NOCA National Office of Clinical Audit | INAS Irish National Audit of Stroke

IRISH NATIONAL AUDIT OF STROKE

NATIONAL REPORT 2022

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ABOUT THE NATIONAL OFFICE OF CLINICAL AUDIT

The National Office of Clinical Audit (NOCA) was established in 2012 to create sustainable clinical audit programmes at national level. NOCA is funded by the Health Service Executive, Office of the Chief Clinical Officer, and is operationally supported by the Royal College of Surgeons in Ireland. The National Clinical Effectiveness Committee defines national clinical audit as "a cyclical process that aims to improve patient care and outcomes by systematic, structured review and evaluation of clinical care against explicit clinical standards on a national basis" (National Clinical Effectiveness Committee, 2015, p. 2). NOCA supports hospitals to learn from their audit cycles.

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NOCA National Office of Clinical Audit

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24th October 2023

Dear Prof Harbison,

Following an assurance review of this report to the NOCA National Reporting Standards, I am delighted on behalf of the NOCA Governance Board to endorse the ***Irish National Audit of Stroke National Report 2022***.

This report is a comprehensive and accurate assessment of the delivery of care of stroke to best practice standards.

I congratulate you, Audit Manager Joan McCormack, Analyst Olga Brych and your governance committee on the development of this report which is an invaluable asset for our healthcare system to improve stroke care and outcomes for all patients.

We look forward to working with you to enhance the audit and support the implementation of recommendations.

Please accept this letter as formal endorsement on behalf of the NOCA Governance Board of the ***Irish National Audit of Stroke National Report 2022***.

Yours sincerely,

Dr Brian Creedon
Clinical Director
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FOREWORD

I am delighted to welcome the fourth Irish National Audit of Stroke (INAS) annual report which presents a comprehensive picture of the current state of stroke services in Ireland. This report will be of interest to all patients and carers, healthcare professionals, hospital managers, Hospital Groups, patient advocacy organisations, policy-makers and researchers.

I was part of the research team for the first Irish national audit of stroke services, 2005–2008. In 2008, stroke services in Ireland were poor, with only one hospital having a stroke unit and only 1% of stroke patients receiving thrombolysis. We should reflect upon all that has been achieved to date with investment of resources in order to deliver better patient care. There has been much progress thanks to the advocacy of professional leaders in stroke care and the collaboration, teamwork and innovation of healthcare professionals around the country, who have delivered hyperacute/acute stroke care, thrombectomy services, rehabilitation and early supported discharge, as well as supplying data for the audit. The *National Clinical Guideline for Stroke for the United Kingdom and Ireland* (Intercollegiate Stroke Working Party, 2023) provides an authoritative, evidence-based practice guidance to improve the quality of care delivered to every adult who has a stroke. We are all striving to deliver quality stroke care for those who have experienced a stroke and are recovering. Audit is essential, and auditing of stroke care allows us to identify shortfalls in the quality of care as well as to guide improvements in stroke care.

The INAS is a powerful and valuable resource that can be used by stroke teams in order to support quality improvement assurance work and research in hospitals that enhances the care of patients with a stroke. The *Irish National Audit of Stroke National Report 2022* indicates that there have been improvements (e.g. with regard to timely imaging and thrombectomy), in the provision of care throughout 2022, and it is reassuring that most other metrics have not deteriorated. The report also highlights challenges in other key areas, such as accessibility to stroke units and timely presentation to hospital. The median time between a patient's hospital arrival and their being seen by a doctor has increased as has the median time between hospital arrival and thrombolysis. Rates of patients who are admitted to a stroke unit remains unchanged at 69%, and 68% of this figure spent more than 90% of thier hospital stay in a stroke unit. Both of these key performance indicators remain below the target of 90% (Health Service Executive (HSE), 2012). Continuing to improve the process of care, particularly by increasing the proportion of patients managed on specialist stroke units, should be a top priority.

The INAS is driving improvements in stroke care and stroke pathways. The *Irish National Audit of Stroke National Report 2022* and analysis will inform the data quality improvement plan for the INAS in 2023. It also identifies priorities with regard to improving patient care. Healthcare professionals working in stroke care continue to develop quality improvement (QI) initiatives in order to improve the quality of care given to patients with a stroke. Section 6 of the report presents information on completed QI initiatives which illustrate how colleagues in stroke care around Ireland are improving the quality of care given to patients with a stroke and which should inspire others to get involved in local QI initiatives.

The INAS data only reflect care in the acute hospital and do not follow the patient along the whole pathway to recovery. Those who experience a stroke will be engaging with health services for the remainder of their lives. The transition at discharge from hospital after stroke, and navigation through the services, is challenging for stroke patients and their families. Understanding more about where patients with stroke are receiving care, support and rehabilitation in the community would be valuable. The National Clinical Programme for Stroke, and its collaborative relationship with the INAS, is currently supporting the drive for improvements in stroke care in Ireland.

"The INAS is a powerful and valuable resource that can be used by stroke teams in order to support quality improvement assurance work and research in hospitals that enhances the care of patients with a stroke."

"In conclusion, the *Irish National Audit of Stroke National Report 2022* is an important reminder of our collective ambition as healthcare professionals to deliver the highest quality of services to those who have experienced a stroke"

The audit would not be possible without the data, and the data are available for analysis because of the commitment of clinical colleagues. The total national coverage of cases submitted by participating hospitals for 2022 was 90.1%, down from 95% in 2021. Four hospitals did not reach 80% coverage, and three were excluded from 2022 reporting. This, as well as previous INAS reports, suggests that the burden of data collection lies, in most hospitals, with the Clinical Nurse Specialist (CNS) in Stroke. When a CNS leaves the position, there is often a gap in service which then impacts on data collection. This highlights an ongoing need for dedicated audit resourcing to be in place in order to support data collection and cover for staff absence. The health and social care professional (HSCP) dataset remains in an implementation phase, and, as coverage remains low, HSCP data are reported in aggregate. All hospitals need the necessary resources in order to participate fully in the INAS.

I wish to acknowledge the INAS team at the National Office of Clinical Audit and all the participating hospitals, the Clinical Leads and the INAS Audit Coordinators, as without their support and input this audit and the meaningful analysis of stroke care in Ireland would not be possible. I congratulate the *Irish National Audit of Stroke National Report 2022* leadership and author team for their detailed and careful analysis, and presenting all the details along with hyperlinks and INAS quarterly dashboards.

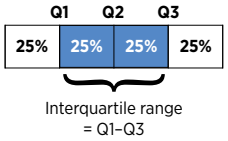
In conclusion, the *Irish National Audit of Stroke National Report 2022* is an important reminder of our collective ambition as healthcare professionals to deliver the highest quality of services to those who have experienced a stroke. The report is a reminder to stroke leaders and advocates, and healthcare commissioners and providers, that stroke is still a leading cause of death and disability and needs ongoing attention and investment.

Frances Horgan
Professor of Physiotherapy
Royal College of Surgeons in Ireland (RCSI) University of Medicine and Health Sciences

CONTENTS

GLOSSARY OF TERMS AND DEFINITIONS

ACRONYM	FULL TERM
AF	atrial fibrillation
aphasia	Aphasia is a disorder that affects the ability to speak, read, write and understand language.
carotid endarterectomy	Carotid endarterectomy is surgery that removes plaque build-up from inside a carotid artery in the neck.
carotid stenosis	Carotid stenosis is a narrowing of the carotid arteries, the two major arteries that carry oxygen-rich blood from the heart to the brain.
carotid stenting	Carotid stenting is a procedure in which a vascular surgeon or neuroradiologist inserts a stent which expands inside the carotid artery to increase blood flow in areas blocked by plaque.
DOAC	direct oral anticoagulant
DTN	'door to needle' – this is a term used to indicate the time between the arrival of the patient at the hospital and the time of thrombolysis treatment.
ESD	Early Supported Discharge
EVT	endovascular thrombectomy
EVT stroke centre	An EVT stroke centre is a hospital that can provide a thrombectomy service.
HADx	hospital acquired diagnosis
haemorrhagic stroke	Haemorrhagic stroke occurs when a blood vessel in the brain leaks or ruptures.
HIPE	Hospital In-Patient Enquiry
HPO	Healthcare Pricing Office

ACRONYM	FULL TERM
HSCP	health and social care professional
HSE	Health Service Executive
ICD-10-AM	International Classification of Diseases, Tenth Revision, Australian Modification
IHF	Irish Heart Foundation
IHI	individual health identifier
INAS	Irish National Audit of Stroke
INR	international normalised ratio
IQR	 interquartile range – this is a measure of variability, based on dividing a dataset into quartiles. It represents the middle 50%.
ischaemic stroke	Ischaemic stroke is the most common type of stroke. It happens when the brain's blood vessels become narrowed or blocked, causing severely reduced blood flow (ischaemia).
KPI	key performance indicator
KQI	key quality indicator
LOS	length of stay
median	The median is the middle number in a sorted (ascending or descending) list of numbers and can be more descriptive of that dataset than the mean.
MRI	magnetic resonance imaging
mRS	modified Rankin Scale

ACRONYM	FULL TERM
NCP	National Clinical Programme
NIHSS	National Institutes of Health Stroke Scale
NOCA	National Office of Clinical Audit
NTS	National Thrombectomy Service
OT	occupational therapist
PT	physiotherapist
p-value	The probability under the assumption of no effect or no difference (null hypothesis) of obtaining a result equal to or more extreme than what was actually observed. For the purpose of this report, if the *p*-value is less than 0.05, it is judged as 'significant', and if the *p*-value is greater than 0.05, it is judged as 'not significant'.
QI	quality improvement
SLT	speech and language therapist
stroke unit	A stroke unit is a geographically discrete area in a ward where patients with a stroke are cared for by a multidisciplinary team that has specialist knowledge, protocols, training and skills in stroke care and the ability to monitor and regulate basic physiological function.
thrombectomy	A thrombectomy is the mechanical removal of a blood clot in the brain.
thrombolysis	Thrombolysis is the breakdown of blood clots formed in blood vessels using medication.

EXECUTIVE SUMMARY

This is the fourth Irish National Audit of Stroke (INAS) annual report and is presented in a condensed format with hyperlinks to the appendices and supporting documentation. The report presents the key findings from analysis of the complete dataset, which is available in the INAS National Reporting Table 2022.

Stroke is the second leading cause of death in middle- to higher-income countries, and the leading cause of acquired adult neurological disability in Ireland (Health Service Executive (HSE), 2023b). In 2022, 4,999 cases were analysed from 21 hospitals. Three hospitals are not included for this reporting period due to low levels of data submission. Auditing acute stroke care is essential in order to identify shortfalls in quality of care and to guide improvements in care, and it is important that there is dedicated audit resourcing available with contingency planning in place to cover for staff absence.

There was a 7.1% increase in the number of patients with a stroke admitted to hospital between 2020 and 2021, and although the number of admissions continued to rise in 2022 it was a lower increase (3.0%) than in previous years (Figure 4.1). There was no change in the demography of patients with a stroke from previous years (National Office of Clinical Audit (NOCA), 2023): 57% (n=2855) of patients with stroke were male, with a mean age of 70 years. Forty-three percent (n=2144) were female, with a mean age of 75 years. Males had a stroke at a younger age compared with females: 33% (n=932) of males had a stroke aged 65 years or under, compared with 22% (n=461) of females.

The thrombolysis rate (n=419, 10%) remains unchanged from 2021 and below the 12% target. A spotlight audit on thrombolysis will be undertaken in 2023 to assess the factors that impact on treatment with thrombolysis. The rate of thrombectomy also remains unchanged at 9% (n=380). There is variation between all hospitals in these results. The unadjusted in-hospital mortality rate for 2022 was 10.8% (n=540), as in previous years (NOCA, 2023), and lower than the United Kingdom (UK) rate of 13.8%, as recorded by the Sentinel Stroke National Audit Programme (SSNAP) (King's College London, 2021/2022).

Data from the health and social care professional dataset have been incorporated into the report, and data were available on 47% of patients eligible for physiotherapy, 41% of patients eligible for occupational therapy, and 46% of patients eligible for speech and language therapy.

This report also presents data on the findings of a spotlight audit on atrial fibrillation (AF) carried out in 2022. It suggests that the management of AF was relatively good. The prevalence of known AF in patients admitted with stroke was 18% (n=918), with a substantial number of patients (n=485, 10%) diagnosed with AF after their stroke. While the great majority of patients were on the correct dose of anticoagulation medication on admission, 23% of those prescribed anticoagulants either were on an inadequate dose, had paused their medication or regularly forgot to take it.

This report indicates improvements in the provision of care in 2022, but some areas have remained unchanged or are not statistically different, and two metrics have deteriorated (Table 1.1). While statistical testing was carried out, it is important to note that, even at times when there is no statistically significant difference, there may be a clinical significance. For example, in the case of key quality indicator (KQI) 4 (the median time between hospital arrival time and brain imaging time), this time decreased from 63 minutes to 59 minutes. However, there was no statistically significant difference between the median time of 63 minutes in 2021 and the median time of 59 minutes in 2022 (p=0.687). The median time of 59 minutes is within the target goal of 60 minutes. Monitoring trends for any further changes will be a focus of the audit each year.

KEY FINDINGS

In 2022, the median interval between onset of stroke symptoms and hospital arrival was 3 hours and 2 minutes (interquartile range (IQR): 1 hour and 38 minutes to 9 hours and 25 minutes) a decrease of 28 minutes from 2021.

Forty-seven percent (n=2097) of patients with a stroke were seen by a medical team within 10 minutes of hospital arrival, which was unchanged from 2021. However, this information was unknown in 575 cases.

The number of admissions to a stroke unit remains unchanged (n=3455, 69%), and of those admissions, 68% of the total hospital stay was spent in a stroke unit. (Figure 4.8). Both key performance indicators remain well below the target of 90% (HSE, 2012).

RECOMMENDATIONS

1.	All hospitals should be resourced to participate fully in the Irish National Audit of Stroke (INAS).	
2.	The number of stroke unit beds should be increased so that at least 90% of patients with a stroke are cared for in a stroke unit.	
3.	Opportunistic screening for atrial fibrillation (AF) should be carried out for all people aged 65 years and over.	
4.	Clinicians and patients should be provided with guidance as to the importance of good adherence to anticoagulation medication in order to avoid strokes.	
5.	All hospitals should review their own performance against the national standards and identify quality improvement opportunities in order to improve the quality of care they are providing.	

TABLE 1.1: CHANGE OVER TIME, BETWEEN 2021 AND 2022

			2021	2022	*p*-value
	The rate of mood screening increased.		**27%**	**38%**	***<0.001***
	The median time between onset of stroke symptoms and hospital arrival decreased by 28 minutes.		**3 hours and 30 minutes**	**3 hours and 2 minutes**	***0.004***
	The proportion of cases who arrive at hospital within 3 hours of symptom onset increased.		**46%**	**50%**	***0.005***
	KQI 6: The rate of swallow screening increased.	**Target: 90**%	**68%**	**71%**	***0.005***
	The proportion of cases who received brain imaging within 1 hour of hospital arrival increased.		**48%**	**50%**	***0.041***
	KQI 4: The median time between hospital arrival time and brain imaging time decreased.	**Target: 60 minutes**	**63 minutes**	**59 minutes**	***0.687***

			2021	2022	*p*-value
	KQI 2: The proportion of time spent in a stroke unit was unchanged.	**Target: 90%**	**68%**	**68%**	**–**
	KQI 3: The proportion of patients with ischaemic stroke who received thrombolysis was unchanged.	**Target: 12%**	**10%**	**10%**	**–**
	The rate of thrombectomy was unchanged.		**9%**	**9%**	**–**
	KQI 7: Proportion of patients who have swallow screen completed within 4 hours was unchanged.	**Target: 90%**	**43%**	**43%**	**–**
	The proportion of patients discharged home was unchanged.		**60%**	**60%**	**–**
	KQI 1: The proportion of patients admitted to a stroke unit decreased.	**Target: 90%**	**70%**	**69%**	***0.474***
	KQI 5: The median time between hospital arrival time and time of thrombolysis increased.	**Target: 60 minutes**	**53 minutes**	**54 minutes**	***0.882***

		2021	2022	*p*-value
	The median total hospital length of stay increased.	**8 days**	**9 days**	***<0.001***
	The median time between hospital arrival and seeing a doctor increased.	**12 minutes**	**14 minutes**	***0.046***

KEY HIGHLIGHTS 2022

IMPROVED | STAYED THE SAME | DISIMPROVED

EMERGENCY CARE

50% Half of all patients arrived at hospital with 3 hours of symptom onset, 28 minutes faster than 2021.

14 The median time between hospital arrival and seeing a doctor was 14 minutes.

50% 50% of patients received a brain scan within 1 hour of hospital arrival.

10% 10% of patients with ischaemic stroke received treatment with thrombolysis. Thrombolysis is the breakdown of blood clots formed in blood vessels using medication. Target: 12%

54% The median time between hospital arrival and time of thrombolysis was 54 minutes. Target: 60 minutes

STROKE UNIT CARE

89% 89% of patients with a stroke were assessed by a health and social care professional.

38% The rate of mood screening was 38%.

71% The rate of swallow screening was 71%. Target: 90%

69% The proportion of patients admitted to a stroke unit was 69%. Target: 90%

9% The rate of thrombectomy was 9%. This is a procedure where large clots can be removed from arteries in the brain.

OUTCOMES

9 The median total hospital length of stay was 9 days.

68% For patients admitted to a stroke unit, 68% of the total hospital stay was spent in a stroke unit. Target: 90%

60% 50% of patients were discharged home with an additional 10% discharged home with early supported discharge.

7.5% **30%** Mortality for patients with ischaemic stroke was 7.5% and 30% for patients with haemorrhagic stroke.

PATIENT AND PUBLIC INTEREST PERSPECTIVE

Declan Whitney

I had a stroke on September 22nd 2022 it took me completely by surprise.

I was walking my dog in our estate when, suddenly, I had only one leg. Or that's how it seemed – my right leg was dangling uselessly. My immediate reaction was to hop on my left leg to sit on a low garden wall, trying to figure out what was going on. I attempted to wave at a passing car, but now my right arm was equally useless. As I hung on to my dog and tried to figure out what was happening, my first piece of good luck occurred. A woman pulled in and came to my rescue. She loaded us into the back of her car and drove me home – just a couple of minutes away. My partner Sarah immediately called an ambulance, and I was soon on my way to Connolly Hospital.

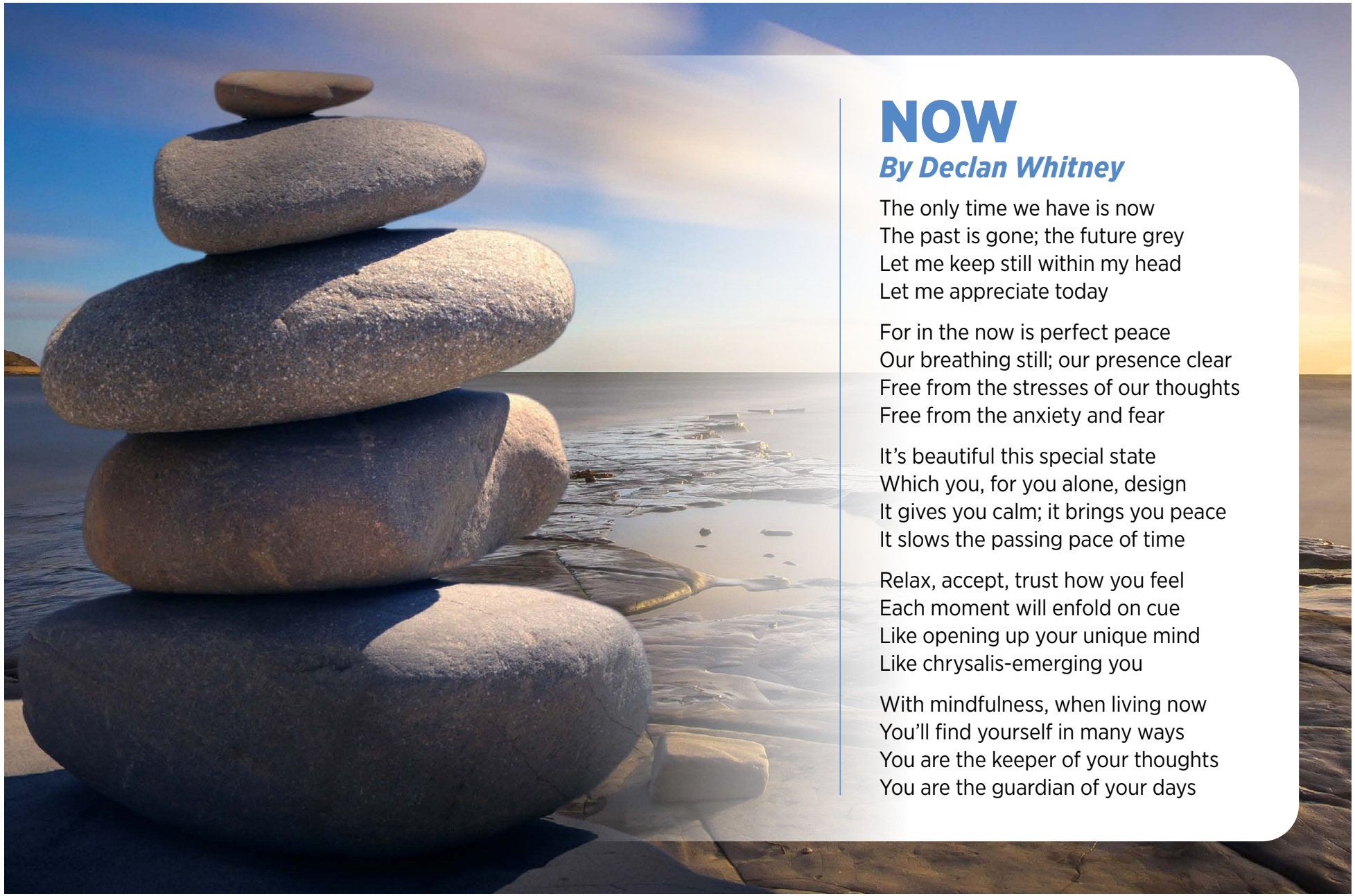
I was seen immediately, tested for stroke – I failed the 'touch your nose' test on a number of occasions – I had a brain scan and was transferred to a ward for further examination. From the moment I was delivered to the emergency department, I felt I was in highly competent hands. Despite the huge demands on their skills, everything was handled urgently, caringly and professionally.

The next day I was moved to the acute stroke ward where I was tended to by Dr Kevin Cregg, specialist stroke nurse Lisa Donaghy and their amazing support team. This was a scary environment, with stroke patients much worse off than me struggling to sleep or cope with pain. It was here that my mindfulness helped me to mentally manage this strange environment and get back on my feet in a relatively short time. Ultrasound and MRI scans followed, and after 4 days I was released home on statins and aspirin. Over the next few weeks, I used home blood pressure and heart monitoring devices provided by Lisa Donaghy, and Dr Cregg reviewed my case with me some 6 months later. Their ongoing contact was reassuring and built up my confidence, which I really appreciated.

I still talk to my friends about the superb services of Connolly Hospital where the treatment I got was amazing – from start to finish – wonderful people; incredible care; with ongoing monitoring and follow up for many months after I was allowed home.

I am back dog walking, playing tennis, holidaying abroad and writing poetry – my poem 'Now' (Whitney, 2015) about mindfulness will, I hope, inspire patients through the scary times of acceptance and recovery, as it did me. My thanks for the amazing services I received during my time at Connolly. I will be forever grateful.

"My thanks for the amazing services I received during my time at Connolly. I will be forever grateful."



NOW

By Declan Whitney

The only time we have is now
The past is gone; the future grey
Let me keep still within my head
Let me appreciate today

For in the now is perfect peace
Our breathing still; our presence clear
Free from the stresses of our thoughts
Free from the anxiety and fear

It's beautiful this special state
Which you, for you alone, design
It gives you calm; it brings you peace
It slows the passing pace of time

Relax, accept, trust how you feel
Each moment will enfold on cue
Like opening up your unique mind
Like chrysalis-emerging you

With mindfulness, when living now
You'll find yourself in many ways
You are the keeper of your thoughts
You are the guardian of your days

1. INTRODUCTION

1. INTRODUCTION

This is the fourth annual report published by the Irish National Audit of Stroke (INAS), presenting data on patients with a stroke admitted to hospitals that provided acute stroke care in 2022. It follows on from the *Irish National Audit of Stroke: A critical review of national stroke data for Ireland from 2013 to 2021* (National Office of Clinical Audit (NOCA), 2023), which examined the quality of stroke data since its inception in 2013 and presented trends in key performance and quality indicators[1]. The INAS is now at a level of maturity where key findings and trends are presented in a condensed report and all results are published online by hospital in the INAS National Reporting Table 2022.

AIM OF THIS REPORT

This report aims to present a synopsis of the key findings and trends in stroke care in Ireland in 2022. It presents a condensed methods section with the comprehensive methodology available in Appendix 1. In 2022, a series of additional questions were added to the INAS dataset (Appendix 2) to provide additional information on patients who received atrial fibrillation (AF) treatment and then went on to have a stroke. This report aims to shine a spotlight on AF, presenting the treatment and outcomes for patients with AF and stroke. Areas for quality improvement (QI) are highlighted, and an update on the audit is provided, followed by recommendations and conclusions.

THE IRISH NATIONAL AUDIT OF STROKE

The INAS is a clinically led, web-based audit that measures the care provided in hospital to patients with a stroke against Irish (Irish Heart Foundation, 2015; 2010) and United Kingdom (Royal College of Physicians, 2016) guidelines. The INAS Governance Committee (Appendix 3) developed the aim and objectives of the audit (Appendix 4) and continued to oversee the audit. Its membership comprises clinical experts, public and patient interest representatives, the Healthcare Pricing Office (HPO), senior accountable healthcare management, and research and specialist bodies. The INAS Governance Committee also ensures that all relevant stakeholders are represented in order to verify that audit findings are interpreted appropriately. The Clinical Lead, supported by the NOCA Executive Team, has operational responsibility for implementation of the INAS.

"This report aims to shine a spotlight on AF, presenting the treatment and outcomes for patients with AF and stroke. Areas for quality improvement (QI) are highlighted, and an update on the audit is provided, followed by recommendations and conclusions."

WHO IS THE REPORT AIMED AT?

Reporting of INAS data for 2022 has been categorised in three parts:

- The INAS National Reporting Table 2022. This is aimed at providing detailed stroke information to all healthcare professionals, hospital managers, Hospital Groups and researchers.
- The INAS National Report 2022, which provides key findings and trends, audit updates and recommendations. This will be of interest to all patients and carers, healthcare professionals, hospital managers, Hospital Groups, patient advocacy organisations, policy-makers and researchers.
- The INAS Summary Report 2022, which will be of particular interest to patients, patient organisations and the public.

[1] Three key performance indicators are reported in the HSE National Service Plan (HSE, 2023a): admission to a stroke unit; proportion of hospital stay spent in a stroke unit; and rate of thrombolysis. They are also reported as key quality indicators in INAS.

2. METHODS

2. METHODS

All patients with ischaemic and haemorrhagic stroke who were treated in public hospitals that provide acute stroke care, that have 80% or more coverage and that admitted more than 25 patients with a stroke annually over the reporting period are included in this audit. Further information related to the methodology can be found on the NOCA website.

DATA SOURCE AND COLLECTION

Data were sourced via the Hospital In-Patient Enquiry (HIPE) system. Additional stroke-specific data (the INAS dataset (Appendix 2)) were collected on patients with a stroke and were submitted from each hospital to the HIPE system via the stroke audit portal. The INAS dataset comprises clinical data collected on all patients with a stroke; these are known as core clinical data. Additional thrombectomy data are collected on patients who receive a thrombectomy, and are collected in the endovascular thrombectomy (EVT) stroke centre. Additional data on discipline-specific health and social care professionals (HSCPs) are collected by participating disciplines.

DATA VALIDATION

A Data Validation Report (DVR) of any missing information or anomalies within the data was produced quarterly so that each hospital could amend the data, thus improving data quality.

CORE CLINICAL DATASET - INCLUSION CRITERIA

The core clinical dataset inclusion criteria are:

i. patients discharged between 1 January 2022 and 31 December 2022

ii. cases reported on HIPE, using the International Classification of Diseases, Tenth Revision, Australian Modification (ICD-10-AM) codes I61, I63 or I64 as a principal diagnosis[2] (Independent Hospital Pricing Authority, 2017)

iii. patients aged 17 years and over

iv. all cases with the 'in-hospital stroke' field populated with '2=No' within the stroke audit portal

v. all cases with the 'admission to stroke unit' field populated with either '1=Yes' or '2=No' within the stroke audit portal.

CORE CLINICAL DATASET - EXCLUSION CRITERIA

Core clinical dataset exclusion criteria are:

i. patients aged 16 years and under

ii. patients with a hospital acquired diagnosis (HADx) stroke code of I61, I63 or I64

iii. patients for whom the stroke occurred while in hospital with another condition

iv. patients who had a thrombectomy in Beaumont Hospital or Cork University Hospital and were transferred back to the referring hospital on the same day.

After the inclusion and exclusion criteria were applied, the final core clinical dataset included 4,999 cases.

[2] The principal diagnosis on HIPE is defined as "the diagnosis established after study to be chiefly responsible for occasioning an episode of admitted patient care, an episode of residential care or an attendance at the health care establishment, as represented by a code"(Australian Consortium for Classification Development, 2017, p. 1).

THE THROMBECTOMY DATASET - INCLUSION CRITERIA

The thrombectomy dataset inclusion criteria are:

i. all cases with the 'thrombectomy' field populated with '1=Yes' within the stroke audit portal

ii. patients aged 17 years and over.

THE THROMBECTOMY DATASET - EXCLUSION CRITERION

The thrombectomy dataset exclusion criterion is:

i. patients aged 16 years and under.

After the inclusion and exclusion criteria were applied, the final thrombectomy dataset used to report on thrombectomy comprised 416 cases.

HSCP DATASET - INCLUSION CRITERIA

HSCP dataset inclusion criteria are:

i. all cases with '1=Yes' populated for the 'seen by physiotherapist', 'seen by occupational therapist' and/or 'seen by speech and language therapist' fields within the stroke audit portal

ii. patients aged 17 years and over.

THE HSCP DATASET - EXCLUSION CRITERION

The HSCP dataset exclusion criterion is:

i. patients aged 16 years and under.

After the inclusion and exclusion criteria were applied, the final HSCP dataset used to report on HSCP data for 2022 comprised 3,256 cases.

DATA ANALYSIS

NOCA received the full stroke audit portal data extract for 2022 from the HPO in April 2023. The analysis was completed by the NOCA Data Analyst following data checks with the HPO. The analysis was conducted using Statistical Package for the Social Sciences (SPSS) V29. The metadata for composite variables is available in Appendix 5.

Where appropriate, statistical tests were used. Chi-squared statistical tests (for binary and categorical variables) were used to determine whether there was a statistical difference in the distribution of cases between two or more groups. The Mann–Whitney U test was used to determine the statistical difference in the medians. As a measure of statistical uncertainty, 95% confidence intervals were presented for means of numerical variables such as number of cases and length of stay. Where the observed *p*-value was less than or equal to 0.05, this was considered to indicate statistical significance. While statistical testing was carried out, it is important to note that at times, even when there is no statistically significant difference, there may be a clinical significance. For example, in the case of key quality indicator (KQI) 4 (the median time between hospital arrival time and brain imaging time), this time decreased from 63 minutes to 59 minutes. However, there was no statistically significant difference between the median time of 63 minutes in 2021 and the median time of 59 minutes in 2022 (p=0.687). The median time of 59 minutes is within the target goal of 60 minutes.

Statistical difference is concerned with the probability of an observed effect occurring by chance, as determined by statistical tests and *p*-values. Clinical difference, on the other hand, considers the practical or real-world significance of an effect, considering factors such as the magnitude of the effect and its relevance to the specific context or population being studied. Both statistical and clinical significance are important considerations in research and decision-making, but they address different aspects of the evidence.

WHO NOCA WORKS WITH

Each hospital that participates in the INAS should have a local governance committee that includes a clinical lead and an audit coordinator. We would like to acknowledge the work of those who are involved in producing high-quality data – particularly the audit coordinators – and the efforts of multidisciplinary teams in each hospital to ensure that the care pathway for patients with a stroke is continuously monitored and improved.

NOTE: Dublin Hospitals have been displayed collectively by hospital group

SAOLTA UNIVERSITY HEALTH CARE GROUP
Letterkenny University Hospital
Mayo University Hospital
Sligo University Hospital
Portiuncula University Hospital
University Hospital Galway

RCSI HOSPITALS
Beaumont Hospital
Cavan General Hospital
Connolly Hospital
Our Lady of Lourdes Hospital, Drogheda

DUBLIN MIDLANDS HOSPITAL GROUP
Tallaght University Hospital
Naas General Hospital
St James's Hospital

IRELAND EAST HOSPITAL GROUP
Mater Misericordiae University Hospital
Regional Hospital Mullingar
St Luke's General Hospital Carlow-Kilkenny
St Vincent's University Hospital
Wexford General Hospital

UL HOSPITAL GROUP
University Hospital Limerick

SOUTH/SOUTH WEST HOSPITAL GROUP
Bantry General Hospital
Cork University Hospital
University Hospital Kerry
Mercy University Hospital
Tipperary University Hospital
University Hospital Waterford

LETTERKENNY UNIVERSITY HOSPITAL
CLINICAL LEAD: Dr Ken Mulpeter
AUDIT COORDINATOR: Christine McLaughlin

MAYO UNIVERSITY HOSPITAL
CLINICAL LEAD: Dr Tom O'Malley
CLINICAL LEAD: Dr Tom Lee
AUDIT COORDINATOR: Joanne Carolan

UNIVERSITY HOSPITAL SLIGO
CLINICAL LEAD: Dr Paula Hickey
AUDIT COORDINATOR: Una Moffatt
AUDIT COORDINATOR: Margaret Carney

PORTIUNCULA UNIVERSITY HOSPITAL
CLINICAL LEAD: Dr Niamh Hannon
AUDIT COORDINATOR: Mary Diskin

UNIVERSITY HOSPITAL GALWAY
CLINICAL LEAD: Dr Tom Walsh
AUDIT COORDINATOR: Mary Rooney Hynes

UNIVERSITY HOSPITAL LIMERICK
CLINICAL LEAD: Dr Margaret O'Connor
CLINICAL LEAD: Dr John McManus
AUDIT COORDINATOR: Nora Cunningham
AUDIT COORDINATOR: Ingrid O'Brien
AUDIT COORDINATOR: Claire Collins

CORK UNIVERSITY HOSPITAL
CLINICAL LEAD: Dr Liam Healy
CLINICAL LEAD: Dr Simon Cronin
AUDIT COORDINATOR: Glen Arrigan
AUDIT COORDINATOR: Karena Hayes
AUDIT COORDINATOR: Ann O'Sullivan
AUDIT COORDINATOR: Ines Saramago

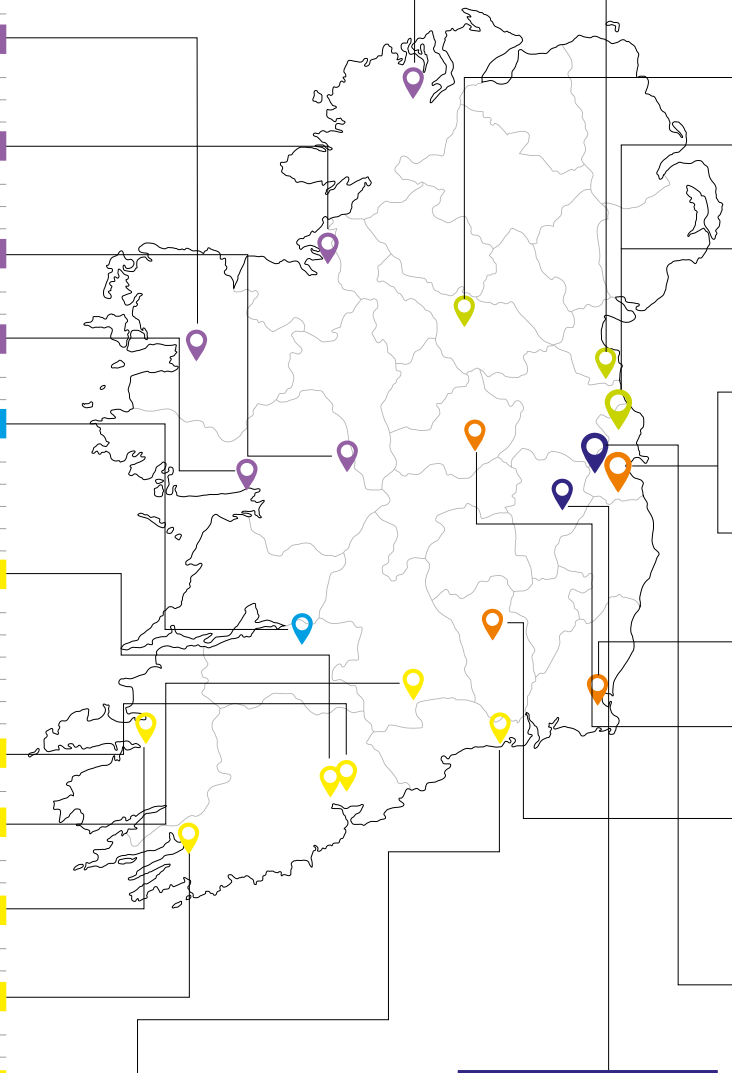
MERCY UNIVERSITY HOSPITAL
CLINICAL LEAD: Dr Catherine O'Sullivan

TIPPERARY UNIVERSITY HOSPITAL
CLINICAL LEAD: Dr Arslan Sohail
AUDIT COORDINATOR: Bency Varghese

UNIVERSITY HOSPITAL KERRY
CLINICAL LEAD: Dr Barry Moynihan
AUDIT COORDINATOR: Mary Donovan

BANTRY GENERAL HOSPITAL
CLINICAL LEAD: Dr Brian Carey
AUDIT COORDINATOR: Noreen Lynch

UNIVERSITY HOSPITAL WATERFORD
CLINICAL LEAD: Prof. Riona Mulcahy
CLINICAL LEAD: Dr George Pope
AUDIT COORDINATOR: Catherine Whittle



OUR LADY OF LOURDES HOSPITAL, DROGHEDA
CLINICAL LEAD: Dr Olwyn Lynch
AUDIT COORDINATOR: Helen Hobson
AUDIT COORDINATOR: Sandra Matthews

CAVAN GENERAL HOSPITAL
CLINICAL LEAD: Dr John Corrigan

CONNOLLY HOSPITAL
CLINICAL LEAD: Dr Eamon Dolan
AUDIT COORDINATOR: Lisa Donaghy
AUDIT COORDINATOR: Maya Baby

BEAUMONT HOSPITAL
CLINICAL LEAD: Dr Karl Boyle
AUDIT COORDINATOR: Emma Hickey
AUDIT COORDINATOR: Julie Lynch
AUDIT COORDINATOR: Carla O'Farrell

MATER MISERICORDIAE UNIVERSITY HOSPITAL
CLINICAL LEAD: Dr Michael Marnane
AUDIT COORDINATOR: Rachael Dooley
AUDIT COORDINATOR: Deepa Jose
AUDIT COORDINATOR: Roisin Callaghan

ST VINCENT'S UNIVERSITY HOSPITAL
CLINICAL LEAD: Dr Tim Cassidy
AUDIT COORDINATOR: Imelda Noone
AUDIT COORDINATOR: Mary Kate Meagher

WEXFORD GENERAL HOSPITAL
CLINICAL LEAD: Dr Emma O'Sullivan
AUDIT COORDINATOR: Elaine Crosby

REGIONAL HOSPITAL MULLINGAR
CLINICAL LEAD: Dr Clare Fallon
AUDIT COORDINATOR: Sinead Gallagher

ST LUKE'S GENERAL HOSPITAL CARLOW-KILKENNY
CLINICAL LEAD: Dr Paul Cotter
AUDIT COORDINATOR: Ann Flahive

ST JAMES'S HOSPITAL
CLINICAL LEAD: Prof. Joe Harbison
AUDIT COORDINATOR: Orla Kennedy
AUDIT COORDINATOR: Julieanne Kirwan

TALLAGHT UNIVERSITY HOSPITAL
CLINICAL LEAD: Prof. Rónán Collins
CLINICAL LEAD: Dr Dan Ryan
AUDIT COORDINATOR: Nicola Cogan
AUDIT COORDINATOR: Suzanne Greene

NAAS GENERAL HOSPITAL
CLINICAL LEAD: Dr Paul O'Brien
AUDIT COORDINATOR: Patricia Daly
AUDIT COORDINATOR: Karen Sinnamon


Coverage of Data Release
Completeness of Data Release
Accuracy of Data Release
3. DATA QUALITY STATEMENT

3. DATA QUALITY STATEMENT

The data quality statement assesses the quality of the INAS data in this report using internationally agreed dimensions of data quality (HIQA, 2018). Table 3.1 describes the context of the data in this report, Table 3.2 outlines the characteristics of the data quality within this report and Table 3.3 provides an overall assessment of the quality of the data in this report. A full data quality assessment of INAS is available in Appendix 6.

TABLE 3.1: CONTEXT OF THE DATA IN THIS REPORT

SCOPE	This data quality statement assesses the INAS data released for this report in 2022. This statement focuses solely on the data quality dimension of 'accuracy and reliability', specifically on the characteristics of: • coverage of data release • completeness of data release • accuracy of data release
PURPOSE	This will help the reader decide whether the data are fit for the user's specific purpose.
DATA SOURCE	Data for this report have been extracted from the HIPE system, which includes data submitted to the stroke audit portal within HIPE.
TIME FRAME OF DATA RELEASE	The data released in this report are based on data reported between 1 January 2022 and 31 December 2022.
TYPE OF DATA	Final

TABLE 3.2: CHARACTERISTICS OF DATA QUALITY

COVERAGE OF DATA RELEASE

The stroke audit portal has three distinct datasets:

- core clinical dataset
- thrombectomy dataset
- HSCP dataset.

Each dataset was assessed for coverage and completeness. The final annual coverage is reported by the HPO at the close of the HIPE file.

CORE CLINICAL DATASET

Coverage was defined as the proportion of cases with a principal diagnosis, or a HADx,[3] of stroke that had additional clinical data submitted to the stroke audit portal. HADx cases are included in the coverage report, but only the cases with a principal diagnosis that meet the inclusion and exclusion criteria as defined in the methods section are reported in this report (Table 3.2.1). Further analysis of in-hospital stroke will be undertaken in 2024.

The total national coverage for 2022 was 90.1%, down from 95% in 2021. Four hospitals did not reach 80% coverage, and three were excluded from 2022 reporting. Naas General Hospital, only marginally below the 80% cut-off for inclusion at 79%, was nevertheless included in this report, as the clinical pathway in Naas General Hospital changed in 2023 and it is important to have access to up-to-date data for the year 2022 for comparison purposes. For each of the three hospitals excluded, there was no clinical nurse specialist (CNS) in position for all or some of the reporting period.

THROMBECTOMY DATASET

Data for patients who have a thrombectomy are submitted by the two EVT stroke centres, Beaumont Hospital and Cork University Hospital (CUH). To assess coverage, the number of cases with thrombectomy data was measured against the number of cases reported in the *National Thrombectomy Service Annual Report 2022* (National Thrombectomy Service, 2023). In 2022, the National Thrombectomy Service (NTS) reported on 484 thrombectomies, 416 of which are reported in the INAS, which gives a coverage of 86%. When broken down by EVT stroke centre, the NTS reported on 338 thrombectomy procedures from Beaumont Hospital and the INAS reported on 318, giving a coverage of 94%. However, the NTS reported on 146 thrombectomy procedures from CUH while the INAS reported on 98, giving a coverage of 67%. At present, cases who are transferred to CUH from another hospital for thrombectomy and are transferred back after the procedure on the same day – i.e. who are not admitted to a bed in CUH – are not currently coded in HIPE and are not reflected in CUH stroke case numbers. There is a plan in progress to rectify this in CUH, and data for 2023 should reflect all cases admitted to CUH. This report will present results at a national level only.

HSCP DATASET

The HSCP dataset remains in an implementation phase. In 2022, 18 hospitals submitted data from one or all of the three participating disciplines: physiotherapy, occupational therapy, and speech and language therapy. This is unchanged from 2021 (NOCA, 2023). In 2022, coverage was assessed by calculating the proportion of patients with a stroke who had HSCP data submitted out of the total number reported to have been assessed by each participating discipline in the core clinical dataset. Overall, 47% (n=1943) of patients who were reported to have been assessed by a physiotherapist (PT) had additional physiotherapy HSCP data submitted, 41% (n=1637) of patients who were reported to have been assessed by an occupational therapist (OT) had additional occupational therapy HSCP data submitted and 46% (n=1426) of patients who were reported to have been assessed by a speech and language therapist (SLT) had additional speech and language therapy HSCP data submitted. As coverage remains low, HSCP data are reported in aggregate.

[3] HADx is defined within HIPE as a condition that arises during the episode of admitted patient care which would not have been present or suspected on admission (HPO, 2021).

TABLE 3.2: CHARACTERISTICS OF DATA QUALITY *CONTINUED*

COMPLETENESS OF DATA RELEASE 	Fifty-three variables were analysed for completeness, and 46 had a completeness rate of >90%, similar to in 2021 (NOCA, 2023). See the INAS National Reporting Table 2022 for completeness of all variables, by hospital. Variables with regard to a recorded time – e.g. time of onset of stroke symptoms or time seen by the medical team – have the greatest number of missing data. In some cases, recorded times are not available. However, medical record documentation with regard to medical team assessment time could be improved at local level. Completeness for 14 additional variables collected for the spotlight audit on AF were also assessed, 7 variables were completed in more than 90% of cases, an additional 3 variables were completed in 80–89% of cases and the remaining 4 variables were completed in less than 80% of cases. Most variables with low levels of completeness were those related to direct oral anticoagulant (DOAC) drug levels.
ACCURACY OF DATA RELEASE 	All data were reported, including missing or unknown data.

TABLE 3.3: OVERALL ASSESSMENT OF DATA IN THIS REPORT

STRENGTHS OF DATA IN THIS REPORT	This report is more concise than previous reports, and the *Irish National Audit of Stroke: A critical review of national stroke data for Ireland from 2013 to 2021* (NOCA, 2023) is a good reference for additional detail on the INAS. This report provides an overview of the quality of stroke care received by 4,999 patients in 21 hospitals for the year 2022. Quarterly Data Validation Reports and alternate bimonthly audit coordinator meetings provide opportunities to enhance data quality. The report provides context to the results presented in the INAS National Reporting Table 2022 and presents hospital-level results for KQIs.
LIMITATION OF DATA IN THIS REPORT	The burden of data collection lies, in most hospitals, with the CNS in Stroke. When a CNS leaves the position, there is often a gap in service which impacts on data collection. This is the first year where three hospitals were excluded from reporting due to lack of data coverage. As with previous reports, INAS data reflect care in the acute hospital and do not follow the patient along their complete pathway to recovery.

TABLE 3.2.1: COVERAGE OF PRINCIPAL AND HOSPITAL ACQUIRED DIAGNOSIS FOR HOSPITAL IN-PATIENT ENQUIRY STROKE CASES WITH IRISH NATIONAL AUDIT OF STROKE DATA

HOSPITAL	INAS DATA	HIPE DATA	COVERAGE	Number of cases after taking into account inclusion/ exclusion criteria
Connolly Hospital	244	244	100.0%	200
Cavan General Hospital	180	180	100.0%	162
Letterkenny University Hospital	237	237	100.0%	201
Tipperary University Hospital	140	140	100.0%	131
Beaumont Hospital	545	545	100.0%	517
Wexford General Hospital	175	176	99.4%	170
St James's Hospital	277	280	98.9%	228
Portiuncula University Hospital	74	75	98.7%	73
University Hospital Kerry	143	145	98.6%	135
Our Lady of Lourdes Hospital Drogheda	253	259	97.7%	238
University Hospital Galway	290	297	97.6%	255
Tallaght University Hospital	324	334	97.0%	297
Cork University Hospital	560	580	96.6%	510
University Hospital Waterford	200	209	95.7%	176
St Vincent's University Hospital	475	498	95.4%	438
St Luke's General Hospital, Carlow/Kilkenny	144	152	94.7%	121
Sligo University Hospital	188	200	94.0%	177
Bantry General Hospital	73	78	93.6%	72
University Hospital Limerick	450	504	89.3%	427
Mater Misericordiae University Hospital	323	374	86.4%	281
Naas General Hospital	194	247	78.5%	190
Mercy University Hospital*	52	82	63.4%	-
Regional Hospital Mullingar*	81	196	41.3%	-
Mayo University Hospital*	22	231	9.5%	-
NATIONAL	**5,644**	**6,263**	**90.1%**	**4,999**

** Did not reach 80% coverage and were excluded from 2022 reporting*

4. STROKE CARE TREATMENT AND OUTCOMES

4. STROKE CARE TREATMENT AND OUTCOMES

In its *2020 Annual Report*, the Stroke Alliance for Europe (2021) indicates that the rate of new strokes and stroke deaths, when adjusting for age, has decreased across all European countries due to successful prevention strategies. However, because of Europe's ageing population, it is predicted that there will be a 34% increase in numbers of strokes, with a 59% increase for Ireland. In May 2023, the Central Statistics Office (CSO) released the summary results for the Census 2022 (CSO, 2023), which showed that the population in Ireland has increased by 8% since 2016, with the highest increase seen in the population aged 70 years and over (26%) and those aged 80 years and over (25%).

Figure 4.1 presents the annual number of HIPE stroke admissions for all hospitals participating in the INAS, for the years 2013–2022. From 2013 to 2017, neither Connolly Hospital nor University Hospital Kerry was participating in the INAS, although they were providing acute stroke care. As such, the HIPE cases for those hospitals were not included in Figure 4.1 for the years 2013–2017. From 2018 onwards, Connolly Hospital and University Hospital Kerry did participate in the INAS, and this explains the resulting sharp rise in stroke cases in 2018. There was a 7.1% increase in cases between 2020 and 2021, and although cases continued to rise in 2022 it was a lower increase (3.0%).

In 2022, 5,961 cases with a principal diagnosis of stroke were admitted to the 24 hospitals providing acute stroke care in Ireland. This report presents information on the care provided to 4,999 patients with a stroke who were admitted to 21 hospitals and have additional INAS data submitted.

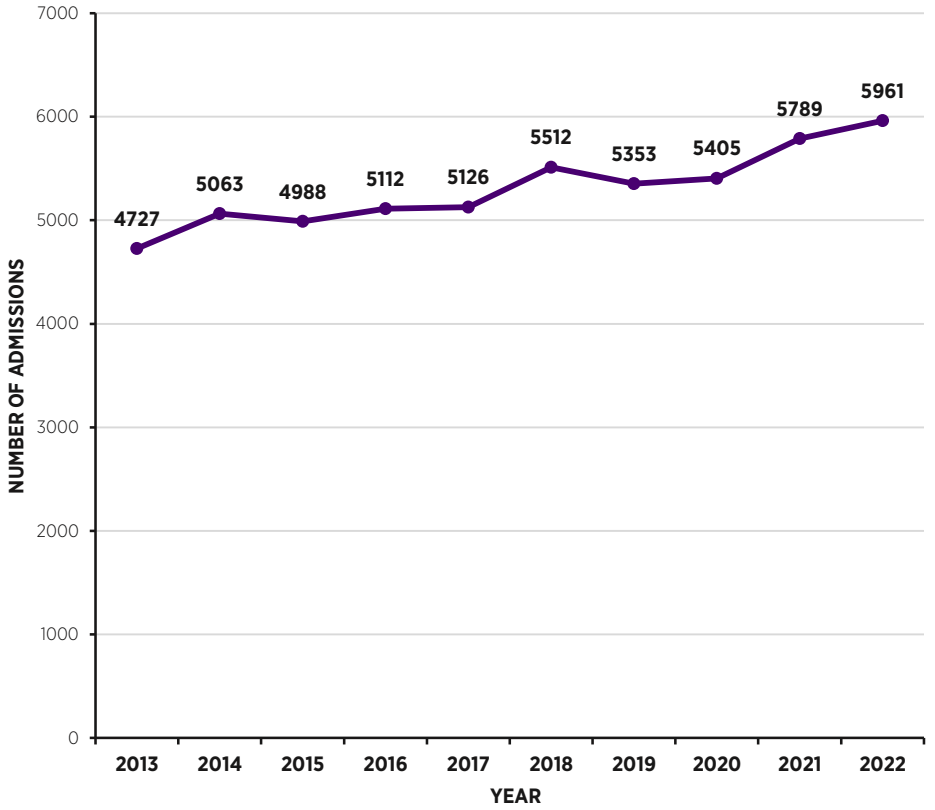


FIGURE 4.1: ANNUAL NUMBER OF HOSPITAL IN-PATIENT ENQUIRY STROKE ADMISSIONS IN ALL PARTICIPATING HOSPITALS, BY YEAR

DEMOGRAPHICS

Eighty-five prcent (n=4272) of cases had a principal diagnosis of ischaemic stroke, and 15% (n=727) had a principal diagnosis of haemorrhagic stroke. The majority of cases (n=2855, 57%) were male and 43% (n=2144) were female, unchanged from 2021 (NOCA, 2023). The median age of patients with a stroke was 74 years (interquartile range (IQR): 64–82 years), and the mean age was 72 years. The mean age for female patients was 75 years, and for male patients it was 70 years. Males had a stroke at a younger age compared with females: 33% (n=932) of males had a stroke aged 65 years and under, compared with 22% (n=461) of females. As in 2021, 88% (n=4420) of cases were admitted from home and 3% (n=171) from long-term care.

EMERGENCY CARE

ONSET OF STROKE SYMPTOMS

The date and time of onset of stroke symptoms (witnessed stroke) were known in 61% (n=3059) of cases. The completeness of this information has increased annually, from 50% in 2013 (NOCA, 2023). For those cases where the time that elapsed from onset of stroke symptoms to hospital arrival was available (n=3040, 61%), the median interval was 3 hours and 2 minutes (IQR: 1 hour and 38 minutes to 9 hours and 25 minutes). This was a decrease from 3 hours and 30 minutes in 2021, which was a statistically significant decrease (p<0.05). In the United Kingdom (UK), the Sentinel Stroke National Audit Programme (SSNAP) (King's College London, 2021/2022) reported an interval of 3 hours and 47 minutes for the years 2021–2022, with that delay before hospital arrival increasing annually. Some rationalisation of services or industrial action in the UK may have impacted on the UK results in this metric. Figure 4.2 shows the proportion of patients who arrived at hospital within 3 hours of onset of stroke symptoms. This proportion has increased from 46% in 2021 to 50% (n=1508) in 2022 and varies between hospitals, ranging from 68% (n=259) in St Vincent's University Hospital to 35% (n=125) in Cork University Hospital. The data do not account for pre-hospital delays such as time waiting for an ambulance, and results are also impacted on by patients' location and proximity to nearest hospital.

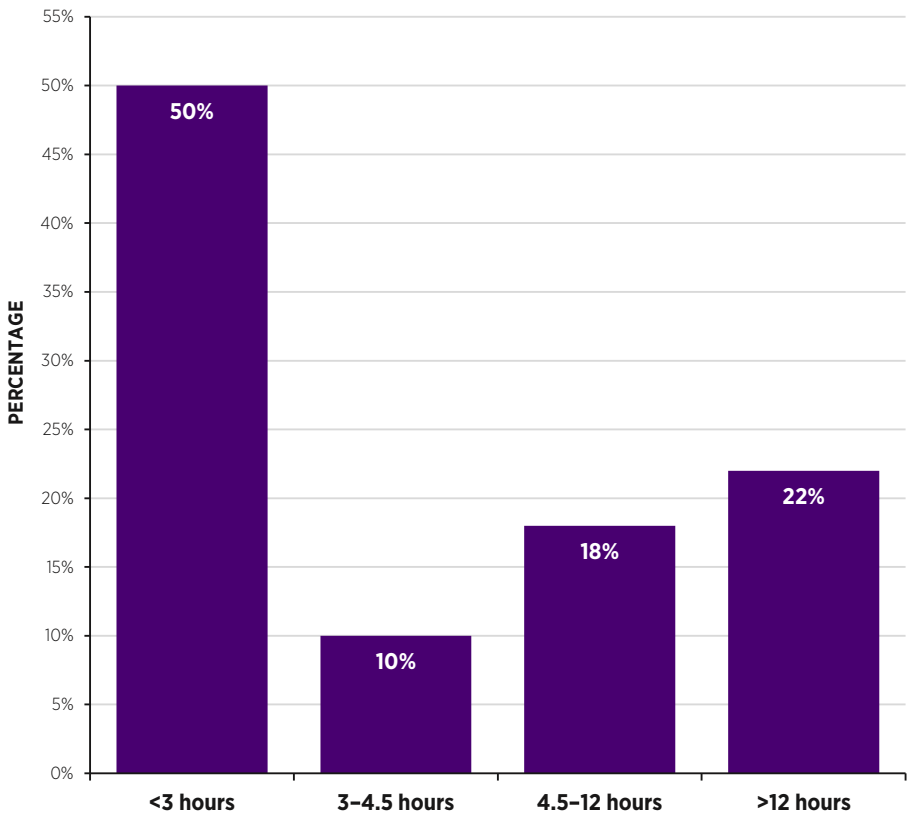


FIGURE 4.2: DISTRIBUTION OF TIME FROM WITNESSED STROKE SYMPTOM ONSET TO HOSPITAL ARRIVAL (n=3040)

OPPORTUNITY FOR QI

THE EXTENT TO WHICH DIFFERENT HOSPITALS RECORD THE TIME OF ONSET OF STROKE SYMPTOMS VARIES. ALL HOSPITALS SHOULD MAKE EVERY EFFORT TO RECORD THIS VARIABLE.

TIME BETWEEN HOSPITAL ARRIVAL AND REVIEW BY MEDICAL TEAM

The median time between hospital arrival and review by a medical team was 14 minutes (IQR: 0–120 minutes) in 2022, an increase from the median time of 12 minutes in 2021, which was statistically significant (p=0.046). Forty-seven percent (n=2097)[4] of patients with a stroke were seen by a medical team within 10 minutes of hospital arrival in 2022, which was unchanged from 2021. This result varied between hospitals, ranging from 99% (n=71) in Bantry General Hospital to 2% (n<5) in Portiuncula University Hospital (INAS National Reporting Table 2022). In Portiuncula University Hospital, there is an ambulance bypass to University Hospital Galway for all FAST (face, arm, speech and time) positive patients, so only patients less likely to be eligible for acute treatments are brought to the hospital. These patients who come to Portiuncula, while they do have an acute stroke, do not exhibit the symptoms associated with high priority, and as such are treated with less urgency. However, although according to the 2023 stroke guidelines (Intercollegiate Stroke Working Party, 2023) all patients with stroke should have a computed tomography (CT) within one hour of admission, and therefore urgent medical review is required.

OPPORTUNITY FOR QI

THE TIME INTERVAL BETWEEN HOSPITAL ARRIVAL AND REVIEW BY THE MEDICAL TEAM VARIES BETWEEN HOSPITALS. ALL HOSPITALS SHOULD MONITOR THE TIME THAT ELAPSES FROM HOSPITAL ARRIVAL TO MEDICAL REVIEW AND IMPLEMENT AN IMPROVEMENT PLAN TO MANAGE THIS PROCESS IF REQUIRED.

[4] 575 cases did not have time information recorded or it was recorded incorrectly. These cases have been excluded from the analysis.

TIME BETWEEN HOSPITAL ARRIVAL AND BRAIN IMAGING TIME

The median time between hospital arrival and brain imaging is a KQI that is reported quarterly in all hospitals. The median time between hospital arrival and brain imaging in 2022 was 59 minutes (IQR: 25–281 minutes). Figure 4.3 presents the variation observed between hospitals, which ranged from 29 minutes in University Hospital Galway to 867 minutes in Portiuncula University Hospital.[5]

The proportion of cases who received brain imaging within 1 hour of hospital arrival increased from 48% in 2021 to 50% in 2022, which was a statistically significant difference ($p<0.05$). Again, this varied between hospitals, ranging from 66% in the Mater Misericordiae University Hospital to 4% in Portiuncula University Hospital. For the UK, the SSNAP (King's College London, 2021/2022) reported a median time between hospital arrival and brain imaging of 50 minutes, with 55% of cases receiving brain imaging within 1 hour.

KQI 4

THE MEDIAN TIME BETWEEN HOSPITAL ARRIVAL TIME AND BRAIN IMAGING TIME.

TARGET: 1 HOUR | **RESULT: 59 MINS**

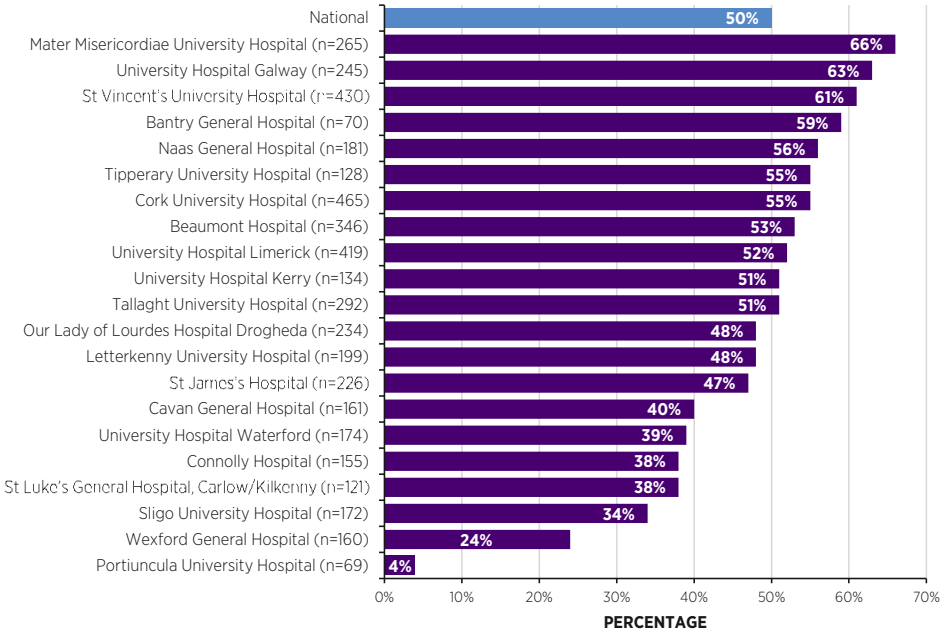


FIGURE 4.3: THE PROPORTION OF PATIENTS WITH A STROKE WHO RECEIVED BRAIN IMAGING WITHIN 1 HOUR OF HOSPITAL ARRIVAL, BY HOSPITAL (n=4646)

OPPORTUNITY FOR QI

INTERVALS BETWEEN THE TIME A PATIENT ARRIVES AT HOSPITAL AND THE TIME THEY RECEIVE BRAIN IMAGING VARY BETWEEN HOSPITALS. ALL HOSPITALS SHOULD MONITOR THE TIME FROM HOSPITAL ARRIVAL TO BRAIN IMAGING AND IMPLEMENT AN IMPROVEMENT PLAN TO MANAGE THIS PROCESS IF REQUIRED.

[5] In Portiuncula University Hospital, there is an ambulance bypass in place for patients who are FAST positive.

THROMBOLYSIS IN ISCHAEMIC STROKE

KQI 3, the percentage of patients with ischaemic stroke who receive thrombolysis, was 10% (n=419) in 2022, unchanged from 2021. Again, rates of thrombolysis vary widely between hospitals, and the reason for this is poorly understood. In the *Irish National Audit of Stroke: A critical review of national stroke data for Ireland from 2013 to 2021* (NOCA, 2023), a recommendation was developed to assess the factors that impact on treatment with thrombolysis. A spotlight audit capturing additional data on the rationale behind patients with ischaemic stroke not receiving thrombolysis commenced in July 2023, and its findings will be presented in the 2023 INAS annual report.

KQI 3

THE PERCENTAGE OF PATIENTS WITH ISCHAEMIC STROKE WHO RECEIVE THROMBOLYSIS

TARGET: 12% | **RESULT: 10%**

KQI 5, the median time to thrombolysis, was 54 minutes (IQR: 36–78 minutes), which was a marginal increase (not statistically significant) from 53 minutes in 2021, and similar to the median time recorded in the UK SSNAP of 53 minutes (King's College London, 2021/2022). Figure 4.4 shows the distribution of time intervals between hospital arrival and time of thrombolysis, by hospital. In total, 59% (n=247) of patients with ischaemic stroke received thrombolysis within 1 hour of hospital arrival, similar to 60% in the UK SSNAP (King's College London, 2021/2022).

KQI 5

THE MEDIAN TIME BETWEEN HOSPITAL ARRIVAL TIME AND TIME OF THROMBOLYSIS

TARGET: 1 HOUR | **RESULT: 54 MINS**

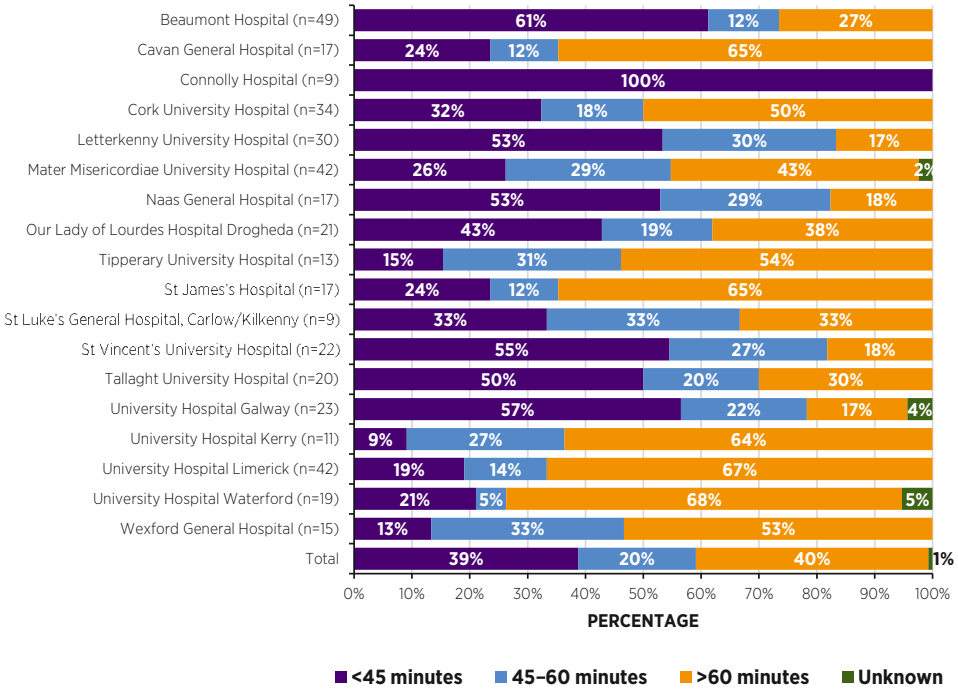


FIGURE 4.4: TIME INTERVALS BETWEEN HOSPITAL ARRIVAL TIME AND TIME OF THROMBOLYSIS, BY HOSPITAL (n=419)[6]

OPPORTUNITY FOR QI

OPPORTUNITY FOR QI: INTERVALS BETWEEN THE TIME A PATIENT ARRIVES AT HOSPITAL AND THE TIME THEY RECEIVE THROMBOLYSIS VARIES BETWEEN HOSPITALS. ALL HOSPITALS SHOULD MONITOR THE TIME FROM ARRIVAL TO THROMBOLYSIS AND IMPLEMENT AN IMPROVEMENT PLAN TO MANAGE THIS PROCESS IF REQUIRED.

[6] Hospitals: Bantry General Hospital, Portiuncula University Hospital and Sligo University Hospital are not present in Figure 4.4, as they each had fewer than five cases who received thrombolysis. However, these cases were included in the total figure.

THROMBECTOMY IN ISCHAEMIC STROKE

In 2022, 416 thrombectomies were reported in the stroke audit portal from the two EVT stroke centres: 318 from Beaumont Hospital and 98 from Cork University Hospital. The total rate of thrombectomy was 9.3% (n=380), similar to in previous years (NOCA, 2023). The sex and age distributions were similar to those of the total stroke population, 58% (n=240) males and 42% (n=176) females. Twenty-three percent (n=40) of females and 35% (n=84) of males were aged 65 years and under. In the UK SSNAP, the thrombectomy rate was 2.4% (King's College London, 2021/2022).

Nationally, the majority (75%, n=313) of patients who had thrombectomy were transferred from a primary stroke hospital to an EVT stroke centre. As expected, there was a higher rate of thrombectomy for patients with a stroke who were admitted directly to an EVT stroke centre, 15% (n=103), compared with 8% (n=277) for those who were transferred from another hospital to an EVT stroke centre.

The NTS in Beaumont Hospital continues to support the national QI collaborative programme 'Door to Decision in 30!' (NTS, 2023), aimed to reduce the time between a patient's arrival at hospital and the decision being made to proceed for thrombectomy. Recording the time that elapses between a patient's arrival at the primary stroke hospital and their leaving the hospital for transfer to an EVT stroke centre is an important metric for ensuring that the patient receives thrombectomy as quickly as possible. This is known as the 'door-in to door-out' (DIDO) time. The DIDO time was known in 70% (n=219) of patients transferred to an EVT stroke centre, and the median DIDO for those patients was 91 minutes (IQR: 70–129 minutes) (Table 4.1). Due to small numbers in some hospitals, the medians and IQRs were not reported by hospital. Out of the 219 patients who had DIDO times recorded, 58% (n=126) arrived at hospital outside of normal working hours.[7] The median DIDO for those who arrived during normal working hours was 78 minutes (IQR: 55–111 minutes), and for those who arrived outside of normal working hours it was 110 minutes (IQR: 79–140 minutes).

In 2018, the National Ambulance Service and the National Thrombectomy Service in Beaumont Hospital introduced a new protocol for Naas General Hospital which was expanded to Tallaght University Hospital in 2020. This protocol, known as PITSTOP,[8] involves the ambulance crew waiting with the patient on arrival at the first hospital until a decision is made whether to transfer the patient to the EVT stroke centre. This means that the ambulance crew can then transport the patient immediately to the EVT stroke centre, thus reducing the DIDO time. Since implementing PITSTOP, the median DIDO time for these two hospitals is lower than the national median: Naas General Hospital, 72 minutes (IQR: 52–93 minutes); Tallaght University Hospital, 68 minutes (IQR: 52–108 minutes). These results could potentially inform national policy in relation to emergency transfer of eligible patients to an EVT stroke centre.

For all patients who had a thrombectomy, the median time from onset of stroke symptoms to arrival at an EVT stroke centre was 244 minutes (IQR: 160–350 minutes) (Table 4.1). For patients who arrived directly at an EVT stroke centre, the median time was 74 minutes (IQR: 61–187 minutes). This was much faster than that for the general stroke population, where onset of stroke symptoms to hospital arrival was 183 minutes. For those who were transferred to an EVT stroke centre following their arrival at the primary stroke hospital, the median time was 250 minutes (IQR: 170–356 minutes). The distance between the primary stroke hospital and the EVT stroke centre will impact on the difference in median times for various hospitals. Once a patient arrived at an EVT stroke centre, the median time to commencement of the procedure (groin puncture) was 15 minutes (IQR: 9–33 minutes). The national median time from arrival at the EVT stroke centre to reperfusion was 43 minutes (IQR: 26–73) (Table 4.1). The INAS National Reporting Table 2022 provides further information on each of these metrics.

TABLE 4.1: MEDIAN TIME AND INTERQUARTILE RANGE FOR ONSET TO ARRIVAL AT ENDOVASCULAR THROMBECTOMY STROKE CENTRE, DOOR-IN TO DOOR-OUT, ARRIVAL AT ENDOVASCULAR THROMBECTOMY STROKE CENTRE TO PUNCTURE AND ARRIVAL AT ENDOVASCULAR THROMBECTOMY STROKE CENTRE TO REPERFUSON

	Number and proportion of patients who had correct time recorded		Median time (minutes)	Lower IQR (minutes)	Higher IQR (minutes)
	N	%			
Onset to arrival at EVT stroke centre	218	52%	244	160	350
DIDO[9]	219	70%	91	70	129
Arrival at EVT stroke centre to puncture	339	81%	15	9	33
Arrival at EVT stroke centre to reperfusion	322	77%	43	26	73

[7] Normal working hours defined as 9.00am to 5.00pm, Monday to Friday.
[8] PITSTOP stands for 'Protocol for Improving Times for Stroke patients requiring Onward transfer from Primary stroke centre to thrombectomy centre'.
[9] Refers to patients who were transferred to the EVT stroke centre only.

STROKE UNIT CARE

ADMISSION TO A STROKE UNIT

Admission to a stroke unit and length of stay in a stroke unit are both national key performance indicators (KPI) reported annually in the HSE National Service Plan (HSE, 2023a) and KQIs for the INAS. Patients with a stroke who receive stroke unit care are more likely to be alive, living at home and capable of looking after themselves independently one year after their stroke (Langhorne *et al*., 2020). In 2022, 69% (n=3455) of patients with a stroke were admitted to a stroke unit (Figure 4.5), similar to the numbers for 2021 (70%) but still well below the target of 90% (HSE, 2012). The main reasons for patients not being admitted to a stroke unit (n=1544) were because there were no available beds (n=657, 43%); due to infection control measures (n=208, 13%); and, in the 36% (n=551) of cases for which free text was available, this indicated that patients were not admitted to a stroke unit because they either had symptoms that were too mild (e.g. no rehabilitation was needed) or that were too severe (e.g. they required intensive care/palliative care). This would suggest that stroke units need access to single rooms in order to manage infection control and palliation for patients with a stroke. In comparison, 92% of patients with a stroke in the UK SSNAP were admitted to a stroke unit (King's College London, 2021/2022).

KQI 1

THE PERCENTAGE OF CASES ADMITTED TO A STROKE UNIT

TARGET: 90% | **RESULT: 69%**

OPPORTUNITY FOR QI

THE PROPORTION OF PATIENTS ADMITTED TO A STROKE UNIT AND THE TIME PATIENTS SPEND IN A STROKE UNIT VARY BETWEEN HOSPITALS. ALL HOSPITALS SHOULD MONITOR ACCESS TO STROKE UNITS AND IMPLEMENT AN IMPROVEMENT PLAN TO MANAGE THIS PROCESS IF NECESSARY.

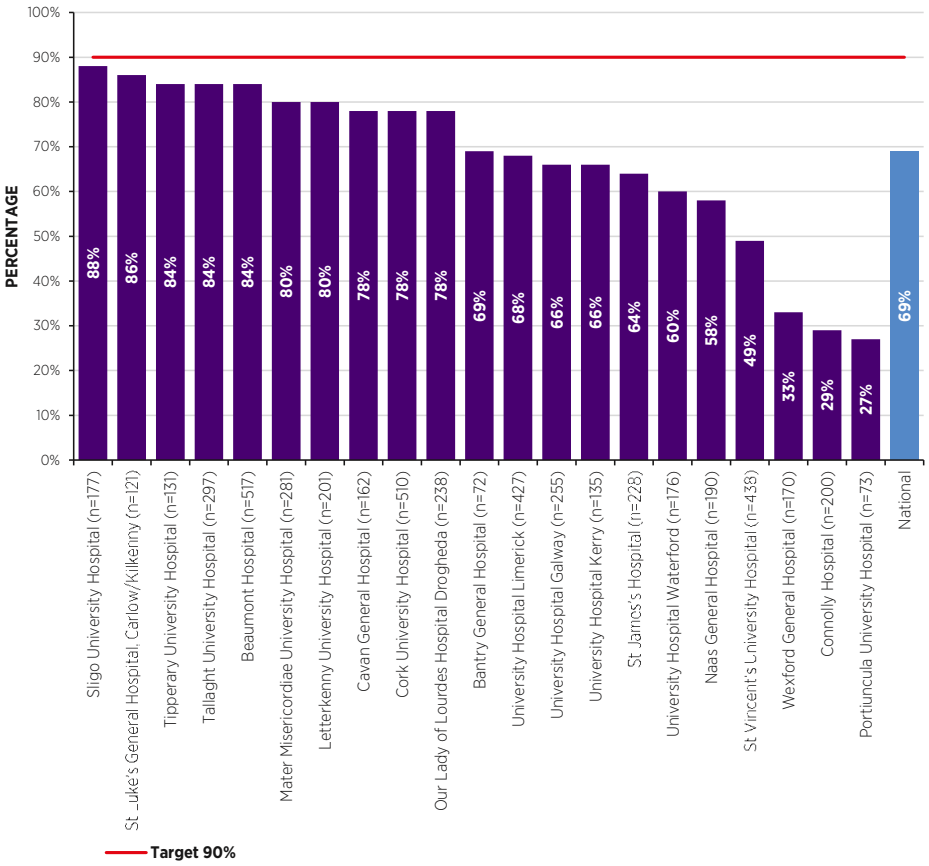


FIGURE 4.5: ADMISSION TO A STROKE UNIT, BY HOSPITAL (N=4999)

SWALLOW SCREENING

KQIs 6 and 7 are concerned with the rate and timeliness, respectively, of swallow screening, and the *Irish National Audit of Stroke: A critical review of national stroke data for Ireland from 2013 to 2021* recommended that hospitals should prioritise increasing these numbers (NOCA, 2023). In 2022, 71% (n=3532) of patients with a stroke received a swallow screen (Figure 4.6), an increase from 68% in 2021, which was statistically significant ($p<0.01$). However, only 43% (n=1502) of those receiving the screen did so within 4 hours of hospital arrival, as was also the case in 2021. The rate of swallow screening varied between hospitals, from 100% (n=200) in Connolly Hospital to 26% (n=52) in Letterkenny University Hospital. The National Clinical Programme for Stroke is in the process of developing a national QI project to improve rates of swallow screening in all hospitals.

KQI 6

PERCENTAGE OF CASES WHO HAVE A SWALLOW SCREEN COMPLETED

TARGET: 90% | **RESULT: 71%**

KQI 7

PERCENTAGE OF CASES WHO HAVE A SWALLOW SCREEN COMPLETED WITHIN 4 HOURS OF HOSPITAL ADMISSION

TARGET: 90% | **RESULT: 43%**

OPPORTUNITY FOR QI

THE PROPORTION OF PATIENTS WHO HAVE SWALLOW SCREENING VARIES BETWEEN HOSPITALS. HOSPITALS SHOULD REVIEW THEIR OWN RESULTS AND PARTICIPATE IN THE NATIONAL SWALLOW SCREENING QI PROJECT THROUGH THE NATIONAL CLINICAL PROGRAMME FOR STROKE.

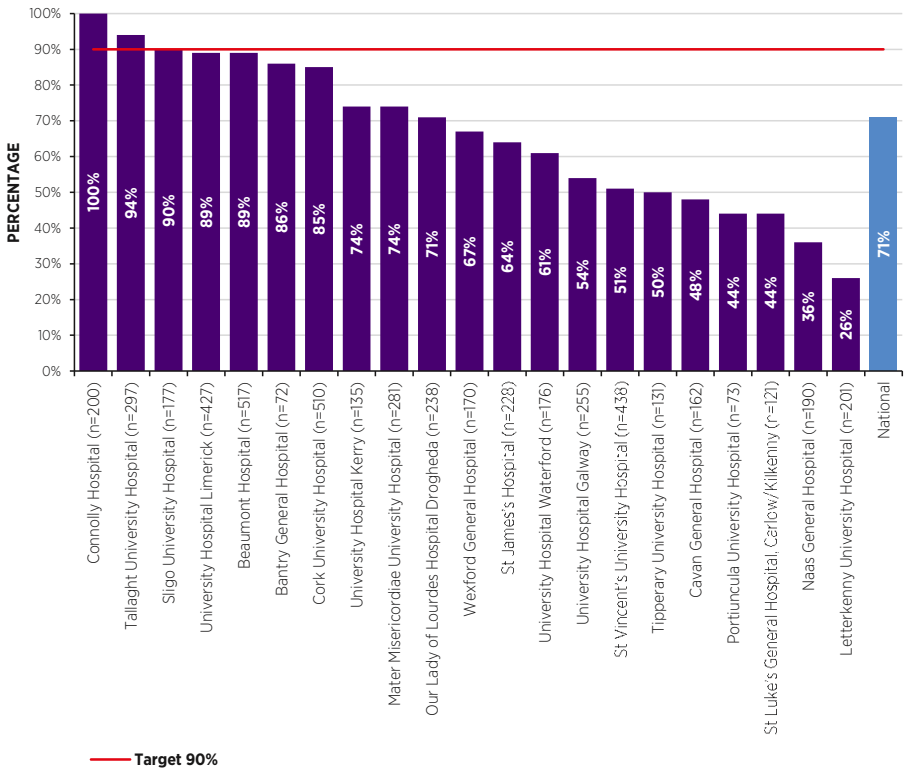


FIGURE 4.6: SWALLOW SCREENING, BY HOSPITAL (N=4999)

MOOD SCREENING

Mood screening remained low at 38% (n=1900) but increased from 27% in 2021, which was a statistically significant increase (p<0.01). It was also reported that mood screening was not indicated in 26% (n=1285) of cases, which would suggest some form of screening occurred.

OPPORTUNITY FOR QI

DEFINING MOOD SCREENING AND AGREEMENT ON SCREENING TOOLS AND APPLICATION WOULD BE A VALUABLE QI INITIATIVE FOR PATIENTS WITH A STROKE AND FOR STAFF IN ALL STROKE UNITS. ALL HOSPITALS SHOULD REVIEW THEIR OWN RESULTS AND DEVELOP AN IMPROVEMENT PLAN TO MANAGE THIS PROCESS IF NECESSARY.

MULTIDISCIPLINARY TEAM MEETING ASSESSMENTS

Multidisciplinary team meeting assessments were held for 77% (n=3874) of patients.

ADVANCED NURSE PRACTITIONER/CLINICAL NURSE SPECIALIST ASSESSMENT

Eighty-six percent (n=4275) of patients with a stroke were assessed by an advanced nurse practitioner (ANP) or a clinical nurse specialist (CNS) during their hospital stay, an increase from 78% in 2020 (NOCA, 2023).

HEALTH AND SOCIAL CARE PROFESSIONALS' ASSESSMENTS

In total, as recorded in the core clinical dataset, 89% (n=4467) of patients with a stroke were assessed by a health and social care professional (HSCP); a PT, 93% (n=4163); an OT, 89% (n=3956); an SLT, 69% (n=3098); dietetics, 33% (n=1466); a medical social worker, 26% (n=1181); a psychologist, 7% (n=311).

Additional HSCP data were submitted by 18 hospitals.[10] As stated in the data quality statement, only national results are available due to difficulties achieving acceptable coverage, and each result is available within the INAS National Reporting Table 2022. However, Figure 4.7 shows the proportion of cases reported to have been assessed by either a PT, an OT or an SLT, with additional discipline-specific HSCP data. Overall, 47% (n=1943) of patients who were reported to have been assessed by a PT had additional physiotherapy HSCP data submitted, 41% (n=1637) of patients who were reported to have been assessed by an OT had additional occupational therapy HSCP data submitted and 46% (n=1426) of patients who were reported to have been assessed by an SLT had additional speech and language therapy HSCP data submitted.

OPPORTUNITY FOR QI

THE MULTIDISCIPLINARY TEAM MEETINGS ARE AN OPPORTUNITY TO IDENTIFY CASES THAT SHOULD BE RECORDED IN THE INAS.

[10] HSCP data were also submitted from St Columcille's Hospital, Loughlinstown (n=8) and were included in total results.

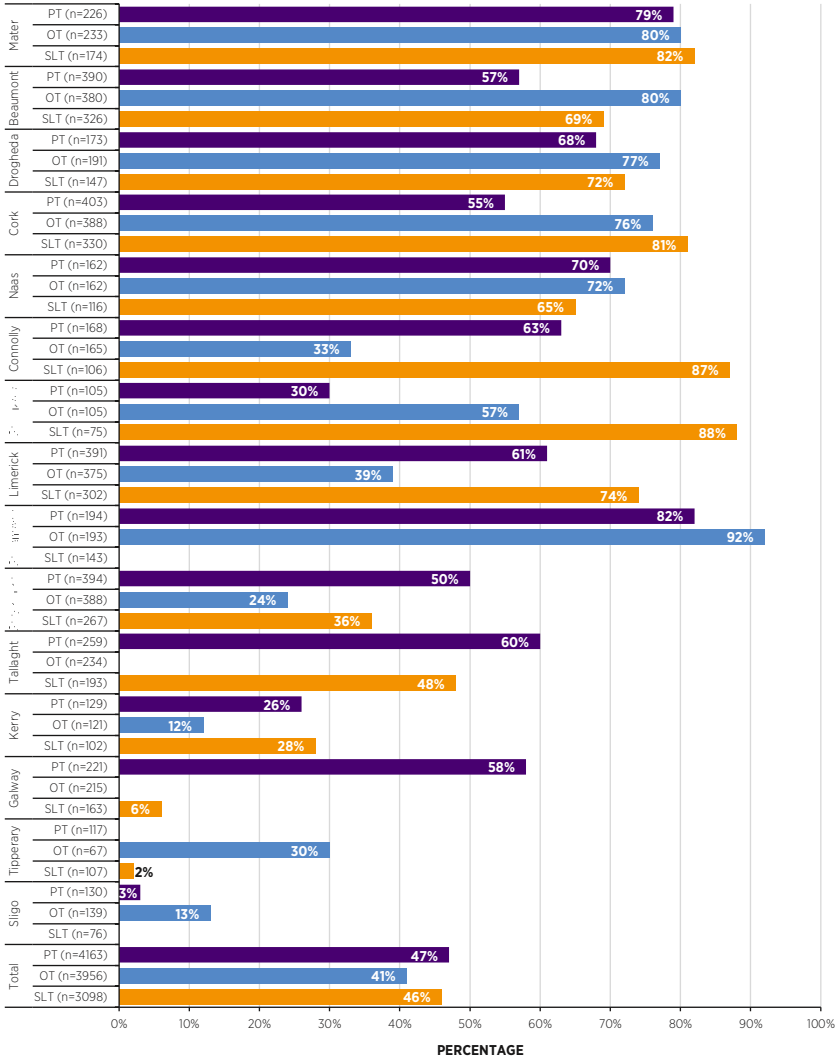


FIGURE 4.7: PROPORTION OF CASES ASSESSED BY A PHYSIOTHERAPIST, OCCUPATIONAL THERAPIST AND SPEECH AND LANGUAGE THERAPIST WITH ADDITIONAL HEALTH AND SOCIAL CARE PROFESSIONAL DATA SUBMITTED, BY HOSPITAL[11]

HSCP ACTIVITY AND OUTCOMES

The HSCP dataset indicates that 47% (n=1074) of patients seen by a PT were seen on the same day of admission or the next day, while 35% (n=695) of patients were seen by an OT and 46% (n=766) of patients were seen by an SLT on the same day of admission or the next day. Twenty-nine percent (n=666) of patients required the assistance of more than one PT/therapy assistant for more than one-half of their treatment sessions, and this was 25% (n=509) for patients working with OTs. PTs reported that 50% (n=1151) of patients received a sufficient amount of physiotherapy, while this number was reported as 40% (n=805) by OTs and 49% (n=818) by SLTs for patients receiving occupational therapy and speech and language therapy, respectively. There are multiple reasons for variation between hospitals, which may need further evaluation.

Sixty percent (n=815) of patients with a stroke who were seen by an SLT had difficulties with swallowing. Only 9% (n=144) had a video fluoroscopy and 4% (n=73) had a fiberoptic endoscopic evaluation of swallowing (FEES) completed, while 39% (n=521) had aphasia.

Forty-four percent (n=887) of patients with a stroke were driving prior to stroke, and 79% (n=703) of those were given advice by an OT about driving limitations after stroke. One-fifth (n=410, 20%) of patients with stroke were in paid employment prior to the stroke, and 64% (n=262) of those were given advice about work prior to discharge.

SECONDARY PREVENTION

New or altered antithrombotic therapy was prescribed for 90% (n=3854) of patients with ischaemic stroke and was commenced on the same day as the patient's arrival at hospital or the next day in 87% (n=3350) of cases, which was unchanged from 2021.

Data on secondary prevention for patients with atrial fibrillation (AF) are presented in further detail in the next section.

Symptomatic carotid artery stenosis was reported in 9% (n=368) of cases, a slight increase from 8% in 2021 (NOCA, 2023). Of those, 46% (n=169) were referred for carotid endarterectomy (an increase from 33% in 2021) and 26% (n=95) for carotid stenting, an increase from 12% in 2021. Eight percent (n=31) were referred for both carotid endarterectomy and carotid stenting.

[11] Hospitals that had no additional HSCP data recorded were excluded in Figure 4.7 (Wexford General Hospital, Cavan General Hospital, Letterkenny University Hospital, Portiuncula University Hospital, Bantry General Hospital and University Hospital Waterford). Although Regional Hospital Mullingar, Mayo University Hospital and Mercy University Hospital were not included in Figure 4.7 due to low coverage, these hospitals had additional HSCP data, and thus were included in the totals.

OUTCOMES

LENGTH OF STAY

In 2022, the median total length of stay (LOS) in hospital was 9 days, a slight increase from 8 days in 2021. This was statistically significant (p<0.01). The LOS can vary between hospitals due to different service provision for rehabilitation. Some hospitals provide rehabilitation on-site, and some provide it off-site. If a hospital provides on-site rehabilitation, the hospital LOS for patients with a stroke will be longer than if the patient is discharged to an off-site rehabilitation service. The UK SSNAP (King's College London, 2021/2022) reported a median LOS of 7.6 days.

In 2022, the median LOS in a stroke unit in Ireland was 7 days. In total, 68% of the total time patients spent in hospital in 2022 was in a stroke unit, which is unchanged from the figure for 2021 (68%) (NOCA, 2023) but remains well off target of 90% (HSE, 2012) (Figure 4.8).

KQI 2

THE PERCENTAGE OF TIME PATIENTS SPEND IN A STROKE UNIT

TARGET: 90% | **RESULT: 68%**

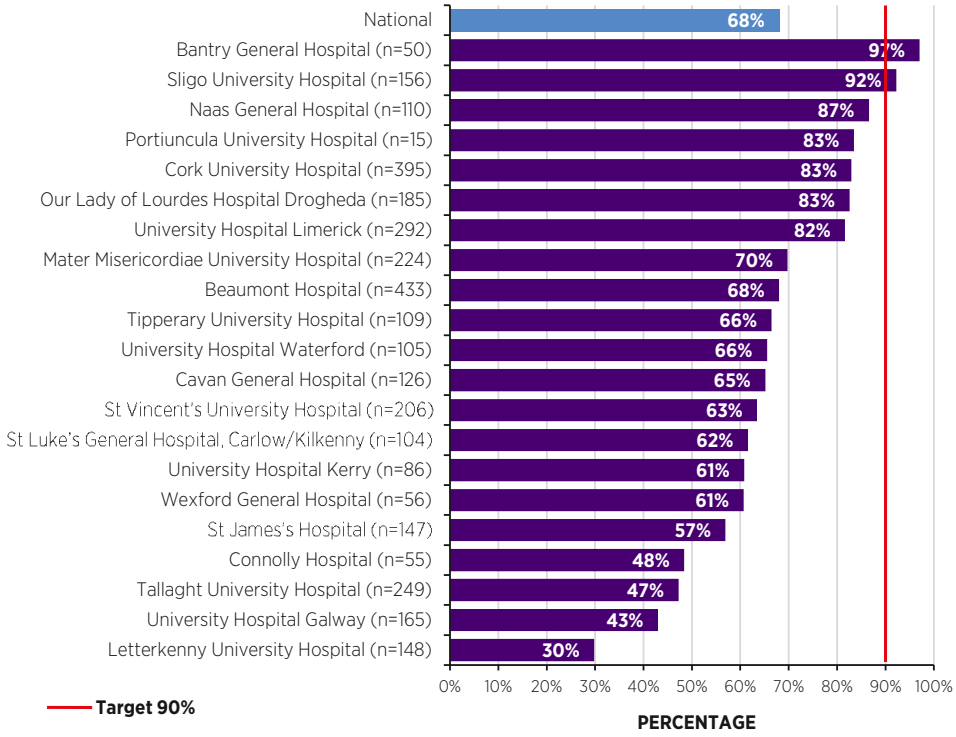


FIGURE 4.8: PERCENTAGE OF BED DAYS SPENT IN A STROKE UNIT FOR PATIENTS WHO SPENT ALL OR SOME OF THEIR HOSPITAL STAY IN A STROKE UNIT (N=69257)[12]

[12] The numbers next to each hospital in Figure 4.8 represent the number of patients in each hospital.

MODIFIED RANKIN SCALE SCORES

Prior to admission, most patients with a stroke (n=3132, 63%) had no disability, and 34% (n=1713) had some form of disability. On discharge from acute services, 66% (n=3278) had either a mild disability or a moderate to severe disability. Figures 4.9 and 4.10 indicate the change in the modified Rankin Scale (mRS) scores among patients by stroke type.

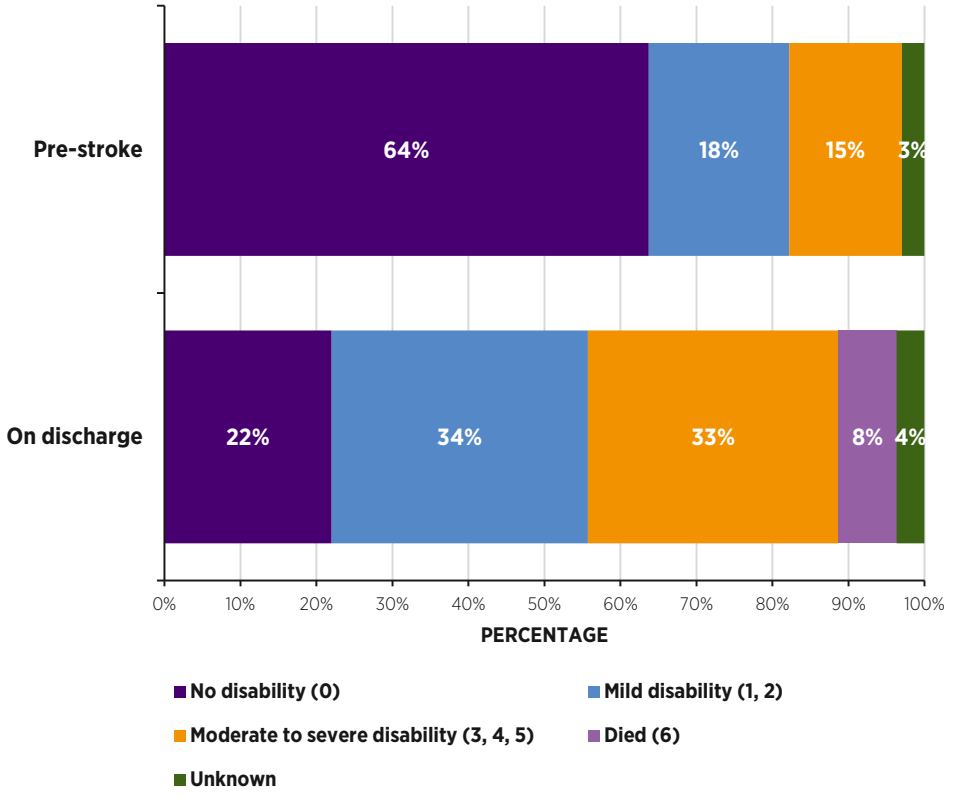


FIGURE 4.9: MODIFIED RANKIN SCALE SCORES IN PATIENTS WITH ISCHAEMIC STROKE, PRE-STROKE AND ON DISCHARGE FROM ACUTE HOSPITAL (n=4272)

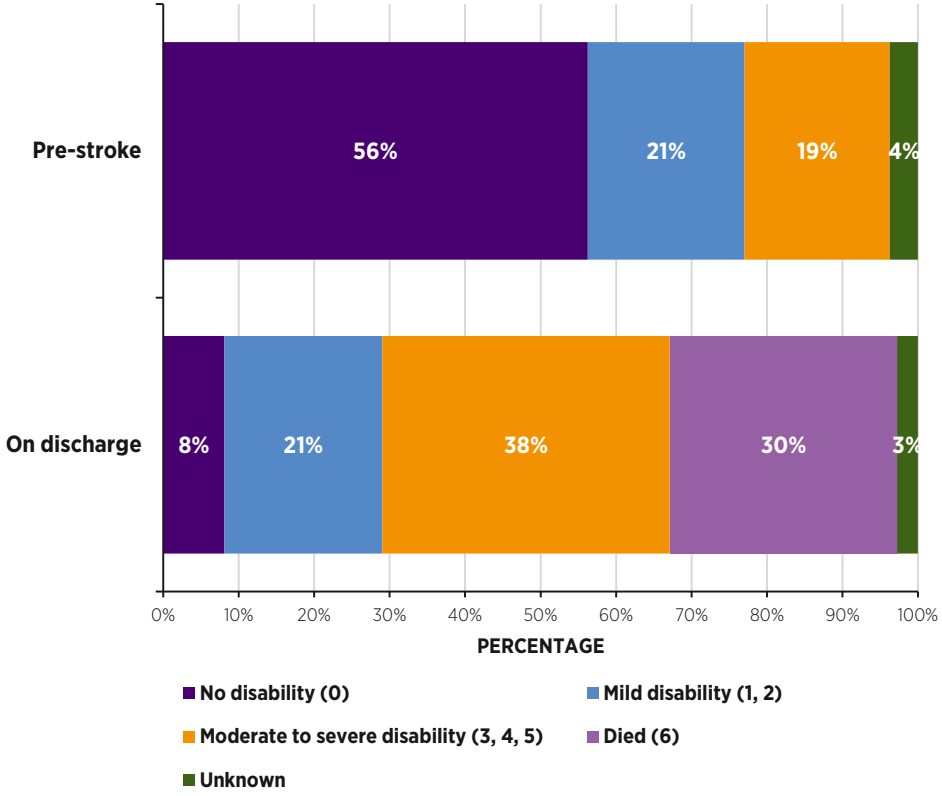


FIGURE 4.10: MODIFIED RANKIN SCALE SCORES IN PATIENTS WITH HAEMORRHAGIC STROKE, PRE-STROKE AND ON DISCHARGE FROM ACUTE HOSPITAL (n=727)

OUTCOMES FROM THE HSCP DATASET

Figure 4.11 shows that 90% (n=2087) of patients were independent in terms of mobility prior to their stroke, compared with 56% (n=1281) of patients on discharge from hospital. Standardised outcome measures were used in 69% (n=1588) of cases.

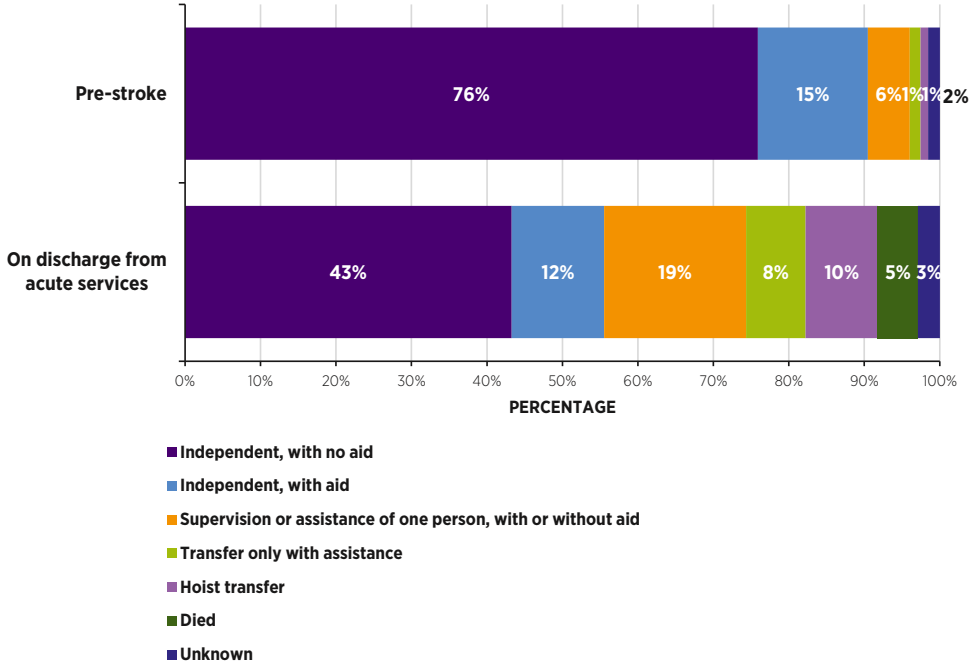


FIGURE 4.11: PHYSIOTHERAPY MOBILITY OUTCOMES (n=2307)[13]

OTs record outcomes based on a patient's ability to perform activities of daily living pre-stroke and on discharge from the acute hospital. The term 'activities of daily living' (ADLs) collectively describes the fundamental skills that are required in order for an individual to independently care for themselves, such as eating, bathing and mobilising. Figure 4.12 shows the distribution of personal ADLs among patients with a stroke both pre-admission and on discharge from acute services. Prior to admission, 74% (n=1490) of patients with a stroke who were seen by an OT were independent in their ability to attend to their personal ADLs. On discharge, this fell to 40% (n=803).

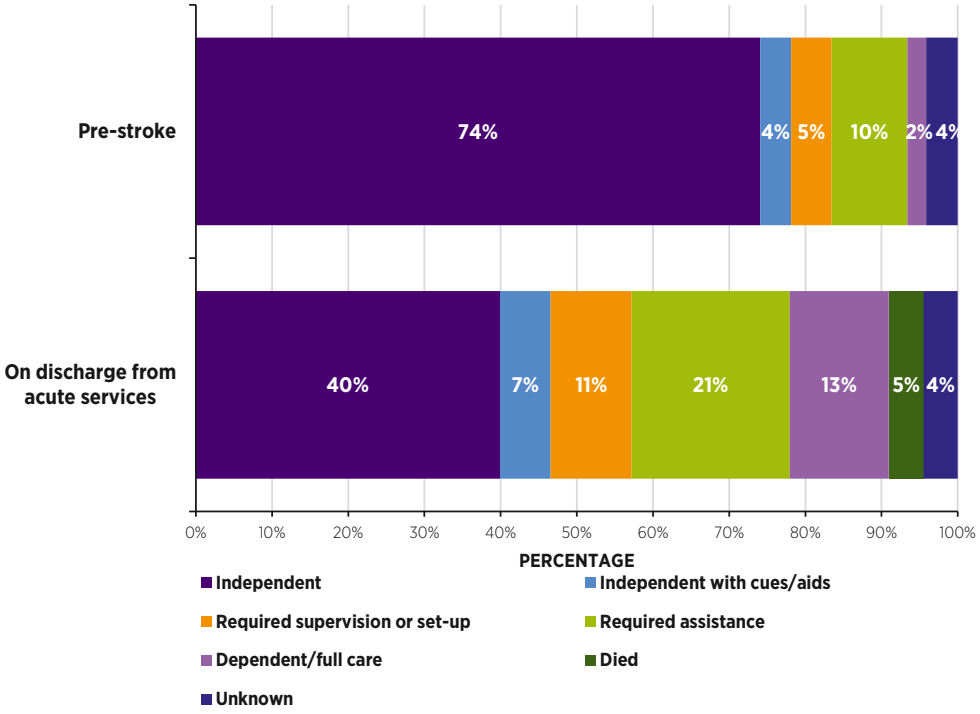


FIGURE 4.12: OCCUPATIONAL THERAPY ACTIVITIES OF DAILY LIVING OUTCOMES (n=2012)

[13] Percentages may not add up to 100% due to rounding.

Figure 4.13 shows the pre- and post-stroke communication ability of patients who were seen by an SLT. Prior to admission, the majority (n=1293, 78%) of patients with a stroke who were assessed by an SLT had no difficulties in their ability to speak and communicate. On discharge, there was an increase in the percentage of patients who were reported to have communication difficulties; 31% (n=510) of patients were reported to have mild communication difficulties, 17% (n=277) had moderate communication difficulties, 7% (n=123) had severe communication difficulties and 3% (n=51) had profound communication difficulties.

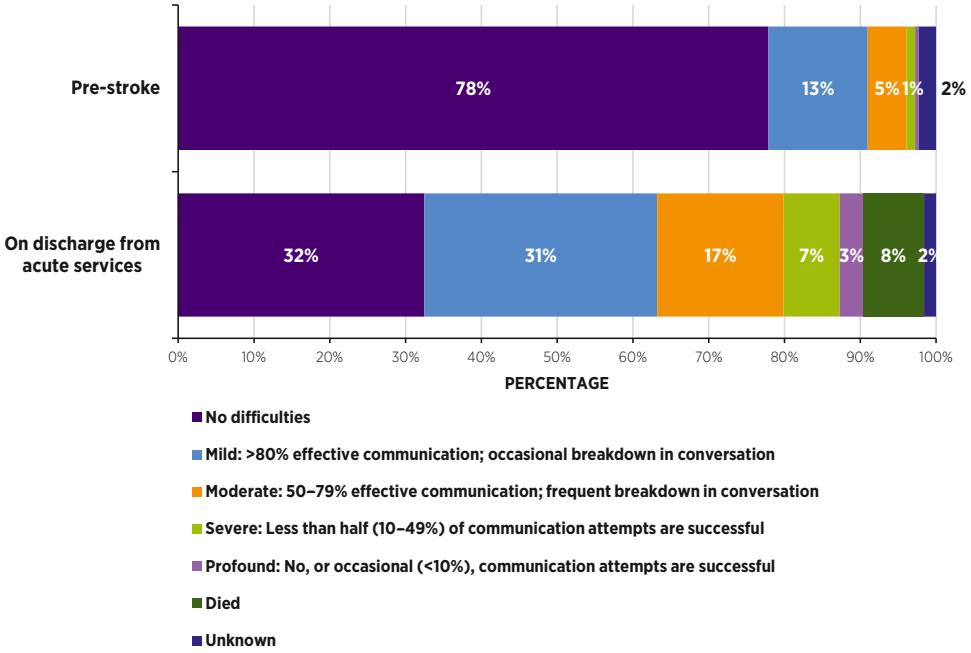


FIGURE 4.13: SPEECH AND LANGUAGE THERAPY PRE- AND POST-STROKE COMMUNICATION ABILITY OUTCOMES (n=1660)

DISCHARGE DESTINATION

In 2022, 50% of patients with a stroke were discharged home (n=2483), with an additional 10% (n=489) discharged home with Early Supported Discharge (ESD), which was unchanged from 2021. The UK SSNAP (King's College London, 2021/2022) reported that 24.5% of patients with a stroke were discharged home, with an additional 49.4% transferred to an ESD/community team. In the UK, community rehabilitation is provided to those with a higher level of disability, and therefore more patients can be discharged from the acute hospital and have rehabilitation in the community rather than in acute hospitals or inpatient rehabilitation hospitals. New ESD teams were established in Ireland in 2022 and 2023, and it is expected that the number of patients discharged with ESD will increase in the next reporting period.

The unadjusted in-hospital mortality rate in 2022 was 10.8% (n=540), which was similar to previous years (NOCA, 2023) and lower than the 13.8% reported by the UK SSNAP (King's College London, 2021/2022). As in previous years, the unadjusted in-hospital mortality rate was 7.5% (n=322) for patients with ischaemic stroke, compared with 30.0% (n=218) for patients with haemorrhagic stroke. The proportion of patients discharged to long-term care was 7.3% (n=364); however, 24% (n=88) of those patients were admitted from long-term care, which would mean an adjusted discharge rate to long-term care of 5.5% (n=276). Figure 4.14 shows the discharge destination from the acute hospital for all patients with a stroke in 2022.

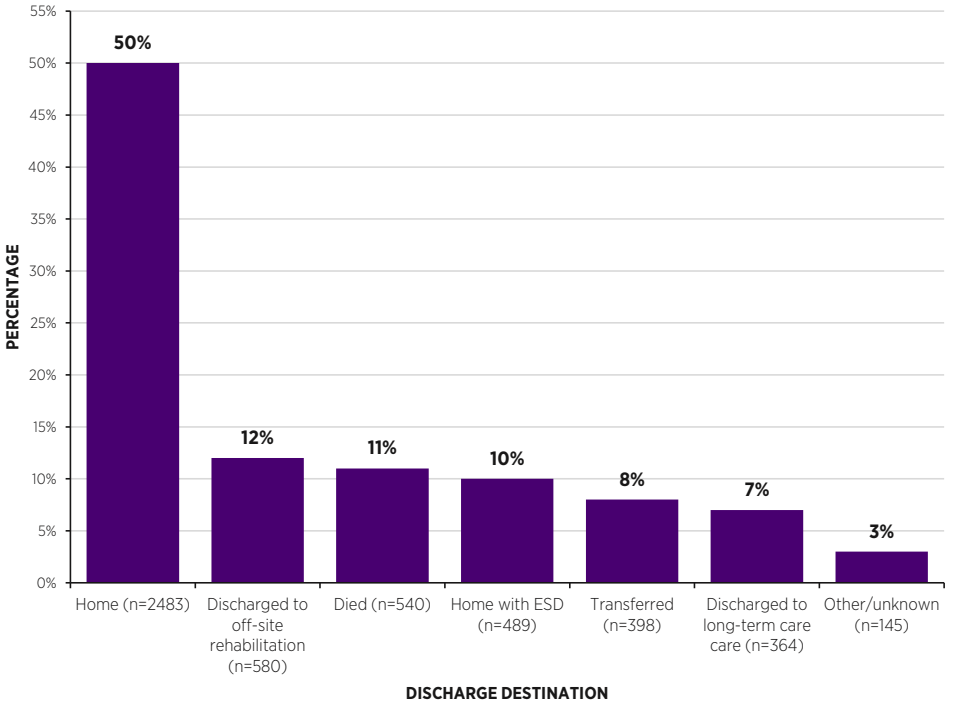


FIGURE 4.14: DISCHARGE DESTINATION FROM ACUTE HOSPITAL FOR ALL PATIENTS WITH A STROKE (N=4999)

HSCP DATASET ONWARD REFERRAL

Onward referral refers to the hospital or community service that a patient with a stroke is referred to on discharge from the acute hospital. Figure 4.15 reflects data from the HSCP dataset and shows the distribution of onward referral destinations for each discipline. On discharge from acute hospital services, 45% (n=1035) of patients with a stroke who were seen by a PT and 46% (n=930) who were seen by an OT did not require an onward referral. Among patients with a stroke who were assessed by an SLT, 53% (n=885) were not referred for further speech and language therapy. Since the development of the Integrated Care Programme for Older Persons (ICPOP) in 2016, community-based ICPOP teams have been established. Understanding more about where patients with a stroke are receiving care, support and rehabilitation in the community would be valuable.

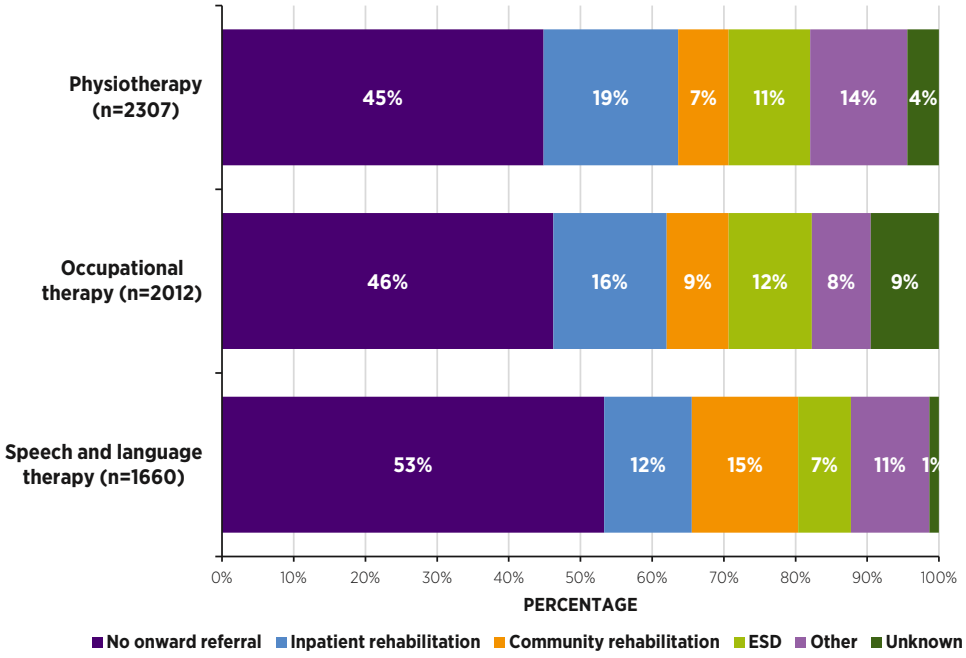
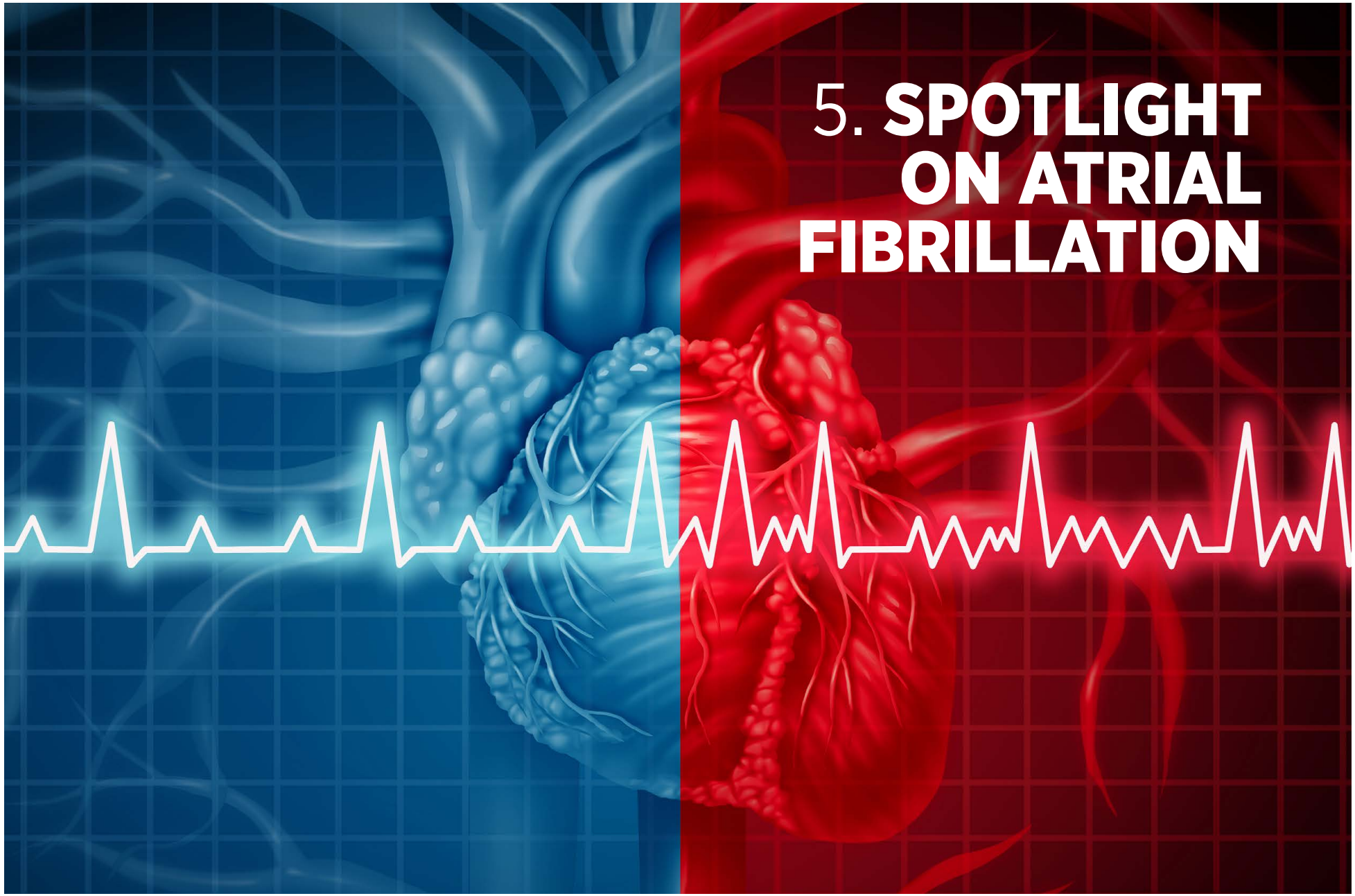


FIGURE 4.15: ONWARD REFERRAL, BY DISCIPLINE (n=3256)[14,15]

KEY FINDINGS

- There was a 7.1% increase in the number of patients with a stroke admitted to hospital between 2020 and 2021, and although the number of admissions increased again in 2022, it was less of an increase (3.0%) (Figure 4.1).
- The median interval between onset of stroke symptoms and hospital arrival was 3 hours and 2 minutes (interquartile range (IQR): 1 hour and 38 minutes to 9 hours and 25 minutes), which represented a 28-minute decrease from 2021.
- Forty-seven percent (n=2097) of patients with a stroke were seen by a medical team within 10 minutes of hospital arrival, which was unchanged from 2021; however, this information was unknown in 575 cases.
- The rate of admission to a stroke unit remains unchanged from 2021, at 69% (n=3455); among those patients, 68% of the total hospital stay was spent in a stroke unit (Figure 4.8). Both of these KPIs remain well below the target of 90% (HSE, 2012).

[14] Figure 4.15 refers to the number of referrals (i.e. a patient could have been referred by one or more HSCPs).
[15] 'No onward referral' includes patients who died in hospital.



5. SPOTLIGHT ON ATRIAL FIBRILLATION

5. SPOTLIGHT ON ATRIAL FIBRILLATION

Atrial fibrillation (AF) is the rapid, irregular beating of the heart, affecting the flow of blood through the heart, making it more likely to clot. If a clot leaves the heart and travels to the brain, it can cause a stroke by blocking the flow of blood through the cerebral arteries. AF is the most common arrhythmia seen in general practice and is associated with a five-fold increase in the risk of stroke. Strokes related to AF are also more severe, with twice the death rate of non-AF-related strokes and greater functional deficits for those who do survive (Health Information and Quality Authority (HIQA), 2015). AF is treated with anticoagulation medications that prevent the formation of blood clots in the heart. NOCA (2023) highlighted the increasing rate of anticoagulation therapy in patients with AF between 2013 and 2021; comparing data from that report with the 2022 data for this report, the type of anticoagulation therapy has changed from primarily warfarin (2013: 46%; 2022: 8%) to primarily direct oral anticoagulants (DOACs) (2013: 9%; 2022: 77%). In 2022, the prevalence of AF among patients with a stroke was 28%, compared to 29% between the years of 2013 and 2021. (NOCA, 2023).

The *Irish National Audit of Stroke: A critical review of national stroke data for Ireland from 2013 to 2021* (NOCA, 2023) recommended that the factors contributing to stroke in patients prescribed anticoagulation therapy should be completed in the INAS dataset. In 2022, a series of questions were added to the INAS dataset (Appendix 2) in order to identify the type of anticoagulation therapy that patients were prescribed prior to stroke, to assess the level of adherence to anticoagulation therapy, and to identify reasons for non-adherence.

ATRIAL FIBRILLATION PREVALENCE

In total, between 2013 and 2022, the prevalence of AF among all patients with a stroke admitted to hospital was 29% (n=11436). Figure 5.1 indicates the proportion of patients with a stroke who had AF, by stroke type and year. Overall, a higher proportion of patients with ischaemic stroke had AF (between 26% and 34%) compared with those with haemorrhagic stroke (between 16% and 24%). In 2022, 28% (n=805) of males and 29% (n=615) of females had AF. There was an increase in the proportion of AF cases reported in 2022 (28%), compared to 2021 (26%) (NOCA, 2023); however, this could be associated with an increased focus on collecting AF data due to the spotlight audit. This will be monitored annually.

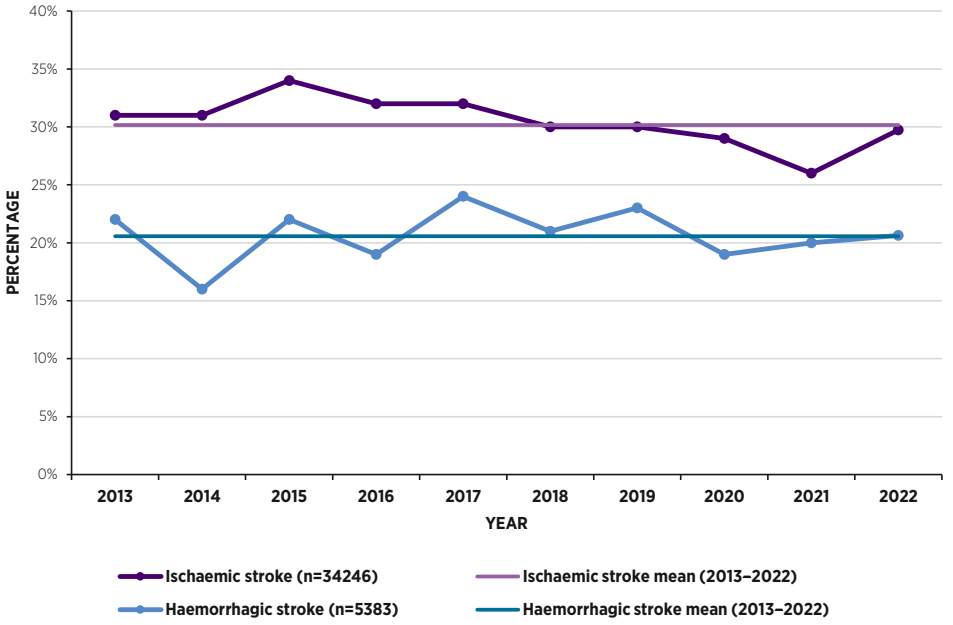


FIGURE 5.1: PROPORTION OF PATIENTS WITH ISCHAEMIC AND HAEMORRHAGIC STROKE WHO HAD ATRIAL FIBRILLATION, BY YEAR (N=39629)

ATRIAL FIBRILLATION PRE-STROKE

In 2022, 28% (n=1420) of all patients with a stroke had AF. Eighteen percent (n=918) had a diagnosis of AF before the stroke, which is the same as the rate reported in the UK SSNAP, (King's College London, 2021/2022). Of those with known AF pre-stroke, 84% (n=771) were receiving antithrombotic therapy[16]. Figure 5.2 indicates the breakdown of AF data by stroke type. Eighty-three percent (n=655) of patients with ischaemic stroke who had known AF pre-stroke were receiving antithrombotic therapy, as were 87% (n=116) of patients with haemorrhagic stroke who had known AF. This difference was not statistically significant (p=0.211). Seventy-one percent (n=557) of patients with ischaemic stroke who had known AF were reported to be anticoagulated with warfarin or a DOAC prior to stroke, compared with 77% (n=103) of patients with haemorrhagic stroke. This was not a statistically significant difference under conventional definitions (p=0.12).

ATRIAL FIBRILLATION IN PATIENTS WITH A STROKE

ALL PATIENTS WITH A STROKE (N=4999)

Ischaemic Stroke Number of patients with ischaemic stroke (n=4272)	Haemorrhagic Stroke Number of patients with haemorrhagic stroke (n=727)
30% (n=1270) of patients with ischaemic stroke had AF	**21%** (n=150) of patients with haemorrhagic stroke had AF
AF was known prior to stroke in **62%** (n=785) of patients with ischaemic stroke.	AF was known prior to stroke in **89%** (n=133) of patients with haemorrhagic stroke.
83% (n=655) of patients with ischaemic stroke and AF known prior to stroke were prescribed anticoagulant or antiplatlet medication.	**87%** (n=116) of patients with haemorrhagic stroke and AF known prior to stroke were prescribed anticoagulant or antiplatlet medication.
Warfarin: **8%** (n=52)	Warfarin: **9%** (n=11)
Dabigatran: **5%** (n=34)	Dabigatran: **~**
Apixaban: **48%** (n=312)	Apixaban: **53%** (n=62)
Edoxaban: **10%** (n=63)	Edoxaban: **8%** (n=9)
Rivaroxaban: **15%** (n=96)	Rivaroxaban: **17%** (n=20)
Antiplatlet: **4%** (n=24)	Antiplatlet: **~**
Unknown: **11%** (n=74)	Unknown: **8%** (n=9)

FIGURE 5.2: BREAKDOWN OF PRE-STROKE ATRIAL FIBRILLATION DATA FOR PATIENTS WITH ISCHAEMIC AND HAEMORRHAGIC STROKE (N=4999)[17]

~ Denotes five cases or fewer
* Further suppression required in order to prevent disclosure of five cases or fewer

[16] Antithrombotic therapy includes antiplatelet medication and/or anticoagulation medication.
[17] The AF spotlight audit specified the breakdown of the DOAC type for patients with known AF. This is not specified in the main INAS dataset; therefore, these results are slightly different from those reported in the INAS National Reporting Table 2022.

ANTICOAGULATION THERAPY

In total, out of all patients with known AF and who were on anticoagulation therapy, 77% (n=597) were prescribed DOACs prior to stroke. Seventy-nine percent (n=473) of those patients were prescribed the correct dosage according to current guidance (Figure 5.3). For the majority of patients who were not prescribed the correct dosage (n=35), the dose was too low (91%, n=32). Of the 597 patients who were prescribed DOAC medication prior to stroke, 1% had a DOAC level taken at the time of hospital admission.

Eight percent (n=63) of patients with known AF prior to stroke were on warfarin. Of those, 40% (n=25) had an international normalised ratio (INR) of between 2 and 3.

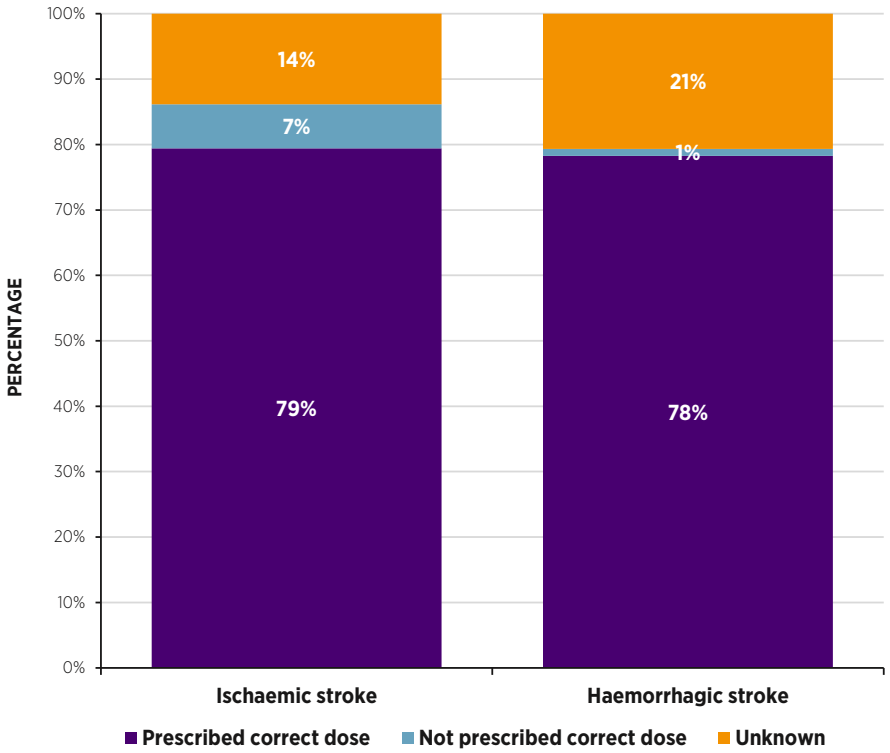


FIGURE 5.3: DIRECT ORAL ANTICOAGULANT PRESCRIPTION DATA FOR PATIENTS WITH ISCHAEMIC AND HAEMORRHAGIC STROKE (n=597)

ANTICOAGULATION MEDICATION ADHERENCE

Medication adherence is defined by the World Health Organization (WHO) as the degree to which ”a person’s behaviour corresponds with the agreed recommendations from a healthcare provider (WHO, 2003). In developed countries, the WHO has reported that medication is taken as prescribed approximately 50% of the time (WHO, 2003).

Good anticoagulation adherence ensures medication safety and effective prevention of stroke (Chen *et al*., 2019). Patients prescribed anticoagulation medications may have greater adherence challenges than patients prescribed other types of medication, as anticoagulants are often prescribed to patients who are older and who may have physical or memory difficulties. In addition, it is a medication that may need to be paused in advance of some medical procedures and may not be restarted immediately following the procedure.

Analysis relating to anticoagulation medication adherence prior to stroke in this spotlight audit found that, among patients with a stroke who were prescribed anticoagulation medication prior to stroke, 7% (n=44) reported that they often forgot to take their medication. Eight percent (n=55) reported that anticoagulation medication had been stopped prior to the stroke, with ‘pre-procedure’ being the main reason given for stopping the medication. Fourteen percent (n=94) either often forgot or had their anticoagulation medication stopped prior to the stroke. Figure 5.4 shows adherence to DOAC and warfarin prescriptions, by stroke type.

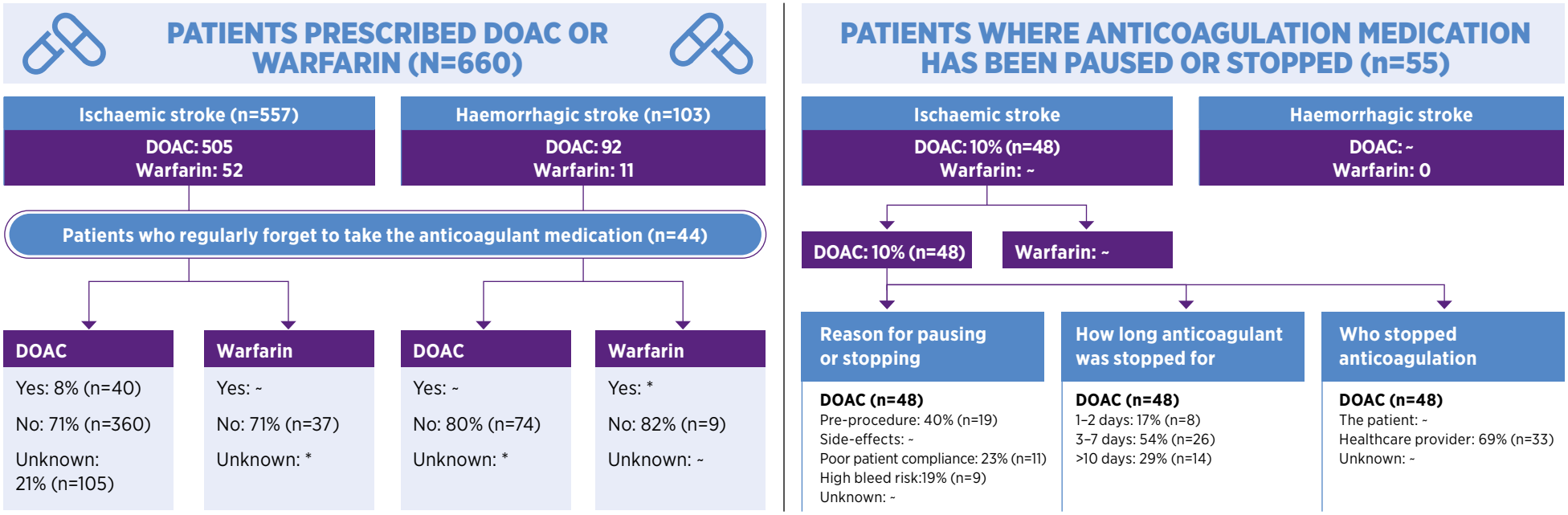
Overall, between patient-acknowledged poor adherence, low dosing, and pausing of anticoagulation therapy, 23% of patients with a stroke who had known AF and were prescribed anticoagulation medication prior to stroke were potentially under-anticoagulated at the time of their stroke. Patients with ischaemic stroke had a higher proportion of under-anticoagulation (n=143, 26%) compared with patients with haemorrhagic stroke (n=9, 9%). The anticoagulation status was unknown for 29% (n=194) of patients.

OPPORTUNITY FOR QI

ALL CLINICAL TEAMS SHOULD ENSURE THAT WHEN PATIENTS ARE PRESCRIBED ANTICOAGULATION MEDICATION, THEY ARE PROVIDED WRITTEN AND VERBAL INFORMATION ON THE IMPORTANCE OF MEDICATION ADHERENCE.

HOSPITAL-BASED ANTICOAGULATION OR ATRIAL FIBRILLATION CLINICS

Out of all patients who were taking DOACs prior to stroke (n=597), only 6% (n=35) attended a hospital-based anticoagulation clinic or AF clinic, 53% (n=314) did not attend such a clinic, and this information was not available for 42% (n=248). Among patients who were taking warfarin (n=63), 33% (n=21) attended a hospital-based anticoagulation clinic or AF clinic, 33% (n=21) did not attend and 33% (n=21) did not have this information available. Attendance at an anticoagulation clinic or AF clinic is important, as it may improve the therapeutic relationship and result in improved adherence to the treatment.



~ Denotes five cases or fewer
* Further suppression required in order to prevent disclosure of five cases or fewer

FIGURE 5.4: ANTICOAGULATION MEDICATION ADHERENCE DATA FOR PATIENTS WITH ISCHAEMIC AND HAEMORRHAGIC STROKE (n=660)

PRE-STROKE ANTICOAGULATION ANALYSIS

This section presents a comparison of demographics, acute treatment and outcomes between five separate groups based on pre-stroke anticoagulation status.The five groups into which cases are broken down are:

GROUP 1
No AF
GROUP 2
AF not known prior to stroke
GROUP 3
AF known prior to stroke, on anticoagulation and no dosage/compliance concerns
GROUP 4
AF known prior to stroke, on anticoagulation and with dosage/compliance concerns
GROUP 5
AF known prior to stroke, not on anticoagulation

Figure 5.5 presents the share of patients in each of the five different AF groups (Appendix 7), as well as the 16% (n=795) of cases for whom this information was unknown. The remainder of this section focuses on Groups 1–5 only (n=4204). Based on this spotlight audit, the majority of cases did not have AF (n=3058), and 1,146 cases did have a diagnosis of AF that was either known or unknown prior to stroke.

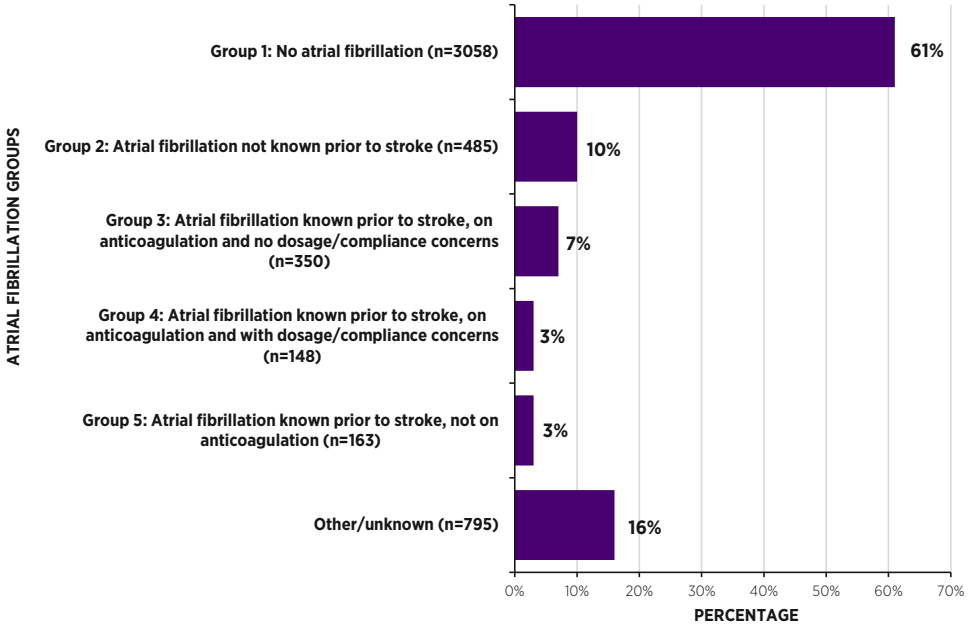


FIGURE 5.5: DISTRIBUTION OF PATIENTS IN EACH OF THE FIVE ATRIAL FIBRILLATION GROUPS (N=4999)

DEMOGRAPHICS OF THE FIVE AF GROUPS

Figures 5.6 and 5.7 show the sex and age distribution of patients within each of the AF groups. In all groups there was a larger proportion of male patients with a stroke, but beyond this, the most significant difference was in the higher proportion of males with concerns regarding dosage or adherence (Group 4).

As expected, the older the person was, the more likely they were to be diagnosed with AF (Figure 5.7). The median age of patients who did not have AF (Group 1) was 71 years (IQR: 60–80 years); this is compared with a median age of 80 years (IQR: 73–86 years) for those who had AF (Groups 2–5). Out of those with AF, 89% (n=1025) were aged over 65 years. As AF is a condition that is more prevalent in older age, this finding was expected.

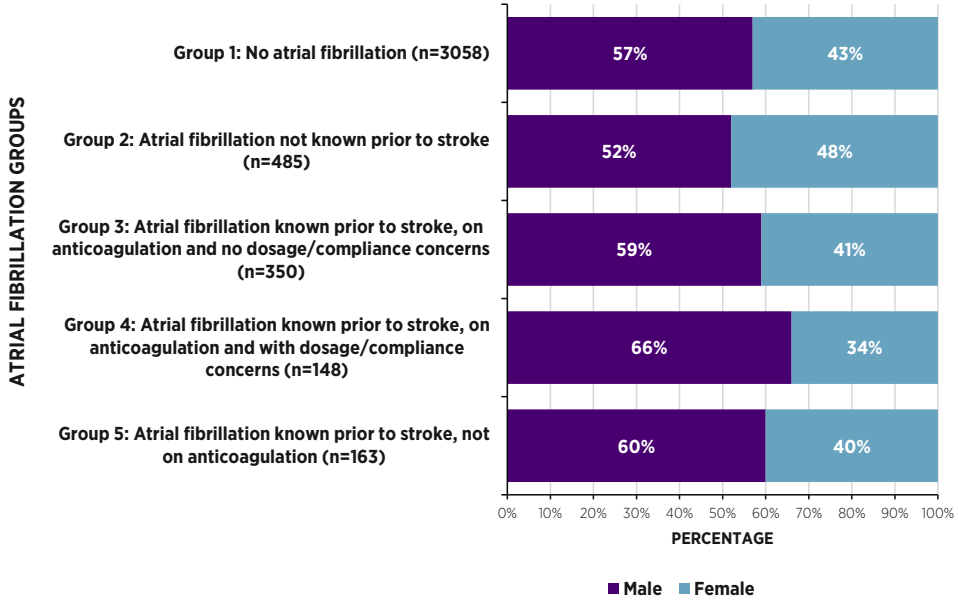


FIGURE 5.6: SEX DISTRIBUTION FOR EACH OF THE FIVE ATRIAL FIBRILLATION GROUPS (n=4204)

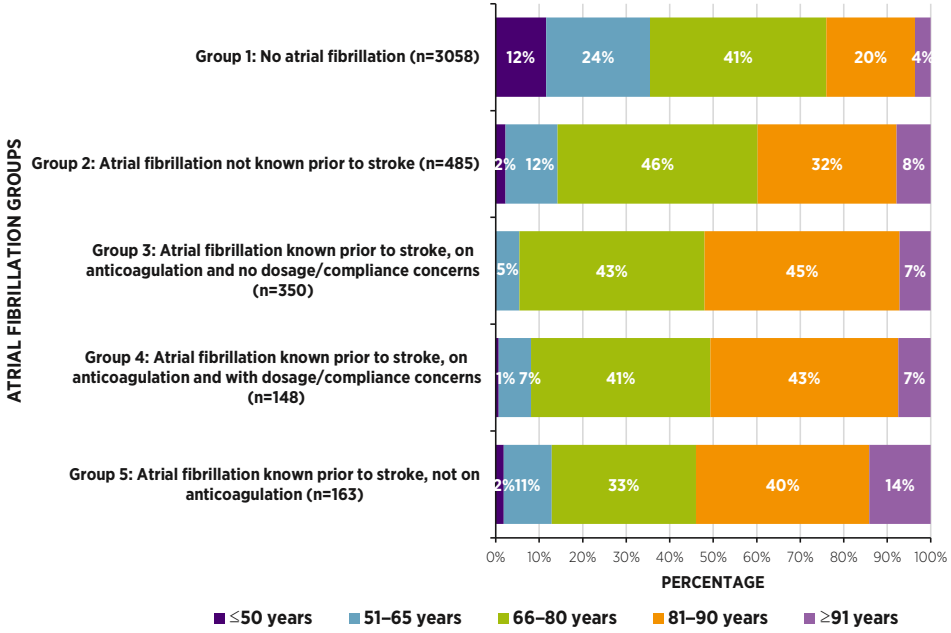


FIGURE 5.7: AGE DISTRIBUTION FOR EACH OF THE FIVE ATRIAL FIBRILLATION GROUPS (n=4204)

STROKE UNIT CARE ACROSS THE FIVE AF GROUPS

Table 5.1 shows the modified Rankin Scale (mRS) score by AF group. The proportion of patients with no disability prior to stroke was higher in those with no AF or with AF unknown pre-stroke (n=2354, 66%) compared with those with known AF pre-stroke (n=293, 44%). Those with known AF pre-stroke had a higher rate of moderate to severe disability (n=195, 30%) compared with those who did not have AF or for whom AF was unknown prior to stroke (n=463, 13%).

TABLE 5.1: MODIFIED RANKIN SCALE SCORE FOR EACH OF THE FIVE ATRIAL FIBRILLATION GROUPS

				HAD ATRIAL FIBRILLATION				
			GROUP 1: No atrial fibrillation	GROUP 2: Atrial fibrillation not known prior to stroke	GROUP 3: Atrial fibrillation known prior to stroke, on anticoagulation and no dosage/ compliance concerns	GROUP 4: Atrial fibrillation known prior to stroke, on anticoagulation and with dosage/ compliance concerns	GROUP 5: Atrial fibrillation known prior to stroke, not on anticoagulation	TOTAL
Modified Rankin Scale score prior to stroke	**Total**	**N**	**3058**	**485**	**350**	**148**	**163**	**4204**
	No disability (0)	n	2024	330	160	72	61	2647
		%	66%	68%	46%	49%	37%	63%
	Mild disability (1, 2)	n	559	66	79	38	*	780
		%	18%	14%	23%	26%	*	19%
	Moderate to severe disability (3, 4, 5)	n	394	69	102	*	62	658
		%	13%	14%	29%	*	38%	16%
	Died (6)	n	0	0	0	0	0	0
	Unknown	n	81	20	9	*	~	119
		%	3%	4%	3%	*	*	3%

~ Denotes five cases or fewer
* Further suppression required in order to prevent disclosure of five cases or fewer

Management of patients with a stroke who had AF versus those who did not have AF varied (Table 5.2). The median time from symptom onset to hospital arrival was lower for patients who had AF than it was for those who did not have AF. Patients who did not have AF had a median time of 195 minutes (IQR: 97–674 minutes), while patients with AF had median times from symptom onset to hospital arrival ranging from 174 minutes (IQR: 96–392 minutes) for patients whose AF was unknown pre-stroke to 135 minutes (IQR: 88–289 minutes) for those with known AF but were not on anticoagulation medication.

Patients with AF had brain imaging completed sooner (for all AF groups: median: 47 minutes; IQR: 24–216 minutes) than those without AF (median: 71 minutes; IQR: 27–310 minutes). Again, the median varied among patients who had AF according to other factors: for patients with AF who were on anticoagulation medication and had dosage/adherence concerns, the median time from hospital arrival to brain imaging was 40 minutes (IQR: 26–194 minutes).

The rate of thrombolysis among patients also varied, ranging from 9.8% for patients without AF to 17.9% for patients whose AF was unknown pre-stroke. AF is typically associated with more severe stroke (HIQA, 2015), and more severe strokes tend to be recognised and treated faster both in the community and in hospital.

TABLE 5.2: TIME BETWEEN SYMPTOM ONSET TO HOSPITAL ARRIVAL AND HOSPITAL ARRIVAL TO BRAIN IMAGING, AND THROMBOLYSIS RATES, FOR EACH OF THE FIVE ATRIAL FIBRILLATION GROUPS

			GROUP 1: No atrial fibrillation	HAD ATRIAL FIBRILLATION				TOTAL
				GROUP 2: Atrial fibrillation not known prior to stroke	GROUP 3: Atrial fibrillation known prior to stroke, on anticoagulation and no dosage/compliance concerns	GROUP 4: Atrial fibrillation known prior to stroke, on anticoagulation and with dosage/ compliance concerns	GROUP 5: Atrial fibrillation known prior to stroke, not on anticoagulation	
Time between stroke symptom onset to hospital arrival	Median (minutes)		195	174	151	170	135	180
	IQR 1 (minutes)		97	96	99	100	88	96
	IQR 3 (minutes)		674	392	324	438	289	547
Time between hospital arrival and brain imaging	Median (minutes)		71	46	56	40	43	60
	IQR 1 (minutes)		27	22	25	26	24	26
	IQR 3 (minutes)		310	205	239	194	220	282
Thrombolysis	**Total**	**N**	**2485**	**452**	**273**	**135**	**140**	**3485**
	Yes	n	243	81	~	9	13	*
		%	9.8%	17.9%	*	6.7%	9.3%	*
	No	n	*	130	63	30	46	1097
		%	*	28.8%	23.1%	22.2%	32.9%	31.5%
	Contraindicated	n	1413	241	208	96	81	2039
		%	56.9%	53.3%	76.2%	71.1%	57.9%	58.5%
	Unknown	n	~	0	0	0	0	~
		%	*	0.0%	0.0%	0.0%	0.0%	*

~ Denotes five cases or fewer
* Further suppression required in order to prevent disclosure of five cases or fewer

Admission to a stroke unit varied between the groups, ranging from 67% for patients who did not have AF to 75% for patients whose AF was unknown pre-stroke. The slightly higher levels of admission to a stroke unit for patients with AF may again relate to the fact that on average, strokes tend to be more severe for patients with AF. Table 5.3 shows that patients with AF had a higher total hospital length of stay (LOS) (with the median ranging from 9 to 13 days) than patients who did not have AF (median: 9 days). Patients with AF also spent a higher proportion of their hospital stay in a stroke unit (65–76%) than patients without AF (68%).

TABLE 5.3: HOSPITAL AND STROKE UNIT LENGTH OF STAY FOR EACH OF THE FIVE ATRIAL FIBRILLATION GROUPS[18]

			GROUP 1: No atrial fibrillation	HAD ATRIAL FIBRILLATION				TOTAL
				GROUP 2: Atrial fibrillation not known prior to stroke	GROUP 3: Atrial fibrillation known prior to stroke, on anticoagulation and no dosage/compliance concerns	GROUP 4: Atrial fibrillation known prior to stroke, on anticoagulation and with dosage/ compliance concerns	GROUP 5: Atrial fibrillation known prior to stroke, not on anticoagulation	
Admission to a stroke unit	**Total**	**N**	**3058**	**485**	**350**	**148**	**163**	**4204**
	Yes	n	2063	364	246	109	118	2900
		%	67%	75%	70%	74%	72%	69%
	No	n	995	121	104	39	45	1304
		%	33%	25%	30%	26%	28%	31%
Hospital LOS (days)	Number of patients		3058	485	350	148	163	4204
	Median		9	13	11	11	9	9
	IQR 1		5	6	6	5	5	5
	IQR 3		18	26	22	20	20	19
Stroke unit LOS (days)	Number of patients		2042	359	243	108	116	2868
	Median		7	9	8	9	9	7
	IQR 1		4	5	5	5	4	4
	IQR 3		14	17	18	16	16	15
Proportion of hospital stay spent in a stroke unit			**68%**	**65%**	**76%**	**72%**	**68%**	**68%**

[18] Patients for whom time information was not recorded or was recorded incorrectly (n=32) were excluded from stroke unit LOS (days) calculation.

DISCHARGE OUTCOMES OF THE FIVE AF GROUPS

Pre-stroke and discharge mRS scores of the five AF groups

There was a variation in mRS scores, both pre-stroke and on discharge, between the five AF groups (Figure 5.8). As expected, there was a larger proportion of patients with no disability pre-stroke in Group 1 (no AF) (66%; n=2024) compared with those who had known AF pre-stroke. Group 2 (AF not known prior to stroke) also had a higher proportion of patients with no disability pre-stroke (n=330, 68% compared with patients who had known AF pre-stroke (n=293, 44%). Patients in Group 2 were younger (14% were aged 65 years and under) compared with those who had known AF pre-stroke (Groups 3, 4 and 5) (8% were aged 65 years and under) (Figure 5.7).

On discharge, there was a larger proportion of patients with no disability (n=684, 22%) in Group 1 (no AF) compared with patients who had AF (n=152, 13%). Patients with known AF who were not receiving anticoagulation medication were typically less independent pre-stroke, suggesting that frailty, comorbidity or background disability may have been a reason for not treating the patient with anticoagulation medication.

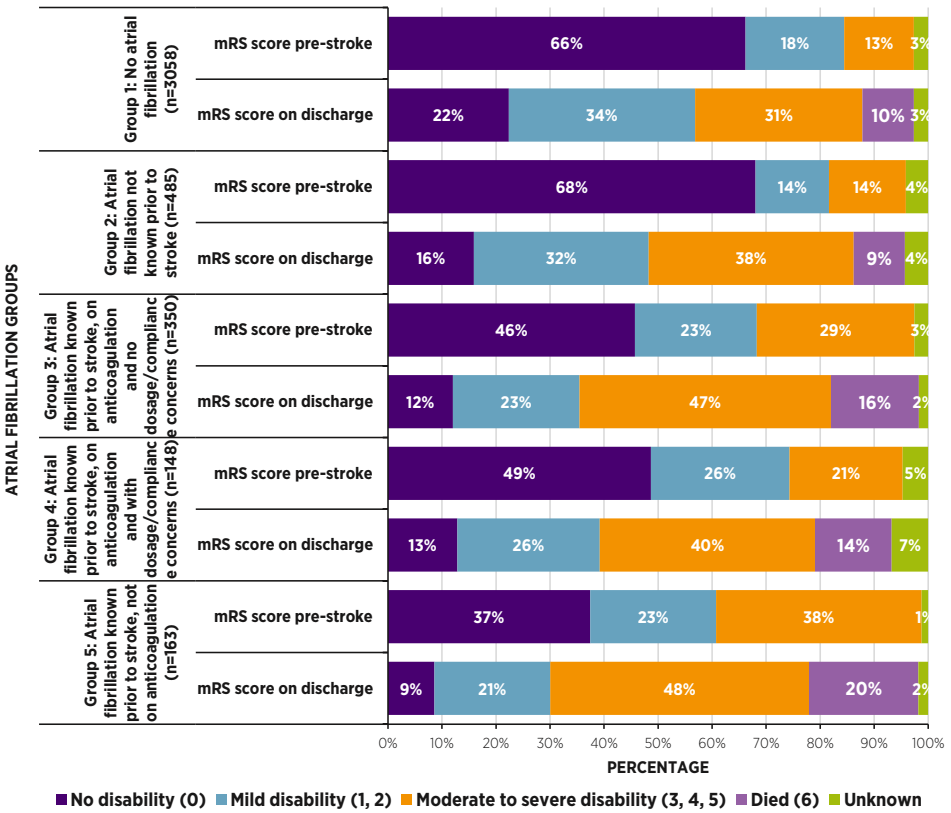


FIGURE 5.8: MODIFIED RANKIN SCALE SCORES IN PATIENTS WITH ISCHAEMIC STROKE, PRE-STROKE AND ON DISCHARGE, FOR EACH OF THE FIVE ATRIAL FIBRILLATION GROUPS (n=4204)

DISCHARGE DESTINATION OF THE FIVE AF GROUPS

Figure 5.9 shows the discharge destination distribution of the five AF groups. The mortality rate was higher among patients with AF (n=155, 14%) compared with those without AF (9%, n=288). Patients without AF were more likely to go home after stroke (n=1623, 53%) compared with patients who had AF (n=500, 44%). This is most likely due to patients in Groups 2–5 being older and having higher rates of disability (Figure 5.7 and Figure 5.8).

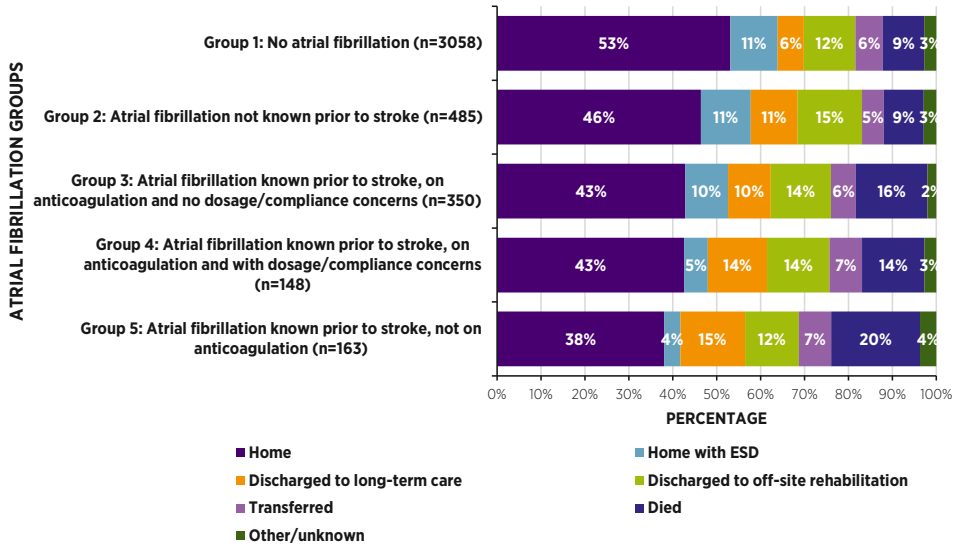


FIGURE 5.9: DISCHARGE DESTINATION OF THE FIVE ATRIAL FIBRILLATION GROUPS (n=4204)

SUMMARY

This spotlight audit provides useful additional information with regard to anticoagulation practices for patients with AF in Ireland and its impact on the incidence of stroke. The prevalence of AF in the population of patients with a stroke in 2022 was 28% (n=1420), unchanged from previous years (NOCA, 2023). The proportion of patients with known AF pre-stroke in 2022 was 18% (n=918), the same as that recorded in the UK SSNAP (18%) (King's College London, 2021/2022).

Overall, the treatment provided to patients with AF was relatively good. There appears to be little difference in current anticoagulation practice for males versus females, although this contrasts slightly from a published study from Scotland (Lee *et al*., 2023). While most patients were on the correct dose of anticoagulation medication on admission, about one-quarter of those prescribed anticoagulants were either on an inadequate dose, paused their medication or regularly forgot to take it. No data were available on anticoagulation status for almost 30% of patients. This would suggest the need to increase the emphasis on adherence and correct dosing for both patients and clinicians. While DOACs have the advantage of not requiring patients to attend clinics for monitoring as frequently, DOACs have a shorter duration of action than older oral anticoagulants like warfarin, and adverse effects from missed or forgotten doses may increase the risk of stroke. As such, clinicians conducting procedures on patients taking DOACs, may on occasion, be overly cautious in stopping medications for longer than the 2–3 days recommended to prevent haemorrhagic complications. The additional delay might not actually have any safety benefits, but could in fact increase the risk of stroke.

The rate of haemorrhagic stroke in patients with AF does not seem to have increased with the introduction of DOACs and the increased use of anticoagulation medication (Figure 5.1). This supports the finding of the *Irish National Audit of Stroke: A critical review of national stroke data for Ireland from 2013 to 2021* (NOCA, 2023) that there was no significant increase in the proportion of haemorrhagic strokes following the increased use of DOACs to treat AF.

What is worth noting is that the majority of strokes among those with known AF appear to have occurred in people who were, as far as we can determine, adequately anticoagulated. Treatment with anticoagulants is always a balance between reducing the risk of ischaemic stroke and increasing haemorrhagic risks. Anticoagulants may prevent about three-quarters of strokes associated with AF, but this still leaves a high number of breakthrough events, and this number is likely to increase with an ageing population and an increased prevalence of stroke.

Finally, there was a substantial proportion of patients with a stroke (n=485, 10%) with newly recognised AF. Screening for stroke in primary care and other contexts has previously been found effective in identifying AF, and HIQA's *Health technology assessment (HTA) of a national screening programme for atrial fibrillation in primary care* (2015) determined that opportunistic screening of people aged 65 years and over in Ireland was an effective use of resources. The INAS welcomes the inclusion of screening for AF within the Integrated Care Programme for Chronic Disease (ICPCD), although this is currently only available for those with Medical Cards. In any awareness campaign, emphasis should be given to both recognition of AF in at-risk groups and to the effective guideline-based treatment of it with regard to anticoagulation.

KEY FINDINGS

- The prevalence of known AF in patients admitted to hospital with a stroke in 2022 was 18% (n=918), with a substantial proportion of patients (n=485, 10%) being diagnosed with AF after their stroke.
- While the great majority of patients with AF who had been prescribed anticoagulants were on the correct dose of anticoagulation medication on admission, 23% of those prescribed anticoagulants were either on an inadequate dose, had paused their anticoagulation medication, or regularly forgot to take it.

SPOTLIGHT ON ATRIAL FIBRILLATION

WHAT IS ATRIAL FIBRILLATION?

Atrial fibrillation (AF) is a fast, irregular beating of the heart, affecting the flow of blood through the heart, making it more likely to clot. If a clot leaves the heart and travels to the brain, it can cause a stroke by blocking the flow of blood through the arteries in the brain.

AF is the most common arrhythmia seen in general practice and is associated with a five-fold increase in the risk of stroke. Strokes related to AF are more severe, with twice the death rate of non-AF-related strokes and greater levels of disability for those who do survive.

HOW IS AF DIAGNOSED?

A GP can check for AF by feeling the pulse for an irregular beat and further tests such as an electrocardiogram (ECG) will confirm the diagnosis.

HOW IS AF TREATED?

AF is treated with anticoagulation medications that prevent the formation of blood clots in the heart

STROKE ASSOCIATED WITH AF IN IRELAND IN 2022

One in three patients with a stroke admitted to hospital in 2022 had a diagnosis of AF.

Two thirds of those had a diagnosis of AF before having their stroke.

Eighty-four percent of those who had AF before the stroke were on anticoagulant medications: 77% were prescribed direct oral anticoagulants (DOACs) and 8% were prescribed warfarin.

79% of patients prescribed DOACs and 40% prescribed warfarin were prescribed the correct dose. For the majority of patients on DOACs who were not prescribed the correct dosage, the dose was too low.

Only 6% of patients' prescribed DOACs attended a hospital-based anticoagulation clinic or AF clinic.

23% of those prescribed anticoagulants were either on an inadequate dose, had paused their anticoagulation medication, or regularly forgot to take it.

RECOMMENDATIONS

Doctors should be provided with guidance as to the correct duration for pausing anticoagulation therapy for various procedures.

Patients should have access to ongoing education related to anticoagulation medication adherence.

Patients should have access to a hospital-based anticoagulation clinic or AF clinic.

6. QUALITY IMPROVEMENT

6. QUALITY IMPROVEMENT

The INAS is more than just a clinical audit. It is a powerful and valuable resource that can be used to support quality improvement (QI) work, assurance work, and research that enhances the care of patients with a stroke. Healthcare professionals with a special interest in stroke continue to develop QI initiatives for improving the quality of care given to patients with a stroke. This chapter presents information on three completed QI initiatives and lists some of the projects in progress.

UNIVERSITY HOSPITAL KERRY

Mary Donovan, Clinical Nurse Specialist (CNS) in Stroke at University Hospital Kerry (UHK) (Figure 6.1), led two QI projects in 2022. The first project was to ensure that data capture for different stroke-related audits could be streamlined through the creation of a CNS in stroke assessment form (Appendix 8). This form captures data required for local and national audit, but also highlights ongoing care needs for patients – such as secondary prevention education – as they transition from acute hospital care to home. The benefit of this form means that structuring data collection in real time allows for more time to focus on direct patient care.

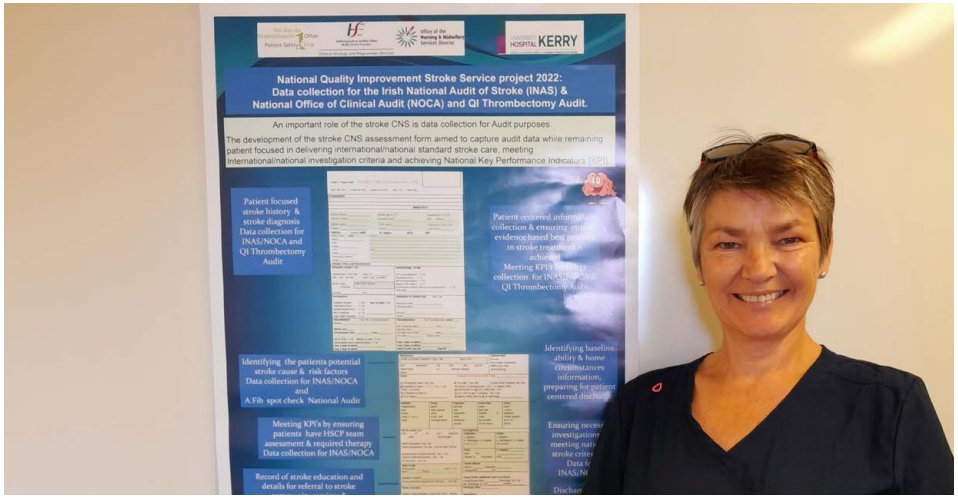


FIGURE 6.1: MARY DONOVAN, CLINICAL NURSE SPECIALIST IN STROKE, UNIVERSITY HOSPITAL KERRY

The second project, Blood Pressure and Hypertension Management in Acute Stroke: A Quality Improvement Initiative to enhance Stroke Management pathways (Appendix 9) developed by a subgroup of the stroke governance team in UHK (Figure 6.2), looked at reviewing the existing management of blood pressure (BP) and hypertension (HTN) guidance in UHK with a view to ensuring alignment with the European Stroke Organisation guidelines on blood pressure management in acute ischaemic stroke and intracerebral haemorrhage (2021). A multidisciplinary subgroup was established in order to review the existing guidance, and changes were made to the 'Time is Brain' document available locally to all clinical staff and approved by the UHK Drug Safety and Medical Governance Council. This document, which incorporated BP and HTN management in acute stroke, was launched hospital-wide in Q4 of 2022.

FIGURE 6.2: STARTING FROM THE LEFT: MARY DONOVAN, CLINICAL NURSE SPECIALIST IN STROKE; DR BARRY MOYNIHAN, STROKE CONSULTANT; AND DR MOHAMMED FADUL, STROKE REGISTRAR

CONNOLLY HOSPITAL

Lisa Donaghy, Advanced Nurse Practitioner in Stroke at Connolly Hospital, led a QI project to establish a pathway for patients with a patent foramen ovale (PFO) (Appendix 10). A PFO is a small hole between the upper right and left chambers (atria) of the heart which can let blood flow between the atria. PFO has been shown to be highly prevalent in patients diagnosed with strokes of unknown cause, and closing the PFO may prevent recurrent strokes in these patients (Kottoor and Arora, 2018). Before the establishment of the PFO pathway, closure of the PFO, from diagnosis to surgery, took 9 months. The PFO poster presents the process involved in establishing the PFO pathway, which included:

- developing a patient information leaflet
- developing a PFO referral pathway
- developing a PFO referral form
- establishing links with the cardiology team at Mater Misericordiae University Hospital.

After the establishment of the PFO pathway, the time from diagnosis of PFO to closure decreased from 9 months to 3 months. The PFO pathway has improved patient outcomes for young stroke survivors with a PFO and assists in reducing further stroke events in the future.

UNIVERSITY HOSPITAL LIMERICK

In 2022, the multidisciplinary team (MDT) in University Hospital Limerick completed a clinical audit on mood and delirium screening for patients with a stroke (Appendix 11). The audit aimed to improve mood screening and to establish a practice in delirium screening for patients with a stroke. The objectives were to establish the baseline rate of screening for mood and delirium on the stroke unit. The results showed that 57.5% of patients with a stroke were screened for mood and 67% were screened for delirium, with the number of screens increasing towards the end of the audit as awareness and training among hospital staff increased. The INAS records the proportion of patients who receive a mood screen, and in 2022, 38% of patients with a stroke across hospitals nationally received a mood screen. There is an opportunity to increase the rate of mood screening nationally by sharing what University Hospital Limerick has learned, and to begin to introduce delirium screening in all stroke units.

The MDT in University Hospital Limerick has a series of QI projects under way and will report back on the results of these in 2023. The ongoing QI projects are as follows:

- introduction of a visual management board to support therapeutic diets on the stroke unit
- creation of aphasia-friendly patient information leaflets on mood and anxiety
- improfement of MDT compliance with regard to mood and delirium screening.

CORK UNIVERSITY HOSPITAL

The stroke team at Cork University Hospital (CUH) (Figure 6.3) won SimStars 2023, a simulation scenario competition for the South/Southwest Hospital Group. The theme for SimStars 2023 was communication. The scenario developed by the members of the stroke team at CUH involved a capacity assessment completed by healthcare professionals who have a patient with severe mixed aphasia post-stroke. The assessment was decision and time specific, in line with the Assisted Decision-Making (Capacity) Act 2015, and can be applied to a multitude of clinical scenarios: for example, where consent is required for decisions regarding patient care.

FIGURE 6.3: Starting from the left: Dr Elizabeth Gannon (Stroke Registrar), Dr Marcia Ward (Clinical Neuropsychologist), Dr Patrick Barry (Stroke Consultant Physician), Ines Saramago (Clinical Nurse Specialist – Stroke/Thrombectomy), and Anne Barrett (Speech and Language Clinical Specialist)

7. AUDIT UPDATE

7: AUDIT UPDATE

UPDATE ON RECOMMENDATIONS

Table 7.1 displays an update on recommendations from the *Irish National Audit of Stroke: A critical review of national stroke data for Ireland from 2013 to 2021* (NOCA, 2023) and the *Irish National Audit of Stroke National Report 2020* (NOCA, 2022).

TABLE 7.1: UPDATE ON RECOMMENDATIONS FROM THE IRISH NATIONAL AUDIT OF STROKE

RECOMMENDATIONS FOR THE NOCA	STATUS	UPDATE
Complete a study in order to explore the factors contributing to stroke in patients prescribed anticoagulation therapy (NOCA, 2022a).	Completed	**An additional six questions related to treatment of AF prior to stroke were added to the INAS dataset in November 2021. Information and training were offered to all stroke teams to support the collection of accurate data from 1 January 2022 to 31 December 2022. Results are discussed in the Spotlight on Atrial Fibrillation section in this report.**
Increase the participation of health and social care professionals (HSCPs) in the HSCP dataset within the INAS (NOCA, 2022a).	In progress	**Action on this recommendation is an ongoing work in progress.** **As of 2022, there is an occupational therapist and a speech and language therapist representing each of their professional bodies to support the INAS HSCP representative. These representatives continue to champion the implementation of the HSCP dataset in all hospitals participating in the INAS. The number of hospitals submitting data to the HSCP dataset was unchanged in 2022 compared with previous years, but the total number of cases submitted increased from 3,092 in 2021 to 3,256 in 2022. HSCP data are embedded in this report, and coverage by hospital is included in order to encourage increased participation.**
The INAS should conduct a spotlight audit on thrombolysis in order to understand the reasons for low thrombolysis rates (NOCA, 2023).	In progress	**An additional three questions have been added to the INAS dataset, and data collection commenced on 1 July 2023 and will continue until 31 December 2023. Analysis of the data will be presented in the next INAS annual report.**
NOCA should engage with the Healthcare Pricing Office (HPO) to assess how access to the individual health identifier (IHI) as part of the Hospital In-Patient Enquiry (HIPE) case/stroke audit portal could assist in tracking patients with stroke as they access care in different hospitals (NOCA, 2023).	In progress	**NOCA is engaging with the HPO, the Health Service Executive (HSE) Health Identifiers Programme, and the Department of Health in order to gain permission for NOCA to use the IHI.**
Develop a best practice tariff for acute stroke care (NOCA, 2023).	In progress	**The National Clinical Programme (NCP) for Stroke is currently engaged in a consultation process with its Clinical Advisory Group on potential items for inclusion in a best practice tariff. It is hoped that this process will be completed by the end of 2023. NOCA will work with the NCP for Stroke and the HPO to develop the methodology for a best practice tariff for all participating hospitals.**

TABLE 7.1: UPDATE ON RECOMMENDATIONS FROM THE IRISH NATIONAL AUDIT OF STROKE *CONTINUED*

RECOMMENDATIONS FOR THE NCP FOR STROKE	STATUS	UPDATE
Develop a stroke awareness campaign (NOCA, 2022a).	Completed	**With the support of the Department of Health, as well as the HSE and its NCP for Stroke, the Irish Heart Foundation (IHF) delivered its Act F.A.S.T. (face, arm, speech, time) campaign on radio and social media in 2021.** **The campaign was jointly funded by the Government of Ireland and the IHF. The NCP for Stroke, in collaboration with the HSE Communications Division and the IHF, secured further funding from the Department of Health in 2023 to develop a sustained 3-year campaign.**
Pilot a large vessel occlusion ambulance bypass for patients with a large vessel occlusion to the endovascular thrombectomy (EVT) stroke centres in Dublin and Cork (NOCA, 2022a).	On hold	**There are currently three hospitals participating in the PITSTOP (Protocol for Improving Times for Stroke patients requiring Onward transfer from Primary stroke centre to thrombectomy centre) Protocol pilot. Results from this pilot may help to inform the need for a large vessel occlusion ambulance bypass.**
Improve the level of swallow screening for patients with a stroke (NOCA, 2022a).	In progress	**A national QI project has commenced, and is being led by the HSCP and Nursing Leads of the NCP for Stroke. An expert advisory group has been established to support and advise the QI project team. The initial phase of the QI project (2023) is aiming to improve the overall level of swallow screening for patients with a stroke (INAS key quality indicator (KQI) 6) to 100% in four pilot hospital sites: Regional Hospital Mullingar; Sligo University Hospital; St Luke's General Hospital, Carlow/Kilkenny; and Mater Misericordiae University Hospital. Learnings from this phase will then be implemented at a national level in 2024.**
All stroke services should have access to a clinical neuropsychologist/psychologist as part of a specialist multidisciplinary team providing care to patients with a stroke (NOCA, 2022a).	In progress	**Action on this recommendation remains in progress. The *Irish National Audit of Stroke Organisational Audit Report 2021* (NOCA, 2022b) found that only five hospitals have access to a clinical psychologist as part of stroke unit care. The NCP for Stroke has prioritised the funding of five clinical psychology posts for 2023 (only two were funded by the Department of Health for 2023) with a view to further developing services over the next 5 years as per *National Stroke Strategy 2022-2027* recommendations.**
The number of stroke unit beds should be increased so that at least 90% of patients with a stroke are cared for in a stroke unit (NOCA, 2023).	In progress	**The NCP for Stroke is currently engaged in a schedule of site visits at acute stroke centres across the country. This involves meetings with each hospital's director of stroke services and executive management in order to review key quality indicators, the local requirements for increased stroke bed designation, and a timeline for implementation.**
Increase the number of Early Supported Discharge (ESD) teams (NOCA, 2023).	In progress	**The NCP for Stroke has completed phase one under the *National Stroke Strategy 2022-2027* (HSE, 2023b) to increase the number of fully commissioned ESD teams to 10. The NCP for Stroke is currently seeking budgetary approval for phase two of the roll-out of ESD teams in the 2024 health estimates process.**

AUDIT DEVELOPMENT

In the 2013–2021 INAS report (NOCA, 2023), there was a recommendation to develop a spotlight audit in order to capture additional data on the rationale behind patients with ischaemic stroke not receiving thrombolysis. A dataset was developed and piloted in two hospitals in 2023 and data collection in all hospitals commenced in July 2023; the findings will be presented in the 2023 INAS annual report.

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8. RECOMMENDATIONS

8. RECOMMENDATIONS

RECOMMENDATION 1

All hospitals should be resourced to participate fully in the Irish National Audit of Stroke (INAS).

Rationale		
Auditing acute stroke care is essential in order to identify shortfalls in quality of care and to guide improvements in care. Three hospitals were excluded from INAS reporting in 2022, as less than 80% of cases were submitted to the stroke audit portal. As a result, data on 10% (n=599) of patients with a stroke were unavailable for analysis. In all three of these hospitals, the reason for this was the absence of a clinical nurse specialist in stroke, who, in most cases, is the person responsible for data collection. Participation in HSCP data collection is also resource dependent. As not all disciplines in all hospitals are participating in the HSCP dataset, the results are presented in aggregate. In 2022, data were available from one or more disciplines in 18 out of the 24 hospitals participating in the INAS. Overall, 47% (n=1943) of patients who were reported to have been assessed by a physiotherapist had additional physiotherapy data submitted, 41% (n=1637) of patients who were reported to have been assessed by an occupational therapist had additional occupational therapy data submitted and 46% (n=1426) of patients who were reported to have been assessed by a speech and language therapist had additional speech and language therapy data submitted.		
What actions should be taken	**Who is responsible for implementation?**	**When should this be implemented?**
Hospital management should ensure that there is dedicated audit resourcing available.	HSE Acute Operations	As soon as possible
Stroke teams should have sufficient time to focus on data submission and validation. Contingency planning should be in place in order to cover for staff absence/sick leave, and training should be provided if necessary.	Stroke teams and hospital managers in all participating hospitals	As soon as possible
NOCA should continue to highlight the impact of deficits in resourcing at a national level.	NOCA	Ongoing
Evidence that the action will be effective		
Clinical audit is an essential aspect of modern healthcare and is important to all healthcare professionals. Health service providers are responsible for ensuring and demonstrating that the quality of care provided is compared against known standards of best practice (HSE, 2019). This can be achieved through the establishment, maintenance and resourcing of appropriate national clinical audits. The Health Information and Quality Authority (HIQA) includes clinical audit as a national standard for safer, better healthcare (HIQA, 2012).		
Who will benefit from this recommendation?		
Hospital managers and stroke teams will benefit from having accurate data and the ability to review how well they are performing against clinical guidelines for stroke through the INAS quarterly dashboard, the INAS National Reporting Table 2022 and the INAS annual report. The general public will benefit by having access to publicly available information on the performance of all hospitals providing acute stroke care.		

RECOMMENDATION 2

The number of stroke unit beds should be increased so that at least 90% of patients with a stroke are cared for in a stroke unit.

Rationale

There are two national key performance indicators (KPIs) reported annually in the HSE National Service Plan (HSE, 2023a) related to stroke unit care:

- Ninety percent of patients with a stroke should be admitted to a stroke unit.
- Ninety percent of patients with a stroke should spend at least 90% of their hospital stay in a stroke unit.

These targets are consistently not achieved (NOCA, 2023), and again in 2022, only 69% of patients were admitted to a stroke unit; among those patients who were admitted to a stroke unit, 68% of their total hospital stay was spent in the stroke unit. There is variation between hospitals in relation to the proportion of patients admitted to a stroke unit (from a high of 89% to a low of 27%), and in the proportion of the hospital stay spent in the stroke unit (from 97% to 30%). The main reasons for patients not being admitted to a stroke unit were because there were no available beds (43%; n=657); due to infection control measures (13%; n=208); and, in the 36% (n=551) of cases for which free text was available, this indicated that patients were not admitted to a stroke unit because they either had symptoms that were too mild (e.g. no rehabilitation was needed) or that were too severe (e.g. they required intensive care/palliative care).

What actions should be taken	Who is responsible for implementation?	When should this be implemented?
Hospital managers and stroke governance committees, in conjunction with the NCP for Stroke, should evaluate the stroke unit bed requirements in their hospital and reorganise the allocation of beds in order to ensure that the national KPIs are met. Allocation of hospital beds should ensure that each unit has access to single-room occupancy in order to provide care for patients who require infection control measures or palliative care	NCP for Stroke Stroke teams and hospital managers in all participating hospitals	As soon as possible
Admission and discharge to and from stroke unit beds should be directed by the stroke clinical team. Stroke unit beds should be protected like coronary care unit and intensive care unit beds.	Chief executive officers (CEOs) and hospital managers	
There should be full implementation of the agreed *National Stroke Strategy 2022-2027* (HSE, 2023b) in order to ensure that all patients have access to stroke unit care.	HSE Acute Operations	

Evidence that the action will be effective

Stroke units reduce death and disability through the provision of specialist multidisciplinary care for diagnosis, emergency treatments, normalisation of homeostasis, prevention of complications, rehabilitation, and secondary prevention (Rodgers and Price, 2017). The establishment of stroke units is key to the implementation of the *Stroke Clinical Care Programme: Model of Care* (HSE, 2012) and the *National Stroke Strategy 2022-2027* (HSE, 2023b), and admission to a stroke unit has been a national KPI since the publication of the *Stroke Clinical Care Programme: Model of Care* in 2012. The European Stroke Organisation's guidelines on the accreditation of stroke units (Waje-Andreassen *et al*., 2018) recommend that admission and discharge to and from stroke units should be directed by the stroke clinical team, similar to the management of coronary care units and intensive care units.

Who will benefit from this recommendation?

All patients with a stroke will benefit from admission to a stroke unit, and all members of the multidisciplinary team caring for patients with a stroke will benefit through the increased expertise developed through all members working together in one geographically located unit.

RECOMMENDATION 3

Opportunistic screening for atrial fibrillation (AF) should be carried out for all people aged 65 years and over.

Rationale
AF is the most common serious cardiac arrhythmia seen in general practice and is associated with a five-fold increase in the risk of stroke (HIQA, 2015). In 2022, 28% (n=1420) of all patients with a stroke had AF, and of those, 34% (n=485) received the diagnosis of AF after their stroke. Out of those who had AF, 89% (n=1025) were aged over 65 years. As discussed in Chapter 5 of this report, strokes related to AF are more severe, with only 44% (n=500) of those with AF discharged home directly compared with 53% (n=1623) of those without AF. In addition, mortality was higher in those with AF, at 14% (n=155), compared with 9% (n=288) among those without AF. The HSE Chronic Disease Management Programme includes identification and treatment of AF, but this is only accessible for those aged over 18 years and who have a Medical Card or general practitioner (GP) Visit Card. Given that 34% (n=485) of patients with a stroke and AF were only diagnosed with AF after the stroke, this would suggest that there is a proportion of people aged over 65 years who do not have a Medical Card or GP Visit Card and who may not have access to opportunistic screening.

What actions should be taken	Who is responsible for implementation?	When should this be implemented?
Opportunistic screening for AF should be carried out in primary care for all people aged 65 years and over using pulse-checking or portable electrocardiogram devices.	NCP for Stroke	As soon as possible
The findings from this report should be disseminated widely in order to increase awareness of AF and maximise opportunities for patients and clinicians to identify AF in those aged 65 years and over.	NOCA	
These data should be further analysed in order to determine differences between populations who were anticoagulated or not anticoagulated and to identify vulnerable groups.	NOCA	

Evidence that the action will be effective
The HIQA (2015) *Health technology assessment (HTA) of a national screening programme for atrial fibrillation in primary care* found that a national screening programme for AF for people aged 65 years and over in primary care would likely be cost-effective in Ireland.

Who will benefit from this recommendation?
Patients will benefit from earlier detection and treatment of AF, thus lowering their risk of stroke.

RECOMMENDATION 4

Clinicians and patients should be provided with guidance as to the importance of good adherence to anticoagulation therapy in order to avoid strokes.

Rationale		
This report found that while the vast majority of patients who were on anticoagulation medication were on the correct dose on admission to hospital, 23% of those prescribed anticoagulants were either on an inadequate dose, had paused their anticoagulation medication, or regularly forgot to take it. In addition, out of all patients who were on direct oral anticoagulants (DOACs) prior to stroke (n=597), only 6% (n=35) attended a hospital-based anticoagulation clinic or AF clinic; this proportion was 33% (n=21) among those on warfarin.		
What actions should be taken	**Who is responsible for implementation?**	**When should this be implemented?**
Clinicians should be provided with guidance as to the correct duration for pausing anticoagulation therapy for various procedures.	NCP for Stroke	As soon as possible
Patients should have access to ongoing education related to anticoagulation medication adherence.		
Patients should have access to a hospital-based anticoagulation clinic or AF clinic.		
Evidence that the action will be effective		
AF is treated with anticoagulation medication that prevents the formation of blood clots in the heart, thus preventing stroke. Good anticoagulation medication adherence ensures medication safety and the effective prevention of stroke (Chen *et al*., 2019).		
Who will benefit from this recommendation?		
People with AF, who should have a decreased incidence of stroke following good adherence to anticoagulation medication.		

RECOMMENDATION 5

All hospitals should review their own performance against the national standards and identify quality improvement opportunities in order to improve the quality of care they are providing.

Rationale
The findings from this report have indicated that while there has been some improvement in the national KQI results, there is wide variation between hospitals in all areas of performance (e.g. variation between hospitals in relation to the proportion of patients admitted to a stroke unit, from a high of 89% to a low of 27%). This report has presented this variation and has identified opportunities for QI initiatives. Each hospital should review its own results using both the INAS annual report and the quarterly dashboards to identify its own specific areas for improvement. The 2023 edition of the *National Clinical Guideline for Stroke for the United Kingdom and Ireland* was published in 2023 (Intercollegiate Stroke Working Party, 2023). This guideline has expanded on some key areas in acute stroke care, including acute interventions, secondary prevention and intensive rehabilitation. This guideline can assist teams in developing QI projects in order to improve stroke care.

What actions should be taken	Who is responsible for implementation?	When should this be implemented?
Each stroke governance committee should discuss QI initiatives as part of meeting agendas.	Stroke governance committees	Ongoing
Each stroke team should monitor the quarterly results from the INAS dashboard and the annual reports and identify QI initiatives that the team could undertake. All stroke teams should be trained in QI methodology and utilise this methodology for QI projects.	Stroke teams and hospital managers in all participating hospitals	
The NCP for Stroke should be made aware of the results of QI projects with a view to endorsing new practices based on project findings.	NCP for Stroke	

Evidence that the action will be effective
Clinical audit is a clinically led QI process that seeks to improve patient care and outcomes through the systematic review of care against explicit criteria and by acting to improve care when standards are not met. The process involves the selection of aspects of the structure, processes and outcomes of care, which are then systematically evaluated against explicit criteria. If required, improvements should be implemented at an individual, team or organisational level, and then the care re-evaluated in order to confirm improvements (Department of Health, 2008). Local clinical audit is a valuable and routine source of information for healthcare professionals and management to better understand the standards of care they are providing to their patient groups (HSE, 2019).

Who will benefit from this recommendation?
All stroke teams will benefit through participation in QI projects. The results of QI projects could promote change through shared learning and endorsement at national level.

9. CONCLUSION

9. CONCLUSION

The *Irish National Audit of Stroke National Report 2022* continues to record the evolution of acute stroke services and stroke care across the Irish health service. The number of strokes continues to increase year on year, a feature of our ageing population and also perhaps of an increase in both the diversity of our population as well as in the number of people with complex health needs. We identified several positive trends in stroke care. Time to hospital admission has decreased, and the speed of assessment post-arrival has improved. However, the fact that the rate of the most common acute intervention, intravenous thrombolysis, continues to be below expected levels remains a concern. There are a number of potential reasons for this, including the increased use of anticoagulants in the community identified in this report. The INAS Governance Committee has determined that a spotlight audit of why patients are not being thrombolysed, despite potentially lengthening treatment windows permitted by the availability of advanced imaging, should be conducted. This audit is under way, and the results will be published in the 2023 INAS annual report.

It is also encouraging to see the significant increases in the proportion of patients with a stroke being screened for mood disorders (which may affect two-thirds of stroke survivors) and for swallowing difficulties and dysphagia. However, while the increase in screening is welcome, the proportion of people who are not being screened remains high, and rates of screening within 4 hours of hospital admission remain low. We look forward to the results of the NCP for Stroke's QI initiative aiming to increase the availability of swallow screening in all hospitals. We need to continue to monitor these data. The continued failure to admit a large proportion of people with a stroke to a stroke unit is a concern, and we recommend that the *National Stroke Strategy 2022-2027* and its recommendations for increasing resources and clinical facilities for stroke be fully implemented. In an environment where the number of strokes continues to increase due to demographic trends, the health service must likewise continue to increase the number of stroke unit beds in order to avoid a deterioration in the admission to a stroke unit national KPI.

Finally, the number of hospitals meeting criteria for entry in this 2022 audit has declined, largely due to the unavailability of key data collection staff. Clinical audit is a key means of maintaining quality and safety of services across the health system. These data are typically collected by clinical nurse specialists in stroke, and the absence of these important staff members can potentially lead not only to a lack of data but also to a deterioration in the quality of service and care provided to patients with a stroke. This report, like other NOCA reports, strongly recommends and advocates for the prioritisation of the collection of these data, even when the person who ordinarily does it is not available. Presentation of data for QI is the responsibility of the hospital as a whole, and not of any single individual.

"In an environment where the number of strokes continues to increase due to demographic trends, the health service must likewise continue to increase the number of stroke unit beds in order to avoid a deterioration in the admission to a stroke unit national KPI."

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APPENDIX 1	IRISH NATIONAL AUDIT OF STROKE: METHODOLOGY 2022	CLICK HERE
APPENDIX 2	IRISH NATIONAL AUDIT OF STROKE: DATASET	CLICK HERE
APPENDIX 3	IRISH NATIONAL AUDIT OF STROKE: GOVERNANCE COMMITTEE	CLICK HERE
APPENDIX 4	IRISH NATIONAL AUDIT OF STROKE: AIMS AND OBJECTIVES	CLICK HERE
APPENDIX 5	IRISH NATIONAL AUDIT OF STROKE: METADATA FOR COMPOSITE VARIABLES	CLICK HERE
APPENDIX 6	IRISH NATIONAL AUDIT OF STROKE: ASSESSMENT OF DATA QUALITY 2022	CLICK HERE
APPENDIX 7	ATRIAL FIBRILLATION GROUPS SPECIFICATIONS	CLICK HERE
APPENDIX 8	QI PROJECT: CNS ASSESSMENT FORM	CLICK HERE
APPENDIX 9	QI PROJECT: BLOOD PRESSURE MANAGEMENT IN ACUTE STROKE	CLICK HERE
APPENDIX 10	QI PROJECT: PATENT FORAMEN OVALE PATHWAY FOR ACUTE STROKE	CLICK HERE
APPENDIX 11	CLINICAL AUDIT: MOOD AND DELERIUM SCREENING	CLICK HERE
APPENDIX 12	FREQUENCY TABLES	CLICK HERE

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