NHS
National
Services
Scotland

Scottish Stroke Improvement Programme

2018 report.

Designed and typeset by

PHI Digital Support

Translation Service

If you would like this leaflet in a different language, large print or Braille (English only), or would like information on how it can be translated into your community language, please phone 0845 310 9900 quoting reference 287407.

Contents

Foreword

The Scottish Government remains committed to delivering world-leading stroke care which is consistently person-centred, clinically effective and safe. The Scottish Stroke Improvement Programme is key to raising the quality and consistency of stroke care on an ongoing basis, with the Scottish Stroke Care Audit illuminating progress and where further improvement is required.

It is very encouraging to see that Health Boards are delivering improvements in the 'stroke care bundle'. The Scottish Stroke Care Audit shows that last year there was statistically significant improvement with 64% patients admitted to hospital with diagnosis of stroke receiving the appropriate elements for the bundle, a 3% increase on last year. I welcome the strong improvement in carotid endarterectomy within 14 days to 55% and thrombolysis within one hour continuing to increase to 59% from 55% in 2016.

But this also shows that more needs to be done. Reducing unwarranted variation is a priority in Realistic Medicine and I encourage you to use the quality audit data and the improvement programme to seek ways to make progress towards the standards of care.

I welcome the developments in collecting information on rehabilitation via the Organisational Audit, although I recognise it is challenging to gather robust information from the extended patient pathway. This is important if we are to better understand the rehabilitation people are receiving and areas for improvement. I encourage Health Boards to provide this information for continued improvements in personalised approach to rehabilitation going forward.

These improvements and developments only happen because of the dedication and passion of a large number of people, from frontline staff and carers to coordinators and analysts, sometimes in challenging circumstances. On behalf of the Scottish Government, I would like to offer my thanks and appreciation for all they have achieved and the continuing commitment to using the data provided by the Scottish Stroke Care Audit to support improvements.

Dr Catherine Calderwood
MA Cantab FRCOG FRCP Edin
Chief Medical Officer for Scotland

1 Scottish Stroke Improvement Programme

The NHS Scotland Quality Strategy[1] is the NHS Scotland Blueprint for improving the quality of care that patients and carers receive from the NHS across Scotland. It sets out an ambition for health care that is person centred, safe and effective, underpinned by the need to "embed the mutual approach of shared rights and responsibilities into every interaction between patients, their families and those providing health services." The Scottish Stroke Improvement Programme (SSIP) works with stroke Managed Clinical Networks (MCNs)/ NHS boards to focus on building capacity for all staff to ensure that they have the knowledge, skills and attitudes necessary to deliver high quality services. Stroke remains the third biggest killer in Scotland and the leading cause of disability. Further reducing the number of deaths from stroke has been a clinical priority for NHS Scotland since the mid 1990s. Scotland continues to have exceptionally high levels of stroke related deaths compared to the rest of Western Europe. The SSIP has set out ambitions to deliver world-leading stroke care which is consistently person-centred, clinically effective and safe.

One of the key factors for success is that there is commitment 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[2] is to further improve the quality of care provided, with one of the focuses being to improve the approach to supporting and treating people with stroke.

Figure 1.1 : Structure of SSIP

National Advisory Committee for Stroke (NACS)

Scottish Government

Scottish Stroke Care Improvement Team

SSIP Lead

Clinical Priorities Team

SSCA Clinical Coordinator

Stroke MCNs

SSCA

Voluntary Sector

SSRN

SSNF

SSAHPF

Key

SSCA - Scottish Stroke Care Audit

MCNs - Managed Clinical Networks

SSRN - Scottish Stroke Research Network

SSNF - Scottish Stroke Nurse Forum

SSAHPF - Scottish Stroke Allied Health Professionals Forum

To improve services effectively the SSIP recognises the need to set clear aims which have been established through the Scottish Stroke Care Standards (2013) and the priority actions from the Stroke Improvement Plan[4]. Through the Scottish Stroke Care Audit (SSCA) and the regular monitoring against the priority actions, performance is mapped and the Stroke MCNs develop action plans, test change and implement improvement methodologies. The Stroke Improvement Programme Lead and SSCA National Clinical Coordinator work closely with the NHS boards to ensure the key priorities from the Improvement Plan and the Scottish Stroke Care Standards are implemented and monitored. However, it is ultimately the responsibility of each NHS board's Chief Executive to ensure that services improve.

The following table represents the self evaluated performance of NHS boards when benchmarking themselves against the Stroke Improvement Plan priorities, displayed in Red, Amber, Green (RAG), Blue or Black with further detailed information in Appendix C.

Generic key for RAG chart and RAG status pages 3 and 4:

⬛ No process or pathway in place	🟩 Implemented but not delivered consistently
🟥 Available but not implemented	🟦 Complete and embedded in practice
🟧 Plan to implement or partially implemented	

Priority Area	1.Early Recognition of TIA/ Stroke		2. Pre-hospital protocols		3. Stroke Bundle Delivery	4. Trained workforce	5. Early diagnosis	
Priority Action	(1) Public FAST	(2) Early identification of stroke by SAS/ Primary Care / Emergency Departments	(1) SAS Pre-alert	(3) Thrombolysis Process & Pathway	Intermittent Pneumatic Compression	Education Template & Training	(1) TIA Access	(2) TIA Imaging
Ayrshire and Arran	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN
Borders	GREEN	GREEN	GREEN	AMBER	GREEN	GREEN	AMBER	BLUE
Dumfries and Galloway	GREEN	GREEN	GREEN	GREEN	GREEN	AMBER	GREEN	GREEN
Fife	BLUE	GREEN	AMBER	AMBER	GREEN	BLUE	AMBER	AMBER
Forth Valley	BLUE	AMBER	AMBER	AMBER	BLUE	GREEN	AMBER	AMBER
Grampian	BLUE	GREEN	AMBER	GREEN	GREEN	GREEN	BLUE	BLUE
Greater Glasgow and Clyde	GREEN	GREEN	AMBER	AMBER	GREEN	GREEN	AMBER	RED
Highland	GREEN	GREEN	AMBER	AMBER	GREEN	GREEN	AMBER	AMBER
Lanarkshire	BLUE	BLUE	AMBER	GREEN	GREEN	BLUE	AMBER	AMBER
Lothian	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	BLUE	BLUE
Orkney	GREEN	AMBER	GREEN	GREEN	GREEN	AMBER	BLUE	GREEN
Shetland	BLUE	GREEN	GREEN	AMBER	GREEN	GREEN	AMBER	AMBER
Tayside	GREEN	GREEN	GREEN	AMBER	GREEN	GREEN	AMBER	AMBER
Western Isles	BLUE	GREEN	AMBER	GREEN	GREEN	GREEN	BLUE	AMBER

Priority Area	6. Secondary Prevention	7. Transition to Community						8. Living with Stroke			
Priority Action	Anti-coagulation for AF	(1.1) Access to Stroke Therapy	(1.2) Access to Stroke Rehabilitation Services	(2) Goal Setting	(3.1) Specialist Visual Assessment and Rehabilitation	(3.2) Access to Specialist Clinical Neuro-psychological Services	(3.3) Specialist Driving Assessment	(1) Self Manage-ment post discharge support	(2) Exercise	(3) Vocational rehabilita-tion	(4) Stroke Spasticity Manage-ment
Ayrshire and Arran	RED	GREEN	AMBER	AMBER	BLUE	AMBER	BLUE	GREEN	BLUE	GREEN	AMBER
Borders	RED	GREEN	AMBER	GREEN	BLUE	RED	BLUE	AMBER	AMBER	AMBER	GREEN
Dumfries and Galloway	AMBER	BLUE	AMBER	AMBER	BLUE	GREEN	BLUE	AMBER	AMBER	GREEN	AMBER
Fife	GREEN	AMBER	GREEN	GREEN	GREEN	AMBER	GREEN	GREEN	BLUE	BLUE	AMBER
Forth Valley	AMBER	GREEN	GREEN	GREEN	BLUE	RED	BLUE	AMBER	GREEN	AMBER	GREEN
Grampian	AMBER	AMBER	AMBER	AMBER	BLUE	AMBER	BLUE	GREEN	GREEN	AMBER	GREEN
Greater Glasgow and Clyde	AMBER	GREEN	GREEN	GREEN	BLUE	BLUE	GREEN	BLUE	BLUE	AMBER	BLUE
Highland	AMBER	AMBER	AMBER	GREEN	GREEN	AMBER	BLUE	BLUE	BLUE	AMBER	GREEN
Lanarkshire	AMBER	AMBER	AMBER	AMBER	GREEN	GREEN	BLUE	BLUE	BLUE	BLUE	GREEN
Lothian	RED	AMBER	AMBER	AMBER	AMBER	GREEN	BLUE	GREEN	GREEN	GREEN	GREEN
Orkney	AMBER	AMBER	GREEN	BLUE	BLUE	BLUE	BLUE	AMBER	GREEN	BLUE	GREEN
Shetland	BLUE	AMBER	AMBER	BLUE	RED	RED	AMBER	GREEN	BLUE	BLUE	GREEN
Tayside	GREEN	AMBER	AMBER	GREEN	GREEN	GREEN	GREEN	GREEN	BLUE	AMBER	AMBER
Western Isles	GREEN	GREEN	AMBER	GREEN	RED	AMBER	AMBER	AMBER	BLUE	AMBER	AMBER

Clearly there is variability across the country and NHS boards should strive to improve access to high quality services to ensure the best treatment and support is available to people living with stroke.

Table 1.1: Scottish Stroke Care Standards Implemented 1st April 2016 (Following review of Scottish Stroke Care Standards 2013)

| Topic	Standard
Access to Stroke Unit	90% within 1 day of admission (Day 0 and 1).
Brain imaging	95% within 24 hours of admission.
Swallow screen	100% within 4 hours of arrival at hospital
Aspirin administration	95% of ischaemic strokes within 1 day of admission (Days 0 and 1).
Delay from receipt of referral to specialist stroke/TIA clinic	80% are assessed within 4 days of receipt of referral (Day 0 being day of receipt of referral).
Thrombolysis	50% of patients receive the bolus within 30 mins of arrival. 80% of patients receive the bolus within one hour of arrival.
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.

Table 1.2: Comparisons between 2016–2017 (based on final diagnosis)

Scottish Stroke Care Standard (2016)	Required Standard	2016	2017
Percentage admitted to a Stroke Unit within 1 day of admission.	90%	82%	82%
Percentage with swallow screen within 4 hours of arrival at hospital	100%	72%	75%
Percentage with brain scan within 24 hours of admission.	95%	93%	93%
Percentage of ischaemic stroke patients given aspirin within 1 day of admission.	95%	90%	91%
Percentage of patients admitted to hospital with a diagnosis of stroke who receive the appropriate elements of the stroke care bundle.	80%	61%	64%
Percentage seen at specialist stroke/TIA clinic within 4 days of receipt of referral. (Day of receipt = day 0)	80%	82%	82%
Percentage receiving thrombolysis bolus within one hour of arrival at hospital.	80%	55%	59%
Percentage undergoing carotid endarterectomy for symptomatic carotid stenosis within 14 days of the event that first led to seeking medical assistance.	80%	46%	55%

The national standards are recommended by the SSCA steering committee and ratified by the National Advisory Committee for Stroke. The standards should not be used to guide the care of individual patients since there may be very legitimate reasons for NOT treating a patient according to the standard. The standards are used to assess the performance of stroke services, at a Scotland wide, NHS board or individual hospital level, not at the level of the individual patients.

The standards are set at a level which aims to be both challenging but potentially achievable by some hospitals. This is done to encourage improvements in performance. Once a standard is routinely exceeded by all hospitals then it is likely that the SSCA committee will recommend that the standard is raised, or if already at an ideal level, it may actually be removed from the audit. It is therefore inevitable that many stroke services will not meet some of the standards. Stroke services need to use appropriate Quality Improvement methods to optimise their own performance. The audit aims to focus its resources on those areas where improvement will enhance patient outcomes and experience.

Figure 1.2: Scottish Stroke Care Bundle flowchart

```
                    ┌─────────────────────────┐
                    │  Initial Diagnosis Stroke │
                    └─────────────────────────┘
                                 │
                    ┌─────────────────────────┐
                    │  Eligible for Stroke Unit │
                    │  Admission Within 1 Day?  │
                    └─────────────────────────┘
```

| **Yes**
(i.e. not any: short-stay, in-hospital stroke, acute transfer in) | **No**
(i.e. any of: short-stay, in-hospital stroke, acute transfer in) |

| Eligible for Aspirin?* | Eligible for Aspirin?* |

| **Yes**
(i.e. no contraindications) | **No**
(i.e. contraindications) | **Yes**
(i.e. no contraindications) | **No**
(i.e. contraindications) |

Appropriate Bundle	**Appropriate Bundle**	**Appropriate Bundle**	**Appropriate Bundle**
Stroke Unit Admission Within 1 Day	Stroke Unit Admission Within 1 Day	Swallow Screen within 4 hours	Swallow Screen within 4 hours
Swallow Screen within 4 hours	Swallow Screen within 4 hours	Brain Scan Within 24 Hours	Brain Scan Within 24 Hours
Brain Scan Within 24 Hours	Brain Scan Within 24 Hours	Aspirin Within 1 Day	
Aspirin Within 1 Day			

*   Thrombolysed patients were removed from the aspirin calculation because it was recognised that aspirin use may be delayed up to 48 hours post thrombolysis to ensure there have been no ill effects from the thrombolysis.

1.1 Scottish Ambulance Service Stroke Improvement Plan

Stroke Improvement Plan, Priority 1, Action 2

Improve early identification of stroke and Transient Ischaemic Attack (TIA) by Scottish Ambulance Service (SAS)/NHS24, primary care and hospital Emergency Departments.

Stroke Improvement Plan, Priority 2, Action 1

Pre-alert by SAS – The SAS should pre-alert Emergency Departments of the arrival of stroke patients who might potentially benefit from thrombolysis.

The Scottish Ambulance Service Stroke Improvement project, led from the Service's Clinical Directorate and in collaboration with the National Advisory Committee for Stroke at the Scottish Government, has embedded the sustained delivery of evidenced based practice under the leadership of regional management teams.

The Scottish Ambulance Service is incredibly proud to report, by means of enhanced ambulance specific education programmes and through collaborative work streams with our health board MCN colleagues. This means that our objectives to introduce and embed our national pre-hospital stroke pathway, our clinical quality care bundle and our enhanced and redesigned in-cab technology have all been achieved allowing our clinicians to consistently delivery best practice. This is evidenced by our clinical quality care bundle, consistently showing compliance with the bundle at or above 96%.

Through our established Regional Stroke Networks, the Scottish Ambulance Service will continue to work closely with MCNs, the wider stroke community and stakeholders to ensure that pre-hospital stroke care and further enhancements, developments and improvements to this care are developed and achieved through collaboration and integrated working with the patient at the centre of everything we do.

The Scottish Ambulance Service looks forward to building on the strong relationships developed throughout our stroke improvement programme as stroke care in Scotland continues to evolve and improve.

2 Scottish Stroke Care Audit

Map of Scotland showing all hospitals in NHS boards contributing to the Scottish Stroke Care Audit

Gilbert Bain Hospital

NHS Shetland

Balfour Hospital

NHS Orkney

Raigmore Hospital
Belford Hospital
Caithness Hospital
Lorn and Islands Hospital

Western Isles Hospital
Uist & Barra Hospital

NHS Western Isles

NHS Highland

Aberdeen Royal Infirmary
Dr Gray's, Elgin

NHS Grampian

Ninewells Hospital Dundee
Perth Royal Infirmary
Stracathro Hospital

NHS Tayside

Queen Margaret Hospital
Victoria Hospital, Kirkcaldy

NHS Fife

Forth Valley Royal Hospital
Stirling Community Hospital
Falkirk Community Hospital

NHS Forth Valley

Royal Infirmary of Edinburgh
St Johns Hospital Livingston
Western General Hospital

NHS Lothian

Queen Elizabeth University Hospital
Glasgow Royal Infirmary
Stobhill Hospital
Royal Alexandra Hospital
Vale of Leven Hospital
Inverclyde Royal Hospital

NHS Greater Glasgow and Clyde

NHS Lanarkshire

NHS Ayrshire and Arran

NHS Borders

Borders General Hospital

University Hospital Ayr
University Hospital Crosshouse

NHS Dumfries and Galloway

University Hospital Hairmyres
University Hospital Monklands
University Hospital Wishaw

Dumfries and Galloway Royal Infirmary
Galloway Community Hospital

Stroke is a key health issue for the people of Scotland and the Scottish NHS. It is the third commonest cause of death in Scotland and the most common cause of severe physical disability amongst Scottish adults. Almost nine and a half thousand stroke patients were admitted to Scottish hospitals in 2017. 3187 stroke cases were seen at transient ischaemic attack (TIA) clinics and many cases may never present to medical attention. Stroke has a significant impact on NHS resources, accounting for approximately 5% of total NHS costs[2]. Societal costs are even higher. The economic cost of stroke to Scotland in terms of lost employment and the cost of support in the community are significant, whilst the impact on family members or friends who care for stroke survivors is massive. For these reasons it is important that all NHS boards across Scotland deliver high quality and equitable stroke care.

Table 2.1: **Numbers of stroke patients by age, sex, case mix, deprivation category and NHS board of residence, 2017 data (final diagnosis)**

NHS board of Residence	Confirmed Strokes admitted during 2017	Crude rate per 100,000 residents	Mean Age Males (years)	Mean Age Females (years)	Males	Ischaemic Strokes	Case Mix						Scottish Index of Multiple Deprivation				
							Independent in Activities of Daily Living?	Lived alone at normal place of residence?	Can talk at first assessment?	Orientated to time, place and person at first assessment?	Can lift both arms off the bed at first assessment?	Can walk without help from another person?	SIMD 1 (Most deprived)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (Least deprived)
							Percentage of Confirmed Strokes										
Total	**9 345**	*173*	**70**	**76**	*51*	*87*	*82*	*38*	*78*	*66*	*63*	*48*	*24*	*22*	*19*	*16*	*16*
Ayrshire & Arran	880	*237*	70	74	*51*	*90*	*81*	*35*	*82*	*77*	*73*	*60*	*34*	*24*	*17*	*12*	*13*
Borders	174	*152*	72	80	*48*	*81*	*79*	*34*	*75*	*61*	*69*	*60*	*7*	*17*	*30*	*41*	*6*
Dumfries & Galloway	259	*173*	73	79	*52*	*86*	*83*	*39*	*69*	*63*	*55*	*20*	*7*	*31*	*39*	*14*	*10*
Fife	677	*183*	71	76	*50*	*87*	*78*	*38*	*81*	*62*	*67*	*44*	*25*	*23*	*21*	*16*	*15*
Forth Valley	517	*170*	71	77	*50*	*86*	*91*	*38*	*82*	*72*	*48*	*40*	*16*	*31*	*24*	*14*	*16*
Grampian	757	*129*	72	77	*50*	*84*	*85*	*41*	*66*	*64*	*58*	*43*	*4*	*17*	*23*	*29*	*27*
Greater Glasgow & Clyde	2 099	*181*	69	75	*50*	*88*	*78*	*37*	*80*	*61*	*68*	*60*	*44*	*19*	*11*	*11*	*15*
Highland	543	*169*	73	76	*53*	*84*	*81*	*41*	*73*	*63*	*55*	*40*	*7*	*23*	*35*	*28*	*7*
Lanarkshire	1 097	*167*	69	75	*53*	*88*	*84*	*34*	*77*	*68*	*66*	*53*	*31*	*33*	*17*	*11*	*7*
Lothian	1 346	*153*	71	77	*50*	*86*	*81*	*39*	*81*	*63*	*66*	*41*	*14*	*24*	*17*	*16*	*28*
Orkney	28	*128*	72	80	*39*	*75*	*79*	*43*	*68*	*54*	*29*	*21*	*0*	*21*	*29*	*46*	*4*
Shetland	35	*151*	71	75	*51*	*86*	*83*	*31*	*80*	*66*	*60*	*31*	*0*	*3*	*49*	*49*	*0*
Tayside	622	*150*	71	76	*53*	*84*	*89*	*39*	*79*	*73*	*52*	*36*	*19*	*19*	*20*	*26*	*16*
Western Isles	50	*186*	73	76	*44*	*88*	*86*	*38*	*72*	*38*	*56*	*40*	*0*	*20*	*76*	*4*	*0*
Outside Scotland/ Not Known/ Other	261	*-*	68	78	*61*	*85*	*90*	*33*	*75*	*64*	*60*	*46*	*-*	*-*	*-*	*-*	*-*

Notes regarding Table 2.1:
1   NHS board of residence derived from postcode. A small proportion of records cannot be assigned to specific NHS boards because of insufficient information (e.g. part postcode) or because patient was a non-Scottish resident.
2   Some patients may not be treated within their resident NHS board and may travel to other NHS boards for treatment.
3   The column 'Confirmed strokes' excludes a small proportion of records for in-hospital wake-up strokes (where the patient was already in hospital for other reasons and had a stroke during their hospital stay but with doubt about whether they woke from sleep with symptoms of stroke).
4   For further information on the Scottish Index of Multiple Deprivation (SIMD) see the Scottish Government web site at http://www.gov.scot/Topics/Statistics/SIMD and http://www.gov.scot/Resource/0050/00504809.pdf.

Table 2.1 provides information on stroke admissions across Scotland including details on age, stroke type, deprivation and other case mix factors. We provided some commentary on these figures in last year's report. It is interesting to see that some areas have particular challenges with patients being younger and coming from more deprived areas. Table 3.1 describes the provision of stroke unit beds across Scotland. The vast majority of patients are managed in integrated stroke units which provide both acute care and rehabilitation. In the developed world many areas have developed Comprehensive Stroke Centres (centres that deliver all aspects of stroke care, including stroke thrombectomy). Currently there are no Comprehensive Stroke Centres in Scotland.

The Scottish Stroke Care Audit (SSCA) has been collecting information about stroke care since 2002. 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. The SSCA has moved its focus more towards service improvement and safety over the last few years. As improvements in performance against most of the Scottish Stroke Care Standards have occurred across

Scotland, the focus has moved towards measuring stroke care 'bundles'. Instead of measuring how an individual fares against any one stroke standard, bundles measure how that individual fares against all relevant Scottish Stroke Care Standards. Achieving this care bundle is associated with reduced mortality and increased likelihood of discharge to usual residence after stroke[10].

In last year's report one of the components of the Stroke Bundle had recently changed (swallow screen timing) meaning that we had no direct comparison to the previous year. This year we can again publish data on change in Stroke Bundle performance over time. Across Scotland Stroke Bundle compliance has improved from 61% in 2016 to 64% in 2017. This is some way short of the 80% standard. The majority of NHS boards have seen improvement over this time.

The numbers of patients being thrombolysed continues to increase and has now reached 11% of all stroke patients. This number does seem to be plateauing but is approaching the proportion of ischaemic stroke patients receiving thrombolysis internationally. There have also been improvements in the numbers being thrombolysed within 60 minutes of hospital arrival (59% in 2017, compared to 55% in 2016). The numbers treated within 30 minutes, however, remain disappointingly low. Stroke thrombectomy was also offered to very few Scottish stroke patients in 2017.

There were encouraging signs with regard to appropriate patients receiving carotid endarterectomy within 14 days of their event. This figure improved from 46% in 2016 to 55% in 2017. The SSCA have started to report on 'pathway entry date' for carotid endartectomy for the first time this year, and this is included in section 7.

For the first time for more than ten years, this report includes some details not just on delivery of stroke care but also on stroke outcomes. We report on stroke mortality, adjusted for important case mix factors. For the first time ever we report on 'Home Time', see chapter 8, which may be a very important quality and outcome measure from a patient perspective. There is interesting variation in this outcome measure between hospitals across Scotland, which may be explained by a variety of factors.

Chart 2.1: (NHS board) Percentage of stroke patients receiving an 'appropriate' Stroke Care Bundle (i.e. Stroke Unit admission, swallow screen, brain scan and aspirin) – 2017 data (based on *final* diagnosis).

* The Scottish Stroke Care Standard for swallow screen within 4 hours was introduced from April 2016 and complete data are unavailable prior to this date because swallow screen time was only recorded from April 2016. Prior to April 2016 only swallow screen date was recorded.
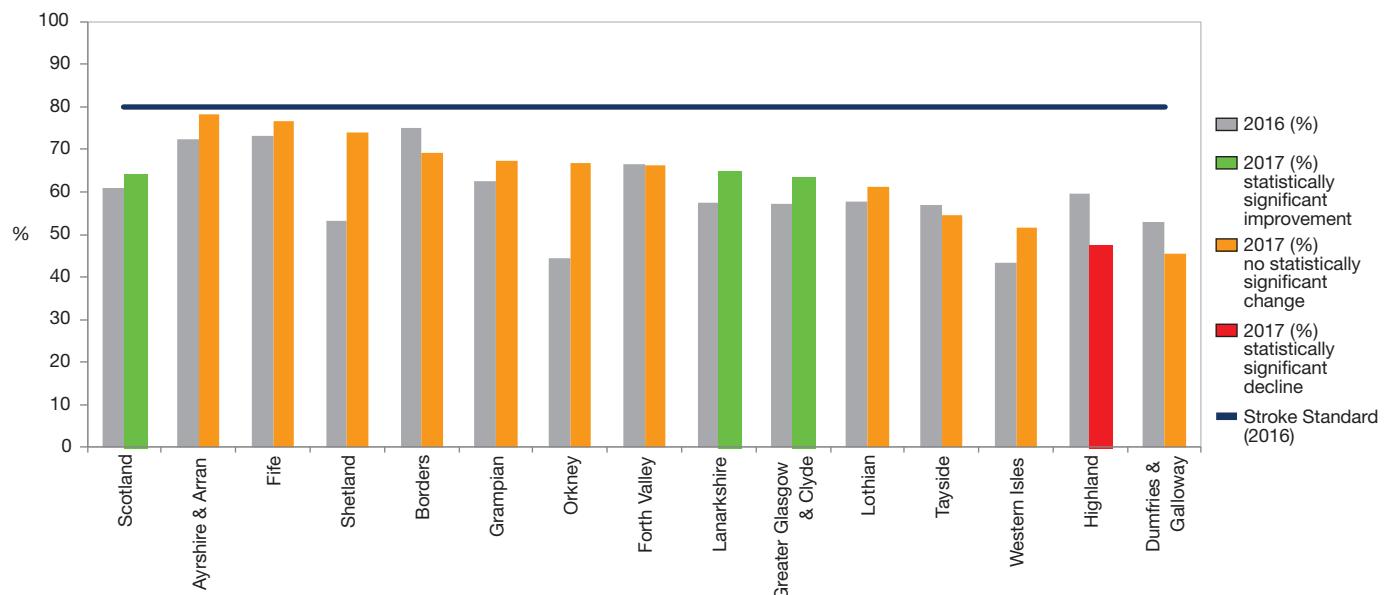

Notes regarding Chart 2.1:

1. **A 'bundle' involves a group of specific interventions/ processes of care that significantly improve patient outcome if done together rather than separately and this also improves the consistency with which patients are managed.**
   The Stroke Care Bundle involves four components: admission to a Stroke Unit, swallow screen, brain scan and aspirin. 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 section 1 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.

2. 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.

3. **Uist & Barra Hospital, NHS Western Isles does not have a CT scanner** but patients are airlifted to Western Isles Hospital and a proportion may arrive in sufficient time to have brain imaging within 24 hours of admission.

4. During 2017 NHS Dumfries & Galloway opened the new Dumfries & Galloway Royal Infirmary.

Chart 2.2: (Hospital) Percentage of stroke patients receiving an 'appropriate' Stroke Care Bundle (i.e. Stroke Unit admission, swallow screen, brain scan and aspirin) – 2017 data (based on *final* diagnosis).

* The Scottish Stroke Care Standard for swallow screen within 4 hours was introduced from April 2016 and complete data are unavailable prior to this date because swallow screen time was only recorded from April 2016. Prior to April 2016 only swallow screen date was recorded.
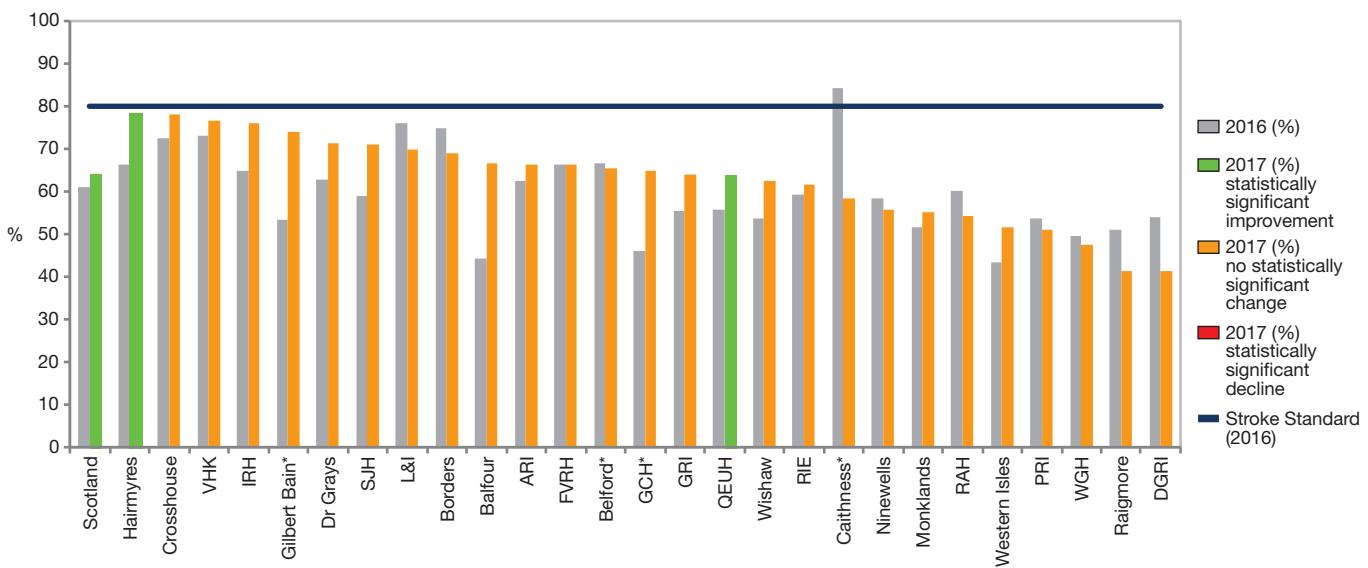
Notes regarding Chart 2.2:

1. **A 'bundle' involves a group of specific interventions/ processes of care that significantly improve patient outcome if done together rather than separately and this also improves the consistency with which patients are managed.**
   The Stroke Care Bundle involves four components: admission to a Stroke Unit, swallow screen, brain scan and aspirin. 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 section 1 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.
2. 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.
3. **Uist & Barra Hospital, NHS Western Isles does not have a CT scanner** but patients are airlifted to Western Isles Hospital and a proportion may arrive in sufficient time to have brain imaging within 24 hours of admission.
4. During 2017 NHS Dumfries & Galloway opened the new Dumfries & Galloway Royal Infirmary.
5. Uist and Barra Hospital has been excluded from this chart due to very low patient numbers.

3   Inpatients

During 2017 over 9,000 patients were admitted to hospital with a final diagnosis of stroke and entered into the SSCA. This is a similar number to 2016. The characteristics of patients admitted to hospital are shown in Table 2.1. Ischaemic stroke was identified in 88% of patients and haemorrhagic stroke in 12%. There were similar numbers of men and women with a mean age of 70 years for men and 76 years for women; this pattern varied across NHS boards. As in 2016, where the average age of stroke patient was lower, the percentage of stroke patients in categories of greater deprivation in the Scottish Index of Multiple Deprivation (SIMD) was greatest. This reflects the recognised association between social deprivation and risk of stroke and emphasises the need to identify and address the factors contributing to stroke risk in this population.

Variations in case mix between NHS boards were observed as in previous years and this was particularly marked for the variable relating to ability to walk. This apparent variation in case mix emphasises the need to correct any patient outcome results for variations in stroke severity.

Table 3.2 lists the numbers of patients discharged from each hospital along with availability of specialist stroke unit beds in that hospital. Glasgow Royal Infirmary and the Queen Elizabeth University Hospital Glasgow are the only two settings to have adopted the Hyper-Acute Stroke Unit (HASU) model involving a small number of beds with a short length of stay aiming to facilitate early assessment, diagnosis, and treatment before moving patients to another ward. The majority of hospitals have an integrated stroke unit, which aims to combine both acute care and ongoing rehabilitation. Several hospitals also had stroke rehabilitation unit beds in an off-site hospital.

3.1   Summary and key findings relating to inpatient data

The most important overall indicator of the performance of stroke services within NHS boards or hospitals is their performance against the stroke care bundle as described in Section 2. The cumulative proportions of patients with an initial and final diagnosis of stroke that were managed in accordance with all four standards, which comprised the care bundle, are 71% and 64% respectively. Performance varied between NHS boards although less so than in 2016. Chart 3.1 shows the ranking of NHS boards which shows that the best performing were NHS Ayrshire & Arran and NHS Fife. One NHS board showed a significant decline in the proportion achieving the bundle in 2017 (data based on final diagnosis). However, most NHS boards showed an improvement in the achievement of the bundle and there is also an improvement across the country as a whole.

The charts also show similar data presented by hospital.

The proportion of patients across Scotland with a final diagnosis of stroke who accessed a stroke unit on the day of admission or the day after (82%) was the same as in 2016 (82%) and this still falls below the standard of 90% (see chart 3.2). This indicator is important because early admission to a stroke unit has been associated with a reduced likelihood of dying after stroke. The only hospitals with defined stroke units to exceed the 90% standard were Crosshouse, Hairmyres, and Inverclyde Hospital. Small hospitals such as those on the Islands and in rural NHS boards perform well against this standard because their only medical ward fulfils our definition of a stroke unit.

Chart 3.1: Relative ranking of NHS board performance against inpatient bundle, 2016 and 2017 data (*initial* and *final* diagnosis).
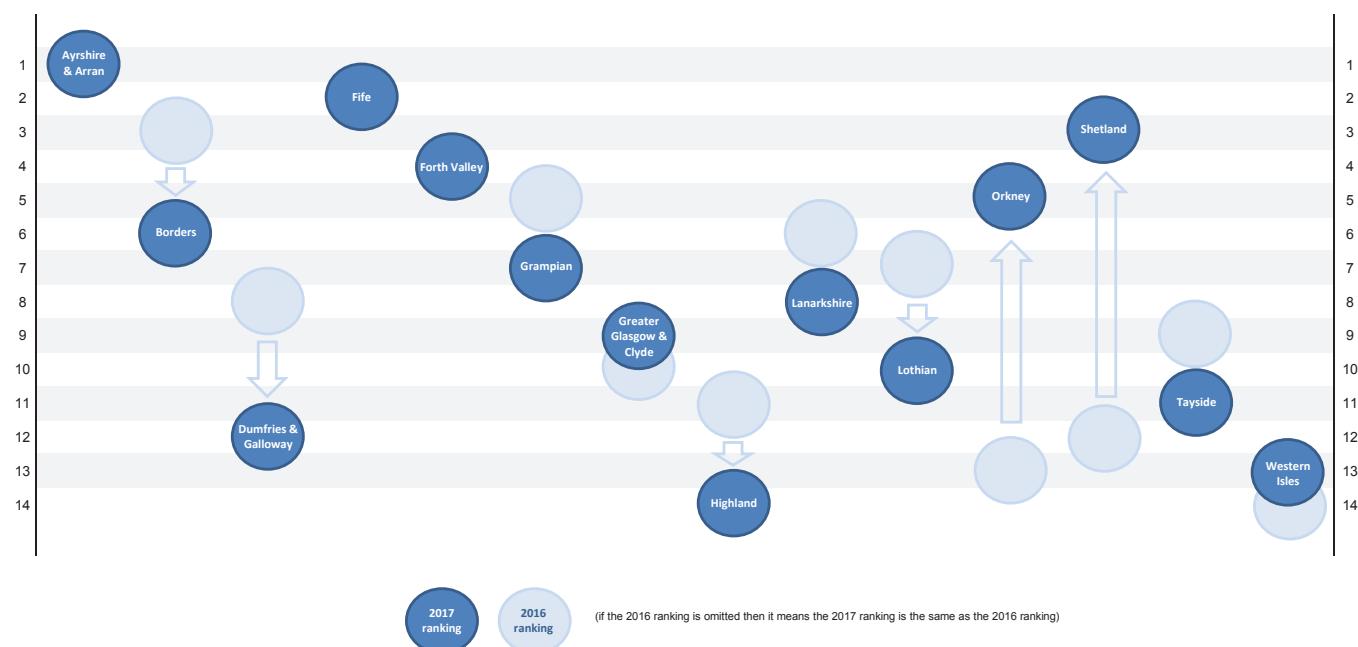
Notes regarding Chart 3.1:
1. A 'bundle' involves a group of specific interventions/ processes of care that significantly improve patient outcome if done together rather than separately and this also improves the consistency with which patients are managed.
2. The Stroke Care Bundle involves four components: admission to a Stroke Unit, swallow screen, brain scan and aspirin. 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 diagram in Section 1 of this report describes the different categories of bundle depending on patients' eligibility.
3. 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.
4. Data for 2016 have been revised since their publication in the 2017 Scottish Stroke Improvement Plan.

For larger hospitals, the standard can be challenging because stroke patients are often boarded into medical wards and stroke unit beds filled with non-stroke patients particularly during periods of high bed demand. The number of stroke unit beds appears to be an important determinant of performance but there is also considerable variation in how well hospitals can manage these stroke beds. The degree of priority in achieving this standard appears to vary between hospitals.

After a patient has been identified as having a possible stroke a swallow assessment should be done early to allow the patient to receive oral medications, food and fluids safely. Previous research has suggested that the greater the delay to swallow screen the higher the risk of stroke-associated pneumonia. Therefore, the swallow assessment needs to be clearly recorded to ensure that patients who cannot swallow safely are not put at risk of aspiration and subsequent serious consequences. Chart 3.3 shows the proportion of patients with a final diagnosis of stroke in Scotland who had a swallow screen within 4 hours of admission with the hospitals ranked from the highest to the lowest. Overall, 75% of patients were treated in accordance with this standard and this is a small but significant improvement since 2016 (72%). However, this still falls short of the target of 100%. The best performing hospitals were Lorn and Islands, Dr Gray's, and Crosshouse, and overall most hospitals showed an improvement since 2016. Unfortunately, there were declines in performance in Caithness and the results in Ayr were well below those of other hospitals. However these hospitals are operating in a different manner from most general hospitals in Scotland. Chart 3.6 shows the percentage of patients who had a swallow screen within 4, 12, and 24 hours of admission

Important measures to improve swallow screen performance include early identification of stroke patients and having nurses trained to initiate a swallow screen and record the result clearly in the notes in the admission wards.

An early brain scan is required to exclude alternative causes of stroke symptoms such as brain tumours and to distinguish stroke due to bleeding into the brain from those caused by blocked arteries. This is important to allow treatment with thrombolysis, anticoagulants, and antiplatelet drugs. In 2017, 93% of stroke patients received a brain scan within 24 hours of admission, which was the same as in 2016. This falls just short of the national standard of 95% of stroke patients receiving a brain scan within 24 hours of admission (chart 3.4). However, nine individual hospitals met or exceeded the new standard. The proportion being scanned within 4 hours of arrival rose from 57% in 2016 to 60% in 2017. Very early scanning is an important factor for patients who can benefit from thrombolysis and thrombectomy. Most hospitals operate a fast track to the brain scanning process for eligible patients.

After a brain scan has excluded bleeding on the brain patients should receive aspirin as soon as possible since this has been shown to improve outcomes. Exceptions are those who are given thrombolysis, or taking an anticoagulant, or are on an alternative antiplatelet drug, or also those who are allergic to aspirin. The standard for 2017 onwards is that 95% of patients without contra-indications should receive aspirin on the day of admission or the day after. In 2017 91% of patients with a final diagnosis of ischaemic stroke and no clear contra-indication received aspirin on the day of admission or the day after compared with 90% in 2016. Six individual hospitals met or exceeded this standard.

Chart 3.2: Percentage of stroke patients admitted to a Stroke Unit within 1 day of admission to hospital, 2016 and 2017 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.
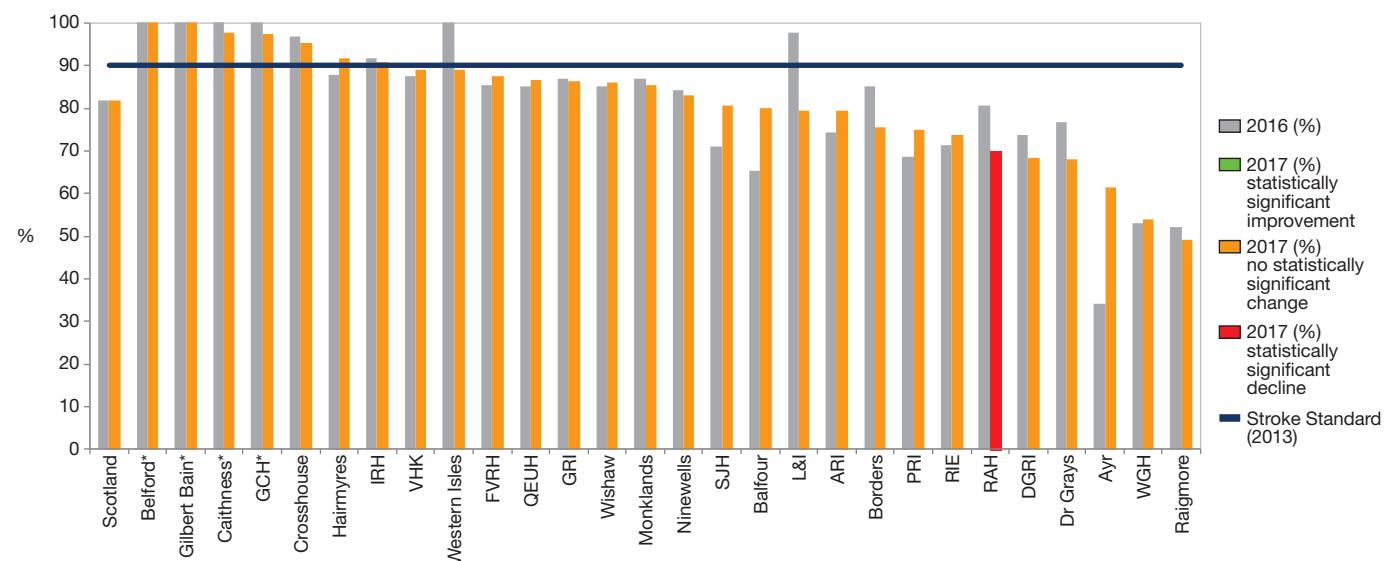

Notes regarding Chart 3.2:
1. **The denominator for the admission to Stroke Unit excludes:** in-hospital strokes, patients discharged within 1 day and transfers in from another hospital.
2. Due to the number of beds within some of the hospitals indicated (*) and the small numbers of stroke admissions 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. **The data included in Chart 3.2 were extracted from eSSCA on the 22nd March 2018.** Changes/ updates to the data following this date will therefore not feature in this analysis. The data relate to patients with *final* diagnosis of stroke and are for **calendar years 2016 and 2017** (i.e. 1 January - 31 December).
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. During 2016, NHS Ayrshire & Arran reorganised its services for acute stroke patients, transferring to Crosshouse Hospital the services previously provided in Ayr Hospital.
6. During 2017 NHS Dumfries & Galloway opened the new Dumfries & Galloway Royal Infirmary.
7. Uist and Barra Hospital has been excluded from this chart due to very low patient numbers.

Chart 3.3: Percentage of stroke patients with a swallow screening within 4 hours of admission, April-December 2016 and April-December 2017 data (based on *final* diagnosis).

Horizontal line reflects Scottish Stroke Care Standard (2016) of 100% of stroke patients swallow screened within 4 hours of admission.
* The Scottish Stroke Care Standard for swallow screen within 4 hours was introduced from April 2016 and complete data are unavailable prior to this date because swallow screen time was only recorded from April 2016. Prior to April 2016 only swallow screen date was recorded.
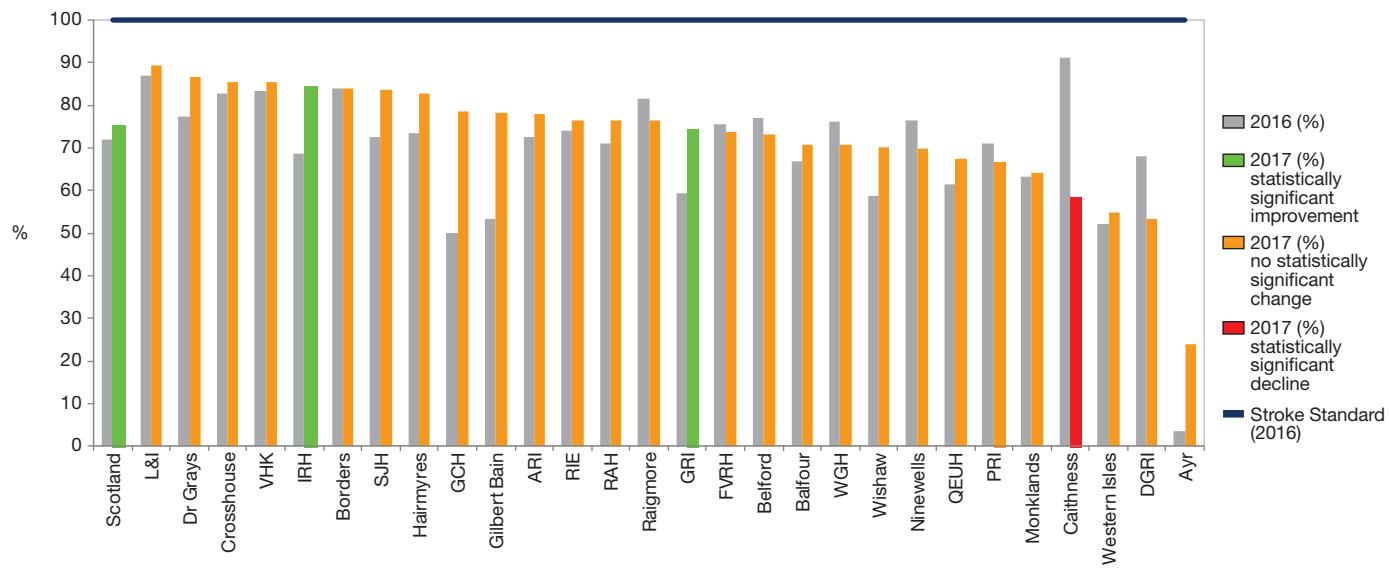
Notes regarding Chart 3.3:

1. **The data included in Chart 3.3 were extracted from eSSCA on the 22nd March 2018.** Changes/ updates to the data following this date will therefore not feature in this analysis. The data relate to patients with *final* diagnosis of stroke and are for the nine month period 1 April - 31 December in **years 2016 and 2017**).

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.

3. During 2016, NHS Ayrshire & Arran reorganised its services for acute stroke patients, transferring to Crosshouse Hospital the services previously provided in Ayr Hospital.

4. During 2017 NHS Dumfries & Galloway opened the new Dumfries & Galloway Royal Infirmary.

5. A small proportion of patients with query in-hospital wake-up strokes are excluded from the chart.

6. Uist and Barra Hospital has been excluded from this chart due to very low patient numbers.

Chart 3.4: Percentage of stroke patients with a brain scan within 24 hours of admission, 2016 and 2017 data (based on *final* diagnosis).

Horizontal solid line reflects Scottish Stroke Care Standard (2016) of 95% of stroke patients to receive brain imaging within 24 hours of admission.
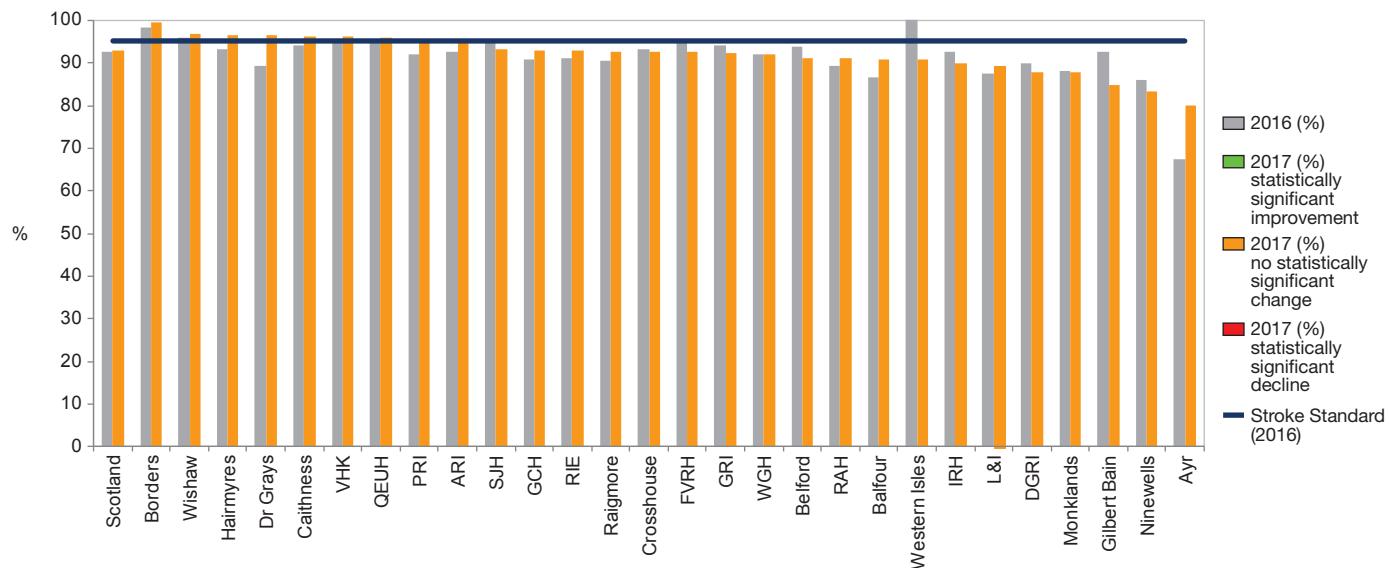

Notes regarding Chart 3.4:

1. **Uist & Barra Hospital, NHS Western Isles does not have a CT scanner** but patients are airlifted to Western Isles Hospital and a proportion may arrive in sufficient time to have brain imaging within 24 hours of admission.

2. **The data included in Chart 3.4 were extracted from eSSCA on the 22nd March 2018.** Changes/ updates to the data following this date will therefore not feature in this analysis. The data relate to patients with final diagnosis of stroke and are for **calendar years 2016 and 2017** (i.e. 1 January - 31 December).

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

4. During 2016, NHS Ayrshire & Arran reorganised its services for acute stroke patients, transferring to Crosshouse Hospital the services previously provided in Ayr Hospital.

5. During 2017 NHS Dumfries & Galloway opened the new Dumfries & Galloway Royal Infirmary.

6. A small proportion of patients with query in-hospital wake-up strokes are excluded from the chart.

Chart 3.5: Percentage of acute ischaemic stroke patients given aspirin in hospital within 1 day of admission, 2016 and 2017 data (based on *final* diagnosis).

Horizontal line reflects Scottish Stroke Care Standard (2013) of 95% ischaemic stroke patients to receive aspirin within 1 day of admission.
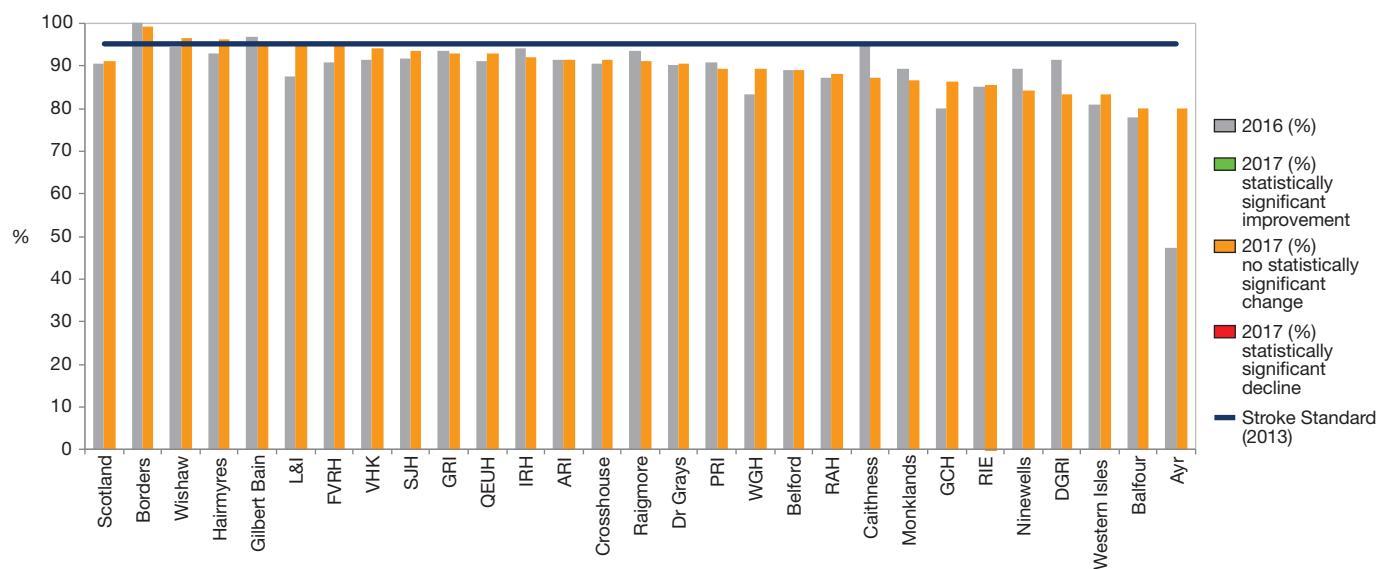

Notes regarding Chart 3.5:
1. The denominator for the **percentages excludes patients with valid reasons not to give early aspirin (e.g. contraindications) and those in receipt of thrombolysis where aspirin may be delayed for clinical reasons.** A small proportion of patients with query in-hospital wake-up strokes are also excluded.
2. **The data included in Chart 3.5 were extracted from eSSCA on the 22nd March 2018.** Changes/ updates to the data following this date will therefore not feature in this analysis. The data relate to patients with final diagnosis of stroke and are for **calendar years 2016 and 2017** (i.e. 1 January - 31 December).
3. In some instances, **data entered into eSSCA are assigned to admitting hospitals other than the main acute hospitals** participating in the Scottish Stroke Care Audit. Data for these hospitals are combined with data for their respective main acute hospitals.
4. During 2016, NHS Ayrshire & Arran reorganised its services for acute stroke patients, transferring to Crosshouse Hospital the services previously provided in Ayr Hospital.
5. During 2017 NHS Dumfries & Galloway opened the new Dumfries & Galloway Royal Infirmary.
6. Uist and Barra Hospital has been excluded from this chart due to very low patient numbers.

Chart 3.6:   Percentage of stroke patients with a swallow screen by number of hours to swallow screen, April - December 2017 data (based on *final* diagnosis).

Horizontal solid line reflects Scottish Stroke Care Standard (2016) of 100% of stroke patients to receive a swallow screen within 4 hours of admission.

* The Scottish Stroke Care Standard for swallow screen within 4 hours was introduced from April 2016 and complete data are unavailable prior to this date because swallow screen time was only recorded from April 2016. Prior to April 2016 only swallow screen date was recorded.

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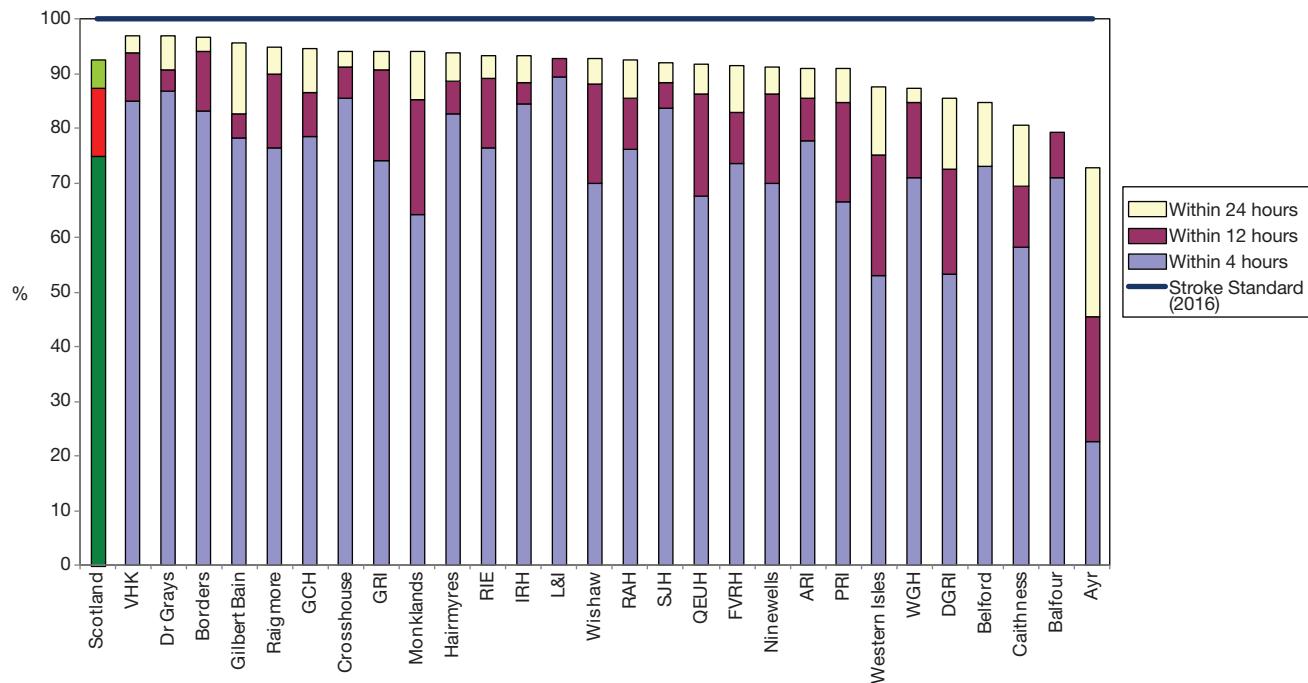

Notes regarding Chart 3.6:

1. **The data included in chart 3.6 were extracted from eSSCA on the 22nd March 2018.** Changes/ updates to the data following this date will therefore not feature in this analysis. The data relate to patients with *final* diagnosis of stroke and are for the nine month period (1 April - 31 December 2017).

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.

3. There may be some slight differences in the numerators and denominators when comparing Chart 3.6 to Chart 3.3 because some records for in-hospital stroke patients may have been assigned to their year of admission rather than their year of onset. This principally affects records around the period of December of one year and January of the next year where the date of admission is in one year and the date of onset is in the next year.

4. Uist and Barra Hospital has been excluded from this chart due to very low patient numbers.

5. During 2017 NHS Dumfries & Galloway opened the new Dumfries & Galloway Royal Infirmary.

Chart 3.7: Percentage of stroke patients with a brain scan by number of hours to scan, 2017 data (based on *final* diagnosis).

Horizontal solid line reflects Scottish Stroke Care Standard (2016) of 95% of stroke patients to receive a brain scan within 24 hours of admission. Note that the Scotland column in the chart is coloured light green and dark green simply to differentiate it from the hospital columns and the colours are not indicative of performance. Light green corresponds to 'Within 24 Hours' and dark green corresponds to 'Within 4 Hours'.
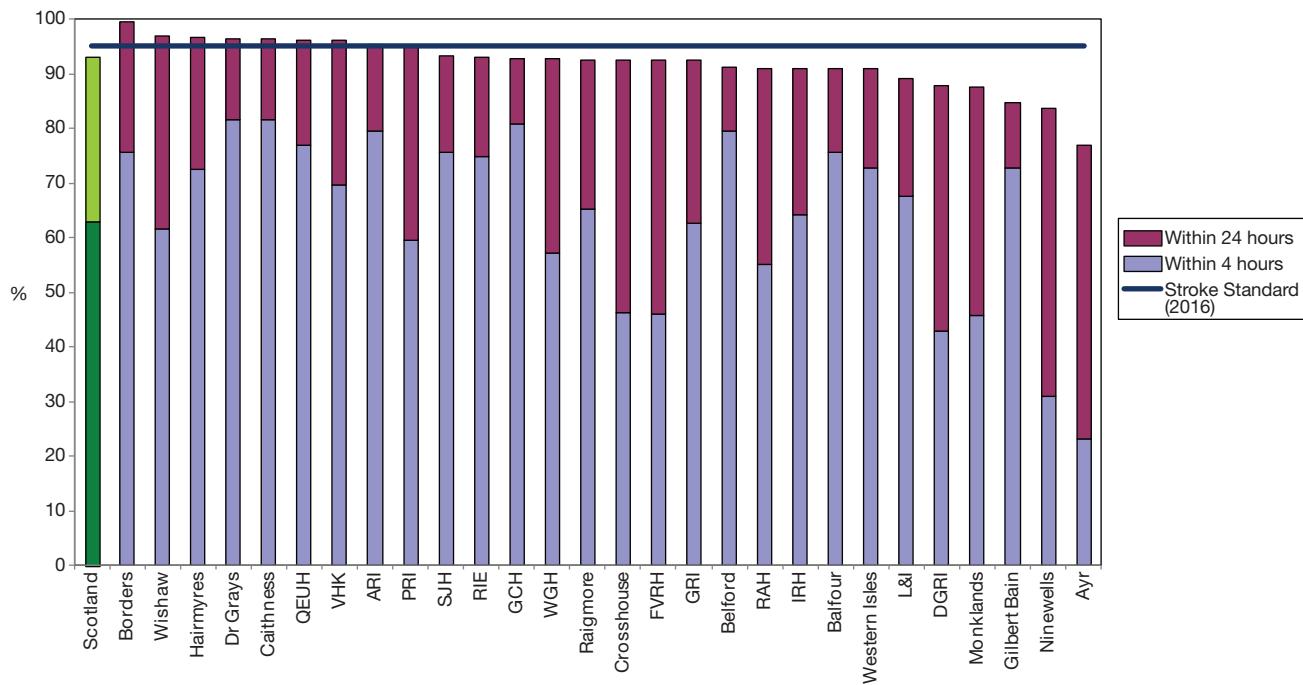

Notes regarding Chart 3.7:

1. In some instances, **data entered into eSSCA are assigned to admitting hospitals other than the main acute hospitals** participating in the Scottish Stroke Care Audit. Data for these hospitals are combined with data for their respective main acute hospitals.
2. During 2017 NHS Dumfries & Galloway opened the new Dumfries & Galloway Royal Infirmary.
3. Uist and Barra Hospital has been excluded from this chart due to very low patient numbers.
4. There may be some slight differences in the numerators and denominators when comparing Chart 3.7 to Chart 3.4 because some records for in-hospital stroke patients may have been assigned to their year of admission rather than their year of onset. This principally affects records around the period of December of one year and January of the next year where the date of admission is in one year and the date of onset is in the next year.

Chart 3.8: Percentage of acute ischaemic stroke patients given aspirin in hospital by number of days to receipt, 2017 data (based on *final* diagnosis).

Horizontal line reflects Scottish Stroke Care Standard (2013) of 95% of acute ischaemic stroke patients to receive aspirin within 1 day of admission.

Note that the Scotland column in the chart is coloured green and red simply to differentiate it from the hospital columns and the colours are not indicative of performance. Light green corresponds to '2 days', red corresponds to '1 day' and dark green corresponds to 'Same Day'.
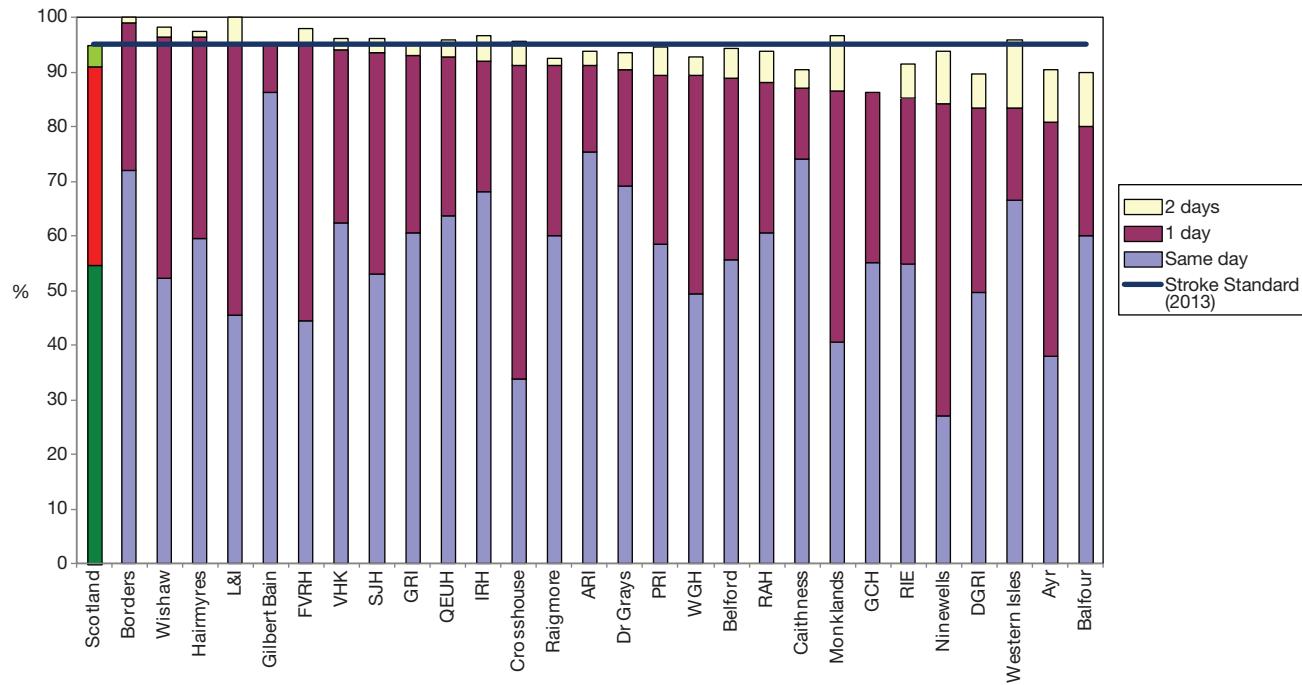
Notes regarding Chart 3.8:

1. In some instances, **data entered into eSSCA are assigned to admitting hospitals** other than the main acute hospitals participating in the Scottish Stroke Care Audit. Data for these hospitals are combined with data for their respective main acute hospitals.
2. The denominator for the percentages excludes patients with valid contraindications to aspirin and those in receipt of thrombolysis where aspirin may be delayed for clinical reasons.
3. During 2017 NHS Dumfries & Galloway opened the new Dumfries & Galloway Royal Infirmary.
4. Uist and Barra Hospital has been excluded from this chart due to very low patient numbers.
5. There may be some slight differences in the numerators and denominators when comparing Chart 3.8 to Chart 3.5 because some records for in-hospital stroke patients may have been assigned to their year of admission rather than their year of onset. This principally affects records around the period of December of one year and January of the next year where the date of admission is in one year and the date of onset is in the next year.

One group of patients in whom it is particularly challenging to meet the standards are the patients who have a stroke whilst an inpatient. Early recognition of the diagnosis is often difficult because patients may have the stroke whilst under anaesthetic, or during an intensive care admission, or on a background of complex co-morbidities. There are sometimes delays in referral to the stroke service. About 5% of strokes in Scotland occur whilst the patient is an inpatient but this varies between hospitals and probably reflects the services they provide.

Chart 3.9: Comparison of *initial* diagnosis of stroke versus *final* diagnosis of stroke, 2017 data.

Note that the Scotland column in the chart is coloured green and red simply to differentiate it from the hospital columns and the colours are not indicative of performance. Light green corresponds to 'Final Only', red corresponds to 'Initial & Final' and dark green corresponds to 'Initial Only'.
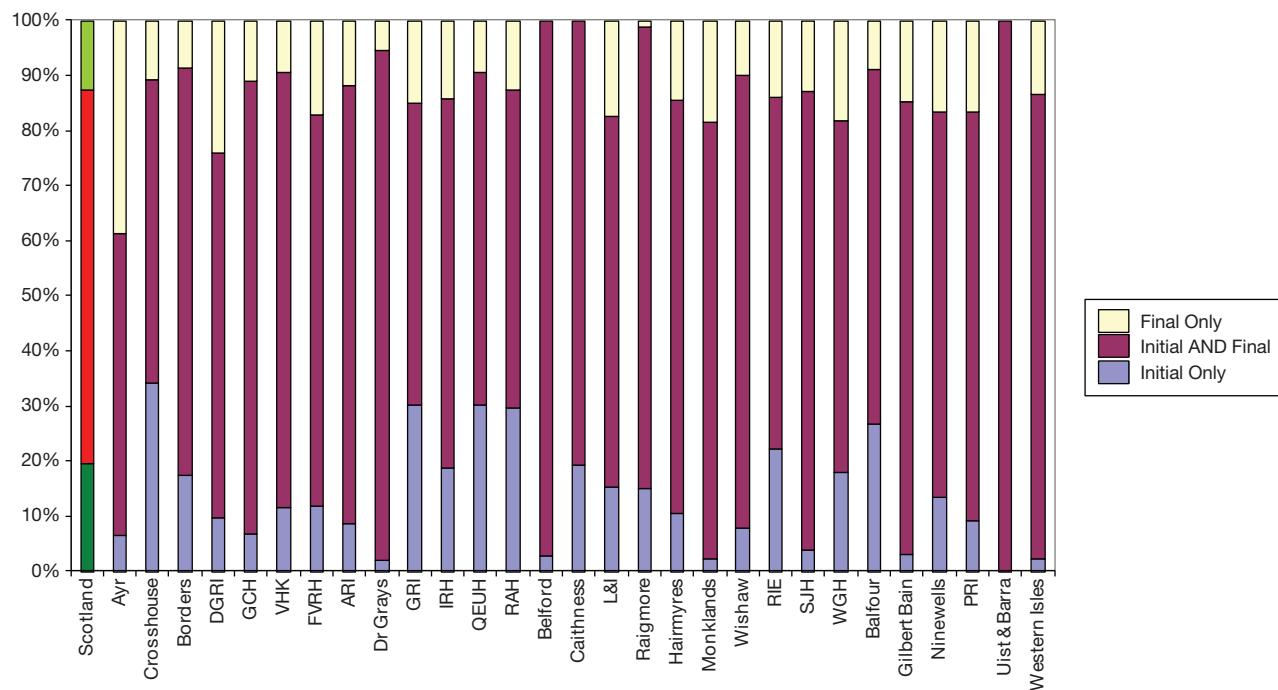
Notes regarding Chart 3.9:

1. Both initial diagnosis and final diagnosis may be recorded in the SSCA data relating, respectively, to whether a patient may be suspected of having had a stroke and whether the stroke diagnosis is confirmed on investigation. Chart 3.9 presents information on three groups of patients, those with:
   - an initial diagnosis of stroke i.e. possible stroke patients who may turn out to have another diagnosis once investigations are complete;
   - a final diagnosis of stroke i.e. patients confirmed as having had strokes when their initial diagnosis may have been considered as something else;
   - an initial diagnosis and final diagnosis of stroke i.e. patients suspected of having had a stroke who have this diagnosis confirmed on investigation.
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.
3. During 2017 NHS Dumfries & Galloway opened the new Dumfries & Galloway Royal Infirmary.

3.2   Stroke Unit Information

Table 3.1:   Stroke Unit Information.

Hospital Name	Number of acute strokes discharged in 2017	Hyper Acute Stroke Unit (HASU) beds	Acute Stroke Unit (ASU) beds	Integrated Stroke Unit (ISU) beds	Stroke Rehabilitation Unit (SRU) beds on acute site	SRU beds off acute site	"Comments (e.g. Off-site Locations)"
Ayr Hospital	26	0	0	0	24	0	24 stroke rehab beds within Station 10
Crosshouse Hospital, Kilmarnock	836	0	24	0	0	20	20 stroke rehabilitation beds within 30 bedded Redburn Rehabilitation ward, Ayrshire Central Hospital
Borders General Hospital, Melrose	176	0	0	12	0	0	
Dumfries & Galloway Royal Infirmary (DGRI)	228	0	0	14	0	0	
Galloway Community Hospital (GCH)	42	0	0	0	0	0	20 bedded unit with mix of medical and surgical admissions including hyperacute and acute stroke
Victoria Hospital, Kirkcaldy (VHK)	624	0	0	24	0	41	QMH Ward 6 - 15 beds within a stroke and general rehabilitation ward. Letham ward Cameron Hospital - 12 funded beds but currently operating 14 with increase to 15/16 beds as necessary (rehabilitation for over 65). Sir George Sharp Unit (rehabilitation for under 65) 6 to 7 out of 12 beds.
Forth Valley Royal Hospital, Larbert (FVRH)	537	0	0	30	0	10	Stirling Community Hospital - 26 beds in total - 10 stroke rehabilitation and 16 for patients with generic rehabilitatiion requirements
Aberdeen Royal Infirmary (ARI)	655	0	16	0	0	40	Currently operating as stroke unit with 4 additional beds. Woodend - SRU: 34 beds. Fraserburgh - SRU: 6 beds
Dr Gray's Hospital, Elgin	149	0	0	8	0	0	
Glasgow Royal Infirmary (GRI)	671	5	0	38	0	24	24 off site rehab beds at Stobhill
Inverclyde Royal Hospital, Greenock (IRH)	222	0	0	17	0	0	
Queen Elizabeth University Hospital (QEUH), Glasgow	1 192	26	0	60	0	0	
Royal Alexandra Hospital, Paisley (RAH)	377	0	0	30	0	6	6 off site rehab beds at Vale of Leven
Belford Hospital, Fort William	33	0	0	0	0	0	Stroke beds within an acute medical ward
Caithness General Hospital, Wick	56	0	0	0	0	0	Stroke beds within an acute medical ward
Lorn & Islands Hospital, Oban	36	0	6	0	0	0	6 stroke beds within another ward
Raigmore Hospital, Inverness	328	0	0	22	0	0	
Hairmyres Hospital, East Kilbride	298	0	0	18	0	0	

Hospital Name	Number of acute strokes discharged in 2017	Hyper Acute Stroke Unit (HASU) beds	Acute Stroke Unit (ASU) beds	Integrated Stroke Unit (ISU) beds	Stroke Rehabilitation Unit (SRU) beds on acute site	SRU beds off acute site	"Comments (e.g. Off-site Locations)"
Monklands Hospital, Airdrie	306	0	0	20	0	0	
Wishaw General Hospital	398	0	0	25	0	0	
Royal Infirmary of Edinburgh at Little France (RIE)	916	0	0	44	0	0	SRU beds off site at Astley Ainslie Hospital.Charles Bell Pavilion - 40 beds and East Pavilion - 6 beds = 46 neuro rehab beds (no stroke beds are ring fenced)
St John's Hospital, Livingston (SJH)	274	0	0	22	0	0	
Western General Hospital, Edinburgh (WGH)	251	0	0	24	0	0	
Balfour Hospital, Orkney	36	0	0	0	0	0	No specific stroke beds but beds will be made available within acute ward as required.
Gilbert Bain Hospital, Shetland	34	0	0	0	0	0	Stroke beds within medical ward
Ninewells Hospital, Dundee	511	0	18	0	0	10	Stracathro has 10 stroke rehab beds. RVH - 16 rehab beds comprising of 14 designated stroke beds, 2 MFE/stroke "swing" beds. In addition, The Centre for Brain Injury has 16 beds for patients aged 16-65 years with either brain injury or stroke.
Perth Royal Infirmary (PRI)	202	0	0	22	0	0	
Uist & Barra Hospital, Benbecula	1	0	0	0	0	0	
Western Isles Hospital (WIH)	45	0	0	6	0	0	
TOTALS	9 460	31	64	436	24	151	

Note regarding Table 3.1:
1. The column "Number of acute strokes discharged in 2017" is based on inpatients with a final diagnosis of stroke discharged during Jan-Dec 2017 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 2017. Some patients discharged in 2017 may have been admitted in 2016 or earlier. Some patients admitted in 2017 may have been discharged in 2018.

3.3   Intermittent Pneumatic Compression

Patients admitted to hospital with stroke and who are unable to walk independently are at high risk of deep vein thrombosis (DVT) and pulmonary emboli (PE). These can be fatal. Recent large randomised trials[10,11] have shown that Intermittent Pneumatic Compression (IPC) reduces the risk of DVT and improves patients' chances of survival. The Scottish Intercollegiate Guidelines Network (SIGN), The National Institute for Health and Care Excellence (NICE) and European guidelines now recommend that IPC should be considered in patients who are immobile after a stroke.

SSCA has been collecting information on the use of IPC in Stroke Units to monitor the extent to which this effective treatment is being implemented. Table 2.1 shows that about 50% of patients admitted to hospital are unable to walk at the time of admission in 2017 and therefore should be considered for treatment with IPC.

Since 31st January 2014 SSCA collected data on whether IPC was offered and documented in the medical records within one week of admission. In 2017, 53% of immobile patients were offered IPC, a statistically significant improvement over the 43% offered IPC in 2016. Chart 3.10 shows the increased implementation of IPC since Jan 2014.

Chart 3.10: **Intermittent Pneumatic Compression (IPC) Percentage of immobile stroke patients offered IPC in Scotland Feb 2014 - Dec 2017**
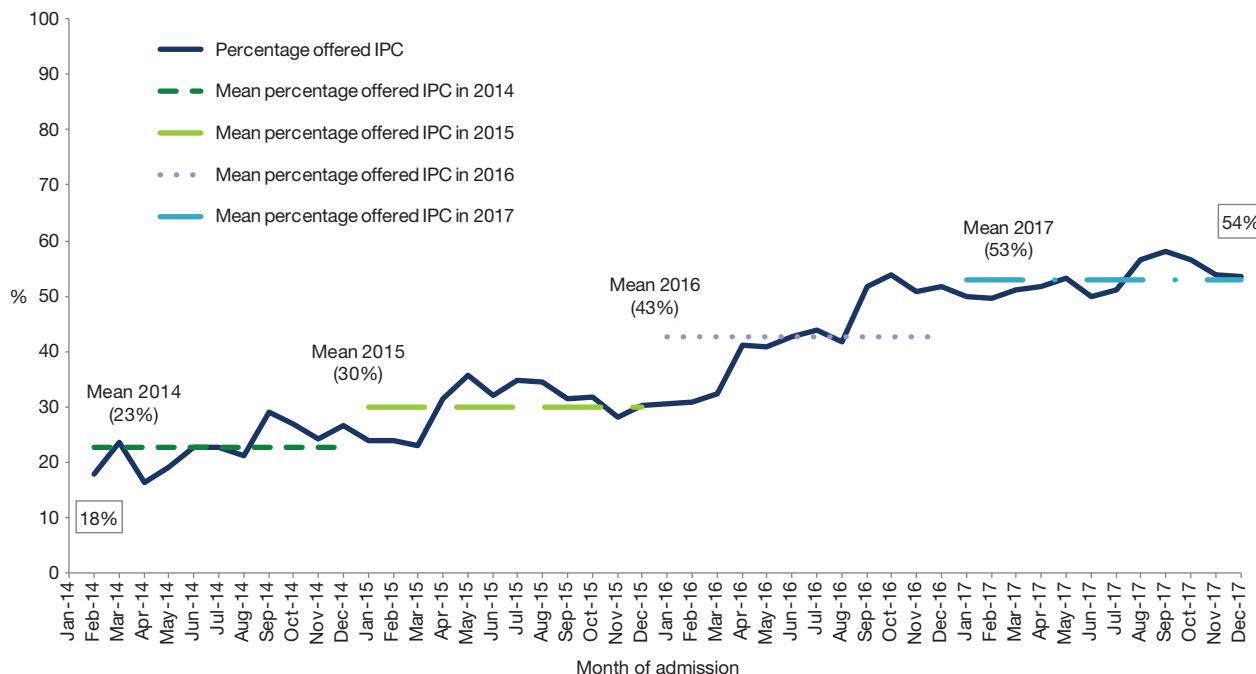
Barriers to achieving high levels of implementation include: lack of awareness of the problem of DVT/ PE and of the effectiveness of IPC amongst nursing and medical staff. Also, lack of training in the sizing, fitting and monitoring of its use. This is clearly an area on which to focus quality improvement. Even in those NHS boards who are offering IPC to large proportions of immobile patients there are challenges in optimising the adherence to the treatment whilst the patient remains at high risk of DVT – whilst immobile in the first 30 days of admission. Apart from the online training available via www.stroketraining. org, focused national training events have continued. Hospitals need to include the delivery of IPC within their quality improvement work.

3.4 Rehabilitation Audit Update

There will not be another rehabilitation sprint audit: instead the plan is to examine the organisational audit and priority 7 and 8 of the Scottish Stroke Improvement Plan, and investigate the possibility of merging these to provide a suitable source for rehabilitation data. This work will be complete by October 2018.

4   Outpatients

Summary and key findings relating to outpatient data

> Key findings:
>
> The overall message is that performance in many areas is very good but there is still considerable variability across Scotland; all NHS Boards are actively working on improvement where it's required.
>
> The majority of patients have their assessment and imaging completed within a week but there are some outliers, notably the Borders General Hospital, Forth Valley Royal Hospital and Perth Royal Infirmary where imaging takes more than a week for completion.

Outpatient assessment is an important part of all Stroke Services. In 2017 twenty hospitals contributed TIA Clinic data to the SSCA. NHS Greater Glasgow & Clyde (NHS GGC) have commenced data collection but this is not yet consistently collected across the entire Board area; it is expected that NHS GGC hospitals will be added in the 2019 report.

Data were collected on 3,914 outpatients in 2017, a similar number to 2016.

Chart 4.1 shows the percentage of patients with a definite cerebrovascular diagnosis seen in specialist stroke/TIA clinics with referral to examination time within four days, and shows 2016 and 2017 data. This chart thus displays compliance with the Scottish Stroke Care Standard that more than 80% of patients should be seen within four days of receipt of the referral. Early assessment facilitates earlier diagnosis and investigation, and should optimise early introduction of treatment to reduce the risk of a further vascular event. The percentage seen within four days varies quite widely, from 60% in Forth Valley Royal Hospital to 97% in Monklands Hospital.

Chart 4.2 shows the proportion of patients seen on the day of referral, the following day, and between days 2-4.

Clearly if the patient is to gain from their outpatient clinic attendance they should also have rapid completion of investigations so that appropriate medication and intervention can be arranged as soon as possible. This minimises the risk of a further stroke.

Chart 4.3 shows the median wait from stroke event to points on the outpatient imaging timeline, indicating the variation between different hospitals in waiting times. The majority of patients have their assessment and imaging completed within a week but there are some outliers, notably the Borders General Hospital, Forth Valley Royal Hospital and Perth Royal Infirmary where imaging takes more than a week for completion.

The risk of a recurrent stroke or TIA is known to be much higher in the first day or two rather than later. Therefore, it is important to start aspirin or clopidogrel as soon as the diagnosis is made. Ideally those seeing patients in general practice or emergency departments will start these treatments before the patient is seen in the specialist clinic where the diagnosis can be confirmed and refined.

Table 4.1 shows patients with a diagnosis of ischaemic stroke/TIA seen in specialist stroke/ TIA clinics and on anticoagulation at onset of the current cerebrovascular event or on aspirin or another antiplatelet at first assessment. The percentage will reflect the success of implementation of local protocols, education and in some areas TIA hotlines where the specialists can offer immediate advice on treatment by telephone.

There are other aspects of stroke outpatient performance which the audit does not currently address, for example whether the medical staff delivering the clinic always have stroke specialist training; the quality of support the patients receive e.g. in the information provided about the clinic and about stroke disease;

how effectively patients are selected for the clinics – we know there are many non stroke patients at stroke clinics but do not count them in the audit and arguably focussing stroke clinic capacity more effectively on stroke and TIA patients would create capacity to reduce waiting times. The audit may move on to include some of this information in future years.

Chart 4.1: Percentage of patients with definite cerebrovascular diagnosis seen in specialist stroke/ TIA clinic with referral to examination time within 4 days, 2016 and 2017 data.

Horizontal line reflects Scottish Stroke Care Standard (2013) of 80% of TIA patients being seen in specialist stroke/TIA clinic within 4 days of receipt of referral.
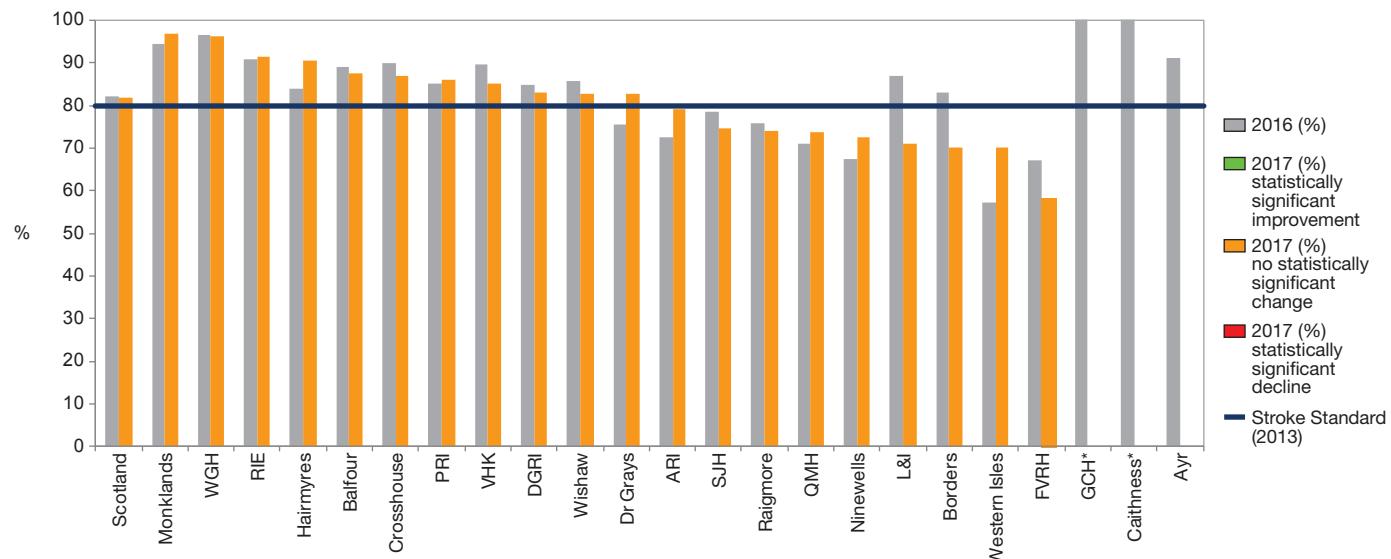
Notes regarding Chart 4.1:
1. **Data presented are for hospitals using eSSCA where all relevant dates** (last event, referral, referral-received, appointment and examination) **are present and ordered chronologically**.
2. The following **hospitals either do not hold specialist stroke/TIA clinics or do not collect and submit data to SSCA** – Caithness, QEUH, WIG, GCH, Belford, GRI, IRH, VI Glasgow, RAH, 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 4.2 separates the performance for these hospitals but they should be considered as a single NHS Fife service. The combined performance for 2016 and 2017 shows 82% and 81% respectively.
4. During 2016, NHS Ayrshire & Arran reorganised its services for acute stroke patients, transferring to Crosshouse Hospital the services previously provided in Ayr Hospital.
5. During 2017 NHS Dumfries & Galloway opened the new Dumfries & Galloway Royal Infirmary.

Chart 4.2: Percentage of patients with definite cerebrovascular diagnosis seen in specialist stroke/ TIA clinic with referral to examination time (days): same day and within 1, 2, 3 & 4 days, 2017 data.

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

Note that the Scotland column in the chart is coloured green, amber, red and grey simply to differentiate it from the hospital columns and the colours are not indicative of performance. Dark green corresponds to 'Same Day', red corresponds to '1 Day', amber corresponds to '2 Days', light green corresponds to '3 Days' and grey corresponds to '4 Days'.

The chart columns are ranked, by hospital, on the percentage within 4 days.

Notes regarding Chart 4.2:

1. In some instances, **data entered into eSSCA are assigned to admitting hospitals other than the main acute hospitals** participating in the Scottish Stroke Care Audit. Data for these hospitals are combined with data for their respective main acute hospitals.
2. The following **hospitals either do not hold specialist stroke/TIA clinics or do not collect and submit data to SSCA** – Caithness, QEUH, WIG, GCH, Belford, GRI, IRH, VI Glasgow, RAH, 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. During 2016, NHS Ayrshire & Arran reorganised its services for acute stroke patients, transferring to Crosshouse Hospital the services previously provided in Ayr Hospital.
4. During 2017 NHS Dumfries & Galloway opened the new Dumfries & Galloway Royal Infirmary.

Chart 4.3: Median waits since stroke event to points on the outpatient imaging timeline, 2016 and 2017 data.

There are instances where elements of the outpatient timeline share the same or similar data point and might not be visible. In these instances the most recent part of the timeline sits on top indicating that the elements have been delivered closely together.
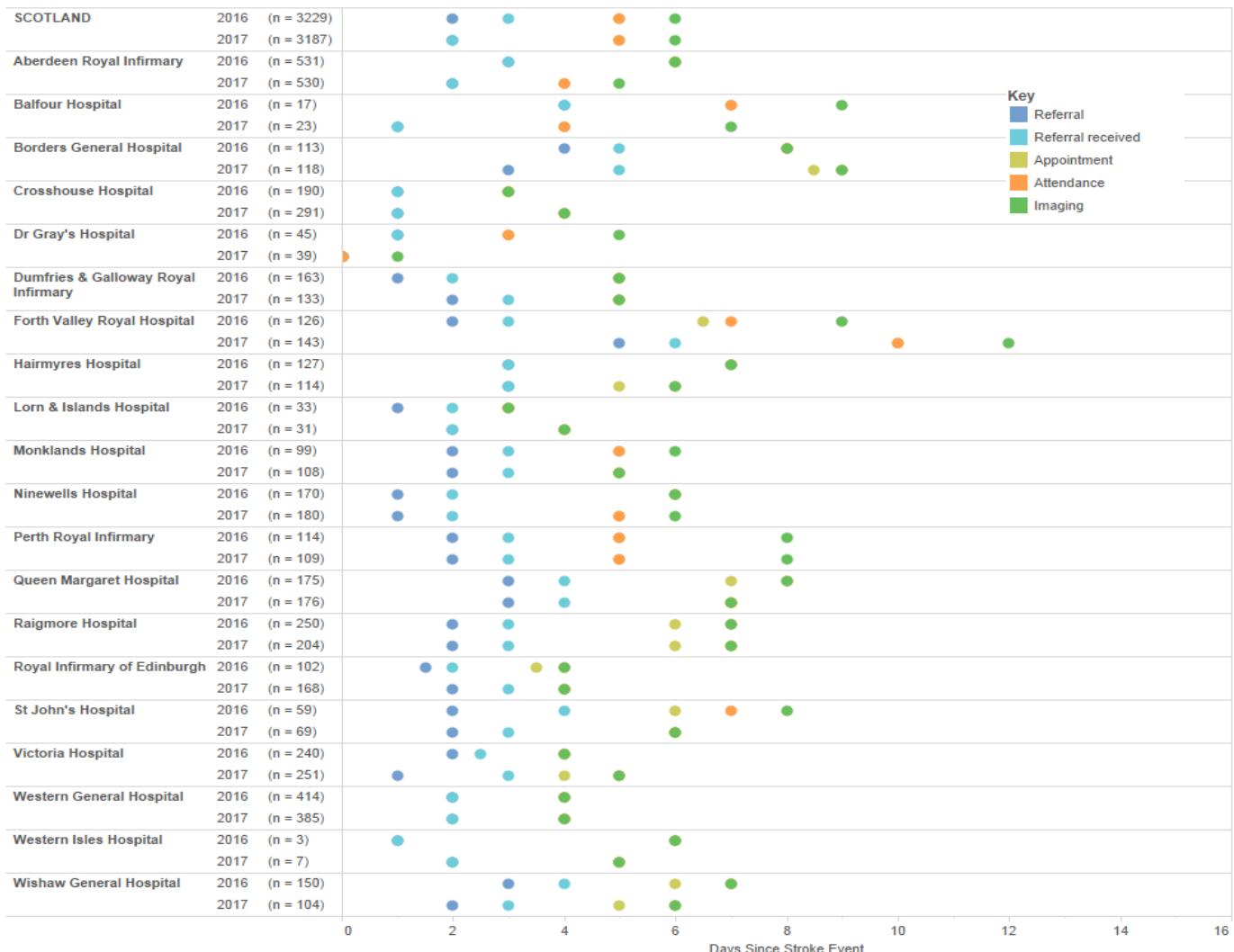
Notes regarding Chart 4.3:

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.
2. The following hospitals either do not hold specialist stroke/TIA clinics or do not collect and submit data to SSCA – Belford, GRI, IRH, QEUH, RAH, 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. The chart only includes events where all relevant dates (last event, event to referral, referral received, appointment, attendance and imaging) are present and ordered chronologically.
4. Cameron Hospital had only one event and Mid Argyll Hospital had only two events in 2017 and these have not been included in the chart. However, these events are included in calculating the median waits for Scotland.
5. During 2016, NHS Ayrshire & Arran reorganised its services for acute stroke patients, transferring to Crosshouse Hospital the services previously provided in Ayr Hospital. The 2016 events for Ayr Hospital have not been included separately in the chart but have been used to calculate the 2016 median waits for Scotland.
6. During 2017 NHS Dumfries & Galloway opened the new Dumfries & Galloway Royal Infirmary.

Table 4.1   Patients with ischaemic diagnosis seen in specialist stroke/ TIA clinics and on anticoagulation at onset of current cerebrovascular event or on aspirin or another antiplatelet at first assessment, 2017 data.

Note that some percentages are based on very small numbers of records.	Denominator	Patients with ischaemic diagnosis seen in specialist stroke/TIA clinics during 2017	
Hospital	Number with current AF	Number on anticoagulation at onset of current cerebrovascular event or on aspirin or another antiplatelet at first assessment	Percentage on anticoagulation at onset of current cerebrovascular event or on aspirin or another antiplatelet at first assessment
Ayr hospital	0	0	..
Crosshouse Hospital, Kilmarnock	356	149	42
Borders General Hospital, Melrose	161	111	69
Dumfries & Galloway Royal Infirmary (DGRI)	137	110	80
Queen Margaret Hospital, Dunfermline (QMH)	176	139	79
Victoria Hospital, Kirkcaldy (VHK)	256	187	73
Forth Valley Royal Hospital, Larbert (FVRH)	249	202	81
Aberdeen Royal Infirmary (ARI)	581	425	73
Dr Gray's Hospital, Elgin	46	25	54
Lorn & Islands Hospital, Oban	45	16	36
Raigmore Hospital, Inverness	218	182	83
Hairmyres Hospital, East Kilbride	181	138	76
Monklands Hospital, Airdrie	136	109	80
Wishaw General Hospital	126	92	73
Royal Infirmary of Edinburgh at Little France (RIE)	208	173	83
St John's Hospital, Livingston (SJH)	95	64	67
Western General Hospital, Edinburgh (WGH)	444	354	80
Balfour Hospital, Orkney	32	26	81
Ninewells Hospital, Dundee	230	208	90
Perth Royal Infirmary (PRI)	146	101	69
Western Isles Hospital (WIH)	**9**	**5**	**56**
Scotland	**3 832**	**2 816**	**73**

Notes regarding Table 4.1:
1. The source database, eSSCA, captures information about stroke type for outpatients via a question on stroke pathology but also includes additional variables to indicate Transient Ischaemic Attack (TIA), transient monocular blindness (TMB) and retinal artery occlusion (RAO). The cohort of patients for Table 4.1 is based on outpatients with an ischaemic stroke, TIA, TMB or RAO. This group differs slightly from the outpatient cohort used elsewhere in this National Report because of its restriction to stroke patients with ischaemic events rather than patients with any type of cerebrovascular diagnosis.

5 Atrial Fibrillation

Key Findings:

Year on year there has been an increase in the percentage of admitted Stroke/TIA patients with current Atrial Fibrillation (AF) who are on anticoagulation at presentation, from 23% in 2013 to 33% in 2017.

Between 2013 and 2017 there has been an increase in Stroke/TIA patients with current AF who are discharged on anticoagulants from 53% to 71% respectively.

Atrial Fibrillation (AF) is a common cardiac rhythm problem and one which becomes commoner with advancing age. Over the age of 60 it affects 4% of the population but by the age of 80 or more this figure is 10%. It is a concern because it increases the risk of ischaemic stroke. Unfortunately because AF does not usually cause symptoms, the first time it is detected is often when a person has a stroke or TIA. In addition, strokes which occur in people with AF tend to be more severe than other types of stroke, with more chance of them leading to death or long-term disability.

In some stroke patients AF is continuous and, therefore, fairly easy to identify by checking for an irregular pulse or doing an ECG. In other patients, AF can be intermittent and much more difficult to identify without putting on a cardiac monitoring device, which may need to be worn for many days. It is important to identify continuous or intermittent AF in ischaemic stroke because patients with these conditions are at a very high risk of further ischaemic strokes.

When AF is identified, patients would usually be commenced on anticoagulant (blood thinning) therapy unless there was a very good reason not to. This medication reduces the risk of further stroke. Traditionally this anticoagulant was Warfarin. In the last few years a group of drugs called Direct Oral Anticoagulants (DOACs) have become available. Examples include Apixaban, Dagibatran, Edoxaban and Rivaroxaban. DOACs are as effective as Warfarin in preventing strokes, generally have fewer side effects and are more convenient and less complicated to take than Warfarin. This should mean that fewer patients have a reason not to be anticoagulated and that more strokes can, therefore, be prevented.

Chart 5.1: **Ischaemic stroke/ TIA patients with current atrial fibrillation (AF) and on anticoagulation at onset of the current cerebrovascular event or prescribed/ recommended anticoagulation at discharge, Scotland, 2013 - 2017 data (final diagnosis).**
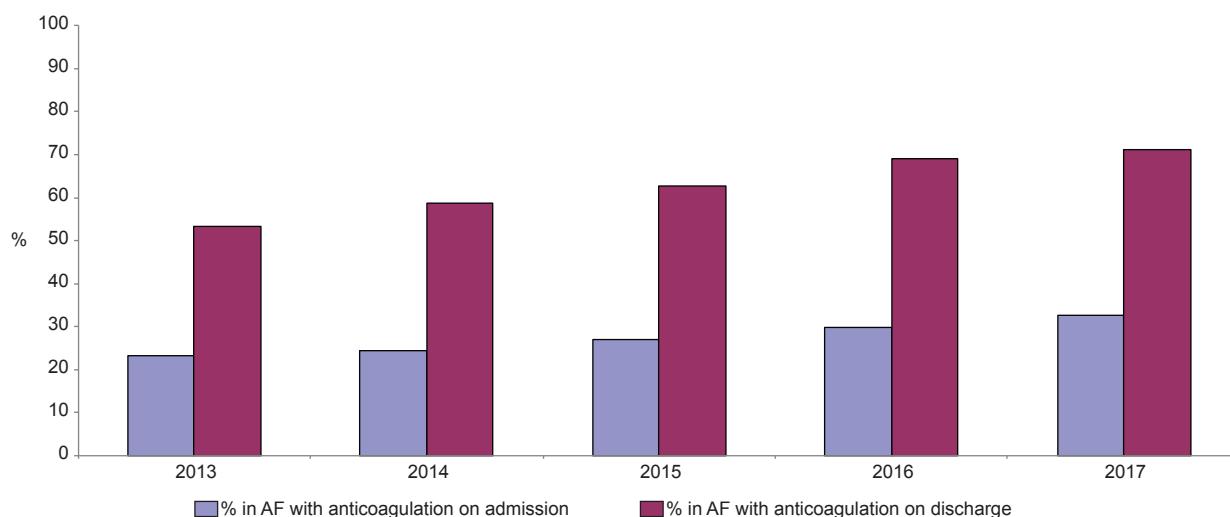
Notes regarding Chart 5.1:
1.   The source database, eSSCA, captures information about stroke type for inpatients via a question on stroke pathology but also includes an additional variable to indicate a final diagnosis of Transient Ischaemic Attack (TIA). The cohort of patients for Chart 5.1 is based 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.

Chart 5.1 shows that year on year there has been an increase in the percentage of admitted Stroke/ TIA patients with current AF who are on anticoagulation at presentation (blue boxes). Between 2013 and 2017 the figure has increased from 23% to 33%. This may reflect an increase in anticoagulant prescribing in Primary Care and could suggest that, in addition, more strokes are being prevented; with such patients never appearing in the SSCA data.

Separately, Chart 5.1 shows the percentage of patients with TIA/Ischaemic Stroke who have AF on admission and who are discharged on anticoagulants. Here the numbers have increased more impressively from 53% to 71%. This suggests increased/more consistent use of anticoagulants in patients post-stroke and will mean that fewer patients have recurrent stroke.

Efforts are currently underway to find ways to identify continuous AF in high risk groups of the population so that strokes can be avoided. Last year's report set out new standards to better identify patients with intermittent AF after an ischaemic stroke, so that recurrent strokes can be avoided. The Scottish Stroke Improvement Plan section of this year's report shows where the various NHS boards are with this standard. The Scottish Parliament's Cross Party Group on Heart Disease and Stroke has also recently highlighted the importance of improving detection and treatment of AF.

Table 5.1: **Patients with ischaemic diagnosis, seen in specialist stroke/ TIA clinics, with current atrial fibrillation (AF) and on anticoagulation, 2017 data.**

Note that some percentages are based on very small numbers of records.	Denominator	Patients with ischaemic diagnosis seen in specialist stroke/TIA clinics during 2017		Patients with ischaemic diagnosis seen in specialist stroke/TIA clinics during 2017	
Hospital	Number with current AF	Number with current AF and on anticoagulation at onset of current cerebrovascular event	Percentage with current AF and on anticoagulation at onset of current cerebrovascular event	Number with current AF and anticoagulation continued, commenced or recommended at first assessment	Percentage with current AF and anticoagulation continued, commenced or recommended at first assessment
Ayr hospital	0	0	..	0	..
Crosshouse Hospital, Kilmarnock	25	12	48	23	92
Borders General Hospital, Melrose	16	11	69	13	81
Dumfries & Galloway Royal Infirmary (DGRI)	15	11	73	15	100
Queen Margaret Hospital, Dunfermline (QMH)	21	9	43	17	81
Victoria Hospital, Kirkcaldy (VHK)	13	4	31	11	85
Forth Valley Royal Hospital, Larbert (FVRH)	24	12	50	21	88
Aberdeen Royal Infirmary (ARI)	72	48	67	66	92
Dr Gray's Hospital, Elgin	5	2	40	5	100
Lorn & Islands Hospital, Oban	3	1	33	3	100
Raigmore Hospital, Inverness	19	11	58	17	89
Hairmyres Hospital, East Kilbride	20	8	40	16	80
Monklands Hospital, Airdrie	19	9	47	15	79
Wishaw General Hospital	12	5	42	8	67
Royal Infirmary of Edinburgh at Little France (RIE)	14	8	57	13	93
St John's Hospital, Livingston (SJH)	12	8	67	10	83
Western General Hospital, Edinburgh (WGH)	28	13	46	27	96
Balfour Hospital, Orkney	2	2	100	2	100
Ninewells Hospital, Dundee	21	12	57	18	86
Perth Royal Infirmary (PRI)	18	7	39	15	83
Western Isles Hospital (WIH)	**0**	**0**	..	**0**	..
Scotland	**359**	**193**	**54**	**315**	**88**

Note regarding Table 5.1:

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 5.1 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 and Thrombectomy

Emergency treatments to unblock arteries causing ischaemic stroke

In 2017, 9345 patients were admitted to hospital with a final diagnosis of stroke. Of these 8085 (86.5%) had an ischaemic stroke. Early treatment with intravenous thrombolysis (alteplase), and/or mechanical thrombectomy ('clot retrieval') has been shown in large randomised studies to greatly improve the outcomes for such patients.

> ### Key findings:
>
> The total number of patients receiving thrombolysis increased in 2017 to its highest level so far - 12.9% of ischaemic stroke patients (19 per 100,000 of population).
>
> In 2017, 59% of patients were thrombolysed within one hour (55% in 2016).
>
> The standard of 80% treated within 1 hour of arrival at hospital has been exceeded in two hospitals in 2017, the first time any hospital has achieved this standard.
>
> Median door to needle times vary between hospitals, and all hospitals have a lot of scope for improvement which would bring real benefits to patients.
>
> Only 13 patients underwent mechanical thrombectomy in 2017, a tiny proportion of the 600 patients with severe ischaemic stroke who would be expected to benefit from such treatment.
>
> The Scottish Government have established a planning group with the intention of improving access to this very effective treatment as quickly and equitably as possible.

Thrombolysis

The studies demonstrating the effectiveness of thrombolysis given within 4.5 hours of a known onset time were completed by 2012, and since then the numbers treated in Scotland have increased from 13 to 19/100,000 population in 2017. In 2017, 1046 (12.9%) patients with ischaemic stroke received thrombolysis, compared with 915 (11.4%) in 2016, the highest annual rate so far, and one which compares favourably with the rest of the UK and other European countries. The observed increase reflects increasing public awareness, enhanced ambulance protocols and improving delivery in acute hospitals.

Recently published studies now indicate that some patients in whom an onset time is unclear, usually because the patient woke from sleep with new stroke symptoms, can also benefit from intravenous thrombolysis. Selection of such patients is based on more complex imaging, which will inevitably mean that implementation of the results will be challenging.

The earlier the artery is unblocked, the more effective the treatment and the better the patients outcomes. Therefore our national standard encourages attempts to treat as early as possible by reducing the so called door to needle (DTN) time. Our standards are that 80% of patients receiving thrombolysis should receive this within 60 minutes of arrival at hospital, and 50% within 30 minutes. Across Scotland in 2017, 59% of patients received thrombolysis within 60 minutes, a modest increase from 55% in 2016. However, for the first time two hospitals, University Hospital Hairmyres and Glasgow Royal Infirmary (which provides only a weekday daytime service) exceeded this target indicating that it is achievable. Unfortunately, 11 hospitals (almost half) are giving thrombolysis within 60 minutes to less than half of their patients.

The proportion across Scotland receiving thrombolysis within 30 minutes of arrival has risen slightly from 10% in 2016, to 11% in 2017 but two hospitals are achieving this in 20-30%. There is plenty of work to be done to reduce DTN time across Scottish hospitals – important work which would be associated with better recovery for patents.

Chart 6.1: Mean door-to-needle time by NHS board.
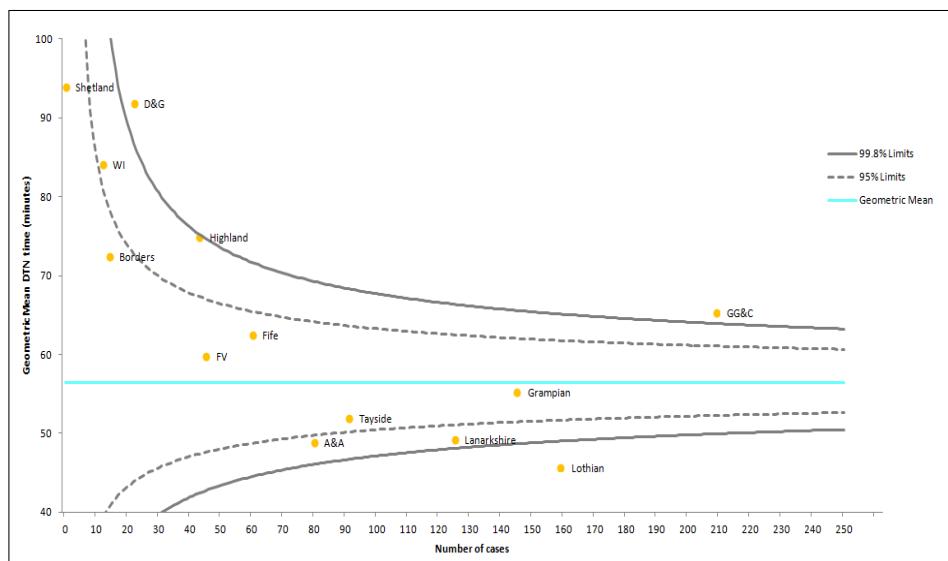
In NHS GG&C all stroke thrombolysis for Clyde residents and all 'out of hours' stroke thrombolysis for patients from the Glasgow Royal Infirmary area is provided by the Queen Elizabeth University Hospital in South Glasgow, so these patients have a first hospital assessment and travel time included in their door-to-needle time.

Chart 6.2: Percentage of patients receiving thrombolysis within 30, 60 & 75 minutes of arrival at first hospital, 2017 data.
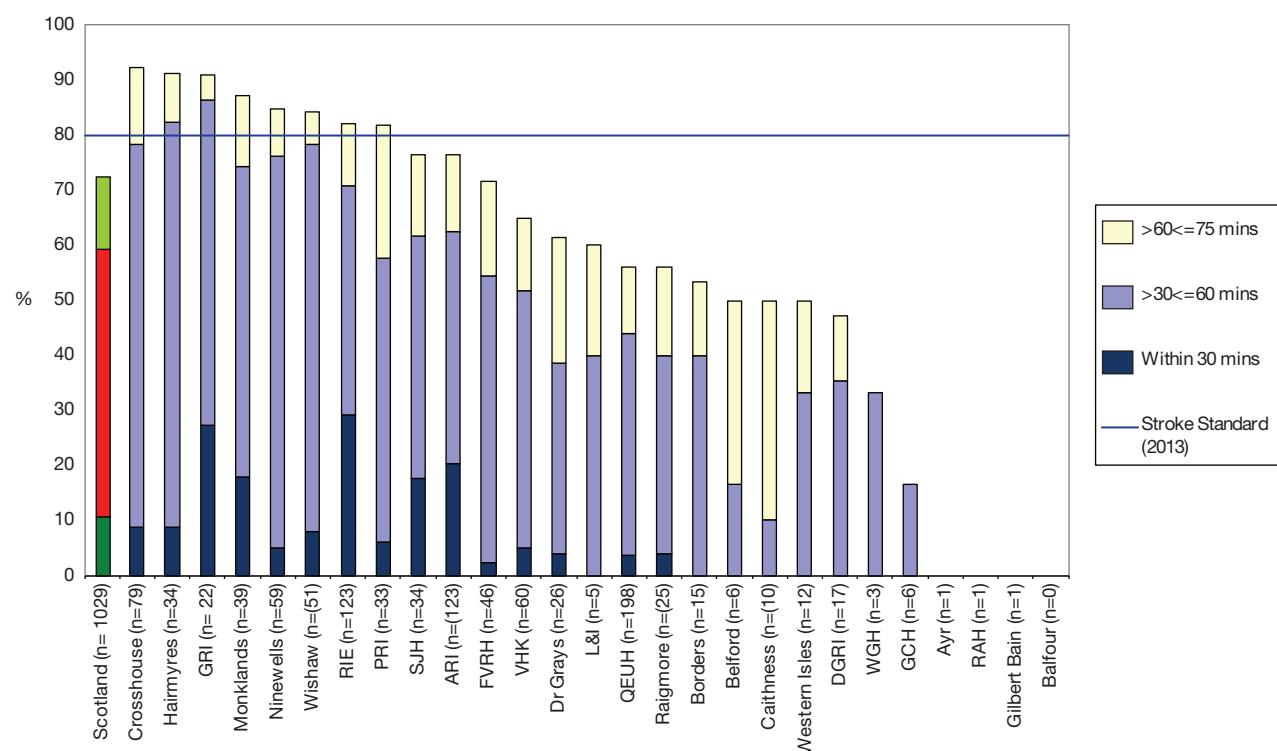
Chart 6.3:   Percentage of patients with door-to-needle times for thrombolysis within 1 hour, 2016 and 2017 data.
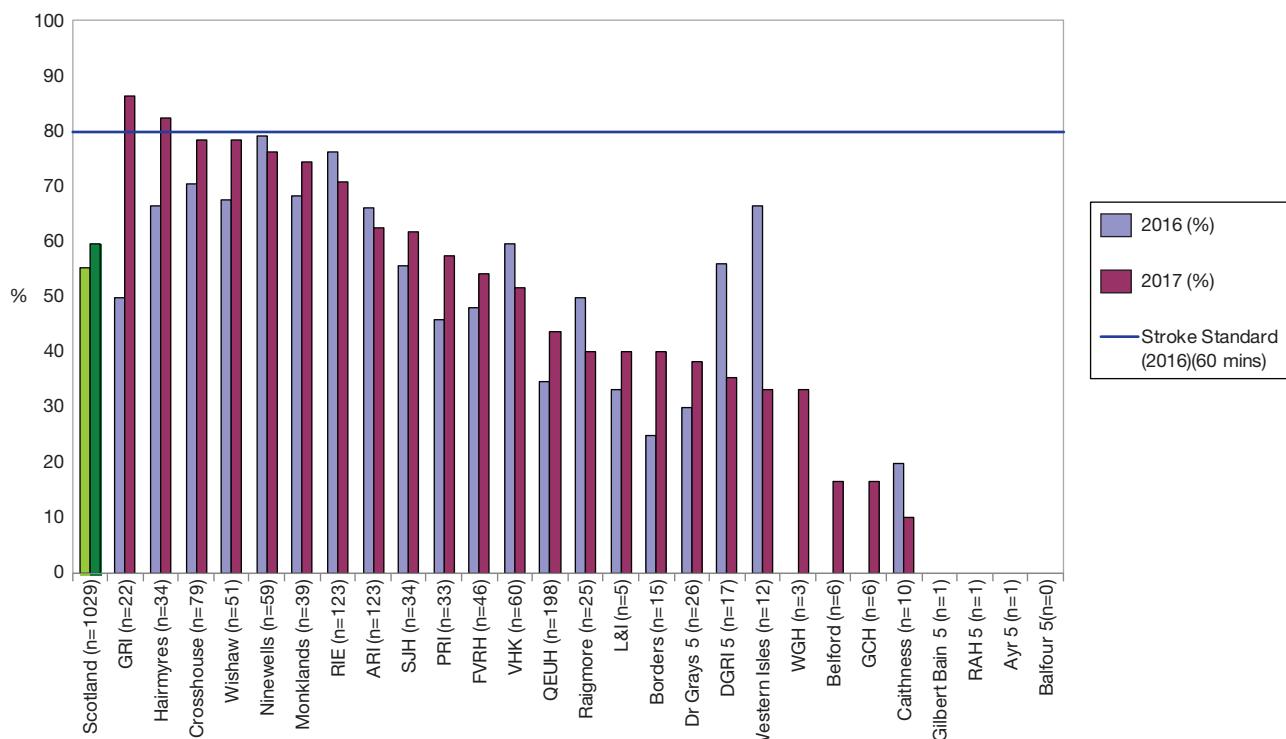
Table 6.1: Thrombolysis - numbers thrombolysed, 2016 & 2017 data.

Hospital	Number of patients receiving thrombolysis in 2016	Number of patients receiving thrombolysis in 2017
Scotland summary	**915**	**1046**
Ayrshire & Arran	**69**	**83**
Ayr Hospital	0	1
Crosshouse Hospital, Kilmarnock	69	82
Borders	**9**	**15**
Borders General Hospital, Melrose	9	15
Dumfries & Galloway	**32**	**23**
Dumfries & Galloway Royal Infirmary (DGRI)	25	17
Galloway Community Hospital (GCH)	7	6
Fife	**75**	**63**
Victoria Hospital, Kirkcaldy (VHK)	75	63
Forth Valley	**55**	**46**
Forth Valley Royal Hospital, Larbert (FVRH)	55	46
Grampian	**143**	**153**
Aberdeen Royal Infirmary (ARI)	121	127
Dr Gray's Hospital, Elgin	22	26
Greater Glasgow & Clyde	**205**	**222**
Glasgow Royal Infirmary (GRI)	18	22
Inverclyde Royal Hospital, Greenock (IRH)		
Queen Elizabeth University Hospital, Glasgow (QEUH)	187	199
Royal Alexandra Hospital, Paisley (RAH)	0	1
Highland	**34**	**46**
Belford Hospital, Fort William	2	6
Caithness General Hospital, Wick	5	10
Lorn & Islands Hospital, Oban	9	5
Raigmore Hospital, Inverness	18	25
Lanarkshire	**79**	**125**
Hairmyres Hospital, East Kilbride	24	34
Monklands Hospital, Airdrie	23	40
Wishaw General Hospital	32	51
Lothian	**136**	**160**
Royal Infirmary of Edinburgh at Little France (RIE)	106	123
St John's Hospital, Livingston (SJH)	27	34
Western General Hospital, Edinburgh (WGH)	3	3
Orkney	**5**	**0**
Balfour Hospital, Orkney	5	0
Shetland	**2**	**1**
Gilbert Bain Hospital, Shetland	2	1
Tayside	**68**	**96**
Ninewells Hospital, Dundee	44	63
Perth Royal Infirmary (PRI)	24	33
Western Isles	**3**	**13**
Uist & Barra Hospital, Benbecula		
Western Isles Hospital (WIH)	3	13

Note regarding Table 6.1:
1. Note that this table is not directly comparable with Table 4 because it is based on hospital/ NHS board of treatment rather than Health Board of residence, upon which Table 6 is based. Health Boards may treat patients from outside their board area or may treat non-Scottish residents.
2. Records are included if a thrombolysis date is present; a small proportion of these records will not have an associated thrombolysis time recorded. This table also includes a small proportion of patients who were thrombolysed for a non-index event. This differs slightly from Chart 9 where measurement of the 60 minute thrombolysis door-to-needle time standard focuses on patients thrombolysed for index events only.
3. Data for this table are derived from the 'admission hospital' field (inpatient dataset).

Thrombectomy

In 2015 some large studies showed that a procedure, mechanical thrombectomy, could greatly improve the chances of a patient with a severe ischaemic stroke making a good recovery, usually in combination with thrombolysis. Thrombectomy, which is carried out in an operating theatre, sometimes under a general anaesthetic, physically removes the clot to open up the artery. This involves inserting a thin flexible tube into an artery in the top of the leg, passing it through the arteries to the blockage in the brain and using a wire net (stent retriever), or suction, to remove the clot – a bit like "Dyno-Rod©" for the brain. However, thrombectomy is only possible if the blocked artery is large and visible on a brain scan.

Thrombectomy, like thrombolysis is most effective if carried out within the first few hours but can help selected patients even if performed later within the first day. Thrombolysis and thrombectomy can be given alone or together. Thrombectomy in combination with thrombolysis is much more effective than thrombolysis alone.

Both thrombolysis and thrombectomy require care in a hospital with special facilities. Thrombolysis can be given in any hospital with an acute stroke unit and brain scanner. Thrombectomy can only be given in a hospital with doctors who can perform the procedure. It may, therefore, be necessary to rapidly transfer a patient from their local hospital to a more specialist hospital, or even to take them directly to a specialist hospital.

Currently no centres in Scotland can offer thrombectomy and last year only 13 patients received this treatment (3/million population).

In the rest of the UK rates are higher (15/million population) but some European countries with well organised and resourced services are now treating over 100 patients/million population which would equate to about 600 per year in Scotland. This would result in about 300 patients having reduced disability and over 100 avoiding dependency on others – for instance the need to live in a nursing home.

The lack of an organised, funded thrombectomy service delivered on more than one site means that many patients who might benefit cannot currently receive this treatment. The Scottish Government have established a planning group with the intention of improving access to this very effective treatment as quickly and equitably as possible. This group are using data from the Scottish Stroke Care Audit to help plan a service. The audit will also monitor thrombectomy rates and times, as it currently does for thrombolysis, to help drive forward improvements in service delivery and patient care.

Table 6.2 shows the numbers of patients arriving at hospitals with a severe ischaemic stroke on different days of the week and at different times of the day. These data can help to identify how services might most efficiently be extended – for instance by extending the working day, or offering thrombectomy at weekends.

Table 6.2: **Confirmed ischaemic strokes (either severe or thrombolysed) by arrival day/ hour, 2015-2017 (admission date) combined.**

Hour of Day	Weekday of arrival at hospital						
	Sun	Mon	Tue	Wed	Thu	Fri	Sat
00:00 - 00:59	28	24	22	25	17	12	27
01:00 - 01:59	14	21	19	15	21	18	19
02:00 - 02:59	10	10	19	9	16	6	14
03:00 - 03:59	16	12	16	8	16	15	17
04:00 - 04:59	15	20	14	15	17	10	19
05:00 - 05:59	9	15	12	9	14	16	16
06:00 - 06:59	22	19	22	21	21	20	19
07:00 - 07:59	19	34	43	32	27	29	23
08:00 - 08:59	33	52	51	45	39	50	43
09:00 - 09:59	74	95	86	86	91	63	79
10:00 - 10:59	94	107	89	100	108	110	79
11:00 - 11:59	114	119	95	109	94	115	98
12:00 - 12:59	87	119	102	97	83	89	96
13:00 - 13:59	96	105	89	90	75	93	76
14:00 - 14:59	85	107	107	94	91	77	70
15:00 - 15:59	69	92	71	98	81	76	69
16:00 - 16:59	67	70	75	79	70	76	74
17:00 - 17:59	70	75	66	70	55	73	62
18:00 - 18:59	61	84	76	68	84	66	36
19:00 - 19:59	53	67	62	46	72	54	44
20:00 - 20:59	48	46	34	39	56	54	42
21:00 - 21:59	37	52	46	56	45	44	55
22:00 - 22:59	33	45	44	50	32	47	42
23:00 - 23:59	38	38	28	34	36	29	38

Low   High

Colour	Cell value
	0-16
	17-25
	26-37
	38-47
	48-60
	61-70
	71-81
	82-91
	92-101
	102-119

Note regarding Table 6.2:
1. Severe stroke defined as those where, at first assessment, patient (a) cannot talk, is not oriented in time/ place/ person, cannot lift arms OR (b) cannot talk, is not oriented in time/ place/ person, cannot walk OR (c) cannot lift arms, cannot walk.
2. There were 8,911 records identified as severe or thrombolysed but 48 records are omitted because of missing dates or times of arrival at first hospital. The table cells therefore sum to 8,863.

7   Carotid Intervention

Summary and key findings relating to carotid intervention

> ### Key findings:
>
> In 2017 there was an improvement in from 46% to 55% in the percentage of patients undergoing a carotid intervention within 14 days of the event that led to them first seeking medical attention.
>
> The SSCA have also begun to report on the percentages of patients receiving carotid endarterectomy within 14 days of the pathway entry date. There has similarly been an improvement in performance against this new measure between 2016 and 2017 from 62% to 76%.

In a small group of patients with TIA or ischaemic stroke, the event has been caused by narrowing of the carotid artery. In these patients the risk of further stroke can be reduced by performing an operation to fix this narrowing. This operation, carotid endarterectomy, is effective in reducing stroke risk, but the operation is only usually beneficial if done very soon after the stroke or TIA. For this reason there is a Scottish Stroke Care Standard that 80% of patients undergoing a carotid intervention should do so within 14 days of the event that led to them first seeking medical attention.

For stroke services, there are some parts of this 14 days that are very difficult to influence, such as if the patient did not present to medical services until a week after the TIA/stroke event. For this reason, and for the first time this year, we are also reporting data on the percentage of patients receiving carotid endarterectomy within 14 days of hospital admission, or being referred to the stroke service. This new measure is referred to as being within 14 days of the pathway entry date.

In 2017, 343 carotid endarterectomies were performed and recorded in the SSCA as opposed to 386 in 2016. In 2014 the number was 409. There does seem to be a steady decline in these numbers. It is not clear whether this decline in numbers reflects a change in the pathology of the strokes that stroke services are seeing or whether stroke services are being more selective in the patients that they are operating on (perhaps being more aware of improvements in medical therapy or in the reduced benefits of surgery performed beyond 14 days).

In 2017 there was an improvement from 46% to 55% in the percentage of patients undergoing a carotid intervention within 14 days of the event that led to them first seeking medical attention. Aberdeen Royal Infirmary was the only hospital to meet this standard in 2017 (as they did in 2016). Interestingly in this hospital the number of carotid endarterectomies had fallen from 36 in 2016 to only 19 in 2017. This may be statistical chance but may also reflect decisions not to perform carotid endarterectomies in later presenting patients.

Percentages of patients receiving carotid endarterectomy within 14 days of the pathway entry date, similarly improved between 2016 and 2017 from 62% to 76% respectively. Five hospitals achieved this measure, which we believe is a better measure of service performance. This does raise the question as to whether the standard should be made more challenging, perhaps either by increasing the percentage needed to achieve the standard or by reducing the time frame within which carotid endarterectomy should be performed.

Table 7.1: **Carotid Endarterectomy - number of patients receiving a carotid endarterectomy in acute hospitals in Scotland during Jan-Dec 2017.**

NHS board of hospital	Hospital providing carotid intervention service	Total	Residents	Rate per 100,000 residents	Non-residents	Non-resident NHS boards (ranked on number of events, high-to-low)
Ayrshire & Arran	Ayr Hospital	52	52	14.0	0	
Dumfries & Galloway	Dumfries & Galloway Royal Infirmary	24	22	14.7	2	Lanarkshire; Outside Scotland/ Not Known/ Other
Fife	Victoria Hospital, Kirkcaldy	11	8	2.2	3	Greater Glasgow & Clyde; Lothian
Forth Valley	Forth Valley Royal Hospital (Larbert)	14	13	4.3	1	Lanarkshire
Grampian	Aberdeen Royal Infirmary	19	17	2.9	2	Forth Valley; Outside Scotland/ Not Known/ Other
Greater Glasgow & Clyde	Queen Elizabeth University Hospital, Glasgow	89	77	6.6	12	Highland; Outside Scotland/ Not Known/ Other; Lanarkshire; Ayrshire & Arran; Tayside
Highland	Raigmore Hospital, Inverness	21	20	6.2	1	Western Isles
Lanarkshire	Hairmyres Hospital, East Kilbride	47	47	7.1	0	
Lothian	Royal Infirmary of Edinburgh at Little France	42	36	4.0	6	Borders; Outside Scotland/ Not Known/ Other
Tayside	Ninewells Hospital, Dundee	24	22	5.3	2	Fife; Outside Scotland/ Not Known/ Other
Scotland	**Scotland**	**343**	**314**	**6.0**	**29**	

Notes regarding Table 7.1:
1. Hospitals shown are those that provide a carotid intervention service and have submitted data to eSSCA for 2017.
2. A small proportion of records could not be assigned to a Health Board of residence because they were either for non-Scottish residents or there was insufficient information to allow their assignment to a Health Board (e.g. partial or incorrect postcode).
3. Health Board boundary changes occurred from April 2014. SSCA data use the revised Health Board boundaries. The issue primarily affects NHS Greater Glasgow & Clyde and NHS Lanarkshire.
4. The Scotland rate is based on the combined mid-year population estimates for the NHS boards shown in the table.

Chart 7.1: Percentage of patients undergoing a carotid intervention within 14 days of the event that led the patient to first seek medical assistance, 2016 and 2017 data.

Horizontal line reflects Scottish Stroke Care Standard (2016) of 80% of patients undergoing carotid endarterectomy for symptomatic carotid stenosis have the operation within 14 days of the stroke event.

Note that the Scotland columns in the chart are coloured light green and dark green simply to differentiate them from the hospital columns and the colours are not indicative of performance. Light green corresponds to '2016' and dark green corresponds to '2017'.
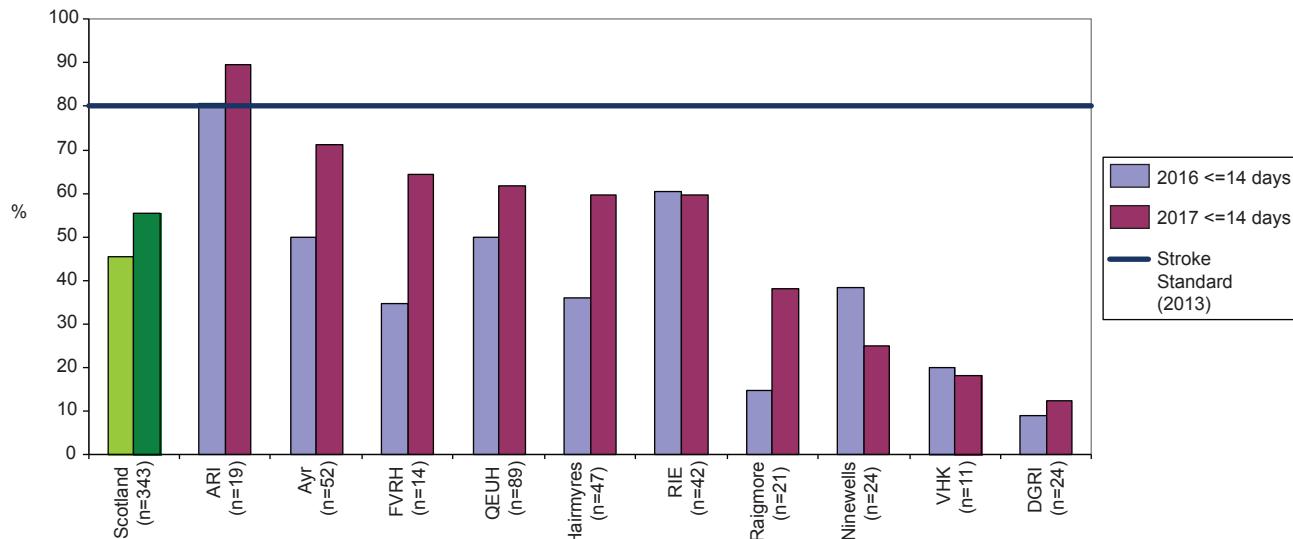
Notes regarding Chart 7.1:

Bracketed number on chart x-axis indicates number of patients in denominator for 2017.

1. **Hospitals shown are those that provide a carotid intervention service and have submitted data to eSSCA for 2017.**
2. Patients in NHS Borders, NHS Orkney, NHS Shetland & NHS Western Isles are treated in other NHS boards as part of their respective carotid intervention pathways.
3. A small proportion of records have a carotid intervention date but no date recorded for the event that led to the first medical assessment. These records are included in the denominator because the presence of an intervention date indicates that a carotid intervention was performed. The absence of a date for the event that led to the first medical assessment, however, prevents the calculation of days to carotid intervention so these cases cannot be measured against the 14 day standard and cannot be confirmed as having achieved it and are assumed not to have done so. This is a slightly different approach from the carotid timeline chart (see associated Excel files on SSCA web site at http://www.strokeaudit.scot.nhs.uk/Reports/Reports.html) where inclusion in the chart requires both a carotid intervention date and date recorded for the event that led to the first medical assessment. As a result, the Chart 7.1 denominators, for individual hospitals, may be slightly higher than those in the carotid timeline chart.

Chart 7.2   Percentage of patients undergoing a carotid intervention within 14 days of the pathway entry date*, 2016 and 2017 data.

* In this analysis we try to reflect the performance of the hospital based services with respect to getting a carotid endarterectomy performed as quickly as possible. For patients receiving their carotid intervention via an inpatient stroke service the interval from the date of inpatient admission to surgery was used. For patients receiving their carotid intervention via an outpatient TIA/stroke clinic service the interval from the date of receipt of referral to the TIA clinic to surgery was used. For other outpatients, the delay from first outpatient assessment to surgery was used. If there was no preceding outpatient or inpatient admission then the date the patient was first seen by surgeons was taken.

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

Note that the Scotland columns in the chart are coloured light green and dark green simply to differentiate them from the hospital columns and the colours are not indicative of performance. Light green corresponds to '2016' and dark green corresponds to '2017'.

The chart columns are ranked, by hospital, on the percentage receiving their intervention within 14 days of referral.
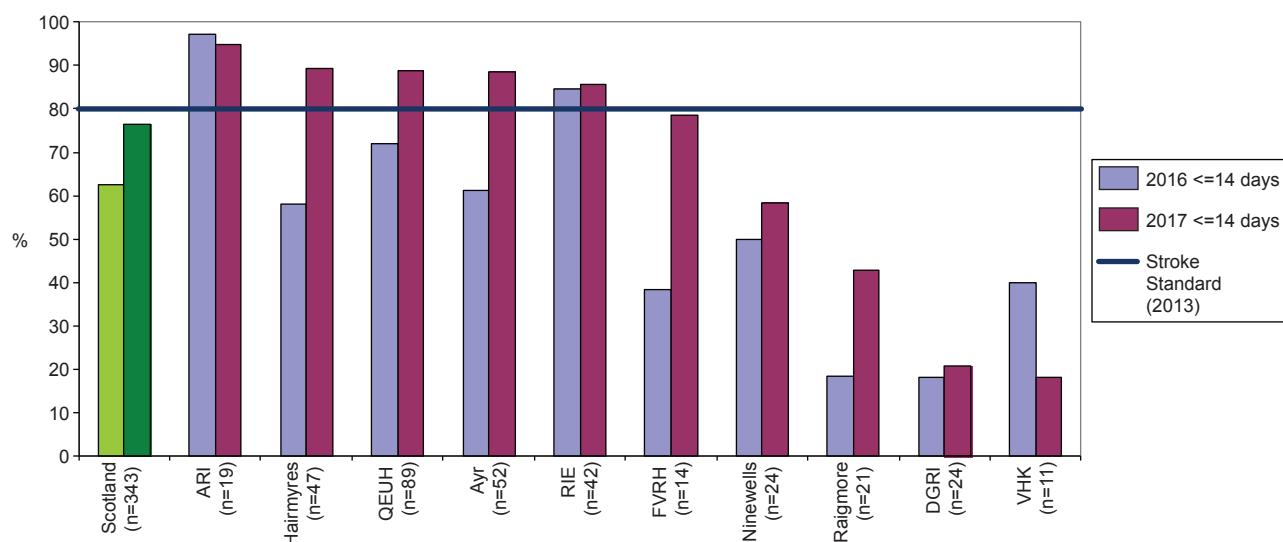
Notes regarding chart 7.2 (pathway entry date):
Bracketed number on chart x-axis indicates number of patients in denominator for 2017.
1. **Hospitals shown are those that provide a carotid intervention service and have submitted data to eSSCA for 2017**.
2. Patients in NHS Borders, NHS Orkney, NHS Shetland & NHS Western Isles are treated in other NHS boards as part of their respective carotid intervention pathways.

8 Outcomes after admission with stroke

The SSCA and SSIP aim to optimise the delivery of effective stroke services across Scotland and thus to optimise the outcomes for patients suffering a stroke or TIA. Large randomised controlled trials tell us that if we give certain stroke interventions, such as thrombolysis, thrombectomy, aspirin, anticoagulation, intermittent pneumatic compression (IPC), carotid endarterectomy and stroke unit care to appropriate patients, the patients have a better chance of a good outcome – this might be survival (for IPC), function (for thrombolysis and thrombectomy) or lower risks of recurrence (for aspirin, anticoagulation and carotid endarterectomy). Large randomised controlled trials use outcomes to infer the effectiveness of treatments but are only able to do so because randomisation reduces the risk of confounding and bias, and large numbers reduces the variation due to chance.

It would be attractive if we could use patient outcomes to determine the quality of stroke care in Scotland but research has shown that differences in the outcomes of patients between services, and changes over time do not reliably reflect the quality of those services. Even in SSCA which includes all admitted stroke patients in Scotland, the numbers of patients overall in any given year is modest, and in any specific hospital or NHS board is too small to provide really precise estimates of outcome.

Whilst the quality of care is likely to influence outcomes, other factors which will lead to variation in outcomes include changes in the types of people having strokes, receiving treatments, stroke severity and changes in the tests used to diagnose strokes and TIA. These factors will often swamp any effects of treatment. Also, whilst it is fairly easy to measure the treatment delivered to patients in hospital, it is much more difficult to measure their outcomes after they have left hospital. Randomised controlled trials expend huge resources ensuring that almost every patient is followed up. This relies on them returning for follow up assessments, responding to questionnaires and these are burdensome for the patients, their families and health services. For these reasons the SSCA measures the delivery of stroke interventions to infer the quality of stroke care rather than patient outcomes.

We can reliably measure using routinely available data whether patients have survived or not, but survival with major disability is not an outcome which many patients value. Also, even if we identify that a larger proportion of patients treated by one hospital die, compared with others, this information does not tell us why, or even what might be going wrong.

Chart 8.1: 90-day mortality for 2017 admissions by NHS board
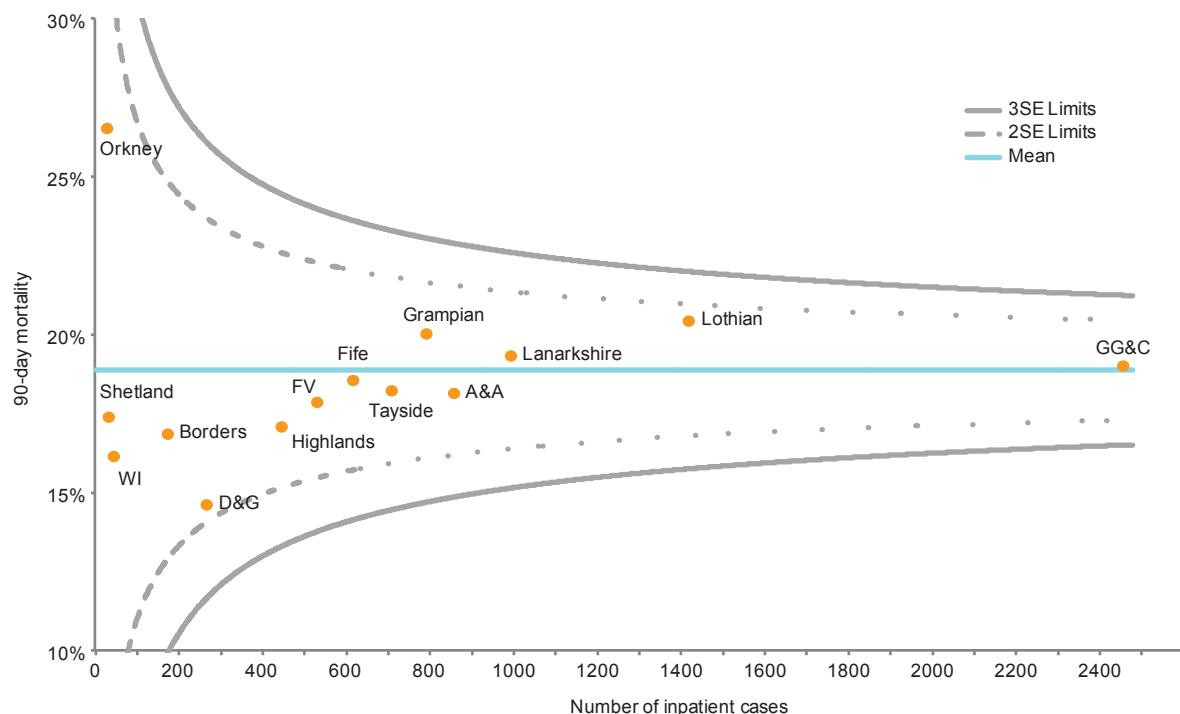
Note for Chart 8.1:

1. The models used for the case-mix adjustment were fitted on the 2017 admissions data and include the variables, age on admission, sex, stroke type and the six simple variables (SSV). The SSV are: Independent in ADL prior to event; patient lived alone at normal place of residence; talking at first assessment; oriented to time, place and person at first assessment; lift both arms at first assessment; walking without help from another person.

Chart 8.1 shows the 90 days case fatality amongst those patients admitted to hospital in 2016 and 2017. These figures have been adjusted for age, stroke severity and other factors which affect survival and might vary between NHS boards. There are no differences between NHS boards which cannot be explained by chance alone. Chart 8.2 shows these data in a different way. The w score with 95% confidence intervals, again adjusted, for patients admitted to hospitals in each NHS board area. The w score is the number of patients dying within 90 days of admission with a stroke in excess of the number who would have been expected to die based on the average survival across Scotland. Whilst the point estimates for NHS Lothian and NHS Grampian indicate a higher mortality than expected, and the case fatality in NHS Dumfries & Galloway is lower, the fact that the 95% confidence intervals, indicated by the vertical line, cross the axis, indicates that this can be explained by chance alone. So the conclusion is that no NHS board has a higher or lower than expected 90 days case fatality after stroke.

Chart 8.2: 90-day mortality W-score for 2017 admissions by NHS board
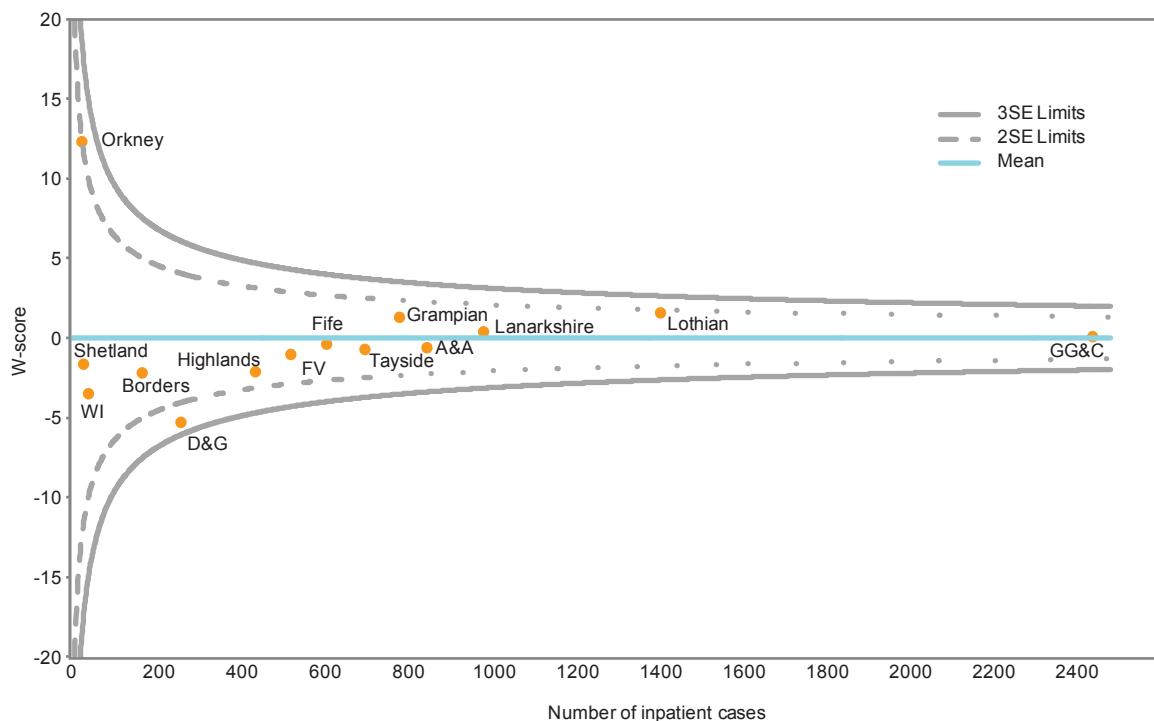
Note for Chart 8.2:

1. The models used for the case-mix adjustment were fitted on the 2017 admissions data and include the variables, age on admission, sex, stroke type and the six simple variables (SSV). The SSV are: Independent in ADL prior to event; patient lived alone at normal place of residence; talking at first assessment; oriented to time, place and person at first assessment; lift both arms at first assessment; walking without help from another person.

2. See reference 15 for more detail on the W-score.

In this section we present some additional information which we believe may better reflect patients outcomes and which could be used in the future to determine the effectiveness of services and treatment.

Home days, or home time, measures the number of days patients are at home in the first 90 days after their stroke. We believe that more home days would generally be valued by the patients. Patients who rapidly recover, who are able to go home within the first few days, and who do not require readmission, or admission to a care home would accrue lots of home days, whereas patients who do not survive to be discharged home, who are discharged to a nursing home, who have a prolonged length of stay in hospital, or who are readmitted having gone home will have fewer or even no home days. Research has shown that home days reflect how well the patients are functioning at 3 months after a stroke.

Chart 8.3: Mean 90-day home-time for 2017 admissions by NHS board
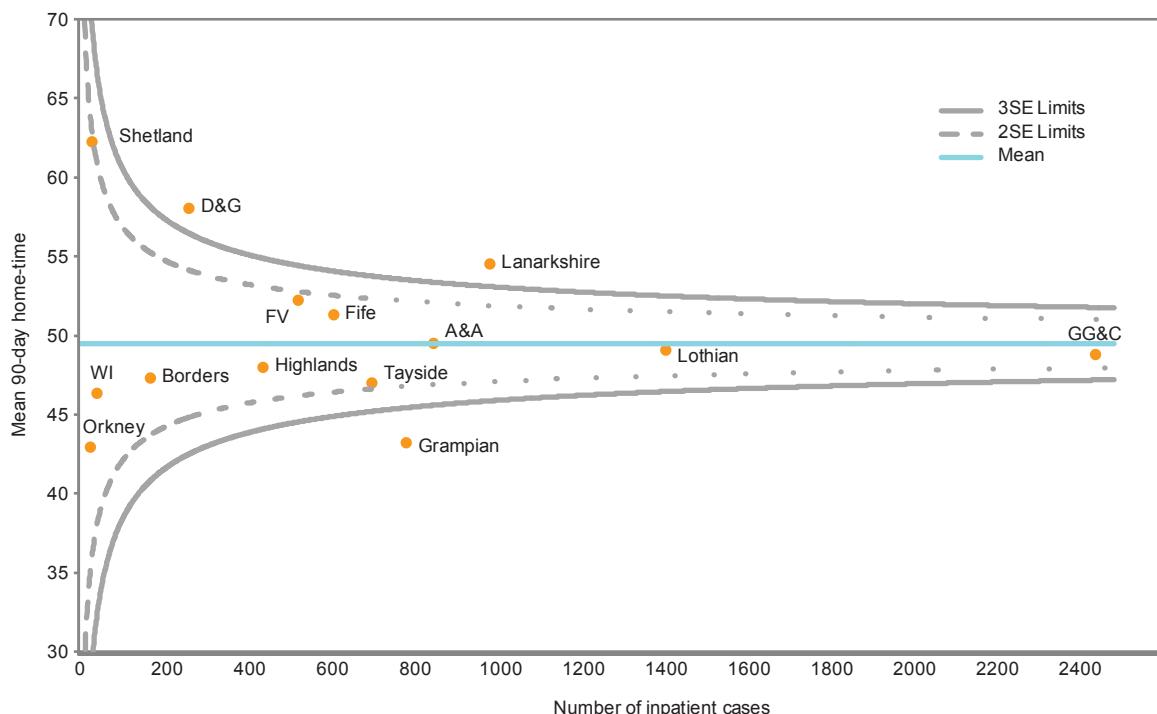
Note for Chart 8.3:

1. The models used for the case-mix adjustment were fitted on the 2017 admissions data and include the variables, age on admission, sex, stroke type and the six simple variables (SSV). The SSV are: Independent in ADL prior to event; patient lived alone at normal place of residence; talking at first assessment; oriented to time, place and person at first assessment; lift both arms at first assessment; walking without help from another person.

Chart 8.3 shows the average number of home days experienced by patients admitted to different NHS boards in Scotland. These data have also been adjusted to take account of age, stroke severity and other prognostic factors. Interestingly patients in NHS Dumfries & Galloway and NHS Lanarkshire experience more home days, and those in NHS Grampian fewer. The differences are unlikely to be due to chance since these estimates are outwith 3 standard errors of the mean. The reason(s) for the observed difference are unclear and warrant further investigation which is now underway. Interventions such as thrombectomy (in the future) and early supported discharge services might increase home days whilst delays in accessing community care and aids and adaptations are likely to reduce home days.

9 Using SSCA data for research

Given the economic and societal burden of stroke, being able to link data from the Scottish Stroke Care Audit to other national datasets gives information which can be used to explore the effect of other conditions and treatments on stroke outcomes and may help to provide more evidence for best care for stroke.

Supported by funding from Chest Heart and Stroke Scotland and the Stroke Association, and with Ethical and Public Benefit Privacy Panel (PBPP) approvals, a linked, pseudo-anonymised dataset is currently being analysed. 168,306 stroke/TIA inpatient and outpatient episodes (with 95,103 first inpatient events) have been linked to data on co-existing health conditions and dispensing datasets.

The main aims of ongoing work are to assess the effects of both general and specific co-existing health conditions on stroke management, secondary prevention and outcomes (including recurrent events and readmission). Dr Melanie Turner will then develop and validate a clinical prediction model to estimate the probability of recurrent stroke within one year.

After linking the stroke dataset to the dispensing dataset, we are now looking at how prescribing of specific medications affects stroke outcomes and risk of recurrent strokes, including which drug classes are the most important at preventing recurrent events.

Across Scotland, other researchers are including SSCA data in projects which aim to identify best practice and improve overall patient care in Scotland. These publications include analysis of stroke risk and outcomes in patients with renal disease. In addition a CHSS funded project confirmed that data on Scottish patients included in the Interstroke study were representative of Scottish stroke patients in general, which is an important finding for the generalisability of the Interstroke results. All requests by researchers to use data are reviewed by the SSCA research subgroup, and obtain appropriate permissions from PBPP. A list of current projects is available on the SSCA website, along with a link to publications from previous linkage projects.

10 Where Next?

It is essential that the Scottish Stroke Care Standards remain current to provide healthcare professionals in Scotland with advice and guidance to support the provision of high quality care for patients with stroke and transient ischaemic attack. Moreover, as performance improves, it is necessary to set a standard which is closer to the 'ideal' or 'optimal' performance to continue to encourage services to strive for improvement. With this in mind the Scottish Stroke Care Audit steering group will continue to review the standards that we set. It is likely that changes will need to be made to the standard for timing of brain imaging, in view of the recent research publications on early secondary prevention after ischaemic stroke. As discussed in the Carotid Intervention section, we will also review the standards for timing to carotid surgery/intervention.

As stroke thrombectomy becomes a more common intervention in Scotland, there needs to be a system in place to monitor numbers being treated, time delays and outcomes, very much as we have previously done for thrombolysis. A stroke thrombectomy dataset is being developed to become part of the SSCA database and to form a larger part of this report in future years.

The audit continues to try to find ways to record and report on performance of health and social care in delivering rehabilitation and longer term aspects of care to patients after stroke.

List of References

1.   The Scottish Government, The Healthcare Quality Strategy. Edinburgh, Scotland: May 2010. http://www.gov.scot/Topics/Health/Policy/Quality-Strategy

2.   The Scottish Government, 2020 Vision. Edinburgh, Scotland: 2011. http://www.gov.scot/Topics/Health/Policy/2020-Vision

3.   The Scottish Government, Stroke Improvement Plan. Edinburgh, Scotland: August 2014. http://www.gov.scot/Publications/2014/08/9114

4.   CLOTS (Clots in Legs Or sTockings after Stroke) Trials Collaboration. Effectiveness of intermittent pneumatic compression in reduction of risk of deep vein thrombosis in patients who have had a stroke (CLOTS 3): a multicentre randomised controlled trial. The Lancet 2013; 382:516 – 524.

5.   CLOTS (Clots in Legs Or sTockings after Stroke) Trials Collaboration. Effect of intermittent pneumatic compression on disability, living circumstances, quality of life, and hospital costs after stroke: secondary analyses from CLOTS 3, a randomised trial. Lancet Neurology 2014. published online Oct 31. http://dx.doi.org/10.1016/S1474-4422(14)70258-3

6.   Langhorne (2013), Cochrane Database Syst Rev. 2013 Sep 11;9:CD000197. doi: 10.1002/14651858.CD000197.pub3.

7.   Te Ao BJ, Brown PM, Feigin VL, et al. (2012) Are stroke units cost effective? Evidence from a New Zealand stroke incidence and population-based study. Int J Stroke 2012; 7:623–30.

8.   Saunders DH, Sanderson M, Hayes S, Kilrane M, Greig CA, Brazzelli M, Mead GE. Physical fitness training for stroke patients. Cochrane Database of Systematic Reviews 2016, Issue 3. Art. No.: CD003316. DOI: 10.1002/14651858.CD003316.pub6

9.   Saka O, McGuire A and Wolfe C. Cost of stroke in the United Kingdom. Age and Ageing 2009; 38: 27–32

10.   Turner M, Barber M, Dodds H, Murphy D, Dennis M, Langhorne P and Macleod MJ on behalf of the Scottish Stroke Care Audit. Implementing a simple care bundle is associated with improved outcomes in a national cohort of ischemic stroke patients. Stroke 2015; 46:1065-1070. DOI: 10.1161/ STROKEAHA.114.007608.

11.   Turner M, Barber M, Dodds H, Martin D, Langhorne P, Macleod M (2015). Agreement between routine electronic hospital discharge and Scottish Stroke Care Audit (SSCA) data in identifying stroke in the Scottish population. BMC Health Services Research, vol 15, 583.

12.   Turner M, Barber M, Dodds H, Dennis M, Langhorne P, Macleod M-J on behalf of the Scottish Stroke Care Audit (2016). Stroke patients admitted within normal working hours are more likely to achieve process standards and to have better outcomes. Journal of Neurology, Neurosurgery & Psychiatry, vol 87, no 2, pp.138-143.

13.   O'Donnell MJ, Xavier D, Liu L. et al. Risk factors for ischaemic and intracerebral haemorrhagic stroke in 22 countries (the INTERSTROKE study): a case-control study. Lancet 2010; 376:112-123.

14.   Benjamin D Bray, Craig J Smith, Geoffrey C Cloud, Pam Enderby, Martin James, Lizz Paley, Pippa J Tyrrell, Charles D A Wolfe, Anthony G Rudd (2016) The association between delays in screening for and assessing dysphagia after acute stroke, and the risk of stroke-associated pneumonia J Neurol Neurosurg Psychiatry 2016;0:1–6. doi:10.1136/jnnp-2016-313356.

15.   Parry, Gould, McCabe and Tarnow-Mordi Annual league tables of mortality in neonatal intensive care units: longitudinal study', BMJ, 1998.

Appendix A: Responses from Chief Executives

During the preparation of this report the NHS board Chief Executives were asked to provide some feedback on their performance against specific Scottish Stroke Care Standards or Improvement Priorities where there had been an improvement or decline in performance, or actions are required to improve access to services.

The Chief Executives responses are noted (by NHS board) below:

NHS Ayrshire & Arran

Stroke Unit admission

NHS Ayrshire and Arran continues to perform well in exceeding the stroke unit admission standard. In consistently achieving the stroke unit admission standard, there has been sustained, improved, performance over the last year on delivery of the Stroke Care Bundle and this has also resulted in enhanced patient, relative and staff experience.

This improved performance has been achieved through a number of initiatives including:-

- Centralisation of Acute Stroke Services;
- Service re-design during late 2016 with development of 24 bedded standalone Acute Stroke Unit (ASU);
- Pre-alert to ASU nurses for all stroke admissions;
- ASU nurses attending the Emergency Department /Combined Assessment Unit to assess swallow, National Institute of Health Stroke Scale (NIHSS) and arrange ASU bed;
- Admission and safety checklists, exception reports, 0800 phone-call between the ASU nurse and radiology;
- Operational flow managers provide support facilitating rapid admission to ASU;
- Pathway for repatriation to rehabilitation units; and
- Patient, relative and staff feedback encouraged to drive improvement.

As a result of this improvement, the ASU team received the William Cullen prize 2017 for service innovation and NHS Ayrshire and Arran Team of the year 2017.

Thrombolysis

Performance against the thrombolysis standard continues to improve as does the number of patients treated per year. The stroke team continually reviews the thrombolysis process to identify any potential causes of delay and potential solutions with the aim of demonstrating consistent achievement of the thrombolysis standard.

Scottish Stroke Improvement Plan Priorities: Access to stroke rehabilitation services and goal setting

There has been a particular focus on reviewing and developing our stroke rehabilitation services. A Stroke Rehabilitation Half Day Event was held on 30 May 2017 and was well attended by a range of stroke stakeholders. The feedback and suggestions relating to potential service developments from this event are being taken forward through the work of the Stroke Managed Clinical Network.

This work is ongoing and the outcomes will contribute to improving our performance relating to:

Priority 7 Action 1.2 Access to Stroke Rehabilitation Services, with a particular aim of improving the rehabilitation pathway and services for stroke patients from hospital to home at the earliest, safest, opportunity.

Priority 7 Action 2 Goal Setting, several initiatives are being implemented to ensure patients have individualised goal setting and these include:-

- Review and development of goal setting documentation;
- Training on goal setting for stroke unit staff;
- Information leaflet for patients and carers; and
- Introduction of goal setting champions.

Carotid intervention

In 2017 a review of the pathway for carotid intervention was carried out in conjunction with vascular surgeons. A new carotid endarterectomy pathway was developed facilitating quicker access to vascular surgeons and radiological investigations resulting in improved performance in the number of patients receiving carotid intervention within 14 days.

The achievements and progress made during 2017 reflect the dedication, commitment and enthusiasm of colleagues from the Stroke Managed Clinical Network.

NHS Borders

2017 has brought a number of challenges but the Stroke Team and NHS Borders (NHSB) endeavor to deliver a consistent, high level service to patients who have had a stroke or TIA.

The NHS Borders Stroke Service has noted the decline in the completion of the Stroke Care Bundle in 2017. Reviewing the component parts of the bundle, this relates to admission to the Borders Stroke Unit (BSU).

All NHS Borders patients have initial assessment and rehabilitation for a few weeks in BSU. Prior to January 2017, patients were transferred to community hospitals within NHS Borders, if it was apparent that they would benefit from a long period of rehabilitation. From January 2017 a decision was made that the community hospitals outside the Central Borders area would only accept patients from their local area for ongoing stroke rehabilitation. Central Borders patients now receive all of their care in the Borders Stroke Unit.

The patient and family feedback about this change has been positive. However, it has had the consequence that a small number of patients have a prolonged length of stay in BSU of several months rather than the previous 2 to 6 weeks. As a result, the unit length of stay average has increased and turnover of beds had decreased. To mitigate this, the unit has increased from 12 to 14 beds when required. During busy periods, particularly late 2017, the increased length of stay had implications for the BSU admission pathway resilience. The Stroke Team along with the Department of Medicine for the Elderly is reviewing strategies to reduce the length of stay.

The Borders Stroke Team continue to have excellent collaborative working within the hospital, reflected with the excellent CT scanning rate which remains the highest rate in Scotland, aspirin administration and swallow screen. This demonstrates exceptional team working from the Stroke team across radiology, emergency department and the admissions team.

The door to needle time for thrombolysis has increased but this remains a work in progress to achieve the new standards. We are aiming to continue to reduce this with ongoing training and pathway review.

The Neurovascular Clinic attendance within 4 days of referral has declined this year. In autumn 2017 due to retirement, the Stroke Service was reduced to a single consultant. This reduced the ability to see low risk patients out with the NVC and coincided with increased referral rates. Same day's referrals continue

to be seen in the admissions unit. A new stroke consultant was appointed in March 2018 which has helped resolve this issue.

Provision of Exercise after Stroke and Community Stroke Rehabilitation Services remains a difficult issue due to the rurality of the Borders. Although there are not stroke specific services the rehabilitation teams in all areas of the Borders are aware of referrals pathways and the resources that are available. They are principally Day Hospital rehabilitation, shared exercise programs with cardiac and respiratory patients, LIVE Borders gyms and third sector organizations.

NHS Dumfries & Galloway

The Stroke MCN recognises that in 2017 a number of the key targets were not met.

Admitting stroke patients promptly to the acute stroke ward at DGRI remains a significant challenge. Even allowing for the final diagnosis effect, the reduction from 74% to 68% is a poor result.

In July of 2017, in preparation for the move to our new DGRI, the integrated stroke unit combined with acute rehabilitation. The creation of a 14 bedded unit resulted in the bed compliment for acute stroke being reduced from nine to seven. In December the move to the new DGRI coincided with the development of a facility within one community hospital to provide intensive rehabilitation. This facilitates early step down from acute care to rehabilitation for those who are deemed medically stable.

The stroke team have a daily presence Monday to Friday within the combined admission unit (CAU) to facilitate stroke patient care and management.

Swallowing screening continues to be a challenge and 2017 saw a reduction from 68% to 53% despite a number of previous initiatives. Unfortunately, due to staffing issues, we were unable to undertake a planned project to review this. The aim for 2018 is that the stroke nurses will undertake a project as part of the Scottish Improvement Skills programme to specifically look at the swallow screen process.

For CT imaging there has been a slight reduction from 90% in 2016 to 88% in 2017. Aspirin prescribing within one day of admission also dropped from 91% to 83%. Given the above data this has impacted on the overall number of patients with a final diagnosis of stroke receiving all aspects of the stroke care bundle. Performance has dropped from 64% in 2016 to 50% in 2017. It is anticipated that during 2018/2019 the identified improvement work will impact on our compliance around the stroke care bundle and stroke standards.

Given that the majority of stroke patients are admitted through the CAU there is a dependency on the receiving clinician to follow stroke protocols and if this is not adhered to then this impacts on stroke bundle. There are plans to introduce a bundle label for the case notes.

Thrombolysis door to needle times also remain an issue for Dumfries and Galloway with overall 1 hour performance of 40% for DGRI and 17% for GCH with no patients receiving treatment within 30 minutes. Currently we are reviewing the pathway with the aim to reduce our door to needle times.

We continue to exceed the standard for the Neurovascular clinic target with 83% of patients seen within 4 days and 96% seen within 7 days.

The Stroke MCN wishes to acknowledge the wider support received from medical, surgical, emergency and radiology teams as well as the Lothian Hub.

NHS Fife

The continued improvement in stroke standards remains a priority for stroke healthcare providers and NHS Fife.

Improvement work related to Stroke Care Standards:

Swallow Assessment: Performance in this area is improving but the standard is challenging at 100%. Focused training continues with the nurses in A & E and Acute Medical Admissions Unit (AMAU). For patients admitted directly to AMAU meeting the standard remains a challenge. The mix of patients that comes through the unit is an area that has been addressed as well as staffing changes and shortages across acute services. Stroke Managed Clinical Network (MCN) strives to improve performance against the standard through staff training and awareness and collaboration with key stakeholders. We regularly (weekly) have formal communication and feedback using exception reporting of performance, to ensure ownership from each key area involved. Regular round table meetings set up in 2017 where the data is discussed with key staff from services across the 'stroke patient pathway' are to be resumed with new managers now in position.

Staff working within stroke services have faced a challenging and prolonged winter where stroke admissions doubled compared to 2016/2017 period figures. However staff remain committed and met recently with the Associate Director of Nursing (Acute Services) to implement further measures to improve & sustain performance across all 'Stroke Bundle' standards.

Improvement work related to Stroke Improvement Plan (SIP) Priority Elements:

5.1 Access to Transient Ischaemic Attack (TIA) Outpatient Clinic:

It has been challenging for us to achieve this standard for Queen Margaret Hospital and the adverse weather earlier this year has had a significant impact in recent months to our achieving this target. NHS Fife offers a one stop rapid access TIA clinic, based on first available appointment, therefore performance should be measured against Fife overall, not two separate sites.

The discrepancy in standard between sites could be due to days of the week clinics run. We have increased clinic slots available earlier in the week and more recently (April 2018) we started a Friday TIA clinic at Victoria Hospital (VHK). We are currently undertaking an audit to investigate the potential barriers to patients attending the TIA clinics at QMH. At the same time we are reforming in hospital pathways in order to minimise recurrent attendance for patients.

7.1.1 Access to Specialist Stroke Therapy Services:

This is a recent addition to the SIP. MCN manager has met with senior therapy staff to discuss this priority and shared the details of the benchmarking criteria for cascading to all relevant staff. A planned audit of patient notes to evidence a rehabilitation needs/ a plan is in place. We feel that following the audit out performance will improve to green, as we have a very good multidisciplinary working in all of the stroke areas.

There is also substantive new 'stroke pathway/s' developments in progress across Fife including spasticity management. Furthermore several members of Fifes Stroke MCN are involved in work streams and initiatives at a National Level.

NHS Forth Valley

Outpatient appointments

Consultant vacancies have had a significant negative impact on clinic capacity and our ability to meet the TIA standard. However, Forth Valley has recently been successful in recruiting a stroke consultant. The consultant will start in September 2018 which will contribute to the improvement of the waiting times for the TIA clinic.

NHS Forth Valley is undertaking detailed modelling to identify the gaps in the TIA service and inform the sustainability plans. It is anticipated that this work will be concluded by the end of June 2018. Work has also commenced on identifying any delays throughout the pathway with a view to taking action to unblock these barriers and subsequently improve compliance against the standards.

Thrombolysis

I was concerned that an issue has been raised in relation to the governance structure around stroke thyrombolysis. NHS Forth Valley has re-established the governance structures around stroke thrombolysis (both locally and with the out of hours South East Scotland thrombolysis network). This will provide leadership to help improve performance.

Members of the stroke team and managers also plan a visit to NHS Lanarkshire to learn how M&M meetings are undertaken there. Action has also been taken to identify support from the quality improvement team in relation to data collection in advance of the M&M meetings.

Priority 1, Action 2: Improve early identification of stroke and TIA by engagement with SAS, primary care and emergency departments

MedSTAT training has been previously delivered to consultants in Emergency Medicine. A planned programme to deliver STAT training for the 16-20 senior nursing staff who will be involved in care in the resuscitation room in the Emergency Department has been developed with backfill agreed to allow 8 staff to undertake the training at the next session.

A tailored FAST training package has also been developed for the Emergency Department reception staff. Education for Primary Health Care Teams will be delivered via the local CREATe education sessions.

Priority 8, Action 1: Self management post discharge support

Personalised goal setting is undertaken with patients within the Acute Stroke Unit and in the community. Patients hold personal stroke folders which include individual goal setting information and a record of discussions around priorities. Patients take their folder home on discharge. Information is shared with Primary Health Care Teams via MiDIS. A 6 month pilot post discharge follow up commenced in January. The evaluation will inform future plans.

Acute and community staff attended the SIP Self-management workshop in 2017. 6 more staff are attending in August. Members of acute and community teams visited Lanarkshire in February to discuss alternative ways of supporting self management. A small group of senior staff recently met with the Community Engagement Manager CHSS to hear about alternative models of patient support. We are planning a scoping event with patients and carers to understand what people living with stroke locally want. We have a further date to progress ideas about tests of change.

NHS Grampian

Scottish Stroke Care Standards

Admitted to the Stroke Unit at Dr Grays Hospital

"There has been an increase in compliance for this standard this year (80% 2016 down to 70% 2017 and now 79% in the past 12 months) despite an increase number of patients being diagnosed with stroke and the hospital on the whole is busier. A reporting system is in place to highlight the patients who are boarding in other wards and the outreach service visits on a daily basis or as the patient requires i.e. for repeated swallow assessment or family want information until a bed is available".

Swallow screening at Dr Grays 80-100% in 5 of last 6 months. Achieved 100% standard twice in last 6 months. (March 2018 – 46%) DGH has achieved the standard 6 times in the past 12 months. Due to a combination of continued improved communication with ED and better communication at the huddle to identify patients not on Stroke Ward. Due to small numbers any missed opportunity has an impact on the overall percentage compliance.

Scottish Stroke Improvement Plan Priorities

Our status for these two areas are both reported in your letter as AMBER however we have in fact improved in these two areas as noted below.

Priority 7, Action 1.1.

We report as BLUE – i.e. Acute therapy assessment is provided by stroke specialists by day 3 of admission following a stroke and a process to ensure effective communication of their rehabilitation needs and / or rehabilitation plan is established.

Evidence - 'Rehab 5' audit demonstrated ARI 77% & DGH 72% of admissions assessed by more than one AHP; of those assessed ARI 89% & DGH 92% were discussed by the MDT; 100% ARI & DGH were documented in a centrally held record; and ARI 61% and DGH 100% of those assessed had rehab plan discussed with them +/or NOK.

Plan – All staff providing therapy assessment to maintain & ensure documentation in centrally held medical record to confirm assessment has taken place. An Occupational Therapy test of change is to continue to provide weekend cover.

Priority 7, Action 2

Stroke services should implement a person-centred approach including goal setting in hospital and community services to ensure an individualised approach.

GREEN – i.e. Goal setting is used across MCN area, but process is not multidisciplinary Evidence – goal setting process and training available across Grampian and used in all areas. Documentation available in all areas however not all areas able to provide multidisciplinary goal setting

Plan – Maintain education across Grampian in use of multidisciplinary goal setting.

NHS Greater Glasgow & Clyde

Thank you for asking me to comment on the NHS Greater Glasgow and Clyde (NHSGGC) performance in two Scottish Stroke Care Standards and two Scottish Stroke Improvement Plan priorities.

For the Scottish Stroke Care Standards, you asked for comments about a significant decrease in performance in the proportion of patients admitted to the Stroke Unit at the Royal Alexandra Hospital

(RAH), and the significant increase in performance in rates of swallow screening at Glasgow Royal Infirmary (GRI).

The Board has been actively addressing the problem of speed for admission for stroke patients to the Stroke Unit in the RAH and improvement actions have included ring fencing of beds in the Stroke Unit and close liaison with the Bed Managers. These actions have resulted in substantially improved performance, to 88% for May 2018. The Senior Management Team in the Clyde Sector is strongly focussed on this issue.

In GRI the Stroke Clinicians have worked closely with colleagues in the Emergency Department in raising awareness of the importance of swallow screening and the Emergency Department nursing team have been very supportive of this. Swallow screening rates have continued to improve and on several occasions recently the weekly performance report I receive has shown 100% achievement of the standard.

For the Stroke Improvement Plan - **Priority 2, Action 3** relating to the thrombolysis process and pathway - we are aware there are problems posed by the number of patients who originate at a hospital other than the Queen Elizabeth University Hospital (QEUH) but travel to the QEUH for thrombolysis. At present in NHSGGC the QEUH is the only hospital providing 24 hour stroke thrombolysis; GRI has a weekday daytime service only.

If patients arrive "out of hours" at GRI, or at any time of day at Inverclyde Royal Hospital or at the RAH, they are transferred to the QEUH for thrombolysis thus building in a delay while the patient is transferred. The 'door to needle' times for patients who arrive at the QEUH at the first hospital are substantially better than for those who originate elsewhere. We are actively working on this via the NHSGGC Stroke Improvement Programme.

I must emphasise that we are 'amber' in this aspect of the Plan because we are not meeting the national standards for 'door to needle' times; we have clear pathways for stroke thrombolysis in the QEUH and in GRI and these are universally adhered to.

For **Priority 8, Action 3**, Living with Stroke - vocational rehabilitation: we do not have a specific vocational rehabilitation service for people who have had a stroke. The multidisciplinary teams in hospital and in the Community Stroke Team do address issues around return to employment and generic vocational rehabilitation services are available.

NHS Highland

Scottish Stroke Care Standards

Admission to Stroke Unit: Performance in this area has in NHS Highland been challenging over the last 12 months and to some extent reflects challenges in hospital flows across the board area. In particular the stroke unit at Raigmore has had spells of closure which has impacted on our ability to admit patients. However a recent review of the process at the daily hospital huddle (Raigmore) for identification of stroke patients and those awaiting beds on the stroke unit has raised awareness of the importance to the need for admission to the unit. Further, development of criteria for use of the beds has taken place and been introduced.

Outpatients: In Highland Neurovascular Clinics (NVC) are routinely held at Raigmore and at the Lorn & Islands. In the summer of 2017 a review of the clinic booking process at Raigmore took place. The review highlighted the person dependant nature of the existing booking process and as a result changes were implemented. However, these changes led to decline against the national standard. As a result of this decline a further review of the process has taken place and changes made. These changes were implemented in early 2018 and it is expect that as a result significant improvement will be made in the months going forward.

Stroke Improvement Priorities

Priority 5.1 (A specialist service to deliver immediate specialist advice for suspected TIA and stroke patients) Across NHS Highland the number of stroke specialist physicians is limited, although there is additional support from consultant physicians at Raigmore with specialist interest in Stroke who supports the NVC and Thrombolysis pathways. The team at Raigmore where our specialist consultant in stroke and consultant in stroke and rehab medicine are based is working hard to support colleagues to deliver this service at times when they are not available.   Links to other areas to support advice and information have are being developed. The Stroke & Rehabilitation Consultant based at Raigmore supports clinics at Caithness General Hospital via" NHS Near Me". There are plans to replicate this at Belford as "NHS Near Me" develops.

Priority 7.1.1 (Access to stroke therapy services); routinely patients are assessed by day three of admission. In Raigmore that review will be carried out by a stroke specialist as per the improvement priority. However our other hospitals are in the Belford, Caithness General and the Lorn & Islands Hospitals. All are Rural General Hospitals and the small numbers of stroke admissions to these hospitals mean that it is not practical to have stroke specialist staff in place; rather staff are generalist but have had and have ongoing training in stroke from the clinical leads/specialists in post who carry a highland wide role.

NHS Lanarkshire

Brain Imaging - with regard to brain imaging, we are pleased that University Hospitals Wishaw and Hairmyres continue to perform amongst the best in Scotland. Performance at University Hospital Monklands has been challenging. With only one CT scanner, there are issues with capacity on the site which have always made this standard more difficult to achieve. However, a new protocol was introduced in October 2017 which allows ROSIER positive strokes to routinely be scanned within 4 hours of hospital admission day or night. This will certainly increase the numbers of patients receiving early scans, as demonstrated in local audit. It is hoped that it will also increase the number of patients achieving the 24 hour Standard. A case is also being put to the Scottish Government to either rebuild or refurbish University Hospital Monklands in coming years. In either of these models it is expected that there would be requirement for additional CT scanning facilities, which will increase capacity and resilience.

Access to Stroke Therapy Services - Acute therapy assessment is provided by stroke specialists by day 3 of admission following a stroke and a process to ensure effective communication of their rehabilitation needs and/or rehabilitation plan is established, however, in a recent sprint audit the sharing of the patients goals and the documentation of these was not consistent across the service. We are now testing an alternative means of recording and sharing these and will monitor this internally using a local sprint audit.

Access to Stroke Rehabilitation Services - this has been another challenging area for NHS Lanarkshire. There are a variety of models of rehabilitation services across NHS Lanarkshire. South Lanarkshire predominantly uses a locality based model rather than CARS (Early Supported Discharge). There can be delays to input from the team and this input is non-specialist, meaning that clinicians sometimes keep patients in stroke unit care longer than they would otherwise. North Lanarkshire provides an Early Supported Discharge model currently, however, they are moving to a locality model soon which will further dilute the input from specialist stroke practitioners. We continue to provide stroke education and support to these teams but will also explore the possibility of developing a Stroke Specific Early Supported Discharge team to allow equitable service delivery across NHS Lanarkshire and shorter inpatient lengths of stay for stroke patients, maximising rehabilitation potential.

NHS Lothian

Performance against the admission to stroke unit standard continues to improve across all sites, but we are currently unable to sustainably deliver the standard. At St John's Hospital (SJH), patients are identified in the morning huddle in the Medical Assessment Unit (MAU) for stroke review and escalated to site management if any challenges to bed capacity in the integrated stroke unit (ISU). There is a joint decision made on any plan if there is lack of capacity. Western General Hospital (WGH) now has a single ISU ward and patients are identified at the site safety morning huddle. The unit also takes a high number of Intensive Care step-down patients post-intervention/surgery which impacts on its ability to admit acute strokes by day one. This will change when the Department of Clinical Neuroscience moves to Royal Infirmary of Edinburgh (RIE) in 2019. RIE has the highest number of admissions, and there are now hourly reports to the stroke liaison team to inform them of any new admissions that need to be reviewed for ISU care: A recent Quality Improvement (QI) project has trialled the use of a dedicated stroke nurse from 7am to 8pm daily, to identify and review stroke patients at the front door and also in-hospital strokes, and this will be rolled out on a permanent basis.

Swallow screening performance is improving year on year. The latest 12 months (May 2017 - April 2018) has shown a mean performance of 86.3% across Lothian and the site teams are focussing on providing a consistent and reliable service for patients, with the introduction of a Trak document to record the assessment. There has been a focus on training nursing staff in Emergency Departments (ED)/MAU areas as well as stroke units to be competent in undertaking this assessment. SJH's proactive approach to front door responsibility by a named stroke bundle nurse in ED and MAU 24/7 is being shared with the WGH team. The QI project at RIE has improved performance overall but particular improvement for in hospital strokes. Across all sites, there is further improvement required around patients who present with mild stroke symptoms.

Evidence of patients accessing stroke therapy services has improved with documentation being developed to promote multidisciplinary communication, rehabilitation needs, goal setting and communication with patients/relatives. Several QI projects are underway on all sites to ensure all the stroke team are aware of what stage the patient is at, and to reliably record this information in Trak.

Tests of change have been undertaken through QI initiatives to measure early supported discharge (ESD) and community services models across Lothian to allow patients to be discharged from hospital in a timely way. Although we have been able to demonstrate measurable impact from such initiatives, with respect to bed days saved and qualitative satisfaction by patients, the transformational change required to sustain the improvement has been difficult to maintain. We have been prioritising educaition and training in stroke for community-based staff so that discharged patients will have some appropriately skilled intervention in community settings.

NHS Orkney

The Balfour hospital does not have a dedicated Stroke Unit due to the physical limitations on bed numbers. In order to improve our pathway we have developed a clear protocol in relation to Stroke Patients. The majority of patients will be admitted to the Acute Ward initially and then transferred to Assessment and Rehabilitation ward if stable and a bed is available within 48 hours. Patients are admitted acutely to HDU if thrombolysed or unstable.

The prescribing of Aspirin is listed as part of the Stroke Care Pathway used by NHS Orkney. This pathway contains a check list for patients undergoing thrombolysis but not a check list for those patients who have had a stroke but not had thrombolysis. A check list for Stroke management is currently under development and this will include the appropriate prescribing of Aspirin

Priority 7 action 1.1 – Going forward we will ensure that a summary of all MDT discussions are appropriately recorded in patient records.

Priority 8 action 1 – Following discussion at a team meeting we have now developed a local information leaflet and we provide a copy to every patient on the stroke pathway.

NHS Shetland

Priority 7, Action 3.1	Specialist Visual assessment and rehabilitation	Red	'There is no plan in place to develop referral process & pathway for people with visual problems following stroke'	Following a process mapping exercise a local pathway is currently being scoped out using the best Practice statement for screening , assessment and management of vision problems Local pathway includes; Initial Assessment Post stroke by OT on ward to include informal visual fields testing, and screening for other eye disorders. Referral to Local designated optometrist for formal visual fields testing. Continued formal review and onwards care by optometrist liaising with Stroke Nurse Specialist.
Priority 7 Action 3.2	Access to specialist clinical /neuro psychological services	Red	'There is no plan to develop referral process and pathway for neuropsychological service'	Local referral and pathway include Referral to neuropsychology services NHS Grampian by medical Consultants NHS Shetland ≤ 1patient per year. Continued liaison via Stroke Nurse Specialist

NHS Tayside

Swallow screen continues to be challenging in Ninewells and PRI. A radical change to direct admission to the Ninewells acute stroke unit rather than initial assessment in the AMUs means patients are receiving specialist stroke care more quickly, leading to an improvement in swallow screening. In PRI a large turnover of staff within AMU has necessitated further training for new staff being delivered in the last few weeks. PRI AMU is also trialling an assessment bay where more rapid emergency treatment can be given. New ANPs employed to coordinate this will be trained in swallow screening which we anticipate will help us more consistently meet the standard.

We anticipate the changes in Ninewells will further improve performance against imaging and aspirin administration. In PRI performance has been better, and we have a rolling programme of training in stroke for junior doctors. We are changing the way we undertake exception reporting to better understand the reasons why a few patients fail on this target so that further strategies can be employed.

Stroke Units are currently working to introduce MDT joint goal setting into their practice which will form the basis of a MDT rehabilitation plan. This is discussed and documented during the MDT meetings. We plan to implement changes to move our RAG status to green in 2018.

Stroke specialist inpatient rehabilitation is currently available across Tayside. All core stroke unit MDT staff have specialist knowledge, training and experience working in stroke and currently deliver high standards of care. Community and outpatient rehabilitation services are offered across Tayside but can be more generic in nature. However all community based rehabilitation staff have experience working in stroke and have received specialist training. All community staff has access to stroke rehabilitation specialist knowledge advice and skills if required. Work is progressing to continue to offer more community specialist services as we continue towards earlier hospital discharge. Dundee currently has a stroke specialist physiotherapy community / outpatient rehabilitation service covering the whole pathway and plans to extend this to Occupational Therapy later in 2018. We anticipate that growing our specialist community rehabilitation services will continue to be an ongoing challenge as we move towards locality models of community care across the IJB partnerships.

NHS Western Isles

NHSWI Stroke Service has seen a number of changes in the last 12 months with several key staff changes. The training needs of these changes for new staff in such a small unit has resulted in a small decrease in the number of patients receiving aspirin on the first day of admission and in a similar decrease in patients having a documented swallow assessment.

NHSWI is putting in place a number of measures to improve on these areas so we are able to meet, and wherever possible, exceed the standards set.

Our new Stroke Liaison Nurse will be providing awareness raising sessions with key areas of the Western Isles Hospital to ensure that all are aware of the need for an immediate swallow assessment on admission and also the need to transfer all patients with a confirmed stroke directly to the stroke unit. In addition, we are looking to perform a daily reminder to the receiving ward to ensure that no stroke patients are placed in the wrong location. The team on the stroke unit will be undergoing training using the STARS resource where appropriate to ensure consistency of approach. We believe these measures will enable us to improve on our current standing in these areas.

The Western Isles Hospital TIA clinic is also being moved to the Stroke Ward area which it is felt will also increase awareness amongst the dedicated stroke team to improve overall concordance with the Stroke Audit standards. This will allow more staff to be trained in TIA and Stoke assessment in the most appropriate location. The changes being made will ensure that all patients across NHSWI will have the same access to the clinic regardless of geographical location.

Another area of great interest is the development of Community Navigators linked to practices to allow patients with long term conditions to access support and, where required, look at developing tailored rehabilitation solutions. This work is running side by side with an initiative to provide long tern generic rehabilitation based on functional status rather than condition specific. This will allow stroke patients to access rehabilitation in an appropriate environment based around others of a similar level of functional. This work will develop over the next few years to allow patients to access support at their appropriate level in an appropriate location.

Appendix B: List of Tables and Charts

Table/ Chart Number	Title	Page Number
Table 4.1	Patients with ischaemic diagnosis seen in specialist stroke/ TIA clinics and on anticoagulation at onset of current cerebrovascular event or on aspirin or another antiplatelet at first assessment, 2017 data.	30
Chart 5.1	Ischaemic stroke/ TIA patients with current atrial fibrillation (AF) and on anticoagulation at onset of the current	32
Table 5.1	Patients with ischaemic diagnosis, seen in specialist stroke/ TIA clinics, with current atrial fibrillation (AF) and on anticoagulation, 2017 data.	33
Chart 6.1	Mean door-to-needle time by NHS board.	35
Chart 6.2	Percentage of patients receiving thrombolysis within 30, 60 & 75 minutes of arrival at first hospital, 2017 data.	35
Chart 6.3	Percentage of patients with door-to-needle times for thrombolysis within 1 hour, 2016 and 2017 data.	36
Table 6.1	Thrombolysis - numbers thrombolysed, 2016 & 2017 data.	37
Table 6.2	Confirmed ischaemic strokes (either severe or thrombolysed) by arrival day/hour, 2015-2017 (admission date) combined.	39
Table 7.1	Carotid Endarterectomy - number of patients receiving a carotid endarterectomy in acute hospitals in Scotland during Jan-Dec 2017.	41
Chart 7.1	Percentage of patients undergoing a carotid intervention within 14 days of the event that led the patient to first seek medical assistance, 2016 and 2017 data.	42
Chart 7.2	Percentage of patients undergoing a carotid intervention within 14 days of the carotid pathway entry date*, 2016 and 2017 data.	43
Chart 8.1	90-day mortality for 2017 admissions by NHS board.	45
Chart 8.2	90-day mortality W-score for 2017 admissions by NHS board.	46
Chart 8.3	Mean 90-day home-time for 2017 admissions by NHS board.	47

Note

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

Appendix C: Stroke Improvement Plan Priorities & Actions RAG

	Action	Aim	NAC Lead	Benchmark Criteria	
Priority 1. Early recognition of Transient Ischaemic Attack (TIA) and stroke by the general public, Scottish Ambulance Service (SAS), NHS 24, primary care hospital front door services and social care staff.					
1	**Public campaign to raise awareness of stroke symptoms [(Face Arm Speech Time (to call 999) (FAST)]**	Deliver public education to increase awareness of common symptoms of stroke and TIA, and the need to seek emergency medical care.	David Clark	BLACK	No evidence of a FAST campaign.
				RED	No plan for an annual FAST campaign.
				AMBER	MCN has considered a further campaign using the available funding but as yet has no delivery plan.
				GREEN	MCN has run a further campaign using the available funding.
				COMPLETE	MCN delivers annual campaigns which are evaluated.
2	**Improve early identification of stroke and TIA by engagement with SAS, primary care and hospital emergency departments.**	Establish links to the MCN with all of these staff groups, SAS, primary care and hospital emergency departments and develop a mechanism to deliver education.	Katrina Brennan / SAS	BLACK	No FAST training delivered with any of these staff groups
				RED	Adhoc training delivered to some of these staff groups,
				AMBER	Adhoc training delivered to most of these staff groups,
				GREEN	Established training programme underway with some of these staff groups.
				COMPLETE	Established training programmes with all staff groups and evidence of a rolling programme of education which is evaluated.
Priority 2. Appropriate pre-hospital protocols to ensure rapid admission, early diagnosis and treatment.					
1	**Pre-alert by SAS**	The SAS should pre alert Emergency Departments of the arrival of FAST positive stroke patients with an onset time of < 4 ½ hours or an unknown onset time. *This element will be monitored using pre alert data soon to be available from SAS.*	Katrina Brennan/ SAS	BLACK	No pre-alerts made from SAS to Emergency Departments.
				RED	Inconsistent pre-alerts made from SAS to Emergency Departments.
				AMBER	Pre-alerts normally made but no record of consistency.
				GREEN	Pre-alert consistently made.
				COMPLETE	Audit data evidences consistent pre-alert.
2	**Early imaging**	Imaging services should work with stroke services, Emergency Departments, and other services where patients with stroke/TIA may present, to provide rapid access to CT or MR brain imaging (as appropriate) for all patients with suspected stroke, and those patients with TIA in whom brain imaging is clinically indicated; timely access to carotid imaging for patients with TIA and minor stroke should also be provided.	Joanna Wardlaw	**This Element measured by SSCA Data**	

	Action	Aim	NAC Lead	Benchmark Criteria	
3	**Thrombolysis Process and pathway**	Develop effective processes and pathways to ensure that the national Scottish Stroke Care Standard for thrombolysis is met. *Validation of this element will be supported using thrombolysis data from SSCA.*	Peter Langhorne	BLACK	No process or pathway in place .
				RED	Emergency Department or Stroke team process or pathway available for potential thrombolysis patient but not utilised.
				AMBER	Emergency Department or Stroke team process or pathway available for potential thrombolysis patient but utilised only on an ad hoc basis.
				GREEN	Emergency Department or Stroke team process or pathway available for potential thrombolysis patients and used consistently in some departments and the SSCA thrombolysis standard is being achieved. This element will be validated using SSCA data.
				COMPLETE	Emergency Department or Stroke team process or pathway available for potential thrombolysis patients and used consistently in all departments across the Board Area and the SSCA thrombolysis standard is being consistently achieved. This element will be validated using SSCA data.

Priority 3. Delivery of Stroke Bundle – (The fourth element of the Stroke Care Bundle (CT scan) is listed under Priority 2, Action 2.)					
1	**Ensure early access to stroke unit**	Acute stroke patients will be admitted rapidly to a stroke unit and remain in that care setting for as long as is clinically necessary.	Peter Langhorne	**This element measured by SSCA data**	
2	**Swallow screen**	• Stroke services should ensure swallow screening is part of the stroke admission protocol and provide a programme of education to support delivery. • Swallow screening is a pass/fail procedure to rapidly identify patients who require referral for comprehensive swallowing assessment to inform appropriate management; • Keeping patients nil by mouth for extended periods pending screening reduces patient satisfaction and may present other health risks such as missed medications; and • The swallow screening procedure requires close observation of both non-swallowing and swallowing behaviours that require sound clinical judgement and competence to practice.	Sheena Borthwick	**This element measured by SSCA data**	
3	**Evidence based interventions: Intermittent Pneumatic Compression (IPC)**	• Ensure that protocols are in place and effectively implemented to guide the appropriate use of:**Intermittent Pneumatic Compression (IPC)** for venous thromboembolism prophylaxis offering sequential compression in patients who are immobile after a stroke. *Validation of this element will be supported using IPC (User Defined Field) data from SSCA.*	Martin Dennis	BLACK	IPC not available in any stroke unit.
				RED	IPC only available in some stroke units.
				AMBER	IPC available in all stroke units.
				GREEN	IPC available in all stroke units but not consistently offered as a treatment This element will be validated using SSCA data.
				COMPLETE	IPC available in all stroke units and are consistently offered as a treatment This element will be validated using SSCA data.
		• Thrombolysis		**This element measured by SSCA data**	
		• Aspirin		**This element measured by SSCA data**	

	Action	Aim	NAC Lead	Benchmark Criteria	
Priority 4. Developing a skilled and knowledgeable workforce					
1	Health and social care staff in hospital and community settings are trained to an appropriate level.	• Utilise the education training template to accurately record training requirements and delivery and demonstrate appropriate levels of training; and NHS boards use the information collated from the education template to identify and address training needs at all levels. **Core training areas** are defined as swallow screen, STAT (thrombolysis), IPC and Core competencies. (NB-STAT will be discounted as a 'red' area for stroke unit staff if STAT training is evidenced for appropriate staff along the pathway. So if thrombolysis is delivered at the front door (e.g. A&E, Emergency Receiving Unit) and training is prioritised to front door staff, this should be documented as the pathway and evidence of training provided, in terms of numbers/ percentage of front door staff STAT trained. This STAT training would then ideally be extended to stroke unit staff).		BLACK	No process or pathway in place
				RED	Available but not implemented, 3 or more than 3 core areas are 'red' ('red' is defined as <50% of staff trained).
				AMBER	Plan to implement or partially implement, 2 or more core areas are 'red' ('red' is defined as <50% of staff trained).
				GREEN	Implemented but not consistently delivered, 1 core area 'red', or all core areas are delivered, (i.e. no core areas are red) ('red' is defined as <50% of staff trained).
				COMPLETE	Complete and embedded in practice, whole stroke education template achieved and evidenced.
Priority 5. Early diagnosis & treatment for non-admitted patients					
1	**A specialist service to deliver immediate specialist advice suspected for TIA and stroke patients.**	Stroke services should provide GPs, Emergency Departments and other services, where patients with TIA/stroke may present, with immediate access to advice from a stroke specialist.	Martin Dennis	BLACK	No plan to provide same day access to advice from specialist and no TIA pathway for Primary Care in place.
				RED	Plan to provide access to advice from specialist on day of request and / or shared protocols for appropriate interventions.
				AMBER	Specialist advice only available on some days and pathways not consistently adhered to.
				GREEN	7 day / week but daytime only access to stroke specialist service.
				COMPLETE	24/7 access to stroke specialist service for advice.
2	**Service to provide early access to confirmatory clinical assessment**	A specialist service should be available to confirm the diagnosis of TIA/stroke, to differentiate these from mimics and to provide early access to brain and vascular imaging. *Validation of this element will be supported using outpatient data from SSCA.*	Martin Dennis	BLACK	No service providing rapid assessment of patients with possible TIAs and minor strokes.
				RED	A service which provides rapid assessment but does not exceed the national standard for access.
				AMBER	A service which provides rapid assessment which exceeds the national standard for access but cannot demonstrate that it offers same day brain or carotid imaging.
				GREEN	A service which provides rapid assessment which exceeds the national standard for access and can demonstrate that it provides same day brain or carotid imaging.
				COMPLETE	A service which provides rapid assessment which exceeds the national standard for access and can demonstrate that it provides same day brain and carotid imaging.
Priority 6: Appropriate Secondary Prevention					

	Action	Aim	NAC Lead	Benchmark Criteria	

1	**Anti-coagulation for patients in AF**	Patients should have a 12 lead ECG to detect persistent AF. Selected patients with Ischaemic stroke or TIA should have prolonged ECG monitoring to detect paroxysmal AF. The following criteria might be used to select patients:
		
		a. No known history of Atrial fibrillation **and**
		b. No contraindication or definite indication for lifelong oral anticoagulation, **with any of the following**:
		   i. History of frequent palpitation
		   ii. Syncope or pre-syncope
		   iii. Recent Myocardial infarction
		   iv. Recent cardiac surgery
		   v. Cardiac failure
		   vi. Ischaemic stroke/TIA affecting more than one vascular territory
		   vii. A cortical ischaemic stroke/TIA with no other explanation.
			Christine McAlpine	BLACK	Ad hoc service.

				RED	Stroke services should have written, locally agreed criteria, to select those patients with stroke or TIA who should be offered prolonged ECG monitoring to detect paroxysmal AF.
				AMBER	Patients meeting those criteria should have prompt access to at least 72 hours of ECG monitoring to detect paroxysmal AF.
				GREEN	The results of the prolonged monitoring should be available within two weeks of referral for monitoring to facilitate early secondary prevention.
				COMPLETE	Oral anticoagulation should be discussed with the patients and commenced if appropriate within a month of the stroke/TIA? Data should be available to confirm that patients meeting the criteria for ECG monitoring are receiving this, that results are available within the two weeks and that patients found to be in atrial fibrillation are offered anticoagulation with a NOAC or Warfarin within a month of their stroke/TIA.
2	**Carotid endarterectomy for patients with recently symptomatic carotid stenosis**	To modify the patient pathway to ensure that at least 80% of patients undergoing carotid endarterectomy for symptomatic carotid stenosis have the procedure within 14 days of their index TIA/stroke event (see details of Scottish Stroke Care Standards in Annex 2).	Martin Dennis	**This element measured by SSCA data**	
Priority 7. Transition to the community					
1.1	**Access to stroke therapy services.**	Acute therapy assessment is provided by stroke specialists by day 3 of admission following a stroke. *Once available, data from the SSCA Rehab sprint audit will be used to support this benchmarking.*	Thérèse Jackson / Mark Smith	BLACK	No acute therapy assessment is available or plan to develop services.
				RED	Plan in place to develop stroke specialist acute therapy assessment provision by day 3 following admission.
				AMBER	Acute therapy assessment is carried out by generic staff but not routinely by day 3.
				GREEN	Acute therapy assessment is carried out by stroke specialists but not routinely by day 3 following admission.
				COMPLETE	Acute therapy assessment is carried out by stroke specialists and by day 3 of admission following a stroke.

	Action	Aim	NAC Lead	Benchmark Criteria	
1.2	**Access to Stroke Rehabilitation Services**	Stroke rehabilitation services including In-patient stroke rehabilitation unit (SRU), early supported discharge (ESD) teams and community rehabilitation (CR) teams should be available in each health board.	Thérèse Jackson / Mark Smith	BLACK	No In-patient SRU, ESD or Community Rehabilitation available.
				RED	Plan to develop SRU, ESD & Community Rehabilitation is in place and implementation plan agreed by MCN.
				AMBER	SRU, ESD & Community Rehabilitation available but not consistently across MCN area and is often generic in nature.
				GREEN	SRU, ESD and Community Rehabilitation is available across MCN area but levels of input are insufficient to provide daily input (Mon-Fri) on the SRU and according to patient need for ESD & CR.
				COMPLETE	SRU, ESD or Community Rehabilitation are available across the MCN area on a needs led basis (i.e., daily for SRU and according to patient need for ESD and CR).
2	**Person-centred approach**	Stroke services should implement a person-centred approach including goal setting in hospital and community services to ensure an individualised approach.	Thérèse Jackson / Mark Smith	BLACK	No goal setting in place, or plan to establish goal setting process.
				RED	Plan to develop goal setting process in hospital stroke services and community rehabilitation services.
				AMBER	Goal setting process is used in some hospital stroke services & community settings, but approaches are inconsistent.
				GREEN	Goal setting is used across MCN area, but process is not multidisciplinary.
				COMPLETE	Goal setting is established across the MCN area and is available in a multidisciplinary format in SRU, ESD and community rehabilitation services.
3.1	**Specialist visual assessment and rehabilitation**	Specialist visual assessment and rehabilitation services are available to all people with visual impairment following stroke across the MCN area.	Thérèse Jackson	BLACK	No referral process or documented pathway is available, or plan to develop one for people with visual problems following stroke.
				RED	Plan to develop referral process & pathway for people with visual problems following stroke.
				AMBER	Documented referral process and pathway for specialised visual assessment services but availability limited and referral is ad hoc across MCN area.
				GREEN	Documented referral process and pathway with provision and availability of specialised visual services in selected MCN areas.
				COMPLETE	All those across the MCN area with identified visual problems after stroke have access to specialised visual assessment and rehabilitation services as required.

	Action	Aim	NAC Lead	Benchmark Criteria	
3.2	**Access to specialist clinical/neuro psychological services**	Clinical/Neuro Psychological services are available to all patients across the MCN area who require specialised psychological assessment and intervention for the emotional and cognitive consequences of stroke.		BLACK	No specialised neuro psychological services are available for people who have had a stroke or plan to establish them.
				RED	Plan to develop referral process & pathway for neuro psychological services for people who have had a stroke.
				AMBER	Documented referral process and pathway for specialised neuro psychological services but availability limited and referral is ad hoc across MCN areas.
				GREEN	Documented referral process and pathway with provision and availability of specialised neuro psychological services and consistent referral in selected MCN areas.
				COMPLETE	All individuals (patients and family/ carers) with identified emotional and/ or cognitive problems after stroke have access to specialised neuro psychological assessment and intervention as required across all MCN areas (prevention, acute, post acute rehabilitation and community).
3.3	**Specialist Driving Assessment**	Specialist advice with regards to return to driving following stroke is available to all patients across the MCN area.		BLACK	No local protocol or access to specialised advice is available, for return to driving following stroke.
				RED	Plan to develop local protocol & access to specialised advice regarding the referral process & pathway for return to driving following stroke.
				AMBER	Local protocol for return to driving assessment & access to specialised advice is available but not documented, and referral for assessment at a specialised driving assessment service is ad hoc across the MCN area.
				GREEN	There is a documented referral process and pathway available, with provision of specialist advice for return to driving in some MCN areas.
				COMPLETE	Clear, documented protocol for accessing specialist advice and referral to driving assessment at an accredited driving assessment service is evident across MCN area.
Priority 8. Living with stroke					
1	**Self management post discharge support**	Multidisciplinary stroke teams provide a range of supported self management approaches including individual, group, written and online resources and can evidence the use of these.	Thérèse Jackson	BLACK	No self management approaches or resources are available.
				RED	Plan in place to develop self management approaches.
				AMBER	Only written and online self management resources are available and are used locally and evidence of their use available.
				GREEN	Individual or group self management options (as well as written and online) are available to some patients across the MCN area and evidence of their use available.
				COMPLETE	Facilitated individual or group self management options (as well as written and online) are available to all patients across the MCN area and evidence of their use available.

	Action	Aim	NAC Lead	Benchmark Criteria	
2	**Exercise**	People being discharged home following stroke should have access to exercise after stroke services and given advice about increasing their physical activity levels where appropriate.	Mark Smith	BLACK	Exercise after stroke services or advice regarding increasing physical activity are not available.
				RED	Advice regarding increasing physical activity is available but an exercise after stroke service is not available.
				AMBER	Advice regarding increasing physical activity is available and limited exercise after stroke services are available across some parts of the MCN area.
				GREEN	Advice regarding increasing physical activity is available and exercise after stroke services are available across the MCN area.
				COMPLETE	An established system to ensure advice regarding increasing physical activity is delivered and a clear process of referral into an exercise after stroke pathway is evident across the entire MCN area.
3	**Living with stroke – vocational rehabilitation**	Vocational rehabilitation services are available to people who wish to return to paid, unpaid or voluntary work.	Thérèse Jackson	BLACK	No vocational rehabilitation services available for people who have had a stroke or plan to establish them .
				RED	Plan to develop referral process & pathway for vocational rehabilitation services for people who have had a stroke.
				AMBER	Vocational rehabilitation services exist for people who have had a stroke, however availability and referral is ad hoc across the MCN area.
				GREEN	There is a documented referral process and vocational rehabilitation pathway available, with provision of specialist services in some MCN areas.
				COMPLETE	All those across the MCN area with identified vocational rehabilitation needs after a stroke have access to specialised assessment and intervention services as required.
4	**Access to stroke spasticity management services**	Stroke services should implement a documented programme for prevention and management, including self-management, of post stroke spasticity. All staff should have completed training on prevention and management of post stroke spasticity (STARs). Patients and carers should receive information on spasticity management both verbally and in written/online format. Timeous stroke spasticity services are available to all patients across the MCN area who require specialist assessment and intervention.		BLACK	No documented pathway or referral process for post stroke spasticity management is available, or plan in place to develop one.
				RED	Plans in place to develop referral process or documented pathway for spasticity management, including staff training and patient/carer information.
				AMBER	Spasticity management pathway in place in some parts of the MCN area but approach is inconsistent. No specialist stroke spasticity services available.
				GREEN	Spasticity referral process and documented pathway in place. Access to specialist, multidisciplinary spasticity services for some patients, but on an ad hoc basis throughout the MCN area.
				COMPLETE	Spasticity referral process and documented management pathway in place. Timely specialist multidisciplinary stroke spasticity services, which include a specialist clinic and appropriate therapy follow up, are available across the entire MCN area.

Appendix D: Stroke Education Template

A national stroke education template has been developed which lists the skills/training requirements for staff working with stroke patients. This includes:

- Swallow screening;
- Stroke core competencies - via stroke courses or STARS* online (Stroke Training Awareness Resource) and STARS advancing;
- SCoT** online core and specialising; and
- Thrombolysis, STAT training or equivalent

***STARS** (Stroke Training Awareness Resource) is an e-learning resource/learning tool available to health and social care staff to enable them to become more knowledgeable in stroke care. The resource is based on the Stroke Core Competencies which were published by NHS Education Scotland (NES) in 2005. The STARs website is a nationally recognised stroke training resource.

****SCoT**, the Stroke Competency Toolkit (SCoT) is a free Continuing Professional Development (CPD) resource, specific to stroke care and is based on the NES Stroke Core Competencies (2005). It provides a format which enables health and social care staff to evidence their learning and demonstrate their knowledge of the stroke core competencies through reflective practice.

*****Thrombolysis/Stroke and TIA Assessment Training (STAT)** is aimed at staff who are involved in clinical decision making around thrombolysis treatment/management. It covers all aspects of assessment, delivery and monitoring.

Appendix E: Organisational Structure of SSCA

The Scottish Stroke Care Audit is a national audit within Scottish Healthcare Audits 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:

Dr Mark Barber	Chairman of the Steering Committee/ Lead Clinician
Neil Muir	National Clinical Co-ordinator
Pamela Maclean	Regional Clinical Co-ordinator
David Murphy	Senior Information Analyst
Iain McDermid	Information Analyst
Martin O'Neill	Principal Analyst
Gillian Gillespie	Data Support Officer

Professor Martin Dennis completed his term as chair of the SSCA in 2017, with Dr Mark Barber being elected unanimously to replace him.

Funding of £167k for the central coordination of the SSCA for 2017/18 was provided by NACS. Funding for the SSCA data collection has been included in each NHS board's general allocation. Each NHS board is expected to continue to collect the audit data. Auditors are employed in each NHS 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 NHS boards have entered data into eSSCA. Prior to this all NHS boards data were entered into the Scottish Stroke Care Audit System (SSCAS) other than NHS Lanarkshire. In NHS Lanarkshire a locally developed system (Stroke Audit In Lanarkshire (SAIL)) was used to collect inpatient and outpatient data. Data from SAIL (up to June 2012) were sent directly to ISD on a monthly basis and are included in National Reporting. Data validation is built into the computer systems, with additional local validation at point of data entry and centrally during analysis.

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

Appendix F: Additional Information

Additional information is available on the SSCA website:

- Aims, objectives and methods of the audit.
  http://www.strokeaudit.scot.nhs.uk/about.htm
- Audit documentation, e.g. data collection forms.
  http://www.strokeaudit.scot.nhs.uk/about/Resources.html
- Core dataset definitions.
  http://www.strokeaudit.scot.nhs.uk/about/Resources.html
- Current Steering Group members.
  http://www.strokeaudit.scot.nhs.uk/about/SSCA_Steering_Committee_Members_2015.pdf
- Contact details of Project Team.
  http://www.strokeaudit.scot.nhs.uk/contact.htm
- Previous Annual National Reports.
  http://www.strokeaudit.scot.nhs.uk/Reports/Reports.html
- Information on requesting SSCA data for research purposes.
  http://www.strokeaudit.scot.nhs.uk/Research.html
- Information on Quality Improvement and the Scottish Stroke Care Standards.
  http://www.strokeaudit.scot.nhs.uk/Quality.html
- Information for patients and carers.
  http://www.strokeaudit.scot.nhs.uk/Patients.html

Acknowledgements

Contacts

If you have any general questions about stroke care in your local area please contact your local Stroke Managed Clinical Network.

NHS board	Contact Name	Email Address
Ayrshire & Arran	Christine Tod	Christine.tod@aaaht.scot.nhs.uk
Borders	Sandi Haines	sandi.haines@borders.scot.nhs.uk
Dumfries & Galloway	Christine Cartner	christine.cartner@nhs.net
Fife	Katrina Mccormick	katrinamccormick@nhs.net
Forth Valley	David Munro	david.munro@nhs.net
Grampian	Robert O'Donnell	rodonnell@nhs.net
Greater Glasgow & Clyde	Camilla Young	camilla.young@nhs.net
Highland	Christian Nicolson	christian.nicolson@nhs.net
Lanarkshire	Katrina Brennan	katrina.brennan@lanarkshire.scot.nhs.uk
Lothian	Morag Medwin	morag.medwin@nhslothian.scot.nhs.uk
Orkney	Nickie Milne	nichola.milne@nhs.net
Tayside	Tracey Gellatly	Tracey.gellatly@nhs.net
Shetland	Dorothy Storey	Dorothy.storey@nhs.net
Western Isles	Debra Vickers	Debra.vickers@nhs.net

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 Neil Muir, David Murphy or Iain McDermid.

For general questions about the audit please contact Neil Muir National Clinical Coordinator for the SSCA.

Neil Muir

National Clinical Coordinator   Gyle Square

phone: 0131 275 6089   1 South Gyle Crescent

email: neil.muir1@nhs.net   Edinburgh, EH12 9EB

Pamela Maclean

Regional Clinical Coordinator   Gyle Square

phone: 0131 275 2222   1 South Gyle Crescent

email: pamela.maclean1@nhs.net   Edinburgh, EH12 9EB

David Murphy

Senior Information Analyst   Gyle Square

phone: 0131 275 6624   1 South Gyle Crescent,

email: david.murphy2@nhs.net   Edinburgh, EH12 9EB

Iain McDermid

Information Analyst   Gyle Square

phone: 0131 275 7419   1 South Gyle Crescent,

email: iain.mcdermid@nhs.net   Edinburgh, EH12 9EB

If you have general questions about stroke care in Scotland please contact Dr Mark Barber, Chair of the Scottish Stroke Care Audit.

Dr Mark Barber

Lead Clinician and Chair of the SSCA

phone: 01236 748748

email: mark.barber@nhs.net

Better data.

Better lives. Better outcomes.

Stroke Care Audit Team
Information Services Division (ISD)

Gyle Square
1 South Gyle Crescent
Edinburgh, EH12 9EB