 & 90 minutes of arrival at first hospital, 2013 data.



Notes regarding Charts 9 and 10:

1. Hospitals shown are those that provide a thrombolysis service. See Table 4 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 11 where inclusion in the chart requires both a thrombolysis date and thrombolysis time. As a result, the Chart 9 and Chart 10 denominators, for individual hospitals, may be slightly higher than those in Chart 11.

Chart 11: Thrombolysis door-to-needle time distribution, minutes, by hospital, 2013 data.



Notes regarding Chart 11:

1. Hospitals shown are those that provide a thrombolysis service (seeTable 4 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. These records have been excluded from Chart 11.
2. For Chart 11 a box plot has been used to show the distribution of door-to-needle times for each hospital. The central box displays the middle 50% of the data spanning the 2nd and 3rd quartiles. The grey line within the box is the median and the blue diamond is the mean. The whiskers extending either side of the box show the 1st and 4th quartiles.
3. Figure next to hospital name indicates the number of patients that were thrombolysed.
4. Five hospitals (Balfour Hospital, Gilbert Bain Hospital, Glasgow Royal Infirmary, Royal Alexandra Hospital and Victoria Infirmary) thrombolysed a single patient in 2013 and cannot be displayed meaningfully as a box plot.
5. Two outlier patients have been removed from Perth Royal Infirmary and Western Infirmary/Gartnavel General as they are considered to be due to data anomalies.
6. 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.
7. 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.
8. The denominator is based on records with both a thrombolysis date and a thrombolysis time. This is a slightly different approach from the denominators used in Chart 9 and Chart 10 where records with a thrombolysis date but no thrombolysis time may be included. As a result, the Chart 11 denominators, for individual hospitals, may be slightly lower than those in either Chart 9 or Chart 10.

Local exception reporting will help identify the reasons for delays in door-to-needle time. These are likely to be different in each hospital depending on how the service is delivered.

6.2 Thrombolysis pre-alerts

Over the past year it has become clear that there continues to be variation in how pre-alert of FAST positive stroke patients is communicated to Accident & Emergency departments. Following a recent consultation with the Scottish Ambulance Service (SAS) it was felt that a Scotland wide policy would be helpful. The stroke MCN managers have worked with the SAS to refresh the SAS Stroke Strategy document which will give clear guidance on the stroke pathway for the SAS staff. The key components of this document are:

- The consistent application of FAST and the recording of the outcome as part of the patient's record;
- The consistent identification and recording of the time the patient was last seen well;
- The use and recording of pre-alert for all stroke presentations managed by the SAS (including those seen by a GP);
- The development of a process to notify Primary Care when the SAS have attended a patient who has suffered a Transient Ischaemic Attack and was not conveyed to hospital; and
- The evidenced provision of advice to patients/ relatives/ carers of the need for them to seek urgent medical advice in the event of the point above.

This has been a priority action for the stroke MCNs since April 2013 and will continue to be a priority for 2014. It is being monitored through the ongoing review process.

7 Carotid Intervention

7.1 Background

Carotid endarterectomy is a preventative stroke procedure. 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 clinical event in the relevant brain territory in a patient who has made good or complete recovery from the neurological or ocular event. The effectiveness of the procedure diminishes as time passes following this index event, most benefit being derived from a procedure performed within 14 days. For these reasons audit of the process as well as the outcomes associated with this invasive procedure 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.

7.2 Summary and key findings relating to carotid intervention

The SSCA commenced collecting carotid intervention data on 1 July 2012. The data are entered by participating hospitals into eSSCA. The presented data are the first attempt at reporting carotid intervention within the SSCA National Report. Naturally, conclusions drawn will be limited as the data extraction process is new and incomplete, and should be interpreted with caution.

Table 7: Carotid Endarterectomy - number of patients receiving a carotid endarterectomy in acute hospitals in Scotland during Jan-Dec 2013.

Hospital	Number of patients
Aberdeen Royal Infirmary (ARI)	40
Ayr Hospital	27
Dumfries & Galloway Royal Infirmary (DGRI)	27
Forth Valley Royal Hospital, Larbert (FVRH)	22
Hairmyres Hospital, East Kilbride	39
Ninewells Hospital, Dundee	25
Royal Infirmary of Edinburgh at Little France (RIE)	75
Victoria Hospital, Kirkcaldy (VHK)	14
Western Infirmary/Southern General Glasgow (WIG/SGH)	111
Total	**380**

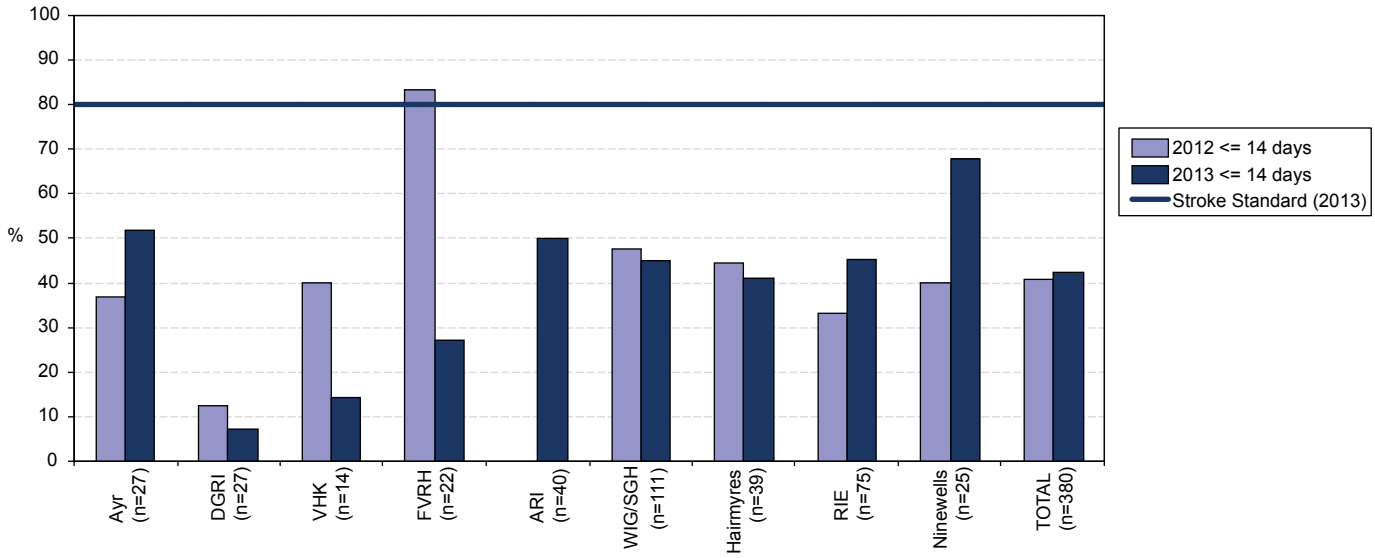
Notes regarding Table 7:

1. Hospitals shown are those that provide a carotid intervention service and have submitted data to eSSCA for 2013. Raigmore Hospital is omitted from this table as data were not entered on eSSCA for this hospital in 2013.
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).

The SMR01 estimates for carotid endarterectomy indicate some variation in the number of procedures performed per 100,000 population. A closer examination will be performed to examine cross border flow between Health Boards.

Chart 12: Percentage of patients undergoing a carotid intervention within 14 days of the event that led the patient to first seek medical assistance, 2012 and 2013.

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.



Notes regarding Chart 12:

1. Bracketed number on chart x-axis indicates number of patients in denominator for 2013.
2. Hospitals shown are those that provide a carotid intervention service and have submitted data to eSSCA for 2013. Raigmore Hospital is omitted from this chart as data were not entered in eSSCA for this hospital in 2013.
3. Patients in Borders, Orkney, Shetland & Western Isles are treated in other Health Boards as part of their respective carotid intervention pathways.
4. 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).

The only part of the process to be audited in this cycle is the proportion of cases performed within 14 days of index event. The period examined is July 2012 to December 2013, inclusive, comparing the data for six months in 2012 with the full submissions for 2013. The proportion of cases operated with14 days of the presenting event in 2013 is **42%** (161/380). It may be tempting to make observations regarding changing performance, but the carotid data were collected for the first time in 2012 and may have been incomplete, with an inherent risk bias associated with incomplete data. The Health Boards showing the biggest changes in time to surgery are also those performing fewer cases (Table 7).

7.3 Future work

The reporting of the process audit data relating to the time 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. This process may be examined in the coming year.

7.4 Carotid pathway in Health Boards across Scotland

The carotid pathway now features as a priority action on the Better Heart Disease and Stroke Care Action Plan[2]. 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 a focus by the stroke MCNs to develop an equitable pathway across the clinical area and improve performance in the number of patients receiving appropriate intervention within 14 days of symptom onset.

8 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).

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

This research study utilised linked data from the Scottish Stroke Care Audit 2005-2011 with inpatient (SMR01) and death certification data from ISD. There have been several important findings:

1. We have validated the SSCA dataset against SMR01 diagnosis of stroke from 2010 onwards. Our data suggest that administrative coding data for SMR01 identified 75.2% of stroke events in Scotland, whereas the SSCA dataset contained 99.2% of strokes occurring in 2010-2011. This confirms the robustness of the SSCA dataset and demonstrates that it most accurately represents the incidence of stroke in Scotland. This resource is therefore reliable for planning and review of patient pathways and stroke services, and also as a tool for research.
2. We have confirmed the benefits of Stroke Unit admission. Correcting for the six simple variables, along with stroke type (infarct or haemorrhage) and early mortality, patients admitted to a Stroke Unit are more likely to be alive up to a year after their stroke. This will help support the ongoing drive to improve Stroke Unit admission rates across the country.
3. We have also looked at thrombolysis data for 2010 and 2011. Numbers from 2010 and 2011 are not large enough to show the impact of thrombolysis on outcome. We are awaiting an update to the linkage to include 2012 and 2013 audit data which will give more data for analysis.
4. We have looked at the impact of a national stroke strategy on 30 day and 6 month case fatality by analysing Stroke Care Bundles: admission to Stroke Unit within one day of admission; CT scan within one day of admission; swallow screen; aspirin administration. Results suggest that for an individual patient, achieving more standards is associated with improved survival. These data are currently in the process of being submitted for publication.

Updated information on publications etc. will be available on the SSCA website.

Two posters on data from the project were also presented at the UK Stroke Forum in December 2013. These looked at the role of deprivation[4] and the significance of admission day on process and outcomes measures.[5]

8.2 CHSS funded research: Setting Scottish stroke services in an international context.

Further funding has been obtained from CHSS, which will facilitate ongoing analysis of an updated linked SSCA data set, along with comparison with new information from 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 aims are to compare stroke service characteristics, look at case-mix adjusted outcomes to explore the prognosis of stroke patients in Scotland compared to other countries, and to establish which service characteristics best explain outcome variations across countries.

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

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Appendix A: Response 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 in all elements of the stroke bundle with the exception of swallow screen on the day of the patient's admission, which has dropped slightly. An on-line Learn-Pro teaching aid for swallow assessment, in conjunction with ward based competency assessment, has been introduced and training for nursing staff on the Stroke Units has been enhanced.

The standard for patients being admitted to a Stroke Unit within one day of admission has been consistently met.

The number of patients who receive a brain scan (CT) within 24 hours of admission to hospital is improving but requires to continue to demonstrate improvement. An 'acute stroke' option has been added to the electronic radiology ordering system which allows the Radiology Service to quickly identify stroke patients and prioritise the scan request. The time of the patient's admission to A&E has also been included in the request to improve 24 hour compliance. An 'aide memoire card' has been developed for doctors in training to remind them of the process to follow. In addition a training programme is now in place to increase the numbers of radiographers with CT scanning skills to help improve scanning capacity. Improved performance against the CT scanning standard should also aid improved performance against the aspirin standard.

While thrombolysing of patients within 60 minutes of their arrival at hospital has improved, we are continuing to develop ways of further reducing the door-to-needle time. In addition, we will continue to implement our phased plan to extend our existing service to a full 24/7 thrombolysis service.

NHS BORDERS

NHS Borders have previously introduced a Stroke Care Bundle, including admission to the Stroke Unit, swallow assessment and prompt CT scanning and aspirin administration. Although we have improved in our rate of completing the bundle for all patients we identified swallow assessment as an area we needed to improve on over the past 12 months.

We had an improvement team that met regularly in addition to our weekly stroke team huddles to address this. We have carried out a series of Plan, Do, Study, Act (PDSA) improvement projects. These include:

- Reviewing the swallow screen documentation with the multi-disciplinary team;
- Setting a local 4 hour target from admission to the hospital to completion of the swallow assessment;
- Using SSCA data and TRAK data we were able to identify that the time spent in the emergency department was limiting the ability of patients to achieve the 4 hour target;
- Formal teaching sessions for medical staff in medicine and the emergency department;

- Excellent staff involvement in one to one teaching sessions, on the job, with nursing staff in the Stroke Unit, medical admissions unit and emergency department. This has been time intensive initially but has shown excellent outcomes; and
- The stroke and emergency department teams have worked together to complete training of the emergency department nurses to complete the swallow assessment before the patient is admitted to the medical ward.

The improvement in swallow screen completion has had benefits for the prescription of aspirin.

For the next year we plan to continue our training program to maintain skills and complete some additional improvement work for aspirin administration to maintain consistent completion of the stroke bundle.

NHS DUMFRIES AND GALLOWAY (D&G)

Aspirin prescribing within one day of admission in DGRI remains above the national average and having improved from 73% to 93% is moving towards the 100% target. This has been achieved by proactive team working.

In hours the Stroke Nurses attend Acute Medical Unit (AMU) on a daily basis to identify patients with an early diagnosis of stroke admitted overnight ensuring referral to CT is enacted. The Stroke Nurse checks regularly to determine that CT has been performed and draws this to the attention of the stroke physician. A member of the stroke team then initiates aspirin prescribing.

The exception reporting process identified that further development is required during the weekend and overnight period; this will be a focus for improvement for next year. Actions so far:

- Stroke physicians provide training as part of the junior medical teaching programme;
- The development of Patient Group Directive for the prescribing of aspirin by key senior nursing staff in the out of hours and weekend period; and
- An additional prompt has been added to the nurse to nurse hand over for any stroke patient being transferred into the stroke ward.

Access to Neurovascular Clinic within four days of referral has improved from 64% to achieve the 80% target following multidisciplinary working to identify capacity across all key services to deliver our desire to provide a one-stop assessment over five days rather than the previous four day service.

NHS Dumfries and Galloway thrombolysed 21.9 per 100,000 patients; which is the highest rate for Scotland. As NHS Dumfries and Galloway is a single handed consultant team we are supported in this achievement by:

- Support from the Lothian Hub;
- Teaching sessions on the stroke thrombolysis pathway to Emergency Department nurses;
- Proactive referral by the Emergency Department; and
- Ongoing support by the wider Physician team.

NHS FIFE

The delivery of improved stroke care and performance against the Scottish Stroke Care Standards in NHS Fife is due to a number of successful interventions. There has been a particular focus over recent months in improving pathways for patients with acute stroke. The Stroke Team have worked hard at improving communication, awareness and performance against the stroke standards within the A&E Department, Medical Assessment Unit as well as

the Stroke Unit. It is recognised that it is the communication of the standards, teaching around achieving the bundle, performance feedback and action plan of the entire cycle of improvement which is needed in order to effect change.

Close working between the Stroke Co-ordinator, Stroke Specialist Nurse, Stroke Audit Facilitator, the Ward Team and the Acute Services Division has resulted in weekly feedback being provided on standard failures and training provided.

The Stroke Clinical Nurse Specialist has developed an outreach role within the hospitals with the remit of:

- Ensuring stroke bundle and SCCA forms initiated;
- Accessing A&E and Admission Unit 1 to ensure assessment of stroke patients, requesting relevant investigations, initiating aspirin if appropriate and arranging admission to the Stroke Unit. Where possible during the working day suitable patients are seen, assessed and admitted directly from A&E;
- Assessment of patients with minor stroke and TIA, facilitating early discharge and access to early clinical follow-up;
- Requesting consultant review if necessary; and
- Facilitating flow and ensuring all patients can be admitted to the Stroke Unit by daily discussion with a Stroke Consultant and the ward team.

Key success has been:

- Having an identified individual to perform the outreach role;
- Working within the Stroke Unit operating procedure; and
- Daily board rounds with all members of the Multi Disciplinary Team.

NHS FORTH VALLEY (FV)

2013 presented us with inpatient flow challenges at Forth Valley Royal Hospital (FVRH) which did impact on the percentage of stroke patients admitted to the Stroke Unit within 1 day of admission. However, we have worked to ensure improvement of patient flow through the early identification and transfer of stroke patients to the Stroke Unit. We have seen month on month improvements since October 2013. Against this backdrop, we were able to match our 2012 performance for the stroke bundle, timely access to swallow screen assessments, brain imaging, aspirin administration and assessment at TIA clinics. We recognise the ongoing challenges in the delivery of stroke thrombolysis and carotid intervention. We will continue to address these.

A stroke bundle sticker (highlighting all four elements of the stroke bundle) was implemented at FVRH in May 2013. The team has worked hard to highlight the importance of the bundle and compliance with it from admission. We have seen improvements since this change was introduced. The stroke team has worked with the emergency department and acute assessment areas to extend the numbers of staff that are trained in carrying out initial swallow screening.

We established a multi-disciplinary Stroke Care Improvement Group in February 2014. This group has set revised trajectories for improvement for the stroke bundle, access to the Stroke Unit, swallow screening, brain imaging and aspirin administration. This group is undertaking a redesign of the current stroke pathway at FVRH to ensure increasing compliance of the stroke targets. Performance is reviewed fortnightly by the Forth Valley Stroke Care Improvement Group, who co-ordinate any necessary action to ensure that these targets are delivered.

These stroke care targets are a key area of performance for the service and we fully recognise the ongoing requirement to make improvements.

NHS GRAMPIAN

NHS Grampian has taken a number of steps to improve stroke care locally:

1. **Stroke flow:** It is acknowledged that the current configuration of stroke services will not allow us to meet the 90% target. There are challenges due to the difficulties with accessing care in the community, which impacts on flow throughout the system. We have employed a stroke flow co-ordinator to support stroke flow through acute and rehabilitation services. We are now using exception reporting to identify specific reasons why patients do not access the Acute Stroke Unit, along with why patients do not achieve the other standards.
2. **CT scanning:** Performance in NHS Grampian against brain imaging standards has improved, consistently achieving the standard. Installing a CT scanner in A&E, within the new Emergency Care Centre has had a positive effect on early access to scans.
3. **Thrombolysis:** Performance is satisfactory, and we are treating 20 per 100,000 population. This is due to a well coordinated team effort involving SAS, A&E and the acute stroke team. Door-to-needle time remains below target: we know that pre-alert results in a significantly lower door-to-needle time and are focussing on working with SAS to improve the proportion of patients with pre-alert.
4. **Swallow screen and aspirin:** Although these are improving, ongoing exception reporting will help identify the issues which are preventing achievement of the standards.
5. **Outpatients – stroke clinics:** Early identification of patients for daily medical clinics has resulted in a significant improvement at Dr Gray's Hospital. At ARI, although there is daily clinic provision, referrals continue to increase. Increased consultant input to cover colleagues' annual leave is being considered by management.

NHS GREATER GLASGOW & CLYDE (GG&C)

Improving performance in our stroke services is a key goal for NHS GG&C. Different challenges exist on our 5 acute sites and we are actively seeking improvement in all areas of stroke care. The imminent new South Hospital (replacing Victoria and Western Infirmaries and the current Southern General Hospital) will rationalise our acute services to 2 sites and will thus solve some of our pathway issues.

Within 2013 we made improvements in stroke service performance at Paisley's Royal Alexandra Hospital (RAH) a focus of improvement work. The changes made were:

- Embedding of the new stroke consultant appointed in 2012;
- A new stroke lead clinician role;
- Local review within RAH Stroke Unit of all pathways to identify areas for improvement;
- Close liaison with emergency and acute medicine to promote direct admission to the Stroke Unit;
- Nursing in-reach from the Stroke Unit to the acute medical admissions area to improve swallow assessments;
- GG&C wide weekly reporting/ analysis of the reasons why patients fail to have timely swallow assessments;
- GG&C wide monthly reporting to all clinical managerial teams of service performance to highlight where improvements are required; and
- GG&C wide regular meetings of all SSCA coordinators to ensure consistency of data collection.

This work achieved significant improvements in numbers of patients having swallowing assessment on the day of admission, speed of access to the Stroke Unit after admission and speed of prescription of aspirin.

Work on achieving further improvement continues: in 2013 the speed of access to CT brain scans did not improve, due to lack of scanning capacity, the hospital now has an additional CT scanner and RAH performance in early May 2014 was 100% for the scanning target.

NHS HIGHLAND

Over the last few years NHS Highland has been developing the Highland Quality Approach (HQA) transforming the way we design and deliver safe, effective and person centred services. The ethos of the HQA puts the patient at the centre of everything we do. In line with this approach and utilising Lean Methodology the stroke service at Raigmore was the subject of a Rapid Process Improvement Week (RPIW) in November 2013. Those involved in the RPIW looked at care in the first 24 hours; the interface between the Emergency Department, Medical Admissions Unit and the Stroke Unit.

The aim is to improve the journey for patients using small tests of change, which if successful are rolled out to the wider service. The areas for change were agreed as:

- Algorithmic pathway;
- Draft GP decision making aid;
- Single standard record sheet;
- Standard process description supporting the pathway;
- Passport for discharge;
- Board round; and
- Swallow training video.

The results of the week were that through the use of the pathway and single standard record sheet there was improved communication between all departments and a greater awareness of all of the stroke standards and the Scottish Stroke Care Audit in general. The changes to the handover and introduction of the Daily Board Round raised awareness of patient progress and the requirements in terms of beds on any one day. Awareness raising and training for swallow screening supported improvement from 64% in 2012 to 79% in 2013 at Raigmore. Further work is in progress with the development of a training video, which will be used elsewhere in NHS Highland.

The process followed involved working with a wide range of professionals, calling on them as and when needed during the week. This included patients, carers and GPs. Some of the work that was started by them will take longer to complete but will comply with wider messages e.g. the aid to GP decision making will highlight the FAST message and provide details of local Neurovascular Clinic services.

NHS LANARKSHIRE

For NHS Lanarkshire the focus of the stroke MCN over the past year has been to ensure that we improved performance in relation to the Stroke Care Bundle across the three Stroke Units. We have embraced the “exception reporting” methodology and involved not only the Stroke Unit staff but all of those who contribute to the patient journey to ensure that the key elements of care are delivered in a safe and timely manner. These performance data are utilised in the Stroke Units on a daily basis and are a focus of the delivery of effective care. This has heightened the awareness of staff in A&E and Receiving Units to the importance of prompt action for this patient

group and the vital role which they play in improving the patient's journey. On a regular basis we shared the data outputs and utilised safety briefs as a mechanism to disseminate information on performance. Where any recurring themes have emerged which indicate a deviation from the pathway this methodology allows prompt action to resolve the issue. The stroke MCN has ensured that staff from all areas involved in the patient's journey have the opportunity to access appropriate training and support to allow them to contribute effectively to the pathway. This has resulted in an improvement in performance from 2012 to 2013 in Wishaw General improving from 75% to 83% in this year's report, Hairmyres Hospital from 71% to 77% and Monklands Hospital from 64% to 72%. The stroke MCN continuously monitors performance and encourages all stakeholders to participate in actions to ensure that all patients receive this Stroke Care Bundle timeously. This makes NHS Lanarkshire the second highest performer in Scotland with only NHS Borders ahead of us.

NHS LOTHIAN

The development and delivery of Stroke Outreach at the Royal Infirmary and Western General Hospital has vastly improved the care delivered to stroke patients across the hospitals and improved performance against the stroke standards. At the Royal Infirmary this has taken the form of greater collaboration between Stroke Outreach and the Emergency Department (ED) completing a joint review of the acute stroke admission pathway and a revision of the paperwork. This work mapped the delay and variations in the process which has led to several important changes; pre-alert by SAS for all stroke thrombolysis patients, direct admission to Resus in ED for suitability of thrombolysis, and a review by a senior ED doctor. Further changes include early booking of CT scan and informing the stroke team has helped to improve door-to-needle time.

Since October 2013, the Stroke Outreach teams attend a daily telephone 'huddle' between the Royal Infirmary and Western General hospitals improving cross-site patient flow and pan-Lothian Stroke Clinician support.

Other developments led by our Stroke Outreach teams include a paper stroke patient tracker system at the Western General Hospital that maps patient journeys against each of the stroke standards ensuring each standard is met, visual query stroke flags in the Acute Receiving Unit to encourage awareness and checks across the Western General Hospital at key patient transfer points to ensure the Outreach team is informed of every patient.

The increase and scheduling of outpatient clinic slots at St John's Hospital has meant a dramatic improvement in seeing patients within four days.

Future improvements will be the development of Stroke Outreach at St John's Hospital and an increase in the number of acute Stroke Unit beds across Lothian to improve performance on the admission to the Stroke Unit standard.

NHS ORKNEY

Thank you for the opportunity to inform you about changes in the delivery of stroke care in NHS Orkney, leading to improvement in stroke care and performance against the stroke care standards.

- A Consultant Physician has been appointed as Clinical Lead for Stroke in NHS Orkney;
- There have been changes in the designation of stroke beds in the Balfour Hospital - the Acute Ward will be the Acute Stroke Unit, and the Stroke Rehabilitation Unit has been allocated to the Assessment and Rehabilitation Ward. This will allow improvement in the assessment and initial treatment of stroke patients and ensure that patients are treated in the right setting;

- An agreement has been reached with a NHS Grampian Consultant in Care of the Elderly, with an interest in Stroke Rehabilitation to provide stroke rehabilitation care in the Balfour Hospital via VC;
- Once our local on island CT scanner is operational, a Consultant in Stroke Care in Aberdeen Royal Infirmary will review the CT scans immediately after acquisition of the images, and advise on thrombolysis and treatment; and
- The TIA pathway is currently being reviewed. This pathway will allow GPs to refer directly to consultants in Aberdeen Royal Infirmary, with the care pathway individualised for each patient depending on circumstances (such as residency on the outer isles, with its transport vagaries) and need.

NHS SHETLAND

No submission received.

NHS TAYSIDE

NHS Tayside have made improvement in Acute Stroke Services with dedicated Acute Stroke Units on both Ninewells and Perth Royal Infirmary sites in addition to rehabilitation services in both Royal Victoria Hospital and Stracathro Hospital to facilitate recovery closer to home.

Performance is published by individual acute hospital and not by Health Board. Therefore, the challenge of reducing variance and sustaining improvement across both acute sites is acknowledged.

An example of change that has led to improved stroke care includes our local quality assurance mechanism incorporating a robust review of every patient to establish reasons for any breach in achieving the standards sharing the data, highlighting opportunities for learning and service improvement to the clinical team.

There has been significant work undertaken by the stroke MCN to raise awareness of acute stroke with emphasis that this is a medical emergency. This has been supported through the national awareness FAST campaign and work around pre hospital care and management via the Scottish Ambulance Service.

An innovative thrombolysis service was implemented at Ninewells as a test of change in February 2011. This model proved highly successful and is now stimulating interest from other Health Boards and nationally. This involves autonomous Emergency Department assessment and decision making regarding thrombolysis out of hours and at weekends with continued support and review from stroke specialists in hours.

The amendment to the standard timeframe for neurovascular clinics has prompted the significant improvement in Ninewells hospital assessing patients within four days.

To explore how we can continue the momentum towards optimising stroke services for all, a workshop was held, with clinicians and managers to explore current patient pathways and address identified challenges, associated clinical risks and options available that will enhance compliance with the Scottish Stroke Care Standards. Introduction of the Stroke Care Bundle to drive improvements and monitor our performance is underway.

NHS WESTERN ISLES

NHS Western Isles has 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 developed a Patient Group Directive to allow the early administration of aspirin by nursing staff who do not hold a prescribing qualification. This will improve the timely administration of aspirin in the absence of immediate medical staff access.
- The Stroke Integrated Care Pathway has been simplified to allow all staff to better understand the concept of a safe swallow assessment. This target was often poorly met and review has shown this to be largely due to a lack of awareness of the steps required in the assessment.
- The MCN has worked closely with the Scottish Ambulance Service to ensure that patients who live on the more remote islands are still able to access thrombolysis. This has involved the Scottish Ambulance Service in the Uists and Barra being trained in the same recognition process as those in Lewis and Harris and having direct access to initiate air transfer to the Western Isles Hospital to allow CT scanning to be performed within the timescale allowed.
- The Stroke Unit staff have worked closely with all ward managers to ensure that patients who are diagnosed with a stroke are rapidly transferred to the Stroke Unit.
- Finally, the MCN have taken the findings of the CLOTS-3 trial and are adopting lower limb compression therapy in line with the evidence base to reduce the risks of morbidity for non mobile patients.

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.

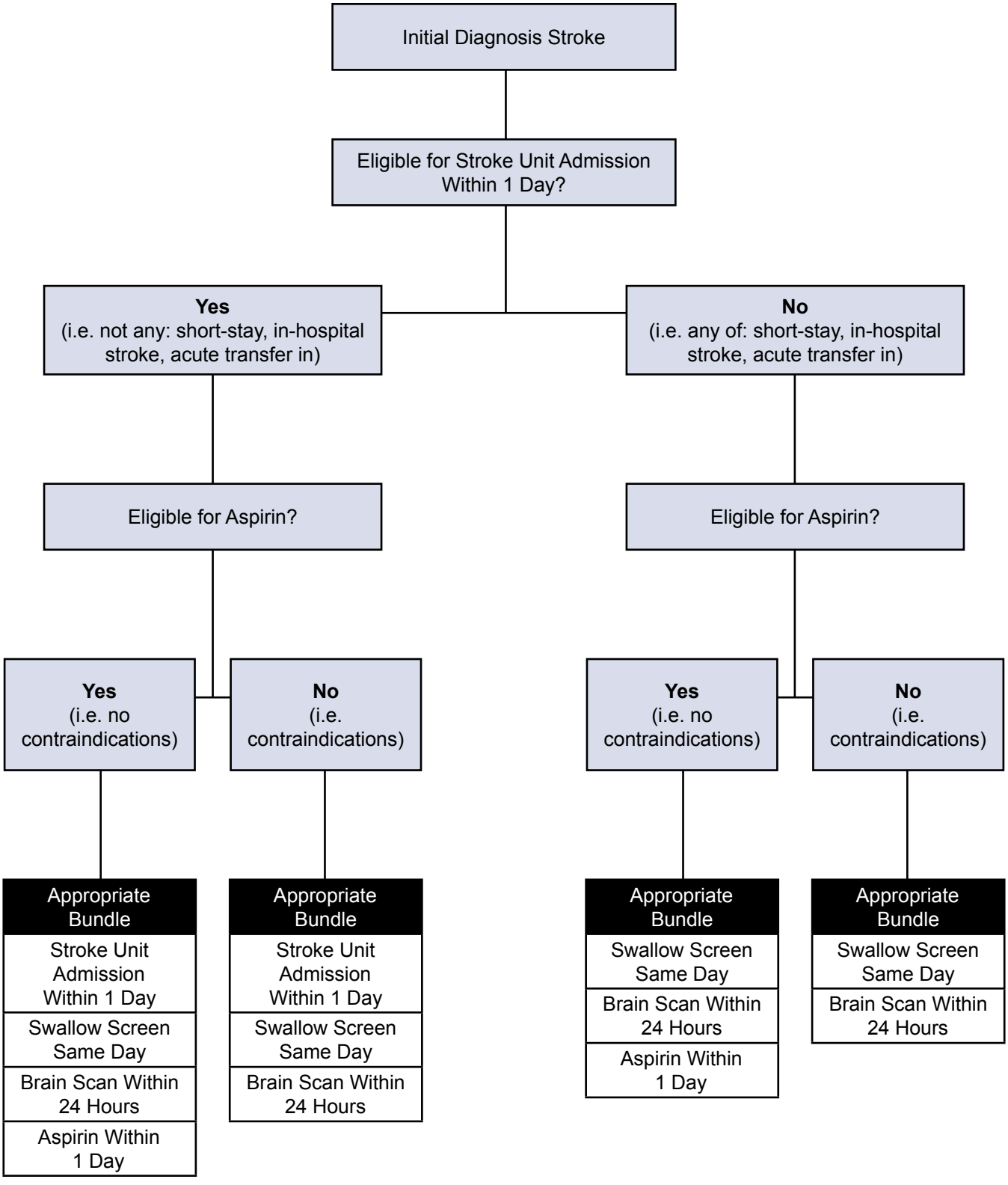
Following publication of the 2013 SSCA National Report Hazel Dodds (SSCA National Clinical Coordinator, ISD) and Katrina Brennan (Scottish Stroke Improvement Plan Lead, Scottish Government) visited all Health Boards in Scotland to meet with stroke clinical teams, stroke MCNs, radiologists, senior managers/ executives, planners and other relevant personnel with input to stroke care locally. The meetings were held between October 2013 and April 2014.

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.

Hazel and Katrina will continue to work with Health Boards throughout 2014/15 to improve delivery of stroke care across Scotland.

Appendix B: Stroke Care Bundle Flow Chart



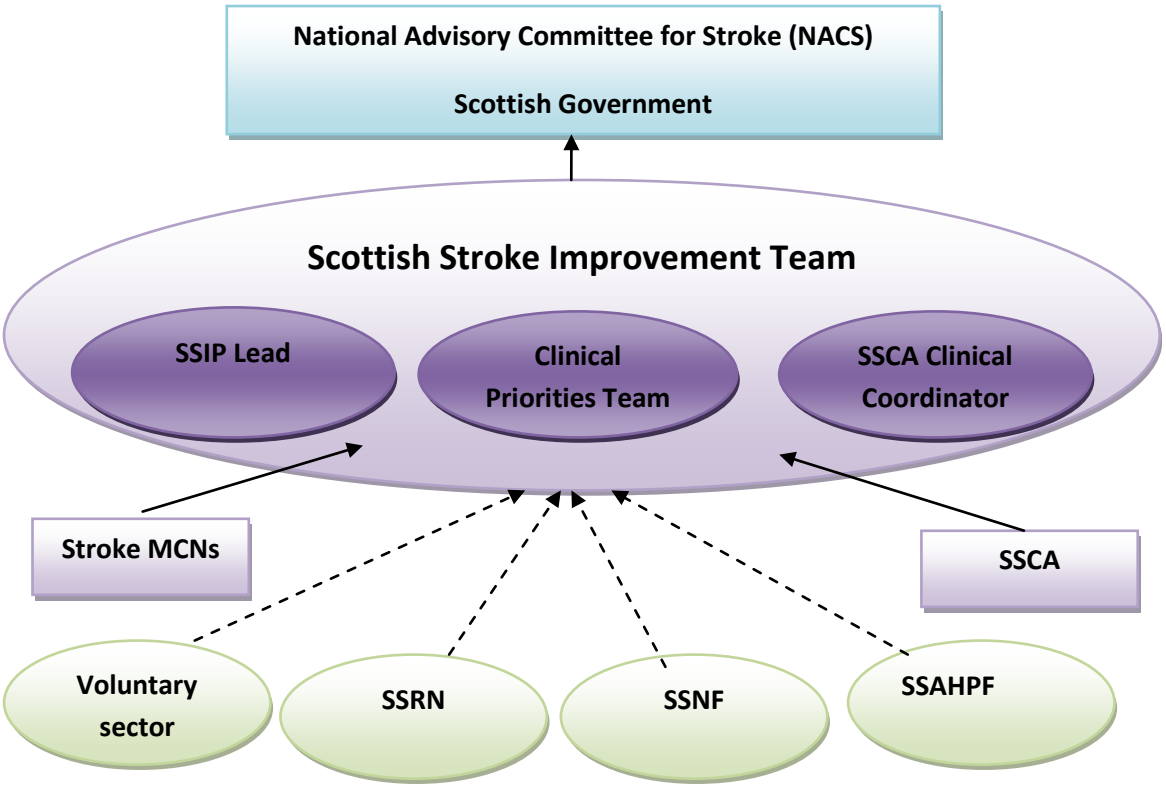
Appendix C: Scottish Stroke Improvement Team

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 1.2.2).

Structure



Key: **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/2012_Steeringcommitteemembers.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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- Patients with stroke who have contributed medical information to the audit;
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- Chief Executives in each Health Board who provided feedback about changes that improved performance in delivery of stroke care;
- The SSCA Audit Team and ISD Publications Team as part of the Information Services Division of NHS National Services Scotland who co-ordinate and collate the necessary information to produce the report and support the publication of the National Report;
- Members of the Report Writing Sub-Group of the SSCA Steering Committee who have contributed to the writing of and commented on drafts of this report; and
- The Scottish Government through the CHD & Stroke Strategy providing funding for the Scottish Stroke Care Audit.

This Annual National Report was prepared by Dr Mark Barber, Professor Martin Dennis, Hazel Dodds, Moranne MacGillivray, Dr Mary-Joan Macleod, Professor Peter Langhorne, David Murphy, Neil Perkins, Mr Wesley Stuart, Dr Melanie Turner, with contributions from Health Boards and partner organisations.

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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).

We are grateful to Chest Heart & Stroke Scotland patient/ carer groups who provided feedback on the 2013 Public Summary and those involved in reviewing the drafts of the 2014 Public Summary.

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Website
http://www.strokeaudit.scot.nhs.uk

Any questions about the SSCA should be referred to the co-ordinating centre. Please refer questions on this report to Hazel Dodds, Moranne MacGillivray, David Murphy or Neil Perkins.

For general questions about the audit please contact Hazel Dodds, National Clinical Coordinator for the SSCA.

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