

IRISH HEART FOUNDATION/HSE  
NATIONAL STROKE AUDIT 2015



**December 2015**



**IRISH HEART  
FOUNDATION**



Feidhmeannacht na Seirbhíse Sláinte  
Health Service Executive



**Trinity  
College  
Dublin**

The University of Dublin



**ROYAL  
COLLEGE OF  
PHYSICIANS  
OF IRELAND**



## Report preparation

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## **ABBREVIATIONS**

ADL – Activities of daily living  
AMAU – Acute medical admission unit  
ANP – Advanced Nurse Practitioner  
ASU – Acute Stroke Unit  
BASP – British Association of Stroke Physicians  
CEO – Chief Executive Officer  
CNS – Clinical Nurse Specialist  
CT – Computerised tomography  
ED – Emergency department  
ESD – Early supported discharge  
ESO – European Stroke Organisation  
ESRI – Economic and Social Research Institute  
EWTD – European working time directive  
FAST – Face, Arm, Speech, Time  
GP – General Practitioner  
HIPE – Hospital In-patient Enquiry  
HSCP – Health and Social Care Professionals  
HSE – Health Service Executive  
IHF – Irish Heart Foundation  
INASC – Irish National Audit of Stroke Care  
ISO – International Organisation for Standardisation  
MDT – Multidisciplinary Team  
MRI – Magnetic resonance imaging  
NCHD – Non-consultant hospital doctor  
NSP – National Stroke Programme  
PC – Personal Computer  
RCP – Royal College of Physicians  
SNP – Stroke Network Partnership  
SSNAP – Sentinel Stroke National Audit Programme  
TIA – Transient ischaemic attack  
WTE – Whole time equivalent

## FOREWORD

The report of first Irish National Audit of Stroke Care published in 2008 made sobering reading. The care offered to Irish people suffering stroke summarised in that document could at best be described as sub-optimal and in many parameters assessed, care was clearly grossly inadequate leading to increased morbidity, mortality and reduced quality of life in Irish stroke survivors. The audit results laid a challenge to the Irish Health system addressed by the inclusion of stroke care in the HSE's 2009 document, 'Changing Cardiovascular Health: National Cardiovascular Health Policy 2010-2019' and by the launch of the National Clinical Programme for Stroke in 2010. That these initiatives were launched at almost the exact moment that the country entered the worse economic crisis in its history is a matter of historical note and consequently left the task of improving care much more challenging. Whilst the Health service was subject to an employment embargo and health expenditure contracted by more than 10%, the stroke programme was given a small resource and allowed to reappoint to a limited number of vacant posts on the condition that they be used to improve stroke care. Apart from these limited resources our only option was to harness the good will of health service staff, often asking them to change work practices and undertake new responsibilities without being able to offer any recompense or reward. Beyond this we undertook a programme of training, education, organisation and reorganisation of services. In this process the only resource available in abundance was the hard work and enthusiasm of our colleagues in the health service across the country.

This second audit shows encouraging improvement in many areas of stroke care. Inpatient mortality has reduced by more than one quarter, discharge direct to nursing home has reduced by one third and this has been matched with an increase in patients discharged home. Thrombolysis rate has increased more than tenfold.

Whilst these improvements are encouraging they cannot take away from persistent substantial deficits in services. The study shows that less than one third of patients are admitted to a stroke unit on presentation to the hospital and only about a half are admitted to a unit at any time during their stay. Treatment in a stroke unit is the most basic standard in the care of stroke patients and substantially improves chances of independent recovery following stroke. There is a large deficit in the availability of rehabilitative therapies to stroke patients with few patients receiving the level of any therapy recommended in national and international guidelines. Nursing levels are low and this may be reflected in the relatively high rates of urinary catheterisation and post stroke infection in our cohort.

Although at least half of people with stroke suffer anxiety, depression or severe psychological distress, access to psychology is available in only two centres. Early Supported Discharge teams are currently available in only three areas of the country despite copious evidence of their effectiveness in reducing length of stay, disability and need for long-term care. These continued deficits in care undoubtedly contribute to the continued long length of stay in hospital amongst stroke patients in Ireland. Whilst median length of stay has reduced by more than one fifth since the first audit, it still remains nearly 50% longer than in our nearest neighbor, the United Kingdom.

Although improvements in stroke care since the last audit have been associated with very substantial reduction in expenditure on long term and supportive care and in the number of hospital bed days occupied, there has been little additional investment in stroke care since the start of the programme. To maintain the improvements achieved, and to progress care of our fellow citizens suffering stroke to a level commensurate with a modern Western country further investment in stroke services is undoubtedly necessary. This additional need for resource is increased by recent developments in the acute management of patients with acute stroke such as thrombectomy. This intervention which Irish stroke services Ireland have been in the forefront of development, brings the possibility of reducing the mortality and morbidity in some patients with severe strokes by 50%. Offering this complex intervention widely to the Irish people will need a considerable additional investment in new centres and new staff in the next few years. We have however, shown in the last few years that such well targeted investment can reap rewards of a magnitude many times that of the resource committed and that further investment will likewise prove beneficial to the health service and Irish people suffering stroke in the future.

**Prof. Joseph Harbison**  
**National Clinical Lead for Stroke**  
**Trinity College Dublin & St. James's Hospital**

**5th December 2015**





## MESSAGE FROM THE IRISH HEART FOUNDATION

My predecessor as Medical Director of the Irish Heart Foundation, the late Dr Brian Maurer, wrote in his foreword for the original Irish National Audit of Stroke Care (INASC) in 2007 that “stroke services in Ireland are so poorly organised that they are largely ineffective”.

Back then, the audit found that only one hospital in the State had a stroke unit; 1% of patients received clot-busting thrombolysis treatment; acute rehabilitation was available to just one in four patients; and continuing care and long-term recovery programmes were haphazardly organised or didn't exist. The effect of this bleak combination of service deficits was a high toll of preventable death and disability from stroke.

The results of the *Irish Heart Foundation/HSE National Stroke Audit 2015* reveal that huge progress has been made in the last eight years from that desperately low base. Today, 21 hospitals have stroke units; the thrombolysis rate of 11% compares well internationally; and therapy is now available, albeit to fluctuating levels, across all sites. The human impact of these improvements is demonstrated by the reduction in in-hospital mortality from 19% of patients to 14% and the fact that only 8% of patients were newly admitted to nursing homes compared to 15% in 2007.

None of this could have been achieved without the skill and leadership provided by the National Stroke Programme in developing nationwide services essentially from scratch, along with the quite extraordinary dedication and commitment of stroke care professionals around the country. Whilst much of the service development has been a product of the reorganisation of existing resources, the role of the Department of Health and the HSE in allocating dedicated resources to stroke services for the first time ever in the midst of Ireland's extreme economic difficulties and massive reduction in the healthcare budget must also be acknowledged.

However, to overstate the progress made would represent a disservice to people who have already been affected by stroke and who will be struck by the disease in the future. We remain a long way from the objective of eliminating preventable death and disability from stroke, as evidenced by many continuing and severe service deficits.

The audit shows that just 29% of patients are admitted directly to a stroke unit, whilst almost half do not receive treatment in a unit at any point during their stay. Nearly a quarter of hospitals providing acute stroke care do not meet the minimum requirements required for a stroke unit.

In addition, there are staffing deficits in stroke services of 50.2% for physiotherapists, 61.2% for occupational therapists and 30.9% for Speech and Language Therapists. In addition, only 44% of hospitals had any access to a medical social worker and 19% had access to a neuropsychologist. Just one out of 27 hospitals treating stroke had access to a specialist community stroke team for continuing long-term management of patient and only 11% had a hospital/community stroke liaison worker as part of their services. Three sites had none of the required infrastructure in place for a stroke unit.

These statistics compare deficits, not against what would be considered optimal services, but to *minimum* levels of service required to meet international standards for stroke services. They demonstrate yet again that whilst better services mean more people are surviving their stroke and returning home than ever before, there is still little emphasis on helping survivors to maximise their recovery.

However, if therapy levels are inadequate in hospital, we know they are significantly worse in the community. And whilst community stroke services are beyond the remit of this audit, the near-total absence of community stroke teams and hospital/community liaison it highlights is fuelling a very strong sense among survivors of being saved and then abandoned by the health system at the hospital gates.

A particular omission has been the failure to extend Early Supported Discharge (ESD) services for stroke survivors in the face of compelling evidence of their human and net economic benefit. The survey concludes that the paucity of current coverage nationally by ESD teams likely contributes to lower discharge home rates currently in Ireland than in other countries.

In conclusion, the audit results indicate that stroke services in Ireland are at a crossroads. More has been achieved with current resource levels than anyone could have thought possible when the National Stroke Programme was established. Further improvements in outcomes will require a new commitment to investing in services, not least as stroke incidence rises in line with our ageing population. The futures of very many patients hinge on a higher priority being given to them by policymakers.

On behalf of the Irish Heart Foundation, I would like to thank everyone who participated in the design and collection of data for this audit and everyone on the frontline of stroke care whose daily dedication continues to save the lives and the quality of life of so many people.

**Dr Angie Brown**  
**Medical Director of the Irish Heart Foundation**

**December 2015**



## EXECUTIVE SUMMARY

### Background

Stroke is a leading cause of death and disability worldwide. Over 7,000 people in Ireland are hospitalised following stroke each year. Improved outcomes for stroke patients' has been a policy priority for the HSE as evidenced by the implementation of the national stroke programme (NSP) since 2010.

The NSP identified the key aims of:

- National rapid access to best-quality stroke services
- Prevent 1 stroke every day
- Avoid death and dependence in 1 patient every day

These aims were targeted through the provision of funding, to develop infrastructure and specialist posts within the stroke service nationally, specifically the development of a national programme for thrombolysis therapy, the creation of designated stroke units on sites managing acute stroke patients and the recruitment of medical, nursing and health and social care professionals (HSCP) with specialist knowledge in stroke.

With the changes and progress that have been made in recent years, it was vital that the stroke service underwent a repeat clinical audit to establish the current situation. The Irish Heart Foundation/HSE National Stroke Audit 2015 is a national audit of acute stroke services in hospitals throughout Ireland. It is the second national audit report on stroke services in Ireland following on from the Irish National Audit of Stroke Care (INASC) in 2008.

### Methodology

The objective of the audit of acute stroke services was to establish the current level and functioning of services for the care of stroke patients in acute hospitals in the Republic of Ireland. The audit of acute hospital services had two components:

- i) An audit of the organisational aspects of stroke care in acute hospitals with regard to their resources for organised stroke care.
- ii) A clinical audit of stroke care involving the review of clinical case notes for a selected national sample of patients with stroke.

Twenty-seven sites participated in both the organisational and clinical audit, with each of the participating sites managing at least 20 new patients with stroke per annum.

The organisational audit involved the completion of a proforma detailing the structure of the stroke service on site in advance of a site visit by the audit team. The visit involved a structured interview with key stakeholders in each hospital clarifying any queries with regard service provision and afforded a review of stroke units where they existed. Results represent services in early 2015.

The clinical audit involved chart reviews from each of the participating sites. With each site providing a number of cases relative to the proportion of stroke admissions per annum. Members of the multidisciplinary team performed the chart reviews with the audit team providing training and support during the audit period. The cases were reflective of the care provided to patients discharged during January-March 2014 and July-September 2014. In total 874 cases were included in this audit, which gives a representative national sample of clinical care in stroke in Ireland.

The results were compared against the findings of INASC 2008 and also the Sentinel Stroke National Audit Programme (SSNAP) UK 2014. Comparison with the UK is informative, given the similar casemix and it can be acknowledged that the UK stroke service is more developed given its National Stroke Strategy has been in place since 2007.

## Key findings and recommendations

### Outcome measures

- The inpatient mortality rate of 14% compares favorably with the 19% rate found in INASC 2008
- Newly institutionalised patients to residential care was 8% in the 2015 audit compared with 15% in INASC 2008
- The average length of stay for patients discharged alive from hospital is 22.4 days versus 29.8 days in 2008

Patients who suffer a stroke in Ireland now have a better chance of surviving and with less disability, and in tandem the health service has made significant cost savings in terms of saved beds days, people returning to work, and reduced costs of residential care. These savings should be reinvested in stroke services in Ireland.

### Thrombolysis

- The development of a national strategy for thrombolysis delivery has seen an improvement in prehospital care, with the adoption of the FAST assessment tool as standard and the all 27 sites had specific arrangements in place for the rapid transfer of acute stroke patients to hospital.
- The estimated national thrombolysis rate of 11% is comparable favorably with international rates and is a clear improvement given that thrombolysis provision was virtually nonexistent in INASC 2008.
- The provision of thrombolysis care has involved many physicians working onerous on-call rotas in order to offer the best treatment for patients.

Improving thrombolysis rates should be central to the aims of stroke services nationally. Renewed funding of the Irish Heart Foundation Act FAST campaign will further raise awareness of stroke symptoms in the general population so that pre-hospital care has the opportunity to transfer patients to centres which provide this treatment.

In view of the mounting evidence supporting endovascular intervention in stroke it is imperative that nationally hyperacute stroke services have the staff and infrastructure to offer patients the best treatment possible in an equitable and consistent way.

### Imaging and diagnostics

- Access to CT is available 24/7 in all hospitals managing patients with acute stroke
- The quality of CT scanners varies nationally with implications for the provision of assessment for endovascular intervention (clot retrieval).
- Availability to MRI has not improved substantially since INASC 2008. With increased specialist knowledge and demand for diagnostics, it is concerning that some hospitals have very limited access for stroke patients.
- Delays in access to appropriate diagnostics including neuroimaging and cardiac monitoring has led to many hospitals adopting an admit and assess policy

Access to CT imaging has improved. However with increased specialists and developments in stroke care, including endovascular intervention, access to high quality modern scanners is important to offer patients the most appropriate assessment of their stroke. A review of the capabilities of all CT scanners nationally would be beneficial.

Rapid assessment of TIA and potential stroke is a fundamental part of any stroke service. Each site, appropriately resourced, should adopt a system that allows patients to be seen promptly and access diagnostics in timely manner as dictated by numbers of patients requiring the service.

### Stroke units

- Stroke units were available in 78% (21/27) of sites. This represents good progress from the single unit available in INASC 2008, but still shows inequity in access to best care as patients in six hospitals have no access to stroke unit care.
- The number of stroke unit beds available nationally at the time of the audit was 150. However 61% of inpatients with a stroke at the time of the audit were being managed on a ward other than a stroke unit.
- For hospitals with stroke units in place only 29% of patients were admitted directly to a stroke unit on admission, and even taking into account admissions to higher dependency beds, this only rises to 40% of patients accessing stroke unit care in the important early phase of their care.
- Inconsistency exists in availability of features recommended in each stroke unit. Most notable inconsistencies included access to continuous physiological monitoring and in nurse training in stroke assessment specifically swallow screening. This is manifest where only 36% of patients had swallow screening performed in the first 24 hours as opposed to over 80% in the SSNAP UK audit.

A stroke unit is the central hub from which the organisation of a stroke service can be coordinated. The provision of stroke unit care is supported by the evidence, reducing morbidity and mortality. Therefore all sites managing acute patients should provide stroke unit care, and all sites should develop their stroke units to provide the highest quality of care possible, including ensuring stroke units are appropriately staffed, equipped, and provide ongoing education and training for staff and patient/carers alike.

## Staffing

- Increased numbers of multidisciplinary team specialists in stroke care was notable. A consultant physician with specialist knowledge of stroke was available in 85% (23/27) of sites versus only one third of hospitals in INASC 2008. Patients had access to a clinical nurse specialist (CNS) in stroke in 85% (23/27) of sites with two advanced nurse practitioners in stroke in the country, as compared with only 5 CNS nationally in INASC 2008.
- Clear staffing whole time equivalent deficits as per guidelines was noted nationally for all members of the multidisciplinary team
- Only one health and social care professional (HSCP) clinical specialist post exists in the country.

Although recruitment of multidisciplinary team members through the NSP facilitated improvements in service provision, when compared against guidelines large shortfalls still exist in all disciplines nationally, none more apparent than psychology. Due to this shortfall, HSCPs are unable to provide recommended levels of therapy to patients, instead having to focus on assessments of new patients.

Stroke units for the most part do not have the required nursing staff to manage patients, even when compared with the most modest guideline targets. The role of the clinical nurse specialist should continue to evolve, with support for the development of more advanced nurse practitioners.

Doctors, both at consultant and NCHD grade, should be adequately supported to provide best patient care, service development, clinical training and research for the benefit of the stroke services.

In all disciplines increased numbers of staff is required in order to allow them to provide appropriate care to their patients.

## Early supported discharge

- A new service since INASC 2008, only three early supported discharge teams exist covering four acute hospitals
- Patients accessing these services in these hospitals ranged between 14-35% of cases reviewed. These are patients who would otherwise have been managed in the acute hospital setting or a rehabilitation facility for a longer period as opposed to being in their own home.
- The assessment of the organisation of rehabilitation and community services was outside of the remit of this audit. However it was clear substantial deficits exist.

Early supported discharge is an example of a service that is an evidence based, cost effective, patient-centered and that can help increase available bed days in the acute hospital setting. The expansion of this service should be supported nationally. Furthermore an audit should be performed to assess service levels in the community and to ensure more joined-up delivery of post-acute services.

## **Conclusion**

The findings of the National Stroke Audit 2015 provide as snapshot of the acute stroke service provided in Ireland. The audit's purpose was to assess current practice against both national and international guidelines. Through the process potential strengths and weaknesses have been identified. This provides vital information for planning and development both at local and national level.

A recommendation from INASC 2008 was the creation of a stroke register, which has been implemented with varying uptake. This essential tool can provide real time information on stroke care, thus facilitating clinical audit in a more accessible and reproducible manner. Data capture and review is an essential element of any clinical service to ensure patients are cared for in a manner consistent with the highest standards. The register should be supported and strengthened.

The assessment of the organisation of rehabilitation and community services was outside of the remit of this audit. However, as a way of laying the groundwork for further audit of both external rehabilitation and community services, the findings will inform the next phase of the audit. Data was gathered on where and to who patients are referred. This provided an indication of both the scale of community rehabilitation service deficits and the lack of connection between acute services and the community services that do exist. In order to develop more holistic services for stroke survivors, it is crucial that a further audit is carried out to assess service levels in the community and to ensure more joined-up delivery of post-acute services.

A clear strength observed from the process and findings of the audit is the dedication of frontline staff who provide care to patients every day in every part of the country. Their hard work to improve services for all patients was set against the backdrop of substantial cuts in healthcare budgets, reduced staffing, and a global recession. Many of the improvements seen were supported by stroke multidisciplinary team members going above and beyond their remit, innovating and collaborating, striving to provide the best care possible. It is essential that their endeavor is acknowledged through investment in staff, infrastructure and services.

Most importantly all patients admitted with an acute stroke, irrespective of age, should have access to the best treatment options, be managed in a stroke unit appropriately equipped and staffed by a trained multidisciplinary team. They should access essential diagnostic tests promptly. They should receive the necessary levels of therapy to facilitate their recovery and be central to the decision-making and goal setting process. The patient should be clearly informed of their diagnosis and the reason their stroke occurred, provided with education and support in their wishes relating to vocational and residential issues. Ultimately they should be respected and supported to return to independent living as quickly as is achievable.

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## **BACKGROUND**

### **Introduction**

Stroke is a leading cause of death and disability worldwide and it is estimated that cerebrovascular diseases account for up to five percent of total healthcare costs (Evers et al 2004, Rossnagel et al 2005). 7,000 people in Ireland are hospitalised following stroke each year, of whom approximately about 20% die as in-patients per year (ESRI 2014). Evidence based stroke care reduces death and disability cost effectively (Stroke Unit Trialists 2013), however, effective stroke care will only occur if the organisational structure allows and facilitates the delivery of the best treatments at the optimal time (RCP Guidelines). Improved outcomes for stroke patients' has been a policy priority for the HSE as evidenced by the implementation of the national stroke programme since 2010.

The Irish Heart Foundation/HSE National Stroke Audit 2015 is a national audit of acute stroke services in hospitals throughout Ireland. It is the second audit report on stroke services in Ireland following on from the Irish National Audit of Stroke Care (INASC) in 2008.

### **Acute stroke care services in Ireland**

There have been important changes in the organisation and delivery of healthcare in general within the HSE since 2008. In 2010 the National Stroke Programme (NSP) was developed with the key aims of:

- National rapid access to best-quality stroke services
- Prevent 1 stroke every day
- Avoid death and dependence in 1 patient every day

These aims were targeted through the provision of funding, to develop infrastructure and specialist posts within the stroke service nationally, specifically the development of a national programme for thrombolysis therapy, the creation of designated stroke units on sites managing acute stroke patients and the recruitment of medical, nursing and health and social care professionals (HSCP) with specialist knowledge in stroke. In 2011, €4.2m reconfigured funding, from the Acute Hospital Division budget, was provided to support the implementation of the programme objectives.

From the outset the NSP established baselines from which the implementation of the programme can be evaluated. A baseline Hospital Emergency Stroke Services Survey was carried out in 2010 along with a review of workforce. With the changes and progress that have been made in recent years, it was vital that the stroke service underwent a repeat clinical audit to establish the current situation.

The recent establishment of acute hospitals into a small number of groups (Table 2.1), each with its own planned governance and management structure, aims to provide an optimum configuration for hospital services to deliver high quality, safe patient care in a cost effective manner. This report uses the framework of the six hospital groups to present its findings.

### **Role of the Irish Heart Foundation**

The Irish Heart Foundation (IHF) has been working since 1966 to reduce premature death and disability from stroke and heart disease in Ireland. The IHF advocates for better stroke services and care in both hospitals and the community. The IHF developed the Stroke Council, an expert group that provides comprehensive advice and information to the IHF on issues surrounding stroke. The IHF also funded the first ever audit of stroke services in Ireland in 2008.

## **INASC 2008 – key findings**

INASC 2008 was wide ranging in its review of stroke services in Ireland, but some key findings were highlighted within the report. Stroke units were virtually nonexistent, with only one hospital having such a unit. Very few patients were accessing and benefiting from acute interventions such as thrombolysis. Acute rehabilitation was only available to one in four patients or was delayed beyond the point at which it is most effective. Continuing care and long-term recovery programmes were haphazardly organised or did not exist. The patient journey was fragmented and not properly organised. The quality of care was determined by chance, location and a haphazard combination of circumstances. Too many people died from stroke because they could not access optimal treatment sufficiently rapidly. Too many survivors were left with avoidable and unduly prolonged disability.

## **Evidence on best practice in acute stroke care**

As with any clinical audit, acute stroke service performance was measured against recognised standards and guidelines. For the most part the findings were measured against the Irish national guidelines, *Irish Heart Foundation: Council for Stroke, National Clinical Guidelines and Recommendations for the Care of People with Stroke and Transient Ischaemic Attack March 2010*. However where the standard or guideline has changed significantly or where Irish guidelines are not available we also drew from other sources from the UK and internationally including *National clinical guideline for stroke, Royal College of Physicians, Fourth Edition 2012*, *British Association of Stroke Physicians (BASP), Stroke Service Standards, Clinical Standards Committee, June 2014* and the *European Stroke Organisation (ESO) Recommendations to Establish a Stroke Unit and Stroke Center 2013;44:828-840*.

## **Overview of audit**

The objective of the audit of acute stroke services was to establish the current level and functioning of services for the care of stroke patients in acute hospitals in the Republic of Ireland. The audit of acute hospital services had two components:

- i. An audit of the organisational aspects of stroke care in acute hospitals with regard to their resources for organised stroke care
- ii. A clinical audit of stroke care involving the review of clinical case notes for a selected national sample of patients with stroke. The audit followed a very similar method and structure to INASC 2008 in order to allow for comparison.

In section 1 the results of the organisational audit are presented, which assessed the organisational structures within Irish hospitals using self-reported survey and site visit data collection. In section 2 the findings of the clinical audit are presented, which encompassed a large national survey of almost 900 clinical cases involving all hospitals managing acute stroke patients. Where appropriate the results are compared with INASC 2008 and also the Sentinel Stroke National Audit Programme (SSNAP) UK 2014 audit of stroke care. Finally in section 3 the recommendations and conclusions from the findings of the audit are discussed.

## **SECTION ONE: ORGANISATIONAL AUDIT 2015**

## CHAPTER 1. METHODOLOGY

### 1.1 Introduction

This chapter describes the data and methods used in the organisational audit phase of the National Stroke Audit 2015. The aim of the organisational audit of hospital-based stroke services was to establish the current level and functioning of services for the care of stroke patients in acute hospitals Ireland, and with regard to their resources for organised stroke care. Use of an organisational audit proforma (Appendix 1) and visits to each participating site allowed each hospital to describe their local stroke service.

### 1.2 Organisational audit proforma

The organisational audit proforma was adapted from the INASC 2008 validated proforma, the Royal College of Physicians London (RCPUK) National Sentinel Stroke Audit 2004 Organisational Audit Proforma, and with minor modifications for the Irish setting and incorporating recent changes in guidelines. Expert opinion on the content of the questionnaire was provided by the National Stroke Audit Steering Group (Appendix 2). The tool was piloted in August 2014 with good geographic representation. Data is maintained both digitally and in paper record, with access limited to the research team only.

### 1.3 Recruitment

The National Stroke Audit aimed to recruit all hospitals admitting over 20 acute stroke patients per year. The identification of eligible hospitals was based on data from the National HIPE Office. Communication of the National Stroke Audit commenced in December 2014 with letters sent to each Clinical Director, Director of Nursing, Clinical Stroke Lead and Hospital Manager/CEO, inviting them to participate in the audit.

### 1.4 Data collection

Health care professionals responsible for stroke services at each site completed the organisational proforma between December 2014 and January 2015. Each hospital was assigned an individual site code to ensure confidentiality. The completed proforma was returned to the project team.

On return of the proforma a date was arranged for a visit to the site. Teams of three people performed the site visits. The teams comprising of a national stroke programme clinical lead, a member of the project team; and a senior nurse or senior HSCP from the national stroke audit steering group. Representation from hospital management, clinical teams and multidisciplinary teams were invited to attend the meeting. The visits took place 5<sup>th</sup> February to the 31<sup>st</sup> March 2015 and involved a review of the completed organisational proforma and a visit to the stroke unit if present and to the emergency department.

### 1.5 Data management and analysis

The project was an audit, using an audit protocol, approved by National Stroke Audit Steering Group. There was no impact with patient care. As advised by National Hospitals' Office from previous INASC 2008, review for all protocols was provided by the expert steering group, with individual hospitals having option to address any local issues with its ethics committee if necessary. Ethical issues relating to data management and protection were discussed with the AMNCH/ St James' Hospital Research Ethics Committee. In advance of the audit, the National Hospitals Office of the Health Service Executive and the Chief Executive Officers of the relevant hospitals permission was obtained.

The data from the proforma were transferred from hardcopy to digital format. Data management and processing was assisted by an ISO accredited data management company. Access to data was restricted to members of the project team. All files both digital and hardcopy were securely stored in a swipe access office with locked filing cabinets and password protected PCs. All sites contributing to this phase of the audit were provided with an interim report of the provisional findings.

### 1.6 Limitations

This is an audit of acute stroke care and as such does not evaluate the patient journey once discharged. The inclusion of the patient experience is key to service development but time and resources did not allow for this at this point. It is nonetheless central to overall service review and should be considered in the next phase.

## CHAPTER 2. ORGANISATIONAL AUDIT RESULTS

### 2.1 Introduction

The findings of the Organisational Audit 2015 illustrate the substantial developments in stroke services since INASC 2008 while also highlighting some significant deficits that still exist. This chapter will describe the findings of the organisational audit using the section headings within the organisational audit proforma as a framework. The findings are compared against INASC 2008 and the UK Sentinel Stroke National Audit Programme 2014 (SSNAP 2014) where possible. National and hospital group data are presented throughout this section with particular emphasis on key organisational areas.

Reference is made to stroke clinical guidelines throughout this results section. Results are primarily viewed against our own Irish national guidelines;

**Guideline A.** *Irish Heart Foundation: Council for Stroke, National Clinical Guidelines and Recommendations for the Care of People with Stroke and Transient Ischaemic Attack, Revised Version March 2010*

Where guidelines have been revised or are not present in the Irish guidelines we refer to other sources as follows:

**Guideline B.** *National clinical guideline for stroke, Royal College of Physicians, Fourth Edition 2012*

**Guideline C.** *British Association of Stroke Physicians (BASP), Stroke Service Standards, Clinical Standards Committee, June 2014*

**Guideline D.** *European Stroke Organisation (ESO) Recommendations to Establish a Stroke Unit and Stroke Center Ringelstein et al Stroke. 2013;44:828-840*

### 2.2 Hospital eligibility and participation

#### Hospital eligibility

In 2013, the Health Service Executive (HSE) reorganised all acute hospitals in the Republic of Ireland into six adult acute hospital groups (Table 2.1). Each group comprises between four and seven hospitals, each including at least one major academic teaching hospital. For the purpose of this audit every hospital within each hospital group was asked to confirm the number of acute stroke patients admitted each year and hospitals with less than 20 acute stroke admissions per year were ineligible to participate.

Table 2.1 Hospital groups

Ireland East	Dublin Midlands	RCSI Hospitals	University of Limerick	South/South West	SAOLTA
Mater Misericordiae University Hospital	St James's Hospital	Beaumont Hospital	University Hospital Limerick	University Hospital Waterford	University College Hospital Galway
St Vincent's University Hospital	Adelaide, Meath, National Childrens Hospital	Our Lady's of Lourdes Hospital Drogheda	Ennis General Hospital	South Tipperary General Hospital	Portiuncula Hospital
Midland Regional Hospital Mullingar	Naas General Hospital	Cavan General Hospital	Nenagh General Hospital	Cork University Hospital	Mayo General Hospital
Wexford General Hospital	Midland Regional Hospital Tullamore	Connolly Hospital Blanchardstown	St John's Hospital	Kerry General Hospital	Sligo General Hospital
St Luke's Hospital, Carlow Kilkenny	Midland Regional Hospital Portlaoise	Louth County Hospital		Mercy University Hospital	Letterkenny General Hospital
Our Lady's Hospital Navan				Bantry General Hospital	Roscommon General Hospital
St Colmcilles Hospital				Mallow General Hospital	

### Hospital participation

All hospital groups were represented and 100% (34/34) of hospitals responded resulting in a total of 79% (27/34) being eligible to participate. It was noteworthy that only one of the hospitals in the University of Limerick group was eligible to participate (Table 2.2).

The total number of acute hospital beds reported from responses to survey at the audit time period was 10,005.

Table 2.2 Hospital groups' participation and bed numbers

	Number of hospitals in group n	Number of hospitals eligible to participate n (%)	Number of acute hospital beds reported
Ireland East	7	6 (86)	1736
Dublin Midlands	5	5 (100)	2145
RCSI Hospitals	5	4 (80)	1844
University of Limerick	4	1 (25)	437
South/South west	7	6 (86)	2073
Saolta	6	5 (83)	1770
<b>Total</b>	<b>34</b>	<b>27 (79)</b>	<b>10005</b>

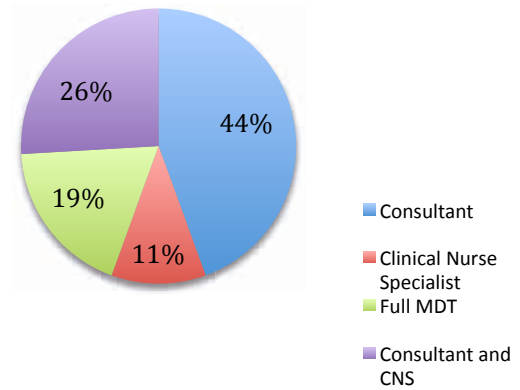


### Organisational audit proforma completion

The completion of the organisational audit proforma was the responsibility of the clinical lead for stroke, if present, with contributions from the clinical nurse specialist, the multidisciplinary team and hospital management. Figure 2.1 illustrates the team involvement in the process.

In addition, the site visit from the national stroke audit team facilitated a review and clarification of any data points.

**Figure 2.1 Completion of organisational audit proforma**



### 2.3 Organisation of care in the emergency department and acute medical assessment units

#### Pre-hospital care

Paramedical staff should pre-notify the receiving hospital emergency department of any incoming FAST positive patient to facilitate early medical assessment and access to rapid imaging. [Guideline A]

FAST (Face Arm Speech Test) has become standard as pre-hospital screening for suspected stroke (Harbison et al 1999). All 27 acute hospital sites stated that they had specific arrangements with local ambulance services for rapid transfer of acute stroke patients to hospital, with 19% (4/27) having a redirect policy for FAST positive cases to a site that provides thrombolysis. Responses indicate that the mechanisms of early notification varied from site to site and some of the most efficient models encountered could be adopted nationally. This is a significant improvement from the 2008 INASC report, which had local arrangements at 3% of sites (Table

Table 2.3 Ambulance/Paramedical organisation

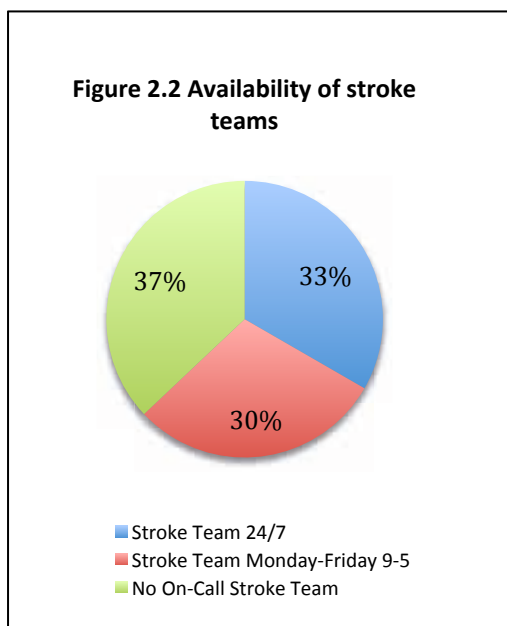
	National Stroke Audit 2015	INASC 2008	SSNAP 2014
Local ambulance arrangements	100% (27/27)	3% (1/37)	99% (165/167)

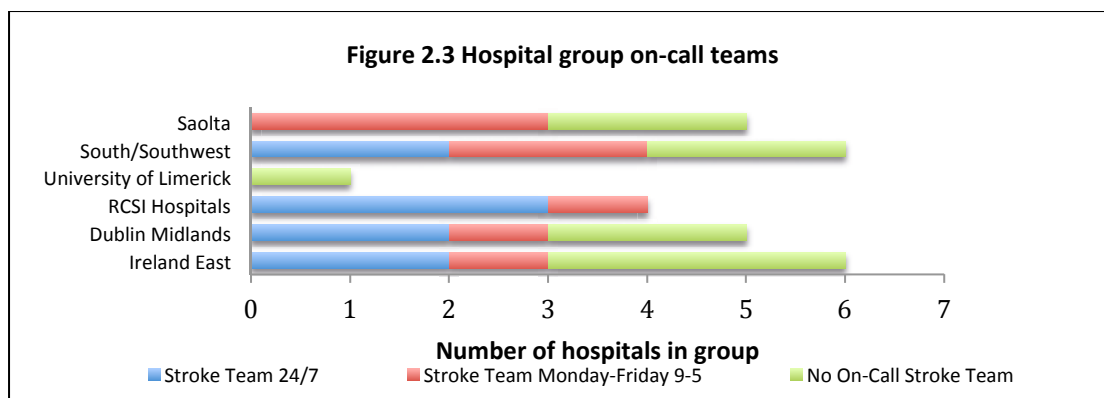
#### Availability of stroke teams

Round the clock on-call availability of an acute stroke specialist either on-site or as part of a stroke network partnership. [Guideline A]

The availability of on-call stroke teams and the service provided within hospitals admitting stroke patients vary (Fig 2.2). On-call stroke teams were available in 63% (17/27) of the hospitals. Examples include a dedicated registrar or medical registrar on site out of hours with access to consultants with specific training in stroke.

For sites with no dedicated stroke team the responsibility for the assessment and management of acute stroke cases, particularly those not viewed as FAST positive cases, lay with the medical team on call. This is one of the challenges when establishing a stroke network partnership so that all patients in each hospital group receive access to specialist knowledge (Fig 2.3).





**Imaging in the emergency department**

All hospitals receiving acute medical admissions, which include patients with potential stroke, should have on-site access to computerised tomography (CT) scanning of the brain. [Guideline A] This imaging technology should be based on a multi-detector CT system that also facilitates non-venography (>64 slice scanner is recommended). [Guideline D]

Access to twenty-four on site CT scanning was available in 100% (27/27) of hospitals (Table 2.4). However, in at least two sites the scanners were of low quality being unable to perform angiography. This has implications for the selection and treatment of patients suitable for acute endovascular intervention and intra-arterial clot retrieval.

Table 2.4 Emergency imaging access

	National Stroke Audit 2015	INASC 2008	SSNAP 2014
CT 24/7	100% (27/27)	84% (31/37)	99% (165/167)
Emergency MRI access <24hour	48% (13/27)	32% (12/37)	N/A

**Access to thrombolysis**

A twenty-four hour, seven-day week, thrombolysis service for acute ischaemic stroke, alone or as part of a stroke network partnership (SNP), using telemedicine solutions should be available. [Guideline A]

Findings showed that 82% (22/27) of sites surveyed provide a 24/7 on-site thrombolysis service. Of the 18% (5/27) remaining hospitals, one site provides a thrombolysis service from Monday - Friday between 9am - 5pm and then cases are re-directed to another hospital; 1 site provides a service on an ad-hoc basis depending on the physician on-call; and 3 sites do not deliver on-site thrombolysis but local arrangements to redirect patients to another site area are in place (Fig 2.4). Results are comparable with UK data (Table 2.5).

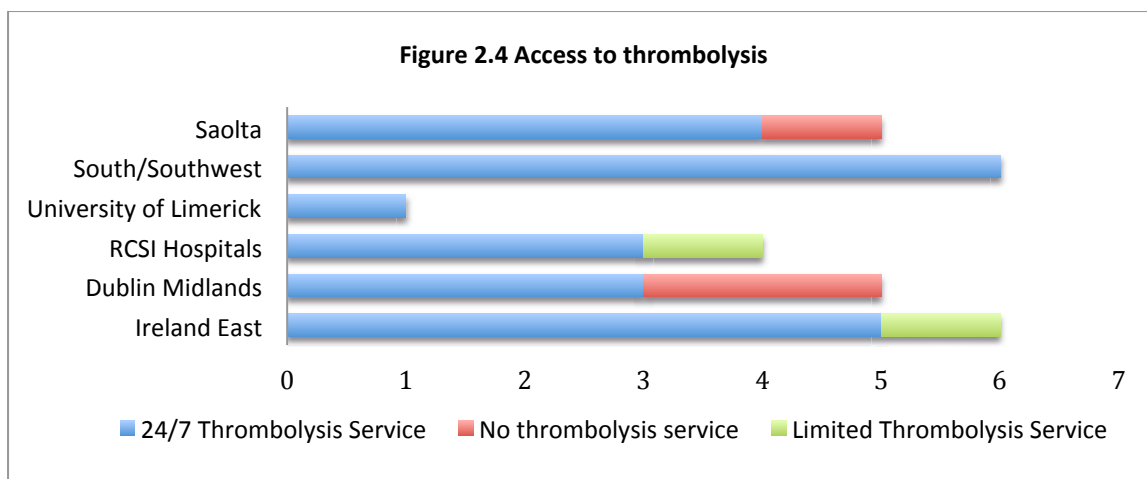


Table 2.5 Comparison of thrombolysis services versus SSNAP 2014

	National Stroke Audit 2015	SSNAP 2014
Thrombolysis service 24/7	82% (22/27)	83% (139/167)
Less than 24/7 service provided but a 24/7 service provided overall involving local arrangements	15% (4/27)	8% (13/167)
No on-site service and less than 24/7 service provided including local arrangements	4% (1/27) *	8% (13/167)
No provision at all	0	1% (2/167)

\* Ad-hoc on-site service with no re-direct provision.

Substantial organisational change has occurred since INASC 2008 with regards provision of thrombolysis therapy, almost the entire country has structures and procedures in place 24/7 to direct patients to centres providing this treatment option, where the decision to prescribe this therapy is always made by a consultant often with specialist stroke training (table 2.6).

#### Endovascular Treatment

The evidence base for supporting thrombectomy and endovascular intervention for appropriate patients with ischaemic stroke increased during the audit period (Nam et al 2015). Two sites were performing thrombectomy, Beaumont Hospital and Cork University Hospital, sites where neurosurgical support is also present for hemicraniectomy. Cork University Hospital provided cover during normal working hours, Monday to Friday, and variably out of hours depending on expertise on call on a given day. The site reported performing seven endovascular procedures in the previous 12 months. Beaumont Hospital provided a twenty-four hour service and an estimated seventy one patients underwent endovascular treatment in the previous 12 months. The challenge of providing endovascular treatment nationally will be discussed in a later section.

Table 2.6. Local availability of stroke teams and thrombolysis service 2015

Hospital	24/7 Stroke team on-call	9-5 Monday-Friday Stroke team on-call	No stroke team on-call	Thrombolysis service 24/7	Thrombolysis service < 24/7	Thrombolysis service < 24/7 but with redirect.	Where is thrombolysis delivered?	Who decides to proceed with thrombolysis?
Mater Misericordiae University Hospital	✓			✓			Emergency department	Stroke consultant
St Vincent's University Hospital		✓		✓			Emergency department	Stroke consultant
Midland Regional Hospital Mullingar			✓	✓			Emergency department	Medical consultant
Wexford General Hospital			✓	✓			Emergency department	Medical consultant
St Luke's Hospital, Carlow Kilkenny	✓			✓			Stroke unit	Stroke consultant
Our Lady's Hospital Navan			✓		✓		Other	Medical consultant
St James's Hospital	✓			✓			Emergency department	Stroke consultant
Adelaide, Meath, National Children's Hospital	✓			✓			Emergency department	Stroke consultant
Naas General Hospital		✓		✓			Emergency department	Stroke consultant
Midland General Hospital Tullamore			✓			✓	Other	Other
Midland General Hospital Portlaoise			✓			✓	Other	Stroke consultant
Our Lady of Lourdes Hospital	✓			✓			Emergency department	Stroke consultant
Cavan General Hospital	✓			✓			CCU	Medical consultant
Beaumont Hospital	✓			✓			Emergency department	Stroke consultant
Connolly Hospital		✓			✓		Emergency department	Medical consultant
University Hospital Limerick			✓	✓			Emergency department	ED consultant
University Hospital Waterford		✓		✓			Emergency department	Stroke consultant
South Tipperary General Hospital		✓		✓			Emergency department	Stroke consultant
Cork University Hospital	✓			✓			Emergency department	Stroke consultant
Kerry General Hospital			✓	✓			Emergency department	Medical consultant
Mercy University Hospital	✓			✓			Emergency department	Stroke consultant
Bantry General Hospital			✓	✓			ICU	Stroke consultant
University College Hospital Galway		✓		✓			Emergency department	Stroke consultant
Portiuncula Hospital			✓			✓	ICU	Medical consultant
Mayo General Hospital		✓		✓			Emergency department	Stroke consultant
Sligo General Hospital			✓	✓			Emergency department	ED consultant
Letterkenny General Hospital		✓		✓			Emergency department	Stroke consultant

**Access to the multidisciplinary team in the emergency department/AMAU**

The ideal situation is for patients to transfer immediately to a stroke unit for assessment by the specialist team. Given that patients can often have prolonged periods in the emergency department (ED), results are presented with regard access to health and social care professionals and specialist nursing in the ED/AMAU. Findings indicate that access to the multidisciplinary team in the emergency department varies widely (figure 2.5).

Patients with acute stroke should be assessed and managed by stroke nursing staff and at least one member of the specialist rehabilitation team within 24 hours of admission. [Guideline B]

Access to a clinical nurse specialist (CNS) in stroke in the emergency department is found to be available in 78% (21/27) sites. In 15% (4/27) sites there is no CNS employed.

Access to health and social care professionals (HSCP) in the emergency department is low with 52% (14/27) of sites having no access to physiotherapy, occupational therapy or speech and language therapy. Only one site reports full access excluding psychology to the multidisciplinary team (figure 2.6). INASC 2008 reported that very few hospitals provided therapy assessment in the emergency department. These findings indicate that access to the full range of HSCP's remains limited in the vast majority of hospitals (table 2.7). However it is again important to highlight that the priority should be that patients have immediate access to an appropriately staffed stroke unit.

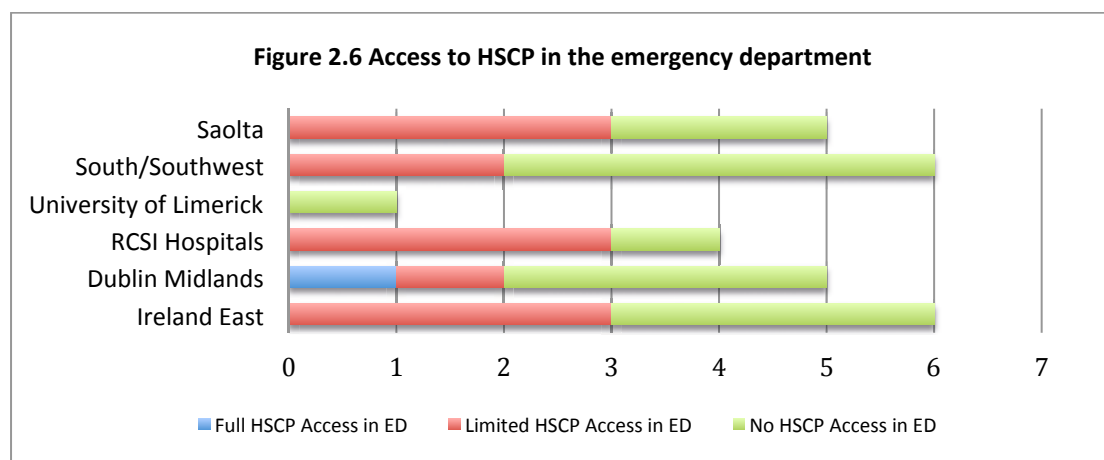
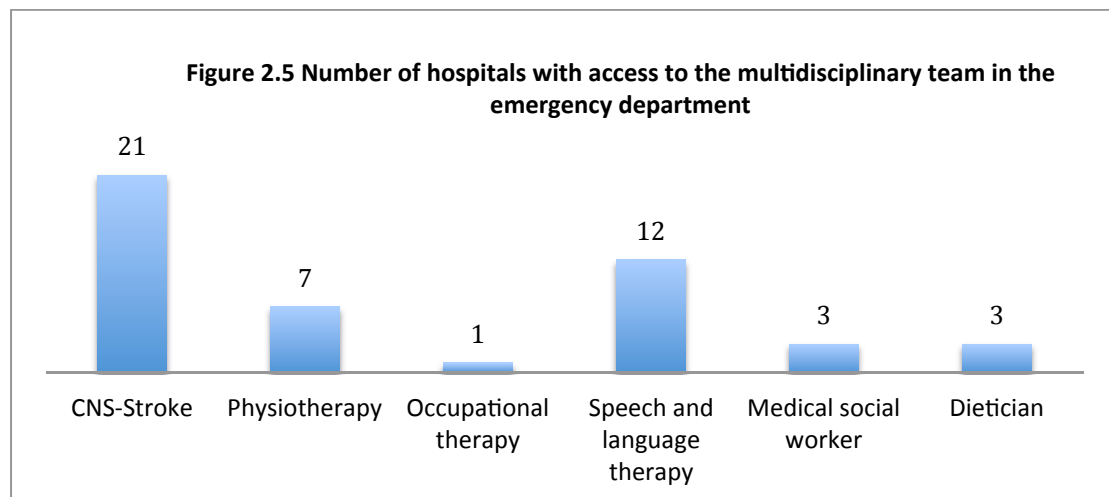


Table 2.7. Local availability of multidisciplinary assessment in the emergency department 2015

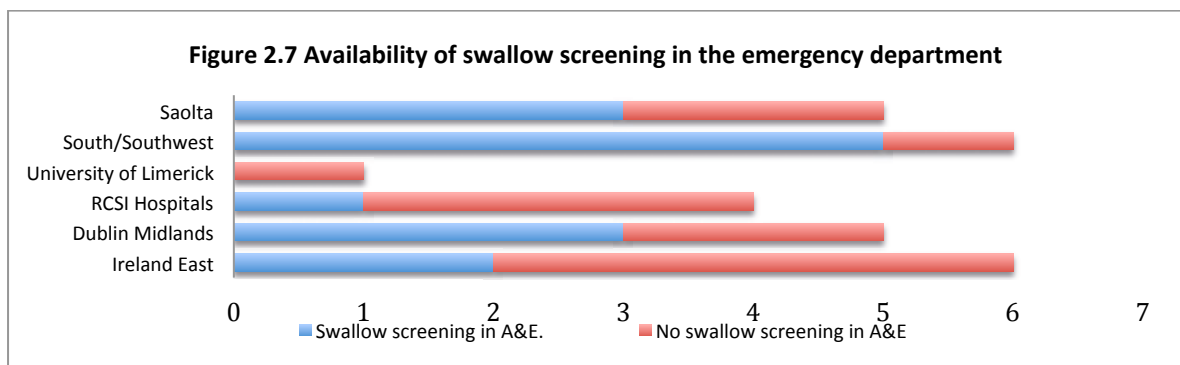
Hospital	Physiotherapy	Speech and language therapy	Occupational therapy	Clinical nurse specialist	Medical social work	Swallow screening	Psychology	Dietetics
Mater Misericordiae University Hospital	✓	✓		✓		✓		✓
St Vincent's University Hospital	✓	✓		✓		✓		
Midland Regional Hospital Mullingar		✓		✓				
Wexford General Hospital								
St Luke's Hospital, Carlow Kilkenny				✓				
Our Lady's Hospital Navan				✓				
St James's Hospital	✓	✓	✓	✓	✓	✓		✓
Adelaide, Meath, National Children's Hospital								
Naas General Hospital	✓	✓		✓	✓	✓		
Midland General Hospital Tullamore						✓		
Midland General Hospital Portlaoise								
Our Lady of Lourdes Hospital		✓		✓				
Cavan General Hospital				✓				
Beaumont Hospital		✓		✓				✓
Connolly Hospital	✓	✓			✓	✓		
University Hospital Limerick				✓				
University Hospital Waterford		✓		✓		✓		
South Tipperary General Hospital				✓		✓		
Cork University Hospital				✓		✓		
Kerry General Hospital								
Mercy University Hospital				✓		✓		
Bantry General Hospital	✓	✓		✓		✓		
University College Hospital Galway		✓		✓		✓		
Portiuncula Hospital				✓				
Mayo General Hospital				✓		✓		
Sligo General Hospital				✓				
Letterkenny General Hospital		✓		✓		✓		

**Swallow screening in the emergency department**

All patients should be assessed within 3 hours of admission for their ability to swallow, using a validated swallow screening test administered by an appropriately trained person.  
[Guideline A]

Access to swallow screening in the emergency department was available in 52% (14/27) of hospitals (figure 2.7).

A speech and language therapist or a clinical nurse specialist generally performs the swallow screen; both services provide a Monday-Friday service only. One site reported that all NCHDs in the stroke service were trained to carry out swallow screening, which potentially means that some swallow screens were carried out during the on-call period also. SSNAP 2014 report that 96% of sites (160/167) have nurses trained in swallow screening on duty seven days per week. Swallow screening will be further evaluated in the clinical audit section.

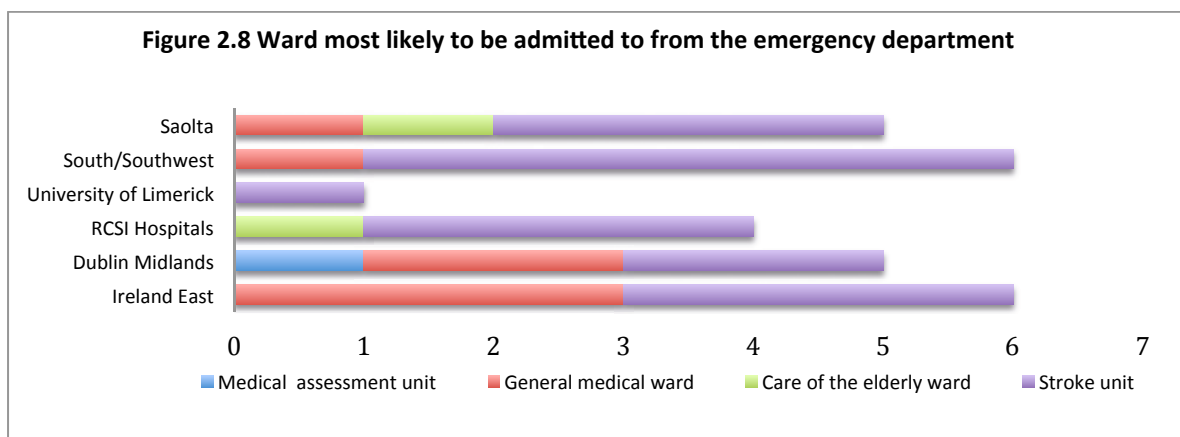


**Initial ward of admission from the emergency department**

All hospitals providing care for acute stroke patients must make available immediate access to a specialist, acute stroke unit or comprehensive stroke unit.  
[Guideline A]

Hospitals indicated that a patient with a stroke would most likely be admitted initially to a stroke unit in 63% (17/27) of the sites (figure 2.8).

Comparison can be made with actual admission wards from the clinical audit results and this is discussed further in section 3.





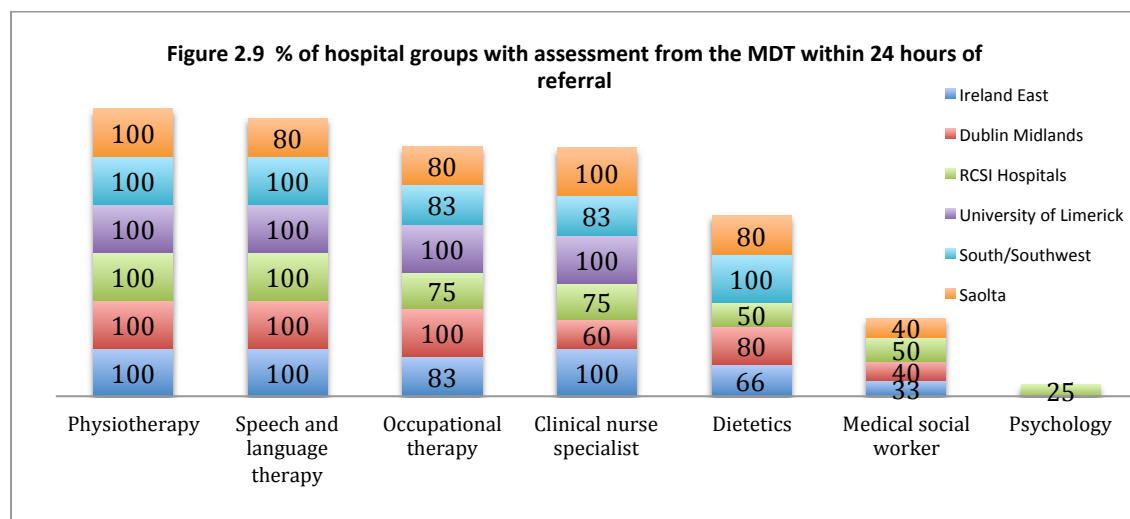
2.4 Organisation of care in the first 24 hours

Multidisciplinary team assessments within 24 hours of referral

All patients should receive an initial physiotherapy, occupational, nutrition and speech and language therapy assessment using an agreed procedure or protocol within 24 hours. [Guideline A]

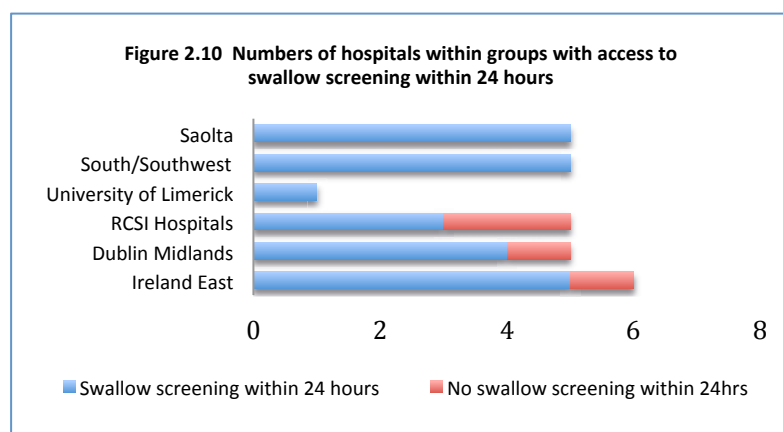
Access to the multidisciplinary team (MDT) within 24 hours of referral is generally good and gaps in medical social work and psychology are reflective a combination of reported reduced need for the service within 24 hours and an absence of personnel (figure 2.9).

All hospitals reported access to physiotherapy within 24 hours of referral, 96% (26/27) to speech and language therapy, 87% (23/27) to occupational therapy, 86% to clinical nurse specialists and 63% (20/27) to dietetics. This access refers primarily to HSCP assessment rather than intervention.



Swallow screening within 24 hours

There is access to swallow screening within 24 hours of admission in 85% (23/27) of hospitals (figure 2.10).



## 2.5 Imaging

### CT and MRI scanning

For all people with acute stroke without indications for immediate brain imaging, scanning should be performed within a maximum of 24 hours after onset of symptoms. Rapidly accessible MRI should be available where there is still diagnostic uncertainty after CT scanning. [Guideline A]

CT scanning is available on all sites on a twenty-four hour, seven-day week basis. There is a reported 100% availability for emergency CT within twenty-four hours and reported 100% availability for routine CT scanning within forty-eight hours. Access to CT imaging is further evaluated in the clinical audit section.

MRI access is available at all times in only two hospitals, however 85% of hospitals have access to MRI during the normal working week.

Early follow-up imaging of the carotid arteries is essential and is available in the vast majority of sites within 48 hours.

Table 2.8 summarises the access to MRI and carotid duplex nationally.

Table 2.8 Availability of MRI and carotid duplex scanning by hospital group

	Ireland East % (n)	Dublin Midlands % (n)	RCSI Hospitals % (n)	University of Limerick % (n)	South/South west % (n)	Saolta % (n)
Access to MRI 24/7	17 (1)	0 (0)	25 (1)	0 (0)	0 (0)	0 (0)
Access to MRI Monday-Friday only	83 (5)	100 (5)	75 (3)	100 (1)	83 (5)	100 (5)
Routine MRI scanning within 48 hours	33 (2)	60 (3)	100 (4)	0 (0)	33 (2)	0 (0)
Emergency MRI scanning within 24 hours	33 (2)	60 (3)	100 (4)	100 (1)	33 (2)	20 (1)
Access to carotid duplex 24/7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Access to carotid duplex Monday-Friday only	100 (6)	80 (4)	100 (4)	100 (1)	83 (5)	100 (5)
Routine carotid duplex within 48 hours	50 (3)	60 (3)	100 (4)	100 (1)	83 (5)	0 (0)
Emergency carotid duplex within 24 hours	50 (3)	80 (4)	75 (3)	100 (1)	83 (5)	20 (1)

### Transient ischaemic attack/neurovascular service

Findings indicate that 26% (7/27) of hospitals have a specialist neurovascular clinic, ranging from daily to once a month clinics. Some sites operate a rapid access service and other services provide a general neurovascular outpatient model. The majority of services require their TIA patients to be admitted in order to access neuroimaging such as carotid duplex and MRI or to access cardiac diagnostics such as holter monitoring or transoesophageal echocardiogram.

26% of sites had agreed protocols between acute and primary services for the rapid assessment of potential TIA patients. Table 2.9 indicates the access to neurovascular services nationally, identifying improvements since INASC 2008 although neurovascular clinics are less available compared to SSNAP 2014. However as stated many sites choose to admit their patients for rapid assessment and investigation and this approach may suit certain services better than attempting to provide full outpatient based assessment.

Patients with TIA should be referred to a hospital with a specialist stroke service for immediate assessment, investigation, and treatment.  
[Guideline A]

Table 2.9 Access to neurovascular service

	National Stroke Audit 2015	INASC 2008	SSNAP 2014
Neurovascular clinic	26% (7/27)	16% (6/37)	98% (163/167)
Provision of a service that enables patients to be seen and investigated within 7 days of minor stroke/TIA	74% (20/27)	16% (6/37)	*

\* SSNAP report data based on patients seen and investigated on the same day.

Table 2.10 Summary of national TIA/Neurovascular services

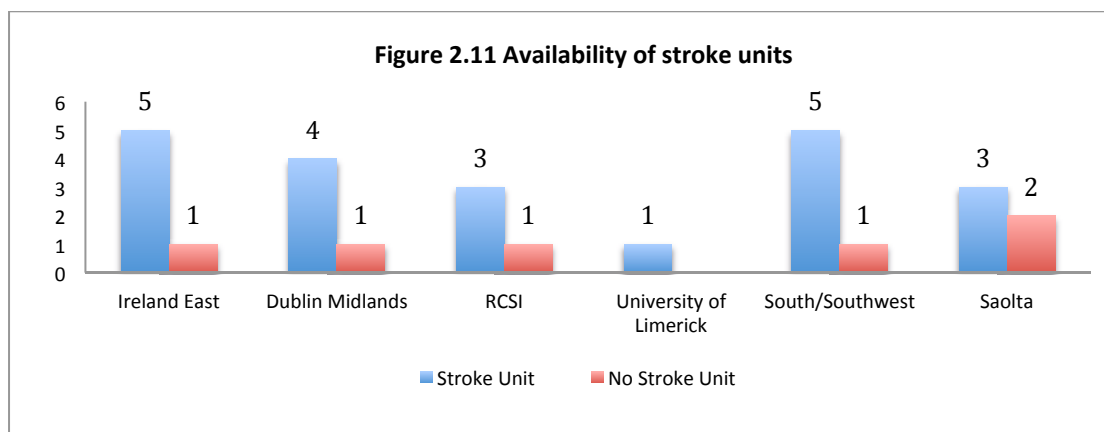
	Access to neurovascular clinic	Clinics per month	Seen and investigated within 24 hours of minor stroke or TIA	Seen and investigated within 7 days of minor stroke or TIA	Rapid access to MRI for patients discharged from the ED within 7 days	Rapid access to carotid duplex for patients discharged from the ED within 7 days	Agreed protocols between acute and primary care services.
Mater Misericordiae University Hospital	✓	20	✓	✓	✓		✓
St Vincent's University Hospital			✓	✓			
Midland Regional Hospital Mullingar			✓	✓			✓
Wexford General Hospital							
St Luke's Hospital, Carlow Kilkenny							
Our Lady's Hospital Navan				✓	✓	✓	
St James's Hospital	✓	8	✓	✓	✓	✓	✓
Adelaide, Meath, National Children's Hospital	✓	20	✓	✓		✓	✓
Naas General Hospital							
Midland Regional Hospital Tullamore							
Midland Regional Hospital Portlaoise					✓		
Our Lady of Lourdes Hospital	✓	4		✓	✓		
Cavan General Hospital				✓	✓	✓	
Beaumont Hospital			✓	✓			
Connolly Hospital	✓	4	✓	✓	✓	✓	✓
University Hospital Limerick				✓		✓	
University Hospital Waterford			✓	✓	✓	✓	
South Tipperary General Hospital	✓	1	✓	✓			
Cork University Hospital	✓	20	✓	✓		✓	✓
Kerry General Hospital					✓	✓	
Mercy University Hospital			✓	✓	✓	✓	✓
Bantry General Hospital			✓	✓		✓	
University College Hospital Galway				✓			
Portiuncula Hospital					✓		
Mayo General Hospital				✓			
Sligo General Hospital				✓	✓	✓	
Letterkenny General Hospital				✓			

## 2.6 Stroke unit models

### Availability of stroke units

All stroke patients should have immediate access to a stroke unit, where they are cared for by a multi professional team who has specialist knowledge, training and skills in stroke care. [Guideline A]

There is a reported availability of a stroke unit in 78% (21/27) of sites. This is a significant development since INASC 2008, which reported the presence of 1 stroke unit. Of the remaining hospitals three had a ward with a strong emphasis on stroke care and multidisciplinary team working ethic, and with a small amount of reorganisation could be identified as a stroke unit. The remaining three sites had no infrastructure in place for a stroke unit (figure 2.11).

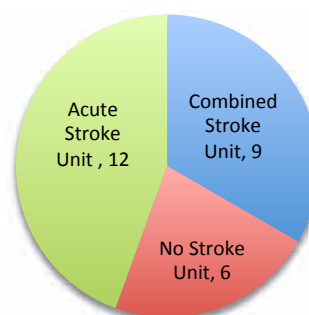


### Type of stroke unit

Each organisation was asked to further define the type of stroke unit it operated based on three options;

- Acute stroke unit - stroke patients are accepted acutely but discharged or transferred early, usually within seven days.
- Combined stroke unit - accepts stroke patients acutely and provides rehabilitation for several weeks if necessary.
- Rehabilitation stroke unit - accepts stroke patients once acute phase is complete with a focus on rehabilitation.

**Figure 2.12 Type of stroke units available**



57% (12/21) of stroke units were defined as acute stroke units with 43% (9/21) defined as combined stroke units, (figure 2.12). One site did identify itself as a rehabilitation stroke unit, and while it had a strong stroke rehabilitation ethos, the beds were not geographically discreet within the generic rehabilitation unit. Table 2.11 indicates the distribution of stroke units throughout the groups.

Table 2.11 Location of stroke units

	Acute stroke unit	Combined stroke unit	No stroke unit
Mater Misericordiae University Hospital		✓	
St Vincent's University Hospital	✓		
Midland Regional Hospital Mullingar		✓	
Wexford General Hospital		✓	
St Luke's Hospital, Carlow Kilkenny		✓	
Our Lady's Hospital Navan			✓
St James's Hospital	✓		
Adelaide, Meath, National Children's Hospital	✓		
Naas General Hospital		✓	
Midland General Hospital Tullamore			✓
Midland General Hospital Portlaoise		✓	
Our Lady of Lourdes Hospital	✓		
Cavan General Hospital	✓		
Beaumont Hospital	✓		
Connolly Hospital			✓
University Hospital Limerick		✓	
University Hospital Waterford	✓		
South Tipperary General Hospital	✓		
Cork University Hospital		✓	
Kerry General Hospital			✓
Mercy University Hospital		✓	
Bantry General Hospital		✓	
University College Hospital Galway		✓	
Portiuncula Hospital	✓		
Mayo General Hospital	✓		
Sligo General Hospital			✓
Letterkenny General Hospital			✓

### Stroke unit criteria

All stroke units providing care for acute stroke patients must be in a geographically discrete area, have the capacity to monitor and regulate basic physiological function, access to immediate imaging and be staffed by a specialist multidisciplinary team.  
[Guideline A]

All sites that admitted stroke patients acutely to their stroke unit were asked if they fulfilled the recommended features of an acute stroke unit.

Table 2.12 compares the results with SSNAP 2014, specifying differences in the features as described. 33% (7/21) of stroke units have all features of an acute stroke unit, table 2.13.

It is important to note that SSNAP 2014 define stroke unit beds according to two types; type 1, beds solely used for the first 72 hours after stroke and type 3, beds used for both the first 72 hours of care and beyond. Only one hospital in this audit defines their beds in this way and for that reason we have compared the data against the type 3 beds in SSNAP 2014.

Table 2.12 Features of a stroke unit

Features of a stroke unit admitting stroke patients acutely	National Stroke Audit 2015 n=21 % (n)	SSNAP 2014 n=109 %
Continuous physiological monitoring (ecg, oximetry, blood pressure)	57 (12)	88
Access to scanning within three hours of admission*	86(18)	99
A policy for direct admission from the emergency department	86 (18)	50
Specialist ward rounds at least 5 times per week**	71 (15)	30
Acute stroke protocols and guidelines	95 (20)	99
Nurses trained in swallow screening	52 (11)	96
Access to 24 hour brain scanning***	100 (21)	N/A
Nurses trained in stroke assessment and management****	N/A	95

\* SSNAP = immediate access to brain scanning

\*\* SSNAP = consultant led ward round 7 times per week vs NSA 2015 5 times per week

\*\*\* SSNAP = not identified as a feature of a stroke unit

\*\*\*\* National Stroke Audit 2015 = not identified as a feature of a stroke unit

Table 2.13 Acute stroke unit criteria

	Continuous physiological monitoring	Access to scanning within three hours of admission	A policy for direct admission from the emergency department	Specialist ward rounds five times per week	Acute stroke protocols and guidelines.	Access to 24 hour brain imaging	Nurses trained in swallow screening	% of features of a stroke unit that accepts stroke patients acutely
St Vincents University Hospital	✓	✓	✓	✓	✓	✓		86%
St James Hospital	✓	✓	✓	✓	✓	✓	✓	100%
Adelaide, Meath, National Children's Hospital	✓	✓	✓	✓	✓	✓	✓	100%
Our Lady of Lourdes Hospital		✓	✓	✓	✓	✓		71%
Cavan General Hospital	✓	✓	✓	✓	✓	✓		86%
Beaumont Hospital	✓	✓	✓	✓	✓	✓	✓	100%
University Hospital Limerick	✓	✓	✓		✓	✓		71%
University Hospital Waterford	✓	✓	✓	✓	✓	✓	✓	100%
South Tipperary Hospital	✓	✓	✓	✓	✓	✓	✓	100%
Portiuncula Hospital	✓	✓	✓		✓	✓	✓	86%
Mayo General Hospital		✓	✓		✓	✓		57%
St Luke's Hospital, Carlow Kilkenny	✓	✓	✓	✓	✓	✓	✓	100%
Bantry General Hospital	✓	✓	✓	✓	✓	✓	✓	100%
Mater Misericordiae University Hospital		✓	✓	✓	✓	✓	✓	86%
Midland Regional Hospital Mullingar					✓	✓		29%
Wexford General Hospital			✓		✓	✓		43%
Naas General Hospital		✓	✓	✓	✓	✓	✓	86%
Midland Regional Hospital Portlaoise						✓		14%
Cork University Hospital	✓	✓	✓	✓	✓	✓		86%
Mercy University Hospital		✓	✓	✓	✓	✓	✓	86%
University College Hospital Galway		✓		✓	✓	✓		57%



Access to stroke unit beds

Stroke units should be large enough to accommodate all acute suspected neurovascular/stroke admissions to the hospital. [Guideline A]

The results of the organisational audit 2015 identify the variance between the number of designated stroke beds and the number of in-patients with a principal diagnosis of stroke. The data presented is based on the day the proforma was completed in each site, between 7/1/2015 to 25/3/2015.

In total, there were 386 in-patients with a principle diagnosis of stroke. The number of stroke unit beds available nationally was 150. Therefore, 61% of stroke patients were not cared for in a stroke unit.

A needs assessment was undertaken in 51% (17/33) of sites reported to identify the appropriate number of beds required for the population.

Figure 2.13 indicates the appropriate occupancy of stroke patients in designated stroke beds. Ideally beds should be protected for stroke patients only, however in practice and with the bed shortages, patients with other conditions are admitted to stroke units. Figure 2.14 highlights the gap between the number of stroke inpatients and the number of stroke unit beds available. The process did not identify the patients who were awaiting discharge.

Figure 2.13 Stroke unit bed occupancy

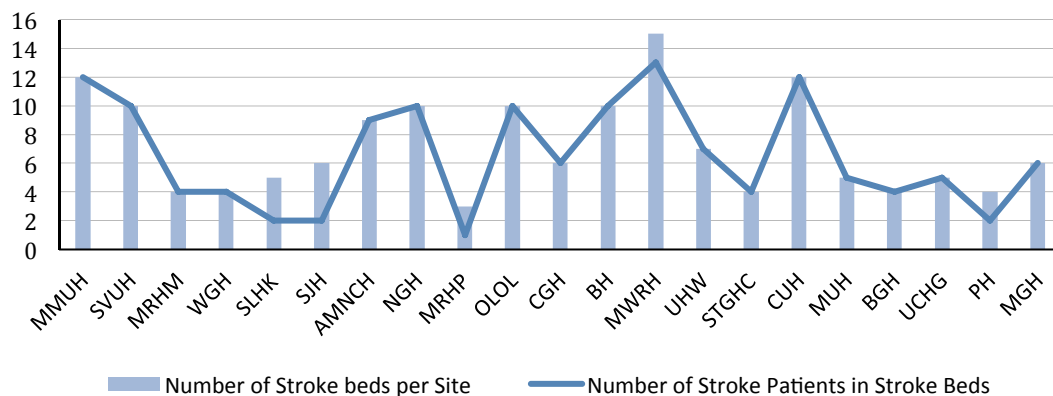
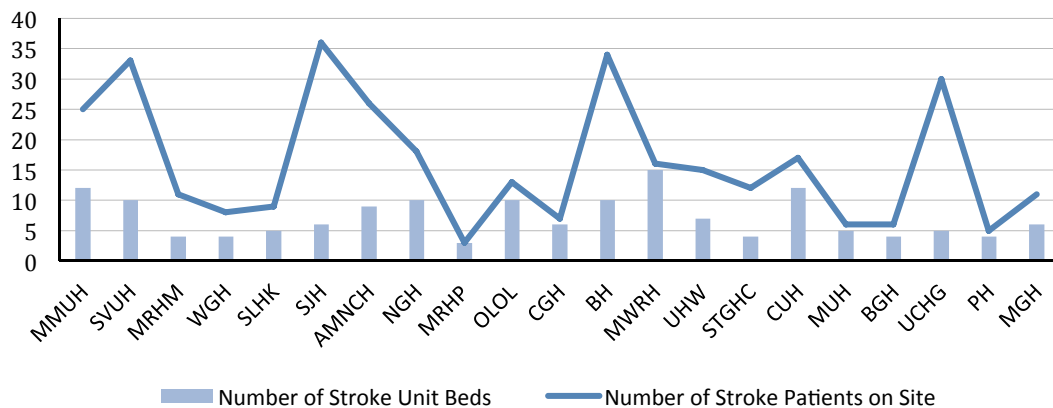


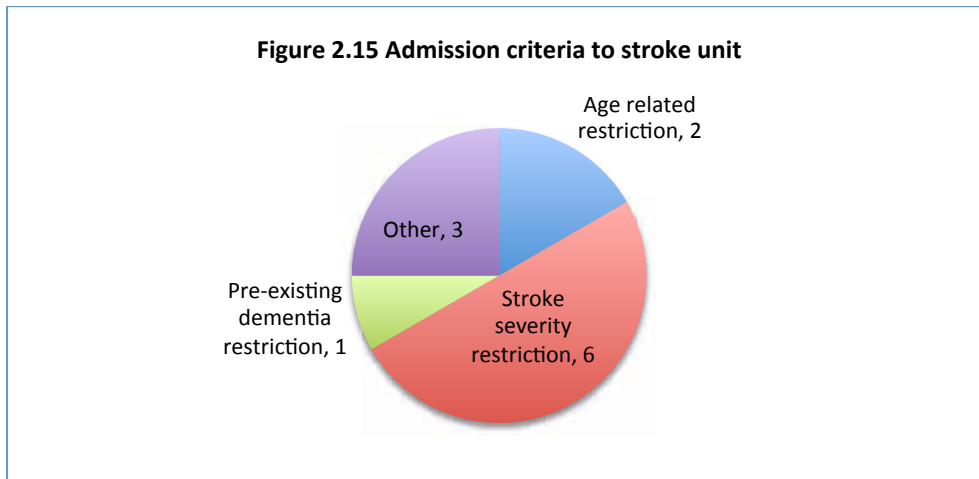
Figure 2.14 Stroke in-patients versus stroke beds



**Stroke unit admission criteria**

All stroke patients should have immediate access to a stroke unit.  
[Guideline A]

Established admission criteria were reportedly in place in 76% (16/21) of the stroke units. Restrictions included: by age; severity of stroke; and dementia. However, only 12 sites identified what those criterion were. Six sites identified severe stroke as a restriction to admission to the stroke unit (figure 2.15). SSNAP 2014 states “exclusion criteria cannot be condoned or justified. No patient should be excluded on the basis of age, stroke severity or co-morbidity”.



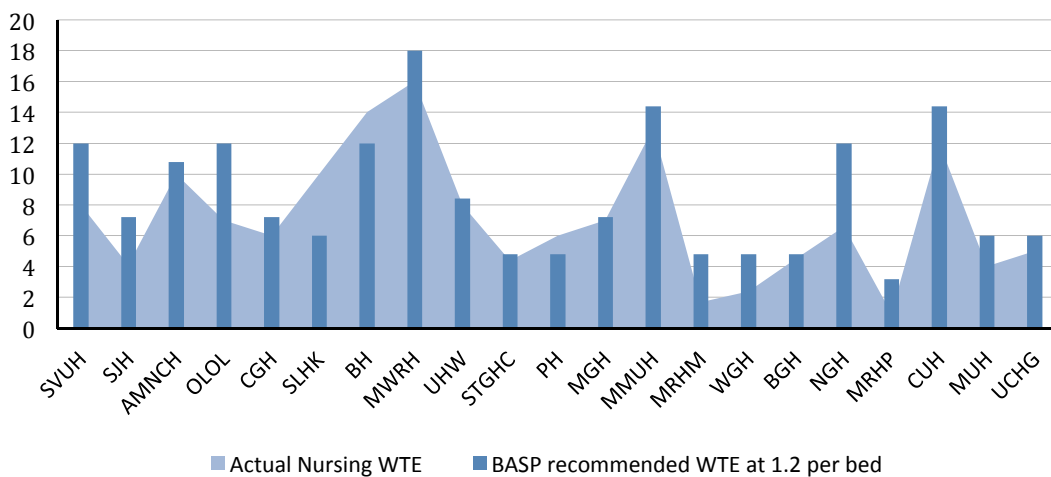
2.7 Staffing

Stroke unit nurse staffing levels

The stroke unit should have sufficient trained nursing staff to provide high quality nursing care. In the first seventy-two hours of admission, patients will require more intensive monitoring and nursing input, requiring a minimum of 2.9 whole time equivalents per beds and thereafter 1.2 WTE per bed. [Guideline C]

Nursing staff levels were found to be below the minimum 1.2 WTEs per stroke unit bed in 86% (18/21) of stroke units (figure 2.16). 7/21 units have staffing deficits of over 30%. This does not take into account the higher requirement for more intensive nursing in the first seventy-two hours after admission. If this level were applied only one unit nationally has appropriate staffing levels. Difficulty arises in estimating stroke unit staffing requirements, which are dependent on the designation of stroke unit beds at each site. It is possible that a patient would require high levels of nursing input in the acute phase of their illness, and then clinically transition to step-down status and then onto the rehabilitation phase in the same hospital bed, particularly in a combined stroke unit model.

Figure 2.16 Nursing deficits based on 1.2 WTE per stroke unit bed

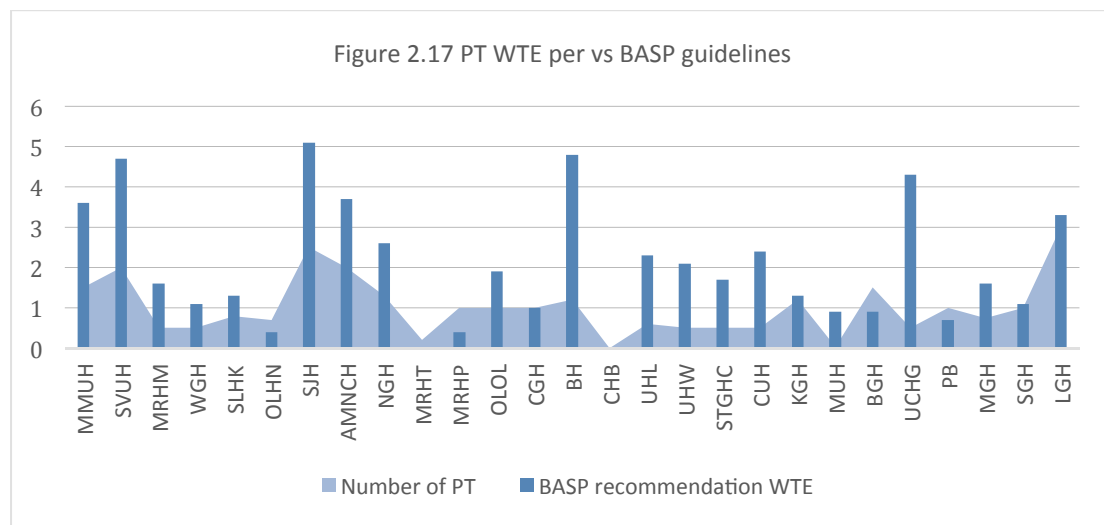


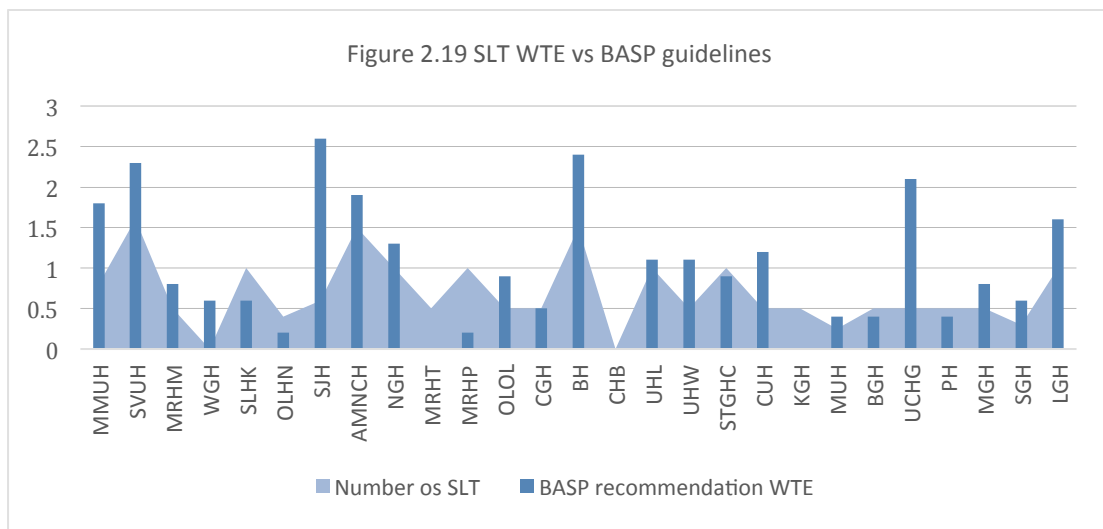
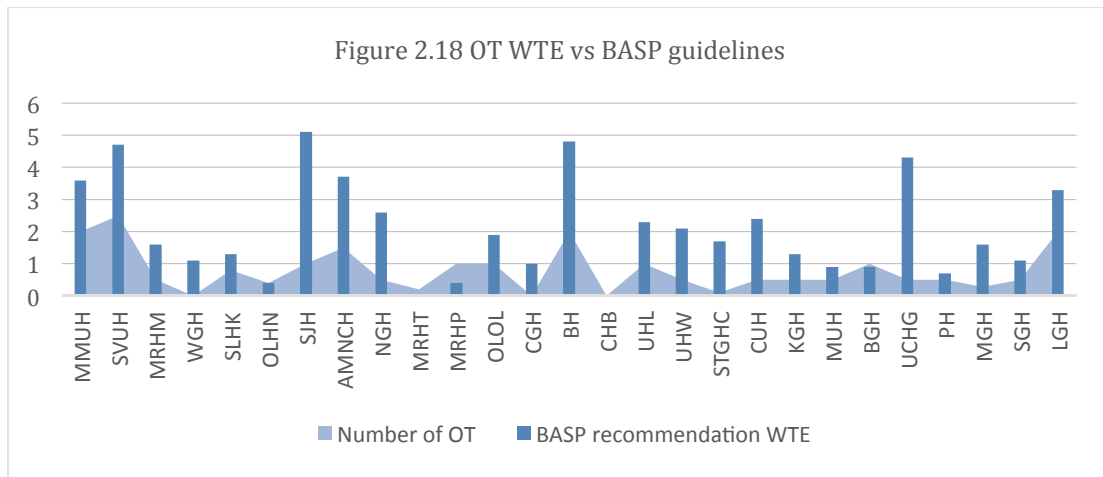
**Health and social care professional staffing levels**

The organisational audit found that in general HSCP numbers were reported based on the entire stroke service rather than the number of beds in the stroke unit. Therefore, data is based on the stroke inpatient numbers on the day of the audit. The BASP 2014 therapy staffing guidance is based on a seven-day service. As such, the WTE equivalents for physiotherapy, occupational therapy, and speech and language therapy have been adjusted to reflect the current five-day service available in the Republic of Ireland; 0.71 WTE per five beds for physiotherapy and occupational therapy, 0.71 WTE for speech and language therapy per ten beds.

All appropriate patients receive a minimum of forty-five minutes of physiotherapy, occupational therapy and speech therapy seven days a week. Provision of this level of therapy requires 1 WTE physiotherapist and occupational therapist per five beds, and 1 WTE speech and language therapist per 10 beds. [Guideline C]

There was a staffing deficit of 50.2% for physiotherapists, (figure 2.17), 61.2% for occupational therapists, (figure 2.18), and 30.9% for speech and language therapists (figure 2.19). Currently no patients receive treatment 7 days per week and resourcing is not adequate to provide 45 minutes of physiotherapy, occupational therapy, and speech and language therapy per day if required.

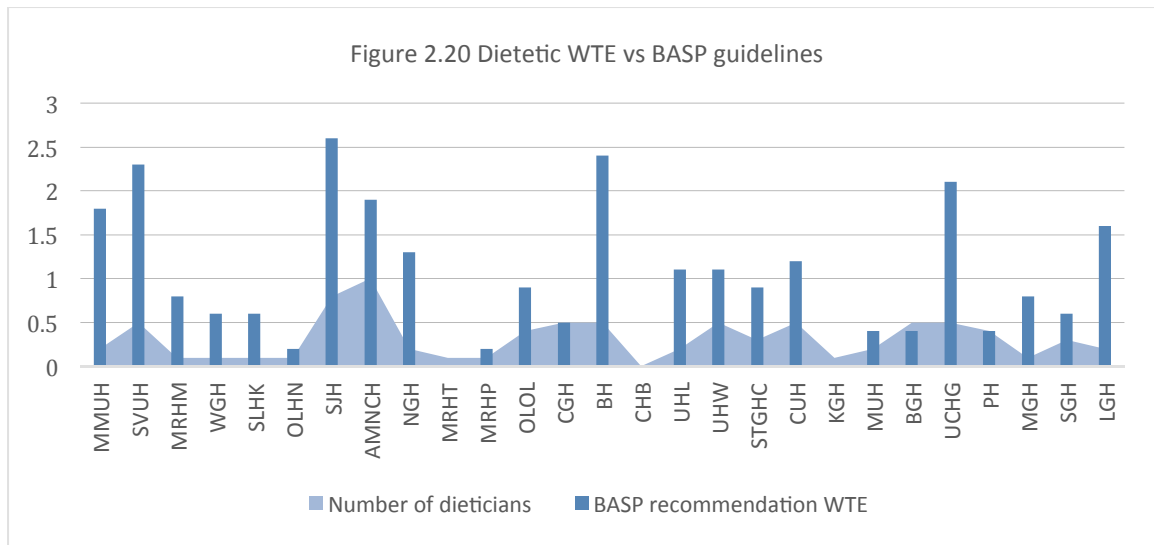




**Access to Nutrition Support**

People with acute stroke who are unable to take adequate nutrition and fluids orally should be referred to a dietician for detailed nutritional assessment, individualized advice and monitoring. [Guideline A]

Another vital component of stroke unit staffing is appropriate access to specialist dietetics. Dietetics is recommended at 0.71 WTE per ten beds for a five day service. It was found that there was a staffing deficit of 68.9% for dietetics cover nationally, (Figure 2.20).

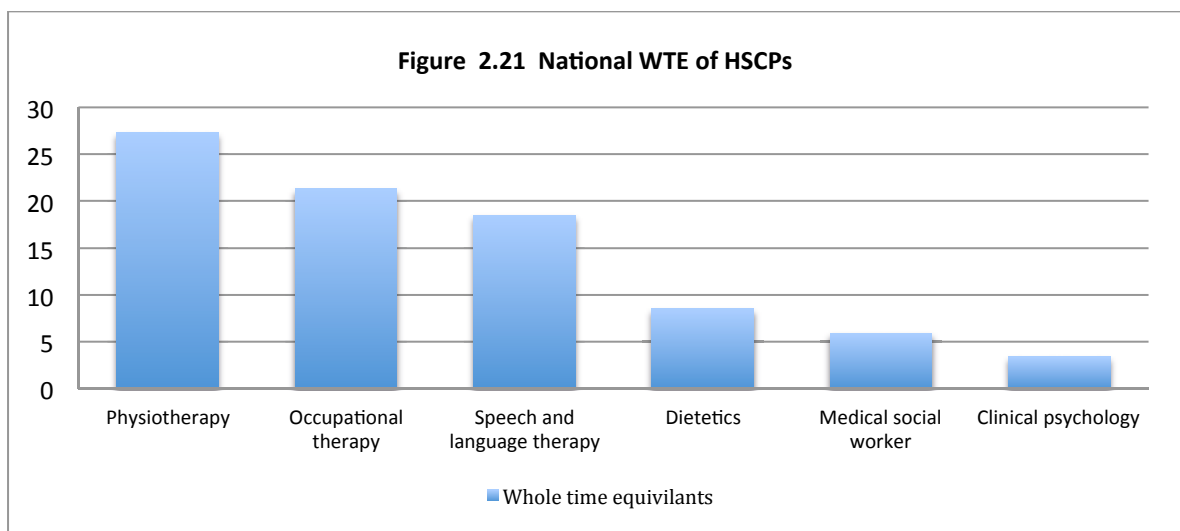


**Access to social and psychological services**

All stroke patients referred to a social worker should undergo a comprehensive psychosocial assessment and intervention. [Guideline A]

No access to a medical social worker was reported in 56% (15/27) of sites and only 19% (5/27) of sites had access to a clinical psychologist. All patients should have access to medical social work and psychological assessment or support as required.

The total number of WTE HSCPs employed in stroke care is represented in figure 2.21. There is no stroke specific HSCP service in any site during the weekend.



## 2.8 Specialist roles

### Medical specialists in stroke

All hospitals receiving acute medical admissions that include patients with stroke should have a clinical lead for stroke.  
All patients should be reviewed by a physician expert in stroke. [Guideline A]

85% (23/27) of hospitals had a consultant physician, with specialist knowledge of stroke, formally recognised as having principal responsibility for stroke services. Table 2.14 shows the improvement in stroke specialism since 2008. In addition, 66% of hospitals have an agreed policy that all, or the majority of patients with acute stroke are admitted under a consultant physician with expertise in stroke care.

Consultant specialists need the support of an NCHD team both for training and service provision. Non-consultant hospital doctor cover varied greatly and it was difficult to collate accurately the deficits in medical staffing. Often NCHDs cross cover both general medical and specialty patients, which made it difficult to assess time dedicated to stroke patients specifically. The effects of variable NCHD numbers and impact of the European Working Time Directive (EWTD) will be expanded on in the discussion section.

Table 2.14 Lead stroke consultant

	National Stroke Audit 2015	INASC 2008
Lead stroke consultant	85%	32%

### Clinical nurse specialists in stroke

All hospitals receiving acute medical admissions, which include patients with potential stroke, should have a clinical nurse specialist with responsibility for stroke. [Guideline A]

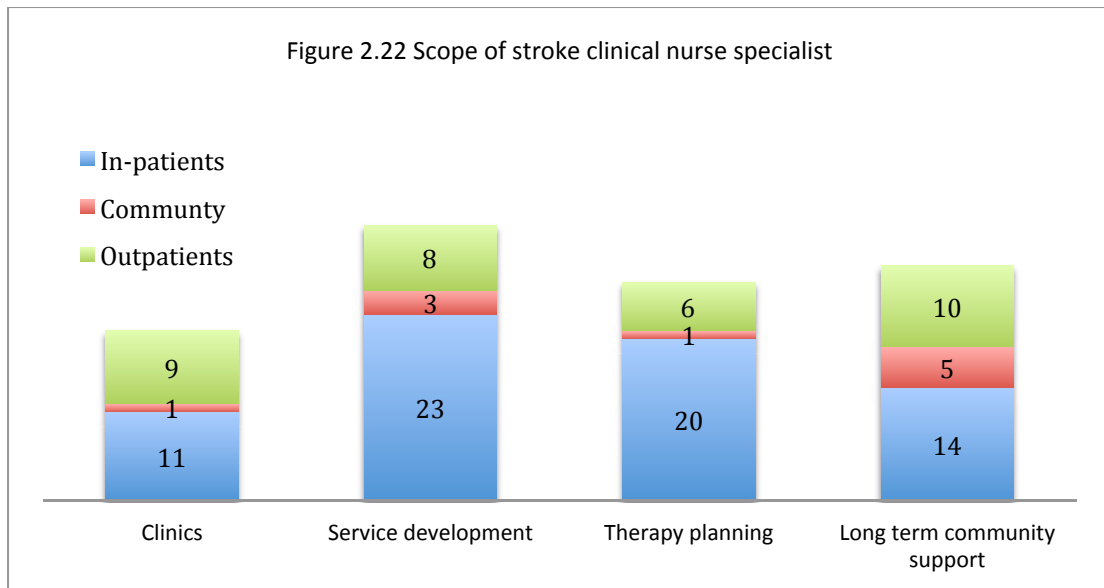
A clinical nurse specialist in stroke was available in 85% (23/27) of hospitals compared to 14% in INASC 2008. One hospital had an advanced nurse practitioner (ANP) in stroke, in addition to a clinical nurse specialist, and one hospital had ANP alone.

The scope of the clinical nurse specialist varied between sites, with an emphasis on inpatient and outpatient services (Figure 2.22), noting that some sites had more than one CNS.

### HSCP clinical specialists

A mix of therapy grades is required to deliver optimum care to the person who has had a stroke, and this includes basic, senior and clinical specialist posts. [Guideline A]

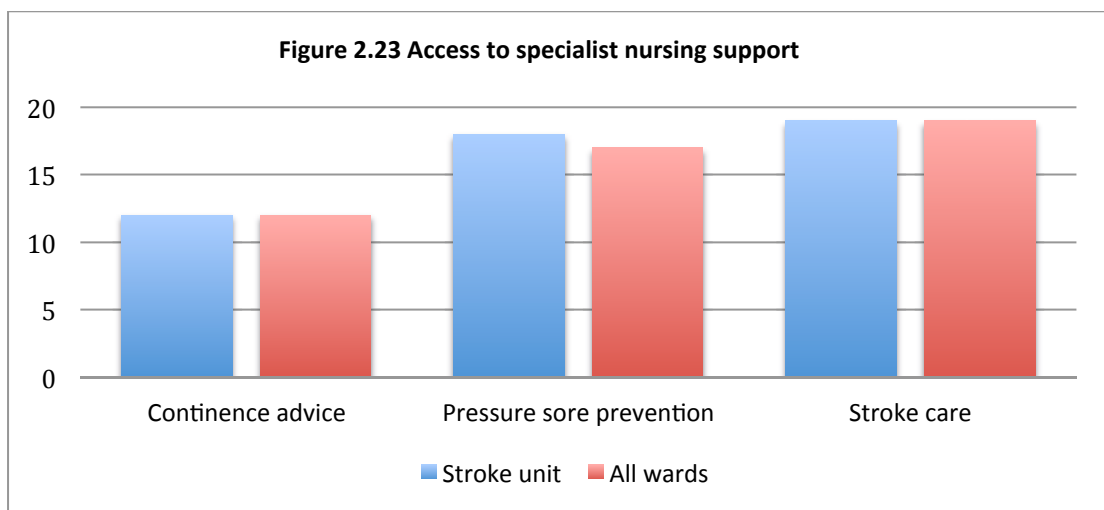
Although there are HSCP with specialist knowledge and interest in stroke working on numerous sites, only one clinical specialist post (in occupational therapy) exists in the whole national acute stroke service.



**2.9 Interdisciplinary services**

**Specialist nursing support**

Access to specialist nursing support for stroke patients varied nationally with 57% of stroke units reporting nurse specialist advice in continence, 86% in pressure sore prevention and 91% in stroke care. Figure 2.23 compares access to specialist nursing support between stroke units and general wards.



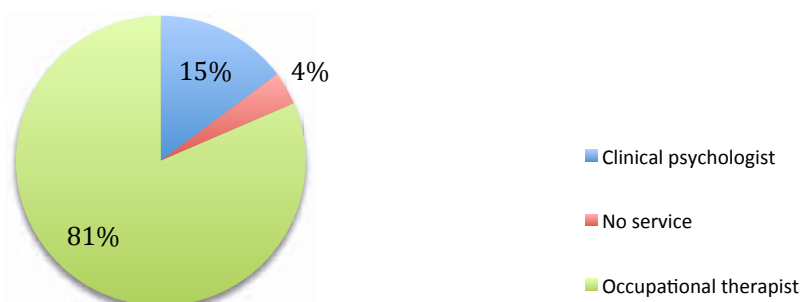


### Cognitive assessment

Assessment of higher cognitive function is largely carried out by occupational therapists, figure 2.24. 5 sites (18.5%) had access to a clinical psychology service. 44% (12/27) of hospitals report access to vocational educational/training, however, this service is often accessed off-site.

All patients at risk should be screened periodically for cognitive impairment, using a simple, standardized screen. [Guideline A]

Figure 2.24 Professions completing cognitive assessments



### Interdisciplinary record keeping

Stroke care pathways should be available for the acute phase of stroke. [Guideline A]

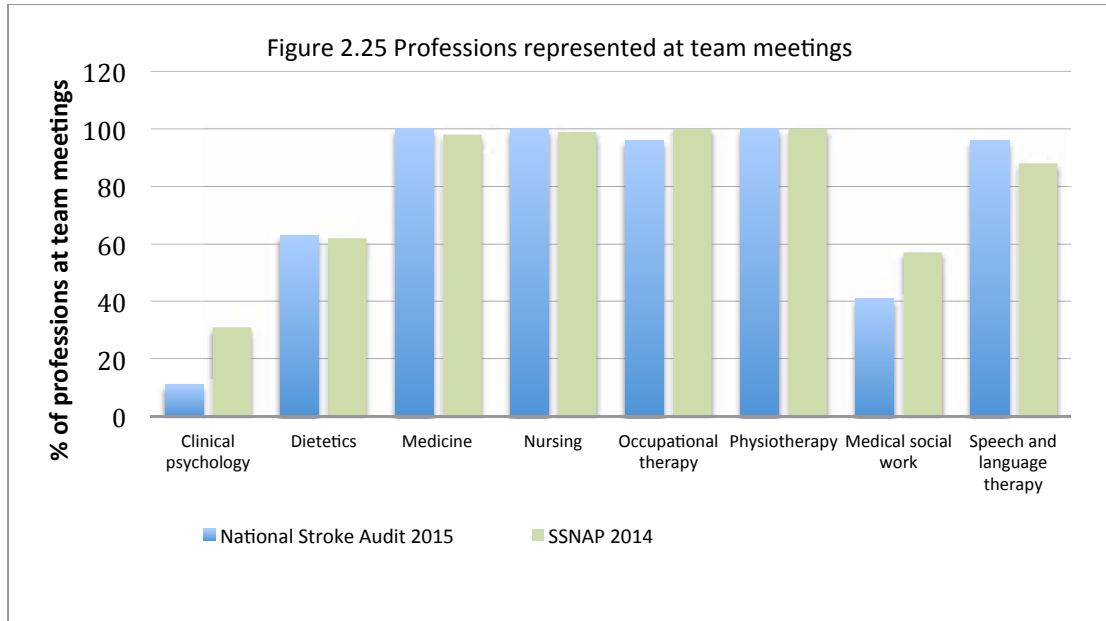
All disciplines contribute to a single set of patient records in 71% (15/21) of stroke units.

While many hospitals have care pathways for stroke, particularly in the initial admission and/or for thrombolysis patients, only 19% (4/21) use an interdisciplinary care pathway for stroke patients during their stroke unit stay.

### Interdisciplinary team meetings

All hospitals held interdisciplinary team meetings for the interchange of information about individual patients, 66% (18/27) of these meetings were exclusively for stroke patients. All members of the interdisciplinary team are represented at varied levels: 11% clinical psychology; 63% dietetics; 100% medicine, nursing and physiotherapy; 96% occupational therapy and speech and language therapy; 41% medical social work. Figure 2.25 outlines interdisciplinary team member representation at team meetings.

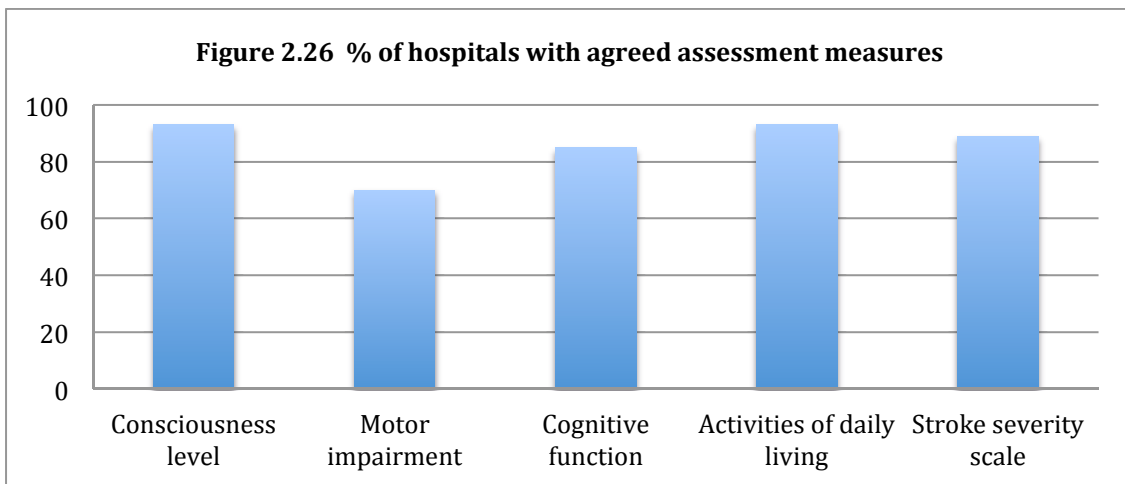
The multidisciplinary team should meet weekly to exchange clinical information, agree management plans and set rehabilitation goals with patients. [Guideline A]



**Agreed assessment measures**

Stroke units should have agreed protocols for acute stroke assessment and treatment. [Guideline A]

Locally agreed protocols for stroke patients were in place for the assessment of: consciousness (figure 2.26), e.g. Glasgow coma scale, 93% (25/27); motor impairment, e.g. modified Rankin scale (mRS), 70% (19/27); cognitive function, e.g. Montreal cognitive assessment (MoCA), 85% (23/27); activities of daily living, e.g. Barthel Index, 93% (25/27); stroke severity scale, e.g. national institute hospital stroke score (NIHSS), 89% (24/27).



**Availability of information to inform practice**

The findings in this section highlight the use of stroke specific policies, procedures, protocols and guidelines available to staff caring for stroke patients in the stroke unit.

There was greater availability of information to the staff on the stroke unit, although not available on all units. The differences in information available for staff between stroke units and general wards is highlighted in Table 2.15. This is concerning given that 61% of patients with stroke were not cared for in a stroke unit at the time of this audit and suggests a lack of protocols for staff managing stroke patients on a general ward.

Stroke units should have agreed protocols for acute stroke assessment and treatment, management of complications, symptom relief, palliative care and provision of information to patients and carers. [Guideline A]

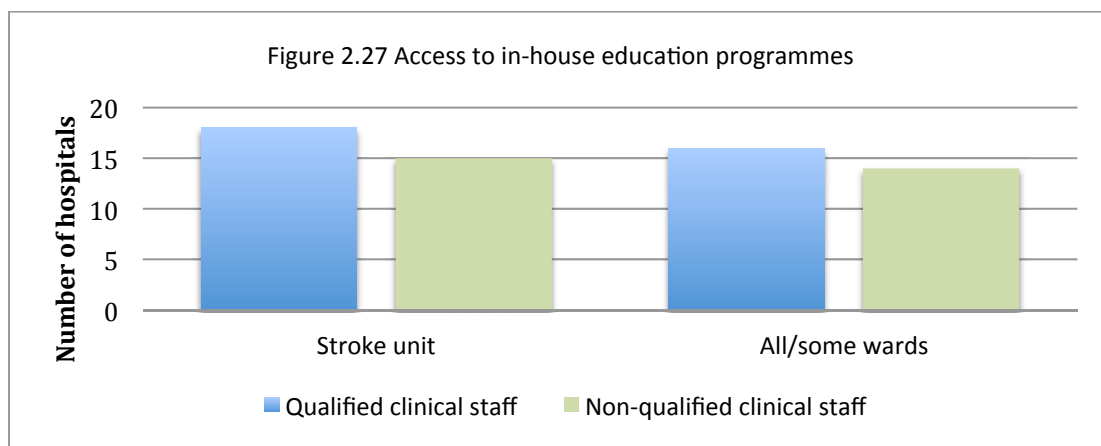
Table 2.15 Available information to inform practice

	Stroke unit % (n)	General wards % (n)
Reference information on the functional assessment tools used locally	70 (19/27)	48 (13/27)
Guidelines on clinical management of stroke	74 (20/27)	44 (12/27)
Guidelines on continence management	52 (14/27)	41 (11/27)
Guidelines on swallowing difficulties	70 (19/27)	41 (11/27)
Guidelines on pressure area care	70 (19/27)	48 (13/27)
Up to date information on local and national patients/carers support organisations	67 (18/27)	44 (12/27)
Records of all patients management in the acute phase of stroke	70 (19/27)	55 (15/27)

**Continuing education**

An ongoing education and professional development programme for all staff involved in stroke care within institutions should be available. [Guideline A]

Stroke units provide access to an in-house continuing education programme in stroke care for qualified clinical staff in 86% (18/21) of sites. Access to continuing education is slightly less for non-qualified clinical staff at 71% (15/21). The data suggests that when continuing education is available on the stroke unit, staff from other wards/service areas may also access this education.



## 2.10 Community services access and communication

### Communication into the community

Hospital services should have a protocol to ensure that before discharge occurs general practitioners, primary healthcare teams and social services departments are all informed before, or at the time of, discharge.

[Guideline B]

On or before discharge from hospital, patients should be given information about and contact details of all relevant statutory, public and voluntary services.

[Guideline A]

A discharge summary is reported to be sent to the GP on discharge in all sites. A named contact on discharge was identified in 30% of sites and only 2 two sites had a hospital/community stroke liaison person. Communication of services available in the community varied however it does appear that there is more patient information available to stroke patients on a stroke unit compared to a general ward.

This information is based on what was visible to the patients during the site visit by the visiting audit team. The site visit highlighted that in many case where the information was not visible it was available through the relevant professional e.g. medical social worker, clinical nurse specialist.

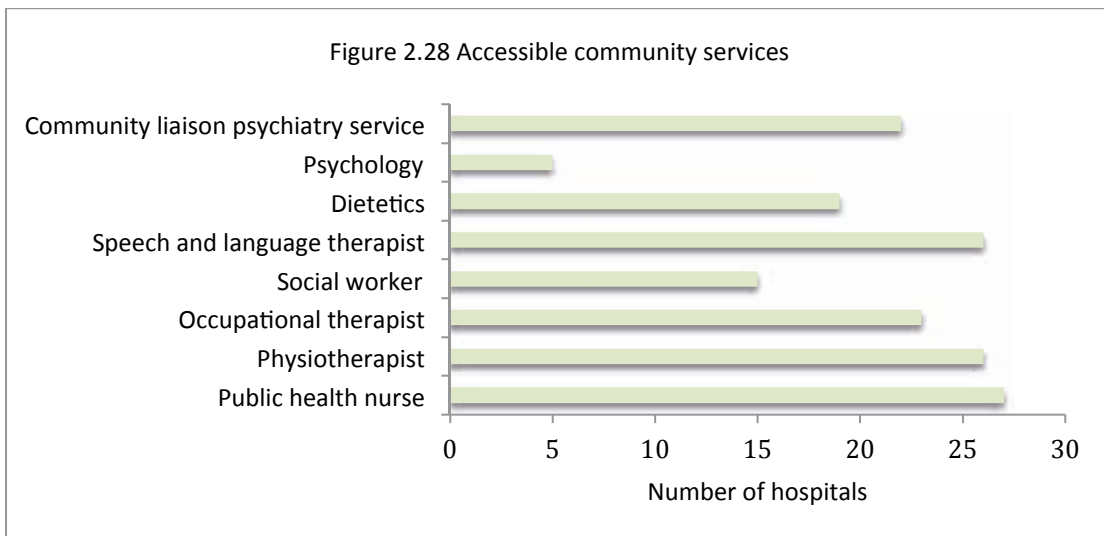
Table 2.16 Availability of information on community support services

	Stroke unit n=21 % (n)	General ward n=27 % (n)
Patient/care information literature on stroke	81 (17/21)	26 (7/27)
Patient versions of national or local guidelines/standards	48 (10/21)	11 (3/27)
Community services	48 (10/21)	15 (4/27)
Carer's benefit/allowance	29 (6/21)	19 (5/27)
Local voluntary services	57 (12/21)	11 (3/27)
How to complain	57 (12/21)	44 (12/27)

**Access to community services**

After leaving hospital, stroke survivors must have access to specialized stroke care and rehabilitation services appropriate to their needs. [Guideline A]

Reported access to services ranged from 100% (27/27) access to public health nurse to 19% (5/27) access to psychology services. Access to community physiotherapy was reported in all but one site, four sites had no access to community occupational therapy. Eight sites reported no access to community dietetics. Access in this context equates to the ability to refer to a community agency. These findings do not account for waiting times or level of intervention, content or intensity of community based intervention, or if the interventions are stroke specific. It was outside of the remit of this audit to assess whether people in fact accessed services following referral. A day hospital on-site is available in 30% (8/27) of hospitals, of which half provide access to over sixty five year olds only. Early supported discharge (ESD) is available in only 15% (4/27) sites. This compares poorly to the SSNAP 2014 report where ESD is available in 74% (135/183) sites.



## **SECTION TWO: CLINICAL AUDIT 2015**

## CHAPTER 3. METHODOLOGY

### 3.1 Introduction

The aim of the clinical audit was to conduct a review of clinical case notes for a selected consecutive sample of patients with stroke. The final sample was taken from 27 participating hospitals within the acute hospital division. The audit of clinical aspects of stroke care involved a retrospective review of clinical case notes for the selected sample of patients in the 27 acute public hospitals.

Total cases per hospital are decided based on volume of stroke admissions (Table 3.1).

Table 3.1 Suggested chart numbers reviewed as per annual stroke admissions

Patient Numbers	Stroke Admissions <100/yr	Stroke Admissions 100-150/yr	Stroke Admissions 150-200/yr	Stroke Admissions >200/yr
Minimum Charts to be audited	25	30	35	40

The audit sample included consecutive cases discharged with a primary diagnosis of stroke (ICD 10 codes: I61, I63 and I64, including subcategories) during the specified six month period: **1 January 2014 – 31 March 2014 and 1 July 2014- 30 September 2014**. We aimed to have a representative portion of patients with ischaemic strokes who received thrombolysis therapy. The chart numbers overall allowed for a national representative sample however the numbers do not allow for comparison between individual hospitals. Individual hospital data are presented in the interest of the stroke teams to assist with service planning and to guide potential areas to target for improvement.

*Inclusion criteria were as follows: Admitted with a primary diagnosis of Intracerebral Haemorrhage (I61), Cerebral Infarction (I63), Stroke, not specified as haemorrhage or infarction (I64).*

*Exclusion criteria were as follows: Cases with subarachnoid haemorrhage (I60); subdural and extradural haematoma (I62); cases related to readmission of a previous event or complications of a previous stroke.*

### 3.2 Data collectors

Local chart auditors were identified through the stroke physician/clinical lead or clinical nurse specialist at each hospital and by means of contact with relevant hospital departments. The chart auditors were provided with written and digital resources for training in use of the audit tool. A helpline was available to support auditors.

### 3.3 Data collection tools

The audit tool proforma is an adapted version of the validated tool of the Royal College of Physicians London (United Kingdom) (RCPUK) National Sentinel Stroke Audit 2006 Clinical Audit Proforma (Appendix 3). The tool had modifications to reflect the Irish setting and recent changes in guidelines and was reviewed by the National Stroke Programme Specialist Working Group. Data are comparable with INASC 2008 and the UK Sentinel Stroke audit. Completed data tools were collected by the project team for analysis.



### 3.4 Reliability

The project team performed reliability testing on a proportion of charts from randomly selected hospitals in each group in the form of a reaudit of a sample of 6% of charts.

### 3.5 Data protection

Security and confidentiality are maintained through the use of passwords. All data were fully anonymised after quality assurance/ reliability testing had taken place. Individual hospital data were confidential to the researcher and the submitting hospital. Data management and processing were assisted by an ISO accredited Data Management company. Access to data were restricted to members of the project team. All files both digital and hardcopy were securely stored in a swipe access office with locked filing cabinets and password protected PCs.

### 3.6 Ethical issues

The clinical was an anonymous audit involving chart review, using an audit protocol, previously approved by National Stroke Programme Working Group. As advised by National Hospitals' Office from previous INASC 2006, review for all protocols was provided centrally by the expert steering group, with individual hospitals having option to address any local issues with its ethics committee if necessary. There was no impact with patient care. Ethics surrounding data management was discussed with the SJH/AMNCH Research Ethics Committee. In advance of the audit, the National Hospitals Office of the Health Service Executive and the Chief Executive Officers of the relevant hospitals permission was obtained.

## CHAPTER 4. CLINICAL AUDIT RESULTS

### 4.1 Hospital group participation

Table 4.1 Number of chart reviews per hospital

Hospitals accepting the care of at least 20 acute stroke patients per year were invited to participate in the clinical audit. The number of clinical charts each hospital was asked to review was based on the annual stroke admissions for that hospital as documented in the HIPE report 2014 (Table 4.1).

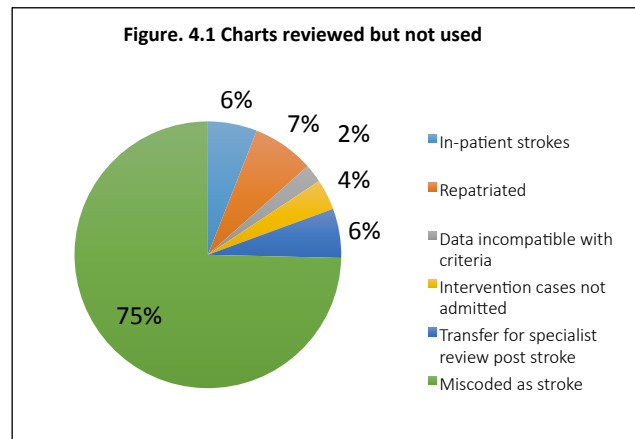
	Stroke admissions <100/year	Stroke admissions 100-150/year	Stroke admissions 150-200/year	Stroke admissions >200/year
Minimum number of charts for audit	25	30	35	40
Number of hospitals in each category	5	7	6	9
Total charts target	125	210	210	360

Table 4.2 Hospital participation

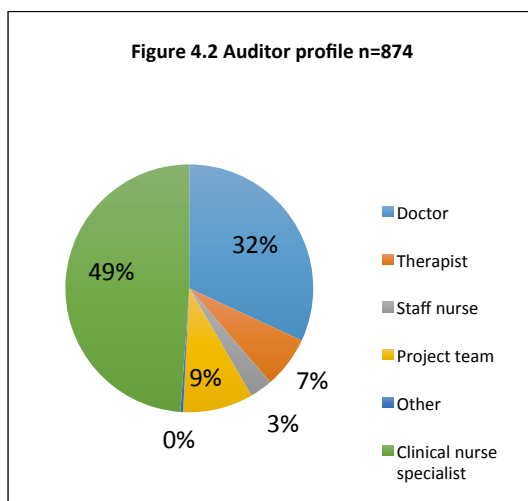
Group name	Hospital name	Synonom	Cases n (%)
<b>Ireland East</b>	Mater Misericordiae University Hospital	MMUH	40
	St Vincent's University Hospital	SVUH	40
	Midland Regional Hospital Mullingar	MRHM	34
	Wexford General Hospital	WGH	30
	St Luke's Hospital, Carlow Kilkenny	SLHK	30
	Our Lady's Hospital Navan	OLHN	21
<b>Dublin Midlands</b>	St James Hospital	SJH	37
	Adelaide Meath National Children's Hospital	AMNCH	36
	Naas General Hospital	NGH	35
	Midland Regional Hospital Tullamore	MRHT	24
	Midland Regional Hospital Portlaoise	MRHP	22
	<b>RCSI Hospitals</b>	Our Lady of Lourdes Hospital	OLOL
Cavan General Hospital		CGH	28
Beaumont Hospital		BH	41
Connolly Hospital		CH	25
<b>University of Limerick</b>	University Hospital Limerick	UHL	40
<b>South Southwest</b>	University Hospital Waterford	UHW	35
	South Tipperary General Hospital Clonmel	STGH	37
	Cork University Hospital	CUH	35
	Kerry General Hospital	KGH	30
	Mercy University Hospital	MUH	30
	Bantry Hospital	BGH	25
<b>Saolta</b>	University College Hospital Galway	UCHG	28
	Portiuncula Hospital	PH	26
	Mayo General Hospital	MGH	35
	Sligo General Hospital	SGH	35
	Letterkenny General Hospital	LGH	34
			Total= 874

Case reviews

As described in the methodology chapter the auditors reviewed charts from a list created by the HIPE coding office. A proportion of charts were outside the inclusion criteria as set out in the methodology. These cases were excluded and further charts requested for review. In total 1010 cases were reviewed by auditors, 13% (136) were excluded. Miscoding of cases, inpatient strokes and patients admitted as repatriation admissions made up the majority of excluded cases, (Figure 4.1).



Auditor discipline



All members of the multidisciplinary team were invited to participate and the numbers of auditor disciplines reflect a good mix of participants (Fig 4.2) Each hospital was requested to designate a lead auditor responsible for the execution of the chart review. The clinical nurse specialists fulfilled this role in 19 of the 27 sites. In the remaining 8 hospitals, 3 clinical leads for stroke led out, 1 clinical director, 1 medical registrar, 1 occupational therapist, 1 director of nursing. One hospital had no staff participation and the project team completed the chart review. In total 89 clinical professionals took part in the clinical audit (Appendix 4).

### 4.2 Demographic profile

With the projected increases in the age profile of the nation and the age divide with regard access to services for the younger person with disability, the age and gender profile of the current audit is compared with INASC in 2008 and with the SSNAP UK in 2014.

#### Age and gender profile

Of the 874 cases audited,

- 57% (n=499) were male and 41% (n=360) female.
- Gender related data was missing in <1% of cases (n=5).
- The mean age was 73.3 years and the median was 76 (range 22 - 102 years).
- 24% of cases were under 65 years of age, which is a rise from 19% in INASC 2008.
- 37% were over 80 years.
- Females were significantly older than males with a mean age of 77 versus 71
- Age related data was missing in 2% (15) of cases.

Table 4.3 and table 4.4 summaries age and gender comparison between Ireland 2008 and UK 2014. Variability in age and gender profile of charts reviewed exists between the different hospitals reflecting the catchment areas the hospitals serve (table 4.5)

Table 4.3 Age profile –National Stroke Audit 2015 and SSNAP 2014

National Stroke Audit 2015	<65 years	65-74 years	75+	Mean
Male n=499	30%	26%	44%	71
Female n=360	15%	19%	66%	77
INASC 2008	<65 years	65-74 years	75+	Mean
Male n=1124	24%	27%	49%	72
Female n=1021	13%	17%	71%	78

Table 4.4 Age profile-National Stroke Audit 2015 and SSNAP 2014

National Stroke Audit 2015					
	<60	60-69 years	70-79 years	80-89 years	90+
Male n=499	19.2% (96)	24.2% (121)	30.1% (150)	22.7% (113)	3.8% (19)
Female n=360	10.3% (37)	13.6% (49)	24.7% (89)	38.6% (139)	12.8% (46)
Totals	15.5% (133)	19.8% (170)	27.8% (239)	29.3% (252)	7.6% (65)
SSNAP UK 2014					
	<60	60-69 years	70-79 years	80-89 years	90+
Totals	14.2% (10532)	16% (11866)	26.5% (19710)	32.2% (23913)	11.2% (8286)

#### Occupation

25% of responses were blank for occupation, with a further 11% unknown or not specified. In 17% of responses the person’s occupation was described as retired but no further detail. 4% of people’s occupation was described as Old Age Pensioner, 5% as Housewife and 4% were either working or retired farmers. Examples from all socioeconomic groups are represented in the findings showing that stroke affects everyone.

Table 4.5 Age and gender profiles totals by hospital group and hospital

	Age	Youngest	Oldest	<65 years %	80+ years %	Gender % Male
<b>National</b>	<b>73.3</b>	<b>22</b>	<b>102</b>	<b>24</b>	<b>37</b>	<b>58</b>
<b>Ireland East</b>	73.5	31	97	25	37	59
<b>Dublin Midlands</b>	71	38	99	31	32	61
<b>RCSI Hospitals</b>	73.1	36	95	24	32	58
<b>University of Limerick</b>	72.8	36	97	23	35	63
<b>South Southwest</b>	74.4	36	102	20	40	55
<b>Saolta</b>	74.2	22	96	22	41	58
<b>MMUH</b>	72.2	43	93	23	28	63
<b>SVUH</b>	75.6	42	94	20	40	55
<b>MRHM</b>	73.1	46	94	24	38	60
<b>WGH</b>	73.6	31	91	20	40	50
<b>SLHK</b>	72.9	47	97	30	37	66
<b>OLHN</b>	73.6	48	91	29	43	52
<b>SJH</b>	73.2	38	95	24	46	60
<b>AMNCH</b>	68.6	42	92	36	22	69
<b>NGH</b>	71.5	40	99	29	31	60
<b>MRHT</b>	69.4	41	93	38	38	46
<b>MRHP</b>	72.3	47	88	27	36	68
<b>OLOL</b>	70.7	36	95	27	24	61
<b>CGH</b>	73.4	50	93	29	32	57
<b>BH</b>	75.5	48	92	17	39	49
<b>CH</b>	72.7	45	93	24	32	68
<b>UHL</b>	72.8	36	97	23	35	63
<b>UHW</b>	75.2	46	99	14	37	51
<b>STGHC</b>	73.2	36	93	24	35	65
<b>CUH</b>	67.3	36	91	37	23	66
<b>KGH</b>	77.8	54	102	13	50	50
<b>MUH</b>	77.8	51	97	17	47	47
<b>BGH</b>	77.2	54	94	12	52	44
<b>UCHG</b>	72.5	47	96	36	39	50
<b>PH</b>	80.4	60	95	8	58	46
<b>MGH</b>	75.4	43	91	14	46	57
<b>SGH</b>	76.4	54	96	14	43	57
<b>LGH</b>	67.3	22	89	35	24	71

### 4.3 Emergency care

The key to excellent acute stroke care is the organisation of services (Langhorne et al 2002) coupled with a heightened public awareness of the symptoms of stroke and how best to access care. In this section we review the early phase of a patient's journey from the onset of their symptoms to admission to hospital.

#### Pre-hospital care

The organisational audit identified that all 27 acute hospital sites stated that they had specific arrangements with local ambulance services for rapid transfer of acute stroke patients to hospital. The results of the clinical audit finds that 63.7% (557) arrived via the ambulance service. This compares to 82% (57679) in the UK SSNAP 2014 data. Ambulance transfer notes were available in 63.6% (354) of cases. The audit finds that 45.6% (252/557) of patients were classed as FAST positive or stroke by the ambulance service on arrival to the emergency department.

#### Stroke onset

The date of stroke was known in 96% (843) of cases. In 72% (603) of cases the patients presented to hospital on the same date as the onset of their stroke. This is similar to the INASC 2008 figure of 71% (1224). Time from onset of stroke to presentation to the emergency department was available in 65% (572) of cases. In the remaining cases the time of onset was either unknown or the patient had a stroke during sleep. Table 4.6 presents the similarities with SSNAP 2014 in the estimation of times of stroke onset.

Table 4.6 Time of stroke onset

	National Stroke Audit 2015 % (n)	SSNAP UK 2014 % (n)		National Stroke Audit 2015 % (n)	SSNAP UK 2014 % (n)
<b>Date of symptom onset</b>			<b>Time of symptom onset</b>		
<b>Precise</b>	73.3 (641)	70 (52470)	Precise	36 (314)	33.5 (24924)
<b>Best estimate</b>	18.9 (165)	19.6 (14581)	Best estimate	25.3 (221)	33.1 (24613)
<b>Stroke during sleep</b>	3.4 (30)	9.8 (7256)	Not known	37.9 (331)*	33.3 (24770)
<b>Not known</b>	4.4 (38)◆◆		Missing	0.9 (8)	N/A

\* Both not known and stroke during sleep

◆◆Both not known and missing data

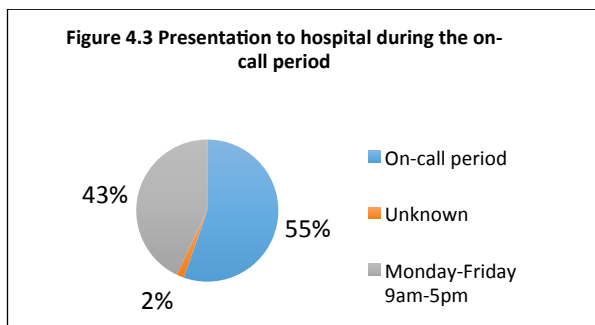
The median time from onset to presentation in the emergency department was 2 hours 26 minutes. Fifty-six percent (317) of patients arrived within 3 hours and a further 22% (123) arrived within 6 hours. Twenty-two per cent (124) arrived more than 6 hours post symptom onset. Table 4.7 compares presentation times with the results of SSNAP 2014. A summary of the median times to presentation for each site is presented in Table 4.8, in context that an appropriate range of variability exists from site to site given the chart numbers assessed.

Table 4.7 Stroke onset to hospital presentation

Time of onset to presentation at hospital	National Stroke Audit 2015 n564 (65%)	SSNAP 2014 n49537 (67%)
<b>Median</b>	2hrs 26mins	2hrs 25mins
<b>Lower IQR</b>	1hr 21mins	1hr 18mins
<b>Upper IQR</b>	6hrs 6mins	7hrs 13mins

**Presentation to the emergency department**

It was found that the number of patients who presented to the emergency department within office hours (Monday-Friday, 9am-5pm) was 43% (375), 55% (484) presented outside of these hours and in 2% (15) of cases it was unknown, (Figure 4.3).



**Time to admit**

Time to admission from time of presentation was available in 80% (n=702) of cases. The average time to admit patients following presentation was 316 minutes (IQR 51-380 mins), which varied greatly from site to site. This variation in part was due to the model of care on each site e.g. in Acute Medical Units (AMUs), time to admit can be the same as time to present as the decision to admit is made at first contact with a physician.

Table 4.8 National summary of median time to presentation to ED following symptom onset

	Median Time of Onset to Presentation (hrs:mins)	Inter quartile range
National	2:26	1:21 – 6:06
Ireland East	2:15	1:19 – 6:04
Dublin Midlands	3:06	1:13–10:18
RCSI Hospitals	2:54	1:23 – 8:16
University of Limerick	2:15	1:31 – 4:11
South Southwest	2:23	1:25 – 5:51
Saolta	2:17	1:32 – 4:33
MMUH	1:53	0:59 – 4:56
SVUH	3:09	1:39 – 7:02
MRHM	2:35	1:30 – 4:47
WGH	2:05	1:25 – 4:25
SLHK	2:14	1:18 -11:15
OLHN	1:32	1:00 – 3:50
SJH	4:10	1:32–10:39
AMNCH	3:30	1:50 – 7:39
NGH	1:59	1:06 – 4:38
MRHT	3:03	1:14 – 25:12*
MRHP	2:20	1:16 – 4:58
OLOL	4:11	2:14–11:38
CGH	2:05	1:13– 3:22
BH	2:38	1:31– 5:41
CH	2:16	1:11– 7:00
UHL	2:15	1:31– 4:11
UHW	1:59	1:25– 4:12
STGHC	2:20	1:20– 3:39
CUH	4:24	1:42 - 11:02
KGH	2:50	1:47 – 3:25
MUH	3:53	1:10 – 7:23
BGH	2:00	1:13 – 5:21
UCHG	2:41	1:35 - 9:31
PH	3:11	1:37 – 5:40
MGH	2:11	1:48 – 5:19
SGH	2:01	1:04 – 3:47
LGH	2:01	1:33– 3:54

#### 4.4 Imaging

One of the areas which emerged from the INASC 2008 audit where a large deficit and inequality existed was in access to neuroimaging. At the time 30% (11/37) of hospitals did not have access to CT scanning within 48 hours. The national guidelines recommended basic requirements with regards imaging in stroke, and in order to fulfil these requirements a hospital needed to provide 24 hour access to CT scanning.

##### Emergency CT scanning

CT scanning after stroke is high at 98.6% (862); however, it was found that 30.2% (264) of patients were not scanned within 24 hours. The main reason for not scanning within 24 hours was patients not arriving at the hospital within 24 hours of symptom onset 47% (125). Other reasons included; not initially clinically indicated, palliative care needs, time of onset unclear. In 27% (72) of cases, no clear reason was identified as to why the patient not scanned within 24 hours. MR imaging was reported to have been carried out in 45% (390) of cases at some point during their admission.

Table 4.9 CT scanning

	National Stroke Audit 2015 % (n)	SSNAP 2014 % (n)	INASC 2008 % (n)
Number of patients scanned	98.9 (862)	98.6 (73231)	93 (2028)
CT scan within 24 hours	69.8 (610)	N/A	40 (867)

##### Stroke types shown by scan

Table 4.10 outlines the pathological diagnosis following initial neuroimaging with a normal scan but a clinical picture consistent with stroke accounted for 37.4% of cases. These cases would often have further imaging to clarify the diagnosis including MRI. Table 4.11 outlines national variation in pathological diagnosis following initial imaging with higher rates of intracerebral haemorrhage noted in certain sites during the audit period.

Table 4.10 Diagnosis following initial neuroimaging

	Infarct % (n)	Intracerebral haemorrhage %(n)	Unknown % (n)
National Stroke Audit 2015	82.9 (725)	15.1 (132)	2 (17)
INASC 2008	64 (1389)	15 (332)	21 (453)
SSNAP 2014	87.7 (65193)	10.8 (8038)	1.4 (1076)



Table 4.11 National breakdown of pathological diagnosis following initial neuroimaging

	<b>Infarct %</b>	<b>Haemorrhage %</b>
<b>National</b>	<b>82.9</b>	<b>15.1</b>
<b>Ireland East</b>	85.6	14.4
<b>Dublin Midlands</b>	87.2	12.8
<b>RCSI Hospitals</b>	88.7	11.4
<b>University of Limerick</b>	87.5	12.5
<b>South Southwest</b>	84.9	15.9
<b>Saolta</b>	77.1	22.8
<b>MMUH</b>	87.5	12.5
<b>SVUH</b>	85	15
<b>MRHM</b>	91.2	8
<b>WGH</b>	83.4	16.7
<b>SLHK</b>	86.7	13.3
<b>OLHN</b>	76.2	23.8
<b>SJH</b>	88.6	11.4
<b>AMNCH</b>	88.5	11.5
<b>NGH</b>	85.7	14.3
<b>MRHT</b>	82.6	17.4
<b>MRHP</b>	90	10
<b>OLOL</b>	90.2	9.8
<b>CGH</b>	92.3	7.7
<b>BH</b>	82.5	17.5
<b>CH</b>	82	8
<b>UHL</b>	87.5	12.5
<b>UHW</b>	71.4	28.6
<b>STGH</b>	83.4	16.6
<b>CUH</b>	88.6	11.4
<b>KGH</b>	89.6	10.3
<b>MUH</b>	90	10
<b>BGH</b>	83.3	16.7
<b>UCHG</b>	66.6	33.3
<b>PH</b>	69.6	30.4
<b>MGH</b>	71.4	28.5
<b>SGH</b>	79.4	20.6
<b>LGH</b>	94.1	5.9

### Time to Scan

The following results show how quickly patients have neuroimaging performed from the onset of their symptoms (Table 4.12) and also importantly how efficiently they have neuroimaging performed when they present to the hospital i.e. door to scan time (Table 4.13). The findings on neuroimaging dictate the management pathway of each patient. The speed with which imaging is performed has important bearing on the patients' outcome as it impacts on consideration for interventions such as thrombolysis therapy or thrombectomy.

The national figures show a median time of 15 hours 44 minutes (interquartile range 2hrs 44mins-20hrs 13mins) from onset of symptoms to performance of neuroimaging.

Table 4.12 National variation in time to have first neuroimaging performed upon presentation to hospital

	<b>Median Time to Scan from Onset (hrs:mins)</b>	<b>Interquartile range (hrs:mins)</b>
<b>National</b>	<b>15:44</b>	<b>2:44 – 20:13</b>
<b>Ireland East</b>	15:42	2:37 – 20:41
<b>Dublin Midlands</b>	18:34	3:00 - 23:01
<b>RCSI Hospitals</b>	13:43	2:45 – 16:58
<b>UL</b>	10:54	2:34 – 17:33
<b>South Southwest</b>	16:03	2:24 – 20:39
<b>Saolta</b>	15:55	3:19 - 19:31

Table 4.13 National median time to CT scan from presentation

	<b>Median time to scan from presentation (hrs:mins)</b>	<b>Interquartile range (hrs:mins)</b>
<b>National</b>	<b>9:23</b>	<b>1:09 – 15:05</b>
<b>Ireland East</b>	10:29	1:06 – 17:47
<b>Dublin Midlands</b>	10:02	1:30 -13:32
<b>RCSI Hospitals</b>	6:57	1:00 – 9:29
<b>University of Limerick</b>	7:37	0:52- 13:09
<b>South Southwest</b>	8:57	1:04 -16:03
<b>Saolta</b>	10:22	1:30 – 16:16
<b>MMUH</b>	8:09	0:49-6:17
<b>SVUH</b>	4:58	1:12 -6:45
<b>MRHM</b>	7:30	0:39 -9:38
<b>WGH</b>	20:03	7:24 -24:50
<b>SLHK</b>	10:25	1:22 -19:21
<b>OLHN</b>	15:44	1:36 -18:41
<b>SJH</b>	5:38	1:37 -5:38
<b>AMNCH</b>	7:14	1:00 -7:07
<b>NGH</b>	13:43	1:04 -19:20
<b>MRHT</b>	15:48	2:40 -21:16
<b>MRHP</b>	11:06	3:28 -17:25
<b>LOL</b>	8:10	0:59 -13:48
<b>CGH</b>	8:17	0:47-15:12
<b>BH</b>	4:17	1:02 -4:16
<b>CH</b>	7:26	2:16 -14:46
<b>UHL</b>	7:37	0:52 -13:09
<b>UHW</b>	7:25	0:47 -10:50
<b>STGH</b>	10:51	1:27 -19:51
<b>CUH</b>	5:23	0:34 -5:36
<b>KGH</b>	5:00	0:40 -6:48
<b>MUH</b>	12:52	1:25 -23:07
<b>BGH</b>	10:34	1:26 -13:16
<b>UCHG</b>	10:47	1:24 -14:18
<b>PH</b>	12:04	2:10 -17:06
<b>MGH</b>	12:14	1:31 -16:03
<b>SGH</b>	9:29	1:46 – 15:40
<b>LGH</b>	7:51	1:07-15:41

#### 4.5 Stroke units

The stroke unit represents the hub from where stroke care can be centrally organised, including patient monitoring, multidisciplinary team interaction and staff education and training. Only one stroke unit existed in Ireland at the time of the INASC 2008 audit, so substantial changes have occurred in the interim. We assessed whether people were accessing these improved numbers of stroke units and how quickly. We also acknowledged the requirement of acute stroke patients for higher dependency care in the early phases of their illness. The results should be taken in the context of the National Stroke Programme KPIs that at least 50% of patients are admitted to a stroke unit and that at least 50% of their stay is on a stroke unit.

There are three primary types of stroke unit. Firstly an acute stroke unit (ASU) where patients are managed in the very early phase of the stroke usually up to 7 days, secondly a rehabilitation unit which acts as a transition from acute care to further recovery for patients with ongoing rehabilitation needs which cannot be met in the community and lastly a combined stroke unit which has elements of both models.

#### Admission profiles

The majority, 42% (369), of patients with a diagnosis of stroke are admitted to a general ward directly from the emergency department with 29% (249) admitted directly to a stroke unit. This compares with 73% direct admission to a stroke unit in the UK SSNAP 2014, (Table 4.14) and 53% (467) spent more than 4 hours in the emergency department following decision to admit. Thirteen per cent (120) of cases were reported to have spent some period of their admission in a high dependency bed, e.g. ICU, HDU, and CCU.

Table 4.14 Initial ward of admission from the emergency department

Ward type	National Stroke Audit 2015 % n=874	SSNAP UK 2014 % n=74307
Medical assessment unit, Clinical decision unit	17 (148)	21 (15507)
Stroke unit	29 (249)	73 (54292)
ITU/CCU/HDU	11 (98)	1.9 (1432)
Other	42 (379)	4 (3076)

#### Admission to stroke units

In total 54% (472) of patients were cared for in a stroke unit compared to 1.9% (42) in INASC 2008. Of the 249 patients admitted directly to the stroke unit 61% (153) waited in the emergency department for over four hours (table 4.15). INASC 2008 found that 2% (1) of patients were admitted to a stroke unit within four hours. The mean time from hospital admission to admission to a stroke unit was 1.7 days (median 1, range 0-93 days, IQR-0-2) compared to 6 days in INASC 2008. SSNAP 2014 reports a median time from presentation to admission to a stroke unit of 3 hours 36 minutes (IQR-2hrs 9mins - 7hrs 1min). Documentation of dates of arrival to the stroke unit was good in 97% (457/472) of cases. However time of admission was not audited in this round and so comparison to SSNAP 2014 was not available.

Table 4.15 Admission to a stroke unit within 4 hours

	<b>INASC 2008 n=42</b>	<b>National Stroke Audit 2015 n=249</b>
Stroke unit patients admitted within 4hours	2% (1)	39% (96)
	<b>UK SSNAP 2014 n=74307</b>	<b>National Stroke Audit 2015 n=874</b>
Total number of patients to stroke unit within 4hours	58% (42283)	11% (96)

**Length of stay in stroke unit**

54% (472) of patients were admitted to a stroke unit and 86% (407) of that cohort spent more than 50% of their stay in the stroke unit (figure 4.4). The mean length of stay in a stroke unit is 14.9 days, range 0-151days. Table 4.16 compares the location where patients spend 50% of their hospital stay compared to INASC 2008

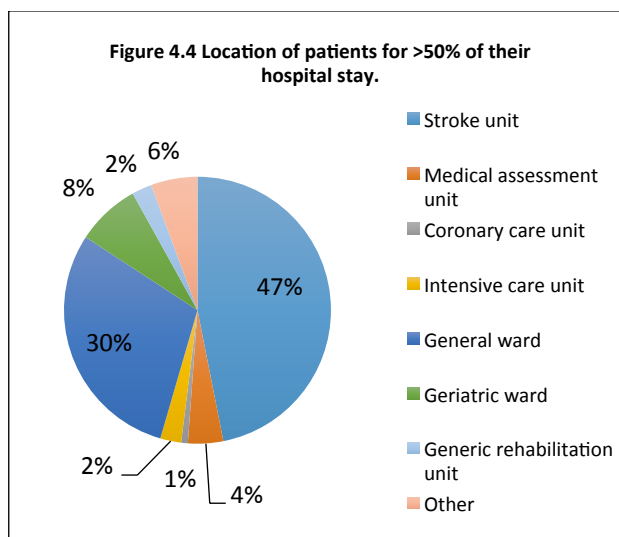
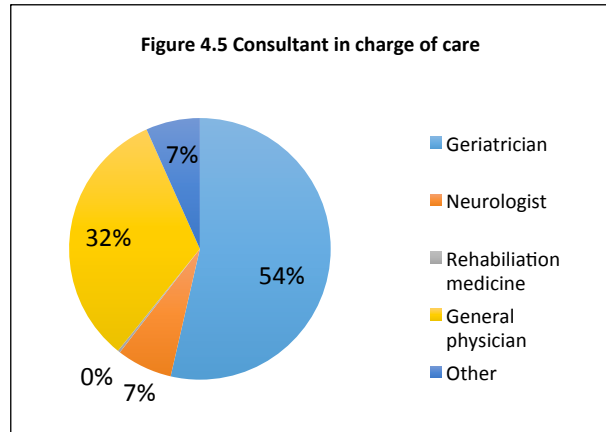


Table 4.16 Comparison of location of patient for over half of their hospital stay versus INASC 2008

	Stroke unit % (n)	MAU	CCU	ICU	General ward	Geriatric medicine ward	Generic rehabilitation unit	Other
<b>National Stroke Audit 2015 n=874</b>	47 (407)	4.2 (37)	0.8 (7)	2.5 (22)	29.5 (258)	7.7 (67)	2.4 (21)	5.6 (49)
<b>INASC 2008 n=2173</b>	1 (24)	1 (21)	0.3 (7)	2 (52)	69 (1496)	8 (183)	4 (78)	14.7 (319)

**Consultant in charge of care**

It is a standard of care that all patients are managed by a team with specialist knowledge in stroke medicine. The majority of patients were under the care of consultant geriatricians at some point during their admission. Figure 4.5 indicated the spread of clinical specialties who care for stroke patients. This compared to the INASC 2008 where the majority (61%) of stroke patients were under the care of a general physician.



**National results on stroke unit admissions**

Access to stroke units for each hospital is outlined in Table 4.17. As highlighted in the organisational audit, not all sites managing acute strokes have a stroke unit either now or at the time period of the clinical audit. It should also be noted that a number of sites use higher dependency beds to manage patients specifically in the early or hyperacute phase of stroke e.g. post thrombolysis delivery.

Table 4.17 National summary of stroke unit admission rates

	Patients admitted to a stroke unit from the emergency department %	Patients initially admitted to a high dependency unit %	Stroke unit admission anytime %
<b>National</b>	<b>29</b>	<b>11</b>	<b>54</b>
<b>Ireland East</b>	21	18	41
<b>Dublin Midlands</b>	21	10	40
<b>RCSI Hospitals</b>	37	7	61
<b>University of Limerick</b>	55	3	83
<b>South Southwest</b>	27	11	59
<b>Saolta</b>	34	10	65
<b>MMUH</b>	10	33	65
<b>SVUH</b>	0	10	0
<b>MRHM</b>	32	21	56
<b>WGH</b>	20	7	27
<b>SLHK</b>	67	6	87
<b>OLHN</b>	0	33	0
<b>SJH</b>	24	8	46
<b>AMNCH</b>	44	6	56
<b>NGH</b>	20	20	69
<b>MRHT</b>	0	8	0
<b>MRHP</b>	0	5	0
<b>LOL</b>	20	7	83
<b>CGH</b>	57	4	75
<b>BH</b>	63	5	66
<b>CH</b>	0	12	0
<b>UHL</b>	55	3	83
<b>UHW</b>	49	2	83
<b>STGH</b>	16	14	51
<b>CUH</b>	40	9	51
<b>KGH</b>	0	3	0
<b>MUH</b>	37	13	87
<b>BGH</b>	12	28	80
<b>UCHG</b>	36	14	61
<b>PH</b>	27	12	54
<b>MGH</b>	63	11	74
<b>SGH</b>	40	6	86
<b>LGH</b>	0	9	44

**4.6 Casemix**

Important factors in a patient’s chances of recovery and return to independent living in the community are the number of preexisting conditions they have and also the social supports around them (Glass et al 1993). Increasingly people are living to an older age often alone in their accommodation while managing multiple conditions and taking various medications. This section outlines the types of patient the acute stroke services care for and the risk factors that are present prior to the stroke event.

**Pre-admission accommodation**

Results show that 92% (800/873) of patients were living at home prior to stroke. This information was missing in 1 case. Data relating to whether the patient was living alone was missing in 44% (386/874) of cases and so considered unreliable, however, it does appear that 7.9% had a preexisting home care package in place.

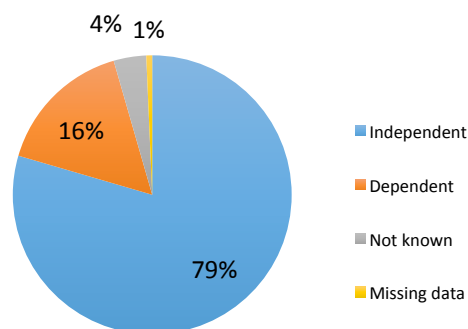
Table 4.18 Pre-admission accommodation

	Living at home	Residential nursing home	Hospital	Other
National Stroke Audit 2015	92%(800)	7% (61)	0.1% (1)	1.4% (12)
INASC 2008	92% (1934)	6% (127)	0.7% (15)	1% (27)

**Functional level pre-stroke**

The level of functional independence in patients prior to stroke was described as independent in approximately 80% of cases. 16% were described as dependent and in 4% of cases dependence was unknown (figure 4.6). INASC reported that 73% were independent pre-stroke in 2008. The UK SSNAP 2014 data finds that 72.4% have no significant disability prior to stroke (mRS 0-1). There was a very high prevalence of smoking, 20% (175) smoked prior to admission and 9% (77) said they drank alcohol to excess.

Figure 4.6 Functional level pre-stroke2015





## Prevalence and management of risk factors prior to stroke

### Pre-existing co-morbidities

The presence of known co-morbidities prior to stroke was recorded in 92% (804) of cases audited. 77.8% of those cases had a pre-existing co-morbidity with hypertension (58.6%) which was the most common condition. Atrial fibrillation was diagnosed in a quarter of patients before their admission. Of note 15.7% of patients had hypertension and atrial fibrillation, 9% had atrial fibrillation and a previous stroke or TIA, and 3.7% had hypertension, dyslipidemia, and atrial fibrillation prior to their stroke. Table 4.19 shows a comparison of this data with INASC 2008 and the UK SSNAP 2014 data.

Table 4.19 Pre-existing comorbidities

	National Stroke Audit 2015 % (n=874)	INASC % (n=2173)	UK SSNAP 2014 % (n)
Atrial fibrillation	24.3 (212)	22 (469)	20.7 (15385)
Previous stroke/TIA	22.9 (200)	25 (541)	27.3 (20292)
Diabetes mellitus	16.1 (141)	12 (260)	19.4 (14424)
Dyslipidemia	24.5 (214)	17 (372)	N/A
Hypertension	58.6 (512)	51 (1108)	53.7 (39918)
MI/Angina	11.3 (99)	14 (307)	N/A
Valvular heart disease	3.9 (34)	4 (92)	N/A

Table 4.20 Prevalence of multiple comorbidities

Number of comorbidities	National Stroke Audit 2015 % (n)	INASC % (n)	UK SSNAP 2014 % (n)
0 comorbidities	21.5(188)	22 (479)	25.8 (19204)
1 comorbidity	26.8 (234)	29 (626)	35.8 (26577)
2 comorbidities	28.8 (252)	24 (524)	26.5 (19705)
3 comorbidities	15.7 (137)	25 (544)*	9.8 (7300)
4 comorbidities	5.9 (52)	N/A	1.9 (1394)
5 comorbidities	1.3 (11)	N/A	0.2 (127)

### Prevention treatment for known modifiable stroke risk factors prior to admission

Pharmacological agents are often prescribed to reduce the risk of first stroke or prevention of further stroke from conditions such as hypertension, dyslipidemia or atrial fibrillation. In this cohort of patients 61% were on antihypertensive medication and 11.9% were prescribed anticoagulation. 43% were taking statin medication prior to admission. Of the 212 patients with known atrial fibrillation 39% (83) were on anticoagulation prior to admission, with 43% (91) on an antiplatelet, and a further 18% (38) on no blood thinning treatment. Medication pre- and post-discharge and how it compares to known risk factors are reviewed in a later section.

Table 4.21 Pre-stroke prevention treatment

Medications	National Stroke Audit 2015 % (n)	INASC 2008 % (n)
<b>Antihypertensives</b>		
Ace inhibitor	35 (308)	26 (567)
Alpha blocker	4 (34)	3 (71)
Beta blocker	31 (273)	18 (386)
Calcium channel blocker	19 (162)	10 (208)
Thiazide diuretic	8 (66)	9 (189)
Other	5 (42)	5 (105)
None	22 (190)	44 (954)
<b>Antiplatelet/anticoagulant</b>		
Aspirin	40 (346)	33 (724)
Clopidogrel	7 (65)	5 (114)
Dipyridamole	0.6 (5)	0.5 (11)
Warfarin	9 (76)	6 (136)
Asasantin retard	1.4 (12)	1 (29)
NOACs	2.9 (25)	N/A
Other	1 (8)	0.7 (15)
None	28 (241)	48 (1040)
<b>Lipid lowering treatment</b>		
Statin	43 (371)	21 (455)
Ezetimide	1 (10)	0.1 (3)
Niacin	0 (0)	0 (0)
Fibrates	0 (0)	0.05 (1)
Omacor	0.1 (1)	0.1 (3)
Other	0.1 (1)	0.1 (1)
None	35 (306)	75 (1627)

Pill burden, the number of medications a patient takes on a daily basis, is an important issue for both patient satisfaction, compliance and safety profile of medications (Osterberg et al 2005). Table 4.22 shows the breakdown of how many patients are on multiple agents in certain drug therapy categories. We found that 75% (n=654) of patients were on at least one medication prior to admission and that almost 8% (n=69) of patients had evidence of polypharmacy (5 or more medications) from just these drug classes.

Table 4.22 Number of medications prescribed on admission

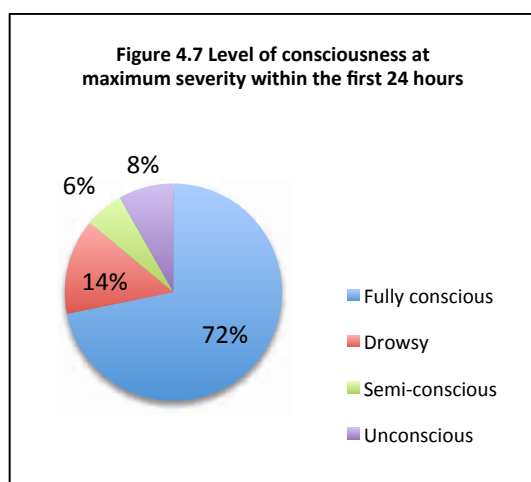
Number of medications	Antihypertensives % (n)	Antiplatelet/Anticoagulant % (n)	Cholesterol treatment % (n)
None	38.8 (339)	45.3 (396)	56.8 (496)
1	30.8 (269)	47.9 (419)	42.7 (373)
2	21.4 (187)	6.8 (59)	0.5 (5)
3	8.6 (75)	0 (0)	0 (0)
4	0.3 (3)		
5	0.1 (1)		

### 4.7 Standards of care

In this section the findings of the patient’s journey are presented and the care they receive up to the point of discharge from the acute hospital. Stroke multidisciplinary teams use specific guidelines when caring for patients with acute stroke, and the findings demonstrate how often it appears the teams are meeting those guidelines. It is helpful to view these results in the context of the findings of the organisational audit in particular with regard staffing. Firstly the results are presented to give a picture of the level of disability that patients present with in the early phase of their stroke. Secondly the findings are presented on a number of key interventions or assessments at different time points.

#### Standards within 24 hours

##### Levels of consciousness and impairments during the first 24 hours



The audit assessed the maximum severity of level of consciousness in the first 24 hours, with four options available (Figure 4.7). 72% were reported as fully conscious and 8% unconscious. SSNAP identify level of consciousness on arrival and report 83% as fully conscious and 3% unconscious. INASC specified the maximum severity within 7 days and reported 60% fully conscious and 14% unconscious. Low levels of consciousness in the initial phase of stroke is an early predictor of poorer outcome .

##### Symptoms and deficits documented with the first 24 hours

In relation to the symptoms documented within the first 24 hours each data point is calculated based on number of responses. The validation process showed a high rate of correlation for affirmative answers compared to answers of ‘no’ or ‘not known’.

The results indicate the positive results for each symptom and deficit.

Documentation of symptoms and deficits within the first 24 hours identified motor deficits in 71% of cases, followed by dysarthria (difficulty in articulation of speech) and dysphasia (difficulty in understanding and content of speech). Approximately 44% of the patients had at least 3 symptoms from the options presented in the first 24 hours.

Table 4.23 Symptoms and deficits within 24 hours n=number of responses

Symptom/Deficit	National Stroke Audit 2015 % (n)
Motor deficits n=868	71 (616)
Dysarthria n=864	43.1 (374)
Dysphasia n=871	37.9 (330)
Sensory impairment n=858	31.7 (272)
Cognitive difficulties n=864	31.4 (271)
Visual/perceptual difficulties n=868	29.2 (253)
Changes in mood n=856	7 (60)

## Swallow screening, visual field function and sensory function assessment at 24 hours.

Assessment of swallow screening was noted at 3 hours and at 24 hours as per national guidelines. The UK SSNAP 2014 records the initial swallow screening marker at 4 hours up to 72 hours. While the result of 6% swallow screening at 3 hours cannot be compared to INASC 2008 it is markedly below the SSNAP results of 55.8% within 4 hours. Only 36% of appropriate patients had their swallow screened within 24 hours. Assessment of visual fields and sensory testing remains largely unchanged since 2008. Comparison with the UK SSNAP data was not possible as it does not specify these item points, possibly as they are considered within the NIHSS which this audit has not identified as a data point.

Table 4.24 Patient assessment at 24 hours

	National Stroke Audit 2015	INASC 2008	SSNAP 2014
<b>Swallow screening within 3 hours % (n)</b>			
Yes	6 (53)	N/A	55.80*
No	73 (638)		
No but	20.3 (177)**		
Missing	0.7 (6)		
Yes applicable	7.6		
<b>Swallow screening within 24 hours % (n)</b>			
Yes	29.4(257)	26 (564)	81.20***
No	51.4 (449)	55 (1188)	
No but****	18.4 (161)	17 (365)	
Missing	0.8 (7)	2 (56)	
Yes applicable	36		
<b>Formal visual assessment % (n)</b>			
Yes	47.8 (418)	46 (992)	
No	34.1 (298)	29 (633)	
No but*****	17.4 (152)	22 (479)	
Missing	0.7 (6)	3 (69)	
Yes applicable	58.9		
<b>Formal sensory assessment % (n)</b>			
Yes	56.3 (492)	53 (1157)	
No	26.3 (230)	21 (466)	
No but*****	16.9 (148)	22 (471)	
Missing	0.5 (4)	4 (79)	
Yes applicable	67.7		

\* SSNAP 2014 = within 4 hours

\*\* No, but if: Impaired level of consciousness is documented

\*\*\* SSNAP 2014 = within 4 hours + within 12 hours + within 24 hours

\*\*\*\* No, but if: Impaired level of consciousness is documented

\*\*\*\*\* /\*\*\*\*\* No, but if: Impaired level of consciousness/communication is documented

**Standards within the first 48 hours.****Assessment by health and social care professional within 48 hours.**

With regard to therapy during admission the audit finds that responses for each profession varied. Based on responses to each discipline, referrals at any point during admission to the different therapists were; physiotherapy - 79% (686/867), occupational therapy - 70% (603/863), speech and language therapy - 62% (533/862), psychology 3.5% (29/824). Data related to goal setting and patient participation in goal setting was unreliable and so is not used in this report.

Both INASC and SSNAP collate admission times differently, Table 4.25 indicates the results of assessments within 48 hours per discipline and compares to 72 hours in INASC and 24 hours in SSNAP.

Table 4.25 Patient assessment in first 48 hours of admission after stroke

	National Stroke Audit 2015- within 48 hours % (n)	INASC 2006 - within 72 hours % (n)	SSNAP 2014 - within 24hrs % (n)
<b>Speech and language therapist assessment % (n)</b>			
<b>Yes</b>	37 (320)	25 (548)	20.2 (15005) within 12 hours
<b>No</b>	29 (251)	39 (844)	
<b>No but *</b>	33 (296)	33 (713)	
<b>Missing</b>	1 (7)	2 (47)	
<b>Yes applicable</b>	55.4%		
<b>Physiotherapy assessment %(n)</b>			
<b>Yes</b>	53 (466)	43 (929)	48.3 (35813)
<b>No</b>	25 (219)	41 (895)	
<b>No but **</b>	21 (185)	13 (282)	
<b>Missing</b>	0.5 (4)	3 (67)	
<b>Yes applicable</b>	67.6%		
<b>Occupational therapy assessment %(n)</b>			
<b>Yes</b>	30 (262)	N/A	36.5% (27087)
<b>No</b>	43 (374)	N/A	
<b>No but ***</b>	27 (232)	N/A	
<b>Missing</b>	1 (6)	N/A	
<b>Yes applicable</b>	40.8%		

\* No but... if: the patient's swallowing is documented as normal, patient is still unconscious, patient dies within 48 hours, patient is receiving palliative care.

\*\*No but ... if: patient dies within 48 hours, patient is receiving palliative care, no physical need/deficit.

\*\*\*No but ... if: patient died within 48 hours, the patient is still unconscious, it is documented that the patient had no difficulties performing everyday activities, patient is receiving palliative care.

### Standards of care within 48 hours

Standards of care within 48 hours have remained comparable in relation to nutrition. Screening for nutrition e.g. MUST, and assessing falls risk was not widely used until recent years and so cannot be compared against INASC. Commencement on aspirin within 48 hours has risen from 45% in INASC 2008 to 70% in the current audit. Numbers receiving nutrition and methods of taking nutrition have not changed considerably.

Table 4.26 Standards of care within 48 hours.

	National Stroke Audit 2015- within 48 hours % (n)	INASC 2008 - within 72 hours % (n)
<b>Aspirin commenced by 48 hours</b>		
Yes	70 (609)	45 (950)
No	7 (63)	32 (672)
No but *	22.5 (197)	22 (470)
Missing	0.5 (5)	4 (82)
Yes applicable	89.9%	
<b>Nutritional screening within 48 hours</b>		
Yes	33 (291)	N/A
No	56 (492)	N/A
No but **	9 (80)	N/A
Missing	1 (11)	N/A
Yes applicable	36.7%	
<b>Was patient receiving nutrition by 48 hours</b>		
Yes	82 (716)	81 (1767)
No	8 (70)	7 (152)
No but ***	9 (81)	8 (176)
Missing	1 (7)	4 (78)
Yes applicable	90.3%	
<b>Type of method used to feed</b>		
Oral	77 (672)	82 (1455)
Nasogastric/PEG****	7 (58)	12 (216)
Intravenous	3 (28)	4 (70)
Missing	13 (116)	1 (26)
<b>Falls assessment</b>		
Yes	66 (575)	N/A
No	25 (222)	N/A
Missing	9 (77)	N/A

\* No, but... if: the patient died, patient had intracerebral haemorrhage, there was a documented contraindication to aspirin or they were given an alternative antiplatelet or anticoagulant.

\*\* No, but... if: patient refused or patient receiving palliative care.

\*\*\* No, but... if: patient refused or patient receiving palliative care.

\*\*\*\*PEG- percutaneous endoscopic gastrostomy

**Standards within 7 days.****Health and social care professional standards within 7 days.**

Communication assessments by speech and language therapy have increased since INASC 2008 from 29% (636) to 49% (427). When adjusted to allow for patients who do not require assessment the rate rises to 79% (427/541), however this is below the SSNAP rate of 91.6% (31691). Similarly, rates of assessment within 7 days by occupational therapy has risen from 22% (476) to 58% (508) since INASC 2008. Again, adjusting for rates of assessment based on appropriate patients the rate rises to 78% (508) which is lower than the SSNAP result of 97.2% (57331). Assessment by a medical social worker within 7 days remains similar with reports from INASC 2008. Social services are community based in the UK and data is not comparable in this report.

It was evident that by discharge 79% of patients were referred to a physiotherapist, 70% to occupational therapy, 62% to speech and language therapy, and 3.5% to psychology. Responses with regard goal setting performed poorly in reliability testing but we will review this important area further in the discussion section of the report.

Table 4.27 7 day standards for HSCP assessment

Standards	National Stroke Audit 2015 n=874	INASC 2008 n=2173
<b>Communication assessment by SLT</b>		
% (n)		
Yes	49 (427)	29 (636)
No	13 (114)	30 (658)
No but *	37 (326)	37 (804)
Missing	1 (7)	3 (74)
Yes applicable	78.9	
<b>Occupational Therapy assessment</b>		
% (n)		
Yes	58 (508)	22 (476)
No	16 (144)	45 (977)
No but **	25 (216)	30 (646)
Missing	1 (6)	3 (74)
Yes applicable	77.9	
<b>Medical Social Worker assessment</b>		
% (n)		
Yes	18 (162)	13 (283)
No	34 (300)	38 (835)
No but ***	47 (409)	45 (982)
Missing	0.5 (3)	3 (73)
Yes applicable	35.1	

\* No but... if: patient died within 7 days; the patient was still unconscious; it is documented that the patient had no communication problems; patient is receiving palliative care.

\*\* No but... if: patient died within 7 days; the patient was still unconscious; it is documented that the patient had no difficulties performing everyday activities; patient is receiving palliative care.

\*\*\* No but... if: patient not referred to social worker; patient died within 7 days; patient refused.



### Management of urinary continence.

The management of urinary continence findings are remarkably similar to INASC 2008 (Table 4.28). There does appear to be fewer catheterisations due to urinary incontinence down to 17% (32) compared to 31% (179) in INASC 2008, however, it remains poorly documented as to the reason why a patient was catheterised. Data adjusted to promote continence in incontinent patients only suggests that 25.5% (82/322) have a continence plan which is lower than the INASC 2008 result of 30% (278/918). SSNAP 2014 reports that 76.9% (26791) of applicable patients have a documented continence plan.

Table 4.28 Continence management

Standards	National Stroke Audit 2015 n=874	INASC 2008 n=2173
<b>Indwelling urinary catheter % (n)</b>		
Yes	21 (183)	26 (569)
No	74 (644)	70 (1515)
No but	5 (41)	N/A
Missing	1 (6)	4 (89)
Yes applicable	21.9%	
<b>Reason for catheterisation n=183 % (n)</b>		
Urinary retention	22 (41)	15 (83)
Pre-existing catheter	4 (8)	2 (14)
Urinary incontinence	17 (32)	31 (179)
Fluid balance monitoring	23 (42)	21 (119)
Critical skin care	7 (13)	6 (36)
Not documented	22 (40)	25 (145)
Other	6 (10)	N/A
Missing	16(29)	5 (30)
<b>Plan to promote urinary continence % (n)</b>		
Yes	9 (82)	13 (278)
No	26 (226)	23 (498)
No but *	63 (552)	58 (1255)
Missing	2 (14)	7 (142)
Yes applicable	25.5%	

\* No but... if: patient is continent; patient died within 7 days; patient is unconscious; patient is receiving palliative care.

**Prevalence of urinary tract infection and pneumonia rates in 7 days.**

The development of urinary tract infections is comparable with SSNAP 2014, table 4.29.  
Rates of pneumonia are higher than reported in SSNAP, table 4.29.

Table 4.29 Urinary tract infection and pneumonia prevalence in 7 days

	<b>National Stroke Audit 2015</b>	<b>SSNAP 2014</b>
<b>Urinary tract infection</b>		
<b>% (n)</b>		
Yes	6 (54)	5 (3311)
No	90 (783)	91.8 (61301)
Not known	4 (37)	3.3 (2186)
<b>Pneumonia</b>		
<b>% (n)</b>		
Yes	16 (144)	8.5 (5702)
No	79 (692)	88.2 (58931)
Not known	4 (38)	3.2 (2165)

## Standards by discharge.

### Screening by discharge.

There is an increase in the numbers of patients weighed during their admission, 65% (566) from 41% (891) in INASC 2008. Assessment of mood and cognition have increased moderately, however, when adjusted to include applicable patients only the results are poor in comparison to SSNAP 2014 with mood assessed 37.5% (289/770) versus 85.6% (34390) in SSNAP 2014 and cognitive assessment 58.4% (437/748) versus 84% (34390) SSNAP 2014.

Table 4.30 Screening by discharge

Standards	National Stroke Audit 2015 n=874	INASC 2008 n=2173
<b>Was patient weighed % (n)</b>		
Yes	65 (566)	41 (891)
No	26 (228)	45 (980)
No but *	9 (76)	11 (242)
Missing	0.5 (4)	3 (60)
Yes applicable	70.9%	
<b>Assessment of mood % (n)</b>		
Yes	33 (289)	28 (612)
No	54 (474)	56 (1222)
No but **	12 (104)	13 (278)
Missing	1 (7)	3 (61)
Yes applicable	37.5%	
<b>Assessment of cognition % (n)</b>		
Yes	50 (437)	41 (879)
No	36 (311)	42 (922)
No but ***	14 (126)	14 (314)
Missing	0	3 (58)
Yes applicable	58.4%	

\* No but... if: patient died within 7 days, patient unconscious throughout.

\*\* No but... if: patient died within 7 days, patient unconscious throughout.

\*\*\* No but... if: patient died within 7 days, patient unconscious throughout or receiving palliative care.

## Care planning

Documentation of multidisciplinary team case discussions with a senior decision maker was reported at 51% (445/874) and of applicable cases at 65% (445/684). This question did not correlate well within the validation audit, with results lying outside the interquartile range for this data point. There may have been some misinterpretation of the question.

Table 4.31 Standards of care by hospital (applicable case results presented)

	Swallow Screen at 24 hours %	SLT at 48 hours %	OT at 48 hours %	Physio at 48 hours %	Nutrition Screen %	Weighed during admission %
<b>National</b>	<b>36</b>	<b>56</b>	<b>41</b>	<b>68</b>	<b>37</b>	<b>71</b>
<b>Ireland East</b>	41	61	41	75	51	84
<b>Dublin Midlands</b>	38	52	37	73	33	82
<b>RCSI Hospitals</b>	36	52	44	70	46	70
<b>UL</b>	18	47	43	60	0	74
<b>South Southwest</b>	35	54	42	58	26	53
<b>North Northwest</b>	37	64	42	66	39	65
MMUH	39	68	34	67	49	81
SVUH	33	60	31	68	64	92
MRHM	39	64	74	89	40	93
WGH	45	68	80	86	73	79
SLHK	58	43	0	83	57	96
OLHN	28	50	19	59	11	50
SJH	47	79	36	79	75	80
AMNCH	67	54	29	71	3	88
NGH	30	50	35	79	25	91
MRHT	17	21	72	72	27	83
MRHP	11	42	12	61	28	52
OLOLHD	16	37	37	78	19	68
CGH	50	62	62	84	89	72
BH	53	54	54	74	21	64
CH	25	16	16	32	82	86
MWRH	18	43	43	60	0	74
UHW	60	71	71	80	17	45
STGH	13	0	0	52	15	41
CUH	24	23	23	48	19	47
KGH	45	70	70	75	100	0
MUH	13	67	67	46	0	97
BGH	91	20	20	38	0	70
UCHG	19	20	20	73	21	56
PH	11	21	21	64	5	68
MGH	59	12	12	60	0	60
SGH	16	65	65	75	56	33
LGH	64	68	68	60	91	100

#### 4.8 Risk factors and secondary prevention

An important risk to suffering a stroke is having had a previous stroke. This underlies the importance of appropriate screening and management of the causes of stroke in the secondary prevention setting. Coupled with this principle is the clear communication and education of modifiable risks to the patient including smoking, alcohol consumption and physical activity. Underpinning successful risk reduction in any disease process is empowerment of patients through knowledge of their condition.

##### Risk factors defined at discharge

In 71% (617) of cases the cause of stroke was identified by discharge. In 13% (112) of cases the cause was not identified and in 16% (139) of cases the cause was not documented. Data was missing in 0.7% (6) of cases. Table 4.32 presents the comparison with INASC 2008, which is similar in most items, however, the biggest variance is the number of cases identified with atrial fibrillation in patients with a known cause of stroke increased from 28% (317) in 2008 to 44% (269) in the current audit. This is the only risk factor data collected in SSNAP 2014 and the reported rate is 21.5% (12174).

In just under 30% of cases, 2 or more risk factors were identified as implicated in the cause of stroke. Review of the 20% 'other' causes shows how heterogenous stroke can be. A number of cases are reported secondary to vertebral and carotid dissection, dyslipidemias, and structural cardiac problems such as ventricular thrombus, aortic arch atheroma and diseased valves. Amyloid angiopathy is an uncommon but important cause of stroke. Hypo-perfusion or reduced blood flow to the brain generally due to low blood pressure also was identified in a number of cases. Medications were associated with the aetiology for example sub-therapeutic control of anticoagulation leading to further atrial fibrillation related stroke and stroke potentially caused by the drugs themselves e.g. chemotherapeutics and NSAIDs. Rarer cases were also reported including antiphospholipid syndrome, lupus related stroke, and CADASIL.

Table 4.32 Risk factors as identified at discharge

	National Stroke Audit 2015 n=617 % (n)	INASC 2008 n=1114 % (n)
Carotid stenosis	14 (89)	11 (118)
Current smoker	16 (100)	14 (156)
Alcohol excess*	7 (41)	6 (67)
Atrial fibrillation	44 (269)	28 (317)
Myocardial infarction within last month	1 (6)	4 (48)
Hypertension	50 (302)	56 (623)
Diabetes mellitus	14 (88)	14 (154)
Other	20 (123)	N/A

\* (no. of units per week >14 for females, >21units for males)

### Lifestyle risk factors

Documentation of lifestyle factors, relevant to the patient, to promote secondary prevention following stroke has improved since INASC 2008. Table 4.33 presents documentation of discussion with the patient and/or the carer of lifestyle issues where the lifestyle factor is relevant.

Initially, 20% (175) of patients were documented as smokers on admission and 9% (77) were documented as drinking alcohol to excess. However, on discharge the data suggests that more patients required information on smoking cessation (247) and alcohol reduction (193) than were initially reported as having these risk factors on admission. However of the 175 patients identified as current smokers on admission, 57% (100) had documented evidence of smoking cessation advice or support.

Table 4.33 Documentation of lifestyle risk factor discussion

Risk factor	National Stroke Audit 2015 % (n)	INASC 2008 % (n)
Smoking cessation	46 (113)	13 (199)
Alcohol reduction	35 (68)	10 (149)
Exercise	41 (173)	12 (193)
Diet	44 (202)	20 (318)

### Lipid profiles.

Sixty-four per cent of patients had a cholesterol profile checked. This revealed an average cholesterol result of 4.38 (Range 1.92-9.74) and a LDL average of 2.53 (range 0.5-6.83). Over 28% (164/560) of cholesterol levels checked were 5.0 or over and 32% (159/499) had a LDL level of 3.0 or greater.

### Discharge medication profile

Following a stroke event, particularly an ischaemic type event, a number of medications are potentially indicated based on the risk factor profile of the patient. Table 4.34 summaries the prescribing trends in the major medication classes targeted following stroke, noting that half the patients discharged are on aspirin and two-thirds of patients are on statins. These trends will be discussed further in the discussion section.

Table 4.34 Discharge medication

Class	Medication	National Stroke Audit 2015 n=874 % (n)	INASC 2008 n=2078 % (n)
<b>Anti hypertensives</b>	Ace inhibitor	40 (352)	45 (941)
	Alpha blocker	3 (28)	4 (89)
	Beta blocker	28 (244)	22 (453)
	Calcium channel blocker	19 (166)	12 (256)
	Thiazide diuretic	5 (48)	10 (213)
	Other	3 (25)	4 (89)
	<b>Antiplatelet/antithrombotic</b>	Aspirin	50 (434)
Clopidogrel		12 (103)	9 (191)
Dipyridamole		1 (12)	2 (46)
Warfarin		12 (101)	13 (274)
NOAC		10 (86)	N/A
Asasantin retard		2 (19)	7 (137)
Other		2 (15)	1 (25)
<b>Lipid lowering treatment</b>		Statin	65 (572)
	Ezetimide	0.5 (5)	0.4 (9)
	Niacin	0.1 (1)	0.05 (1)
	Fibrates	0.3 (3)	0.1 (2)
	Omega 3	0.1 (1)	0.05 (1)
	Other	0.2 (2)	0.7 (15)

#### 4.9 Patient communication and research

Discussion with patients about diagnosis and prognosis has slightly improved since INASC 2008. However only marginally more than 50% of patients have discussions about their diagnosis documented, with even less documenting discussing about prognosis.

Table 4.35 Communication and research

	National Stroke Audit 2015	INASC 2008
<b>Documented evidence of discussion with patient about diagnosis</b>		
<b>% (n)</b>		
Yes	51 (444)	22 (469)
No	28 (244)	50 (1087)
No But*	21 (183)	24 (530)
Missing	0.3 (3)	4 (87)
<b>Documented evidence of discussion with patient about prognosis</b>		
<b>% (n)</b>		
Yes	37 (312)	18 (382)
No	41 (364)	53 (1162)
No But**	22 (193)	25 (533)
Missing	0.5 (5)	4 (96)

Answer No but...

\*/\*\* Patient unconscious throughout died or has severe receptive or cognitive difficulties.



#### 4.10 Discharge planning from hospital and onward referral

Continuing with the theme of good communication this section deals with how hospital stroke services communicate and manage a patient's discharge. This vital step can often be the source of difficulties including absence or delay of therapy and community supports, and readmissions due to medication errors for example (Payne et al 2002). With regards onward referral for services, information gathered relates the intention to refer to services as described in the medical notes. This does not equate to the actual experience of follow up of the patient and was outside the remit of this audit.

##### Assessment of carers' needs

Documentation of assessment of carers' needs has marginally improved at 30% (260) but even when adjusted for applicability, only 51% of cases document that carers have their needs assessed. Documentation of teaching skills to carers remains low but when adjusted for applicability 45% of cases have documentation of skills being taught. Of those who had a home visit 53% (19) of visits included the patient, which is down from 77% (118) in INASC 2008.

Table 4.36 Documentation of assessment of needs at home

	National Stroke Audit 2015	INASC 2008
<b>Assessment of carers needs</b>		
<b>% (n)</b>		
Yes	30 (260)	24 (524)
No	28 (244)	39 (857)
No But	41 (360)	32 (692)
Missing	1 (10)	5 (100)
<b>Skills required to care for patient at home were taught</b>		
<b>% (n)</b>		
Yes	16 (136)	12 (257)
No	19 (163)	19 (400)
No But	65 (570)	65 (1420)
Missing	0.5 (5)	4 (96)
<b>Home visit performed</b>		
<b>% (n)</b>		
Yes	4 (36)	7 (153)
No	28 (241)	27% (588)
No But	68 (590)	62 (1342)
Missing	1 (7)	4 (90)

Answer No but...

\* if patient died; patient discharged to institutional care; it is documented that the carer is not participating in the patient's care; patient was self-caring by discharge

\*\* if it was documented that there was no carer, if patient sent to another hospital /institution; was functionally competent, there was no change in functional ability from before stroke; if plan to perform home visit on discharge; patient died or patient or care refused.

\*\*\* if it was documented that there was no carer, if patient sent to another hospital /institution; was functionally competent, there was no change in functional ability from before stroke; if plan to perform home visit on discharge; patient died or patient or care refused.

**Information to the general practitioner (GP)**

A discharge letter was sent at some point to the GP in 89% (776) of cases, although it was unclear how many letters were prepared before or at the time of discharge as recommended in the RCPUK guidelines. The death of the patient was the main reason for not sending a discharge summary to the GP along with transfers to rehabilitation from the acute care setting. Within the discharge letters 90% (698) have a documented diagnosis, 84% (655) have a treatment plan, 54% (421) document complications, 83% (643) document the medications on discharge and 41% (318) describe functional ability on discharge (INASC 2008 report 24%).

Table 4.37 Discharge letter information

	Diagnosis	Treatment	Complications	Medications on discharge	Functional Ability
National Stroke Audit 2015	90% (698)	84% (655)	54% (421)	83% (643)	41% (318)
INASC 2008					24% (512)

**Onward referral from hospital**

Table 4.38 Early supported discharge summary

With regards onward referral for services significant numbers of patients were transferred to offsite rehabilitation units where more definitive follow up in the community is arranged. Early supported discharge is a new service since the INASC 2008 audit with 3 teams covering 4 hospitals (1 Mater Misericordiae University Hospital, 1 University College Hospital Galway, and 1 AMNCH/St James’s). Other sites had patients referred to ESD, possibly as their home address was within the catchment of the ESD team, and Naas General Hospital have developed an outpatient based version of ESD in the absence of an available team.

<b>National Stroke Audit 2015</b>	
Early supported discharge team n=41	
Mater Misericordiae University Hospital	n= 14 (35% of their patients)
ANMCH/St James’s Hospital	n=12 (16% of their patients)
University College Hospital Galway	n=4 (14% of their patients)
Other	n=11

Table 4.39 summarises referral intentions following acute admission. It is important to note that intention to refer on discharge was assessed from the medical notes and does not provide information on speed of access, type or intensity of assessment/intervention provided for various community services.

Table 4.39 Referral into community services

	<b>National Stroke Audit 2015 % (n/number of responses)</b>
Early supported discharge team	5.2 (41/743)
Public health nurse	29.9 (223/746)
Physiotherapy	13.7 (102/742)
Occupational therapy	13.9 (104/745)
Speech and language therapy	8.7 (65/745)
Clinical nutrition	2.5 (19/746)
Psychology	0.4 (3/745)
Liaison psychiatry	2 (13/744)
Community rehabilitation team	2.4 (18/743)
Hospital based therapy out patients	5.2 (39/744)
Day hospital	4.2 (31/743)
In patient rehabilitation unit	5 (37/743)
Off site rehabilitation unit	17.2 (128/746)
Baggot Street Hospital	0.8 (6/734)
National Rehabilitation Hospital	4.3 (32/743)
Volunteer Stroke Scheme	0.14 (1/743)
Headway	0.9 (7/743)

#### 4.11 Outcome

A strength of performing clinical audit is in assessing outcome against designated standards and guidelines. In stroke medicine as with most illnesses, reviews of mortality figures, level of disability and discharge location are key markers in quality of care. Lengths of stay results are also presented, although interpretation of these results must factor in the different models of care on the various acute hospital sites.

#### Hospital length of stay

Data related to length of stay for patients who had died were available in 100% of cases. Length of stay data for survivors were missing in 1% (6) of cases. Results indicate that the average length of stay when discharged alive has reduced by 7 days since INASC 2008. However while the mortality rate has reduced, the length of stay to death has increased by 7 days. SSNAP 2014 include both deaths and survivors in their length of stay data. When this data is adjusted to include both, the results indicate that the length of stay rises to 27.9 days, 10 days more than the UK. Variation exists from site to site nationally depending on model of care provided. A number of sites provide onsite rehabilitation, which has the knock on effect of increasing average length of stay in these units.

Table 4.40 Length of hospital stay

	National Stroke Audit 2015	INASC 2008	SSNAP 2014 *
<b>Length of stay to discharge alive</b>	Mean 22.4 days	Mean 29.8 days	Mean 17.3
	Median 11 days	Median 14 days	Median 7.2 days
	IQR 6-23 days	IQR 7-30 days	IQR 3-21.1 days
<b>Length of stay to death</b>	Mean 33.4 days	Mean 26 days	N/A
	Median 9days	Median 9days	
	IQR 3-20 days	IQR 3-24 days	

\* Length of stay includes length of stay to death

### Discharge level of disability

The median Barthel Index score upon discharge was 19, where a score of 20 equates to full independence and a score of 0 equates to complete dependence on all activities of daily living. Over half of patients were discharged either fully independent or near-full independence, with 52% (378/727) discharged with a Barthel score of 19-20. Eleven per cent of discharge patients (81/727) had a Barthel score of 3 or less, indicating severe impairment of activities of daily living. Just under 10% of patients (72/744) were reported discharged home with a home care package.

Table 4.41 National summary of length of stay and discharge location

	ALOS (days)	Median LOS (days)	IQR 25 LOS	IQR 75 LOS	Discharged home %	Discharged to offsite rehab %	Discharge to NH %
<b>National</b>	<b>22.1</b>	<b>11</b>	<b>6</b>	<b>23</b>	<b>54.7</b>	<b>16.3</b>	<b>11.4</b>
<b>Ireland East</b>	21.4	10	5	22.75	51.3	23.8	8.8
<b>Dublin Midlands</b>	30	11.5	6	29	66.7	6.2	13.7
<b>RCSI Hospitals</b>	19.5	10	6	15.25	57.8	18.5	9.6
<b>UL</b>	11.2	9	7	14	58.9	17.5	12.8
<b>South Southwest</b>	20.1	11	6	25	49.5	16.2	15.8
<b>North Northwest</b>	22.5	12	7	24.5	49.7	14.2	8.4
MMUH	17.9	11	6	19	50	27.5	7.5
SVUH	28.5	15	6.5	31.5	52.5	25	12.5
MRHM	13.3	10	5	15.5	58.8	11.8	2.9
WGH	21.2	11.5	6	19.25	44.8	41.4	6.9
SLGH	12	6	4	12	53.3	20	6.7
OLHN*	39.8	22	7	68	45	15	20
SJH*	52.1	39	10	87	56.8	5.4	19.4
AMNCH	19.8	10	6.5	20.5	69.4	8.3	5.5
NGH	29.9	10	5	26	76.5	3	14.7
MRHT	12.35	9	3.75	15.5	75	0	8.7
MRHP	27.47	14	8	26	54.6	13.6	18.2
OLOLD	9.2	9	6	13	52.5	34.1	7.3
CGH	15.8	12	7	21	57.1	21.4	7.1
BH	21.7	12.5	8.25	21	63.4	13.9	13.9
CHB*	40.15	9.5	5	29.75	60	8	12
MWRH	11.2	9	7	14	58.9	17.5	12.8
UHW	24.3	8.5	5.75	35.75	22.9	25.7	22.9
STGH	14.3	11.5	6	16.25	51.4	29.7	16.2
CUH	15.1	7	4	13.5	68.6	5.9	2.9
KGH*	20.8	16.5	6.75	36.75	53.3	0	13.3
MUH	17.8	11	7	20	34.5	30	24.1
BGH*	34.5	26.5	10	40.5	64	0	16
UCHG	33.9	22	13	39.25	57.1	0	10.7
PH	18.2	11	8	18.25	38.5	16	12.5
MGH	13.9	11	9.25	16.5	25.7	48	5.7
SGH	9.8	7	5	13	52.9	23.5	2.9
LGH*	37	18	9.25	42.75	73.5	0	12.1

- \* Onsite rehab facility

### Discharge accommodation

More patients were discharged home from the acute hospitals compared to INASC 2008, 63% vs 56% (table 4.42). However, SSNAP 2014 indicates that 79% (39490) of patients are discharged home, with the support of early supported discharge and community rehabilitation teams in 8% (7685) of cases. The paucity of current coverage nationally by ESD teams likely contributes to lower discharge home rates currently in Ireland.

Table 4.42 Accommodation at discharge of patients discharged alive

This audit also specified off-site rehabilitation as discharge accommodation data point, which was not specified in INASC 2008 nor SSNAP 2014. Adding this data point has likely affected rates reported both for discharge home and to long term care. It could be inferred therefore that the ultimate discharge home rate is higher than 63%. However ultimate discharge to residential nursing homes may be slightly higher than reported as not all rehabilitation can successfully discharge to home. This change may also explain the variance between discharges to hospital from 12% in 2008 to 6% in 2015, 'hospital' may have been off-site rehabilitation in many cases.

	<b>National Stroke Audit 2015 n753 % (n)</b>	<b>INASC 2008 n1670 % (n)</b>
Home	63 (472)	56 (931)
Residential nursing home	13 (98)	19 (324)
Hospital	6 (44)	12 (204)
Off-site rehabilitation	19 (140)	N/A
Other	N/A	8 (127)
Missing	0	5 (84)

Seven per cent (61) of patients were admitted to the acute hospital from a residential nursing home with two-thirds (40) of these patients being discharged back to the nursing home. These patients are included in the total numbers of discharges to residential nursing homes. When adjusted to account for new cases of institutionalised patients the rate falls from 15% in INASC 2008 to 8% in 2015.

### In-patient mortality

In-patient mortality data was available for 99% (868) of cases (1%, 6 cases missing). All of the missing cases indicate that the patient did not die as an in-patient. 14% (121) died as an in-patient down from 19% (408) in INASC 2008 and less than the 15.3% (10193) reported in SSNAP 2014. A more detailed discussion of mortality figures is discussed in a later section.

Table 4.43 Mortality

	<b>National Stroke Audit 2015 % (n)</b>	<b>INASC 2008 % (n)</b>	<b>SSNAP 2014 % (n)</b>
Died in hospital	14 (121)	19 (408)	15.3 (10193)

#### 4.12 Thrombolysis of ischaemic stroke

81 cases of patients who received thrombolysis were reported within the 874 case total. This suggests a national thrombolysis rate of 10.9% when excluding haemorrhagic strokes. This rate compares favourably with SSNAP UK 2014. Table 4.44 shows thrombolysis rates both nationally and locally, with the caveat that our audit captured a particular point in time and as stated previously the sample sizes are small and therefore comparison between sites is not appropriate. Where the different thrombolysis rates from different sites are presented for the local stroke teams' interest, confidence intervals are also included.

Table 4.44 National thrombolysis figures

The youngest person reported to receive thrombolysis was 36, and the oldest person was 93 years of age. 37% of patients receiving thrombolysis were 80 years or older.

	Thrombolysed n=81	National total n=874
Age	71.4 (36-93)	73.3 (22-102)
Male: Female	1.13:1	1.39:1

As would be expected but important to highlight, more patients arrive by ambulance, present sooner and are scanned quicker in the group receiving thrombolysis.

Table 4.45 Factors affecting thrombolysis rate

	Thrombolysed n=81	National total n=874
Ambulance arrival	88%	64%
Median time of onset to presentation (mins)	85	146
Median time of onset to scan (mins)	142	373
Median time to scan from presentation (mins)	46	182

Table 4.46 Thrombolysis group outcomes versus national group

	Thrombolysed n=81	National total n=874
Median length of stay (days)	13.5	11
Preadmission independent in ADLs	83%	80%
Preadmission living in nursing home	7.4%	7%
New admissions to nursing home	7.4%	
Mortality	11.1%	13.8%

Similar levels of dependency prestroke appear in the thrombolysis group when compared with the national total. Of note 6 patients who were nursing home residents received the treatment. The mortality rate is 11% in thrombolysis group.

Patients who received thrombolysis had both higher use of high dependency beds and overall stroke unit admissions when compared to the national group. The higher dependency bed use can be explained by local hospital procedures to admit patients to these beds following receipt of thrombolytic agents.

Table 4.47 Stroke unit access for thrombolysis group

	Thrombolysed n=81 %	National total n=874 %
Admitted to SU initially	41	29
Admitted SU anytime	82	54
>50% of stay in SU	68	47
High dependency bed admission	48	11

Table 4.48 Standards of care for thrombolysis group

	Thrombolysed n=81 %	National total n=874 %
Swallow at 24 hours	55	36
Aspirin at 48 hours	91	91
SLT at 48 hours	83	56
Physio at 48 hours	74	68
OT at 48 hours	42	41
Pneumonia	22	16
Catheter inserted	32	22

Swallow assessment by 24 hours for patients who received thrombolysis is higher than the national average. Assessment in general is higher for most therapies in the first 48 hours despite access to these patients often being restricted in the first 24 hours. Catheter insertion appears higher than the national average as does the rate of pneumonia cases.

Existing comorbidities were present in 75% of the thrombolysis group, comparable with the national figure, although there was a higher rate of previous stroke or TIA in this group. The lower anticoagulant rate most likely is explained by the fact these patients will often be excluded from thrombolytic therapy due to bleed risk.

Table 4.49 Casemix of thrombolysis group

	Thrombolysed n=81 %	National total n=874 %
Existing Comorbidities	75	78
Previous Stroke or TIA	23.5	23
Already on aspirin	44	40
Already on anticoagulant	6	12
Presenting with motor symptoms	88	71
Presenting with dysphasia	58	38
Cause identified	79	71
AF as causal factor	38	31
Carotid stenosis as causal factor	16	10



Table 4.50 Comparison of thrombolysis rates nationally

	Thrombolysed (n)	Thrombolysis rate excluding bleeds % n=742	95% Confidence Interval	Thrombolysis rate of total strokes % n=874
<b>National</b>	<b>81</b>	<b>10.9</b>	<b>±2.24</b>	<b>9.3</b>
<b>Ireland East</b>	23	13.8	±5.2	11.8
<b>Dublin Midlands</b>	12	9.6	±4.8	7.8
<b>RCSI Hospitals</b>	12	10	±5.37	8.9
<b>UL</b>	13	37.1	±16.01	32.5
<b>South Southwest</b>	15	9.2	±4.46	7.8
<b>North Northwest</b>	6	4.9	±3.81	3.8
MMUH	11	31.4	±15.38	27.5
SVUH	3	8.8	±9.56	7.5
MRHM	5	16.1	±12.95	14.7
WGH	1	4	±7.68	3.3
SLHK	2	7.7	±11.86	6.7
OLHN	1	6.3	±10.24	4.8
SJH	4	12.1	±11.14	10.8
AMNCH	4	12.5	±11.46	11.1
NGH	4	13.3	±12.16	11.4
MRHT	0	0		0
MRHP	0	0		0
OLOL	1	2.7	±5.23	2.7
CGH	1	3.9	±7.39	3.6
BH	8	23.5	±14.26	19.5
CH	2	8.7	±11.52	8
UHL	13	37.1	±16.01	32.5
UHW	3	12	±12.74	8.6
STGHC	3	9.7	±10.41	8.1
CUH	2	6.5	±8.65	5.7
KGH	1	3.7	±7.12	3.3
MGH	4	14.8	±13.4	13.3
BGH	2	9.5	±12.55	8
UCHG	1	5.3	±10.04	3.6
PH	0	0		0
MGH	2	8	±10.63	5.7
SGH	1	3.6	±6.87	2.9
LGH	2	6.25	±8.39	5.9

### 4.13 Mortality

The mortality figures show an inpatient mortality rate of 14% (n=121) compared with 19% in INASC 2008 and 15.3% in SSNAP UK 2014. Every effort was made to obtain a reflective figure of inpatient mortality but in the process of chart review missing charts potentially (see Figure 4.1) would affect the overall accuracy of the figure. However when compared with available data from the stroke register, the national figure appears accurate. The mortality rate is very encouraging when compared internationally.

Table 4.51 Mortality age and gender profile

As expected this group were significantly older than the national average and as also be expected with increasing age, the gender ratio shifts towards increasing female deaths.

	Deaths n=121	National total n=874
Age	80.7	73.3
Male:Female	0.78:1	1.39:1

Table 4.52 Preadmission dependency in mortality group

	Deaths n=121	National total n=874
Preadmission independent in ADLs	55%	80%
Preadmission living in nursing home	15%	7%

Higher levels of pre-stroke disability is evident as is a higher rate of nursing home residents among the cases of death due to stroke.

The vast majority of patients arrive by ambulance likely indicating both a measure of premorbid condition and severity of stroke.

Table 4.53 Factors related to speed of presentation in mortality group

	Deaths n=121	National total n=874
Ambulance arrival	92%	64%
Median time of onset to presentation	118mins	146mins

A comparison of stroke unit admissions rates between the patients who died during the admission and the national figures (Table 4.54) shows similar levels of access.

Table 4.54 Stroke unit access for mortality group

	Deaths n=121 %	National total n=874 %
Admitted to SU initially	29	29
Admitted SU anytime	41	54
>50% of stay in SU	36	47
High dependency bed admission	19	11

The results relating to standards of care are outlined below in Table 4.55, taken in the context that a large proportion of these standards of care could not be applied to the mortality group due to the severity of their stroke or impaired level of consciousness. As would be predicted a higher rate of pneumonia is reported in the mortality group. It is also noted that the mortality group were more likely to be seen for swallow screening and speech and language therapy than the national group.

Table 4.55 Standards of care for mortality group

	<b>Deaths n=121</b>	<b>National total n=874</b>
	<b>%</b>	<b>%</b>
Swallow at 24 hours	61	36
Aspirin at 48 hours	80	91
SLT at 48 hours	70	56
Physio at 48 hours	63	68
OT at 48 hours	34	41
Pneumonia	40	16
Catheter inserted	50	22

A higher rate of previous stroke or TIA is reported in the mortality group. Atrial fibrillation was identified in over a third of patients who died (Table 4.56).

Table 4.56 Casemix of mortality group

	<b>Deaths n=121</b>	<b>National Total n=874</b>
	<b>%</b>	<b>%</b>
Existing Comorbidities	75	78
Previous Stroke or TIA	24	23
Already on aspirin	39	40
Already on anticoagulant	18	12
Presented with motor symptoms	79	71
Presented with dysphasia	60	38
Cause identified	59	71
AF	35	31
Carotid stenosis	5	10

Table 4.57 summarises the mortality figures nationally for the hospitals and hospital groups. Again the sample size is too small to be accurate measure of mortality rate at local level as indicated by confidence intervals were supplied. The mortality rate is a crude rate and average age by hospital suggest that the underlying age of the patients is the biggest influence on the mortality rate rather than the quality of care for example.

Table 4.57 Mortality rates by hospital groups and hospitals

	Mortality rate %	Confidence intervals	Average age
<b>National</b>	<b>13.8</b>	<b>±2.3</b>	<b>80.7</b>
<b>Ireland East</b>	9.7	±4.2	80.1
<b>Dublin Midlands</b>	10.4	±4.8	81.6
<b>RCSI Hospitals</b>	13.3	±5.7	78.5
<b>UL</b>	12.5	±10.3	80.6
<b>South Southwest</b>	16.1	±5.2	82.1
<b>Saolta</b>	20.3	±6.3	80.4
MMUH	7.5	±8.16	71.3
SVUH*	0	N/A	N/A
MRHM	17.7	±12.8	79.8
WGH	6.7	±8.9	84.5
SLHK	16.7	±13.4	80.4
OLHN	14.3	±14.9	86
SJH	10.8	±10	77
AMNCH	13.9	±11.3	86
NGH	5.7	±7.7	88
MRHT	16.6	±14.9	76.5
MRHP	4.5	±8.7	88
OLOLD	4.9	±6.6	74.5
CHG	17.9	±14.2	76.6
BH	14.6	±10.8	80.2
CH	20	±15.7	80
MWRH	12.5	±10.3	80.6
UHW	20	±13.3	80.7
STGH	8.1	±8.8	78
CUH	11.4	±10.5	80.3
KGH	33	±16.8	86.1
MUH	6.6	±8.9	86
BGH	20	±15.7	78.6
UCHG	28.6	±16.7	76.5
PH	27	±17.1	86.3
MGH	22.9	±13.9	77.9
SGH	17.1	±12.5	80
LGH	8.8	±9.5	84.7

\* SVUH had no cases of deaths included in their cohort, related to charts being unavailable during audit process, which would have effected rate (see figure 4).

## **SECTION 3: RECOMMENDATIONS AND CONCLUSIONS**

## CHAPTER 5. Recommendations and Conclusions

### 5.1 Introduction

The first Irish national stroke audit, INASC 2008, gave the HSE national stroke programme, in partnership with the Irish Heart Foundation, the baseline from which to construct a more modern, evidence-based, and patient-centered health service to manage the thousands of people affected by stroke each year in Ireland.

The aims of the national stroke programme were to reduce death and disability related to stroke. The key to achieving this aim was to bring organisation and cohesion to the care of stroke patients. This was manifest through a number of specific areas including the provision of specialist posts in the management of stroke in the various disciplines, the development of the infrastructure and resources to increase the number of stroke units nationally and to ensure that all patients who develop symptoms of stroke will have access to evidence based treatments including thrombolytic therapy of ischaemic stroke.

The national stroke audit 2015 sought to assess how much progress has been made against both national and international standards, bringing attention to areas that have improved significantly and identifying areas of weakness, thus providing the next building block for the national stroke programme and the Irish Heart Foundation to inform planning and development of stroke services in the coming years.

Some of the most significant findings of the audit are discussed below, aiming to bring the data gathered from the audit on the organisation of care in the acute hospitals in Ireland together with the clinical outcomes that patients' experience. The areas covered in this section are not exhaustive and the expectation is that this report will inform debate and discussion nationally among all people with an interest in stroke care.

### 5.2 Demographics

The audit is representative of the entire Republic of Ireland, covering large urban areas and smaller rural communities (Kearney et al 2011). The age profiles show how stroke affects people of all ages, with trends increasing with advancing years. However it is concerning that there is a higher proportion of strokes documented in the under 65 years of age population when compared with INASC 2008. The SSNAP UK results also give a potential window to the future, with a significantly higher proportion of strokes in their oldest population group. As people begin to survive from previously untreatable conditions such as certain cancers, the relative proportion of people being affected by stroke may increase.

Nationally it is also evident that different centres manage potentially different cohorts of people, with the average age per site ranging from 67.3 years to 80.4 years, which has significant implications when planning hospital/regionally specific resources and infrastructure to care for these people.

### 5.3 Onset and presentation

Vital to the whole process of stroke management and recovery is that people who develop symptoms of stroke recognise the symptoms, and in doing so are then directed to a hospital with the expertise and facilities to provide the right care to the right person every time.

The success of the Irish Heart Foundation's Act FAST campaign is evident in that the standard tool used by paramedical staff when managing a patient with suspected stroke is the Act FAST assessment. Nearly two-thirds of patients presented to hospital via ambulance in this audit, however that is significantly less than the 82% in the SSNAP UK 2014. These results underline the importance of renewed support of the IHF Act FAST campaign nationally. The evidence would suggest that the

impact of its message on the population has waned with time but it continues to be crucial that populations are aware of stroke symptoms and act quickly (Hickey et al 2010, Mellon et al 2011).

All 27 sites report arrangements with local ambulance services for rapid transfer of patients. Crude measures of the effectiveness of these arrangements could include thrombolysis rates or time from onset to presentation, however that would not take into account significant other factors including patient awareness of symptoms, social isolation, or road access for example. Patients are presenting on the same day as their stroke in similar numbers when compared to INASC 2008, and also the median time of onset of symptoms to presentation mirrors the SSNAP UK 2014 data. Perhaps underlining the 24/7 nature of stroke care, 55% of people present to the emergency department outside of 'office' hours (Monday-Friday, 9am-5pm).

In the context of hyperacute management of stroke with both thrombolysis and/or thrombectomy, a significant challenge is apparent that in over 38% of cases a time of onset of symptoms is unknown, marginally higher than the UK (33%). Nationally the median time of onset to presentation varies appreciably from site to site, with some large urban hospitals having the longer times on the face of our results. The reasons for this may include the casemix of stroke patients attending these departments and those potentially milder stroke episodes present later in the large hospitals and not at all in some more peripheral sites.

Almost two-thirds (17/27) of hospitals report having a stroke team on call to provide acute care, however almost half of these are only able to cover Monday-Friday 9am-5pm. This remains a challenge for the stroke network partnership to ensure patients have access to medical staff with specialist knowledge in stroke care. This emphasizes the need for appropriate systems to be in place to ensure all patients are assessed at diagnosis and treated in a timely manner.

#### 5.4 Imaging and diagnostics

Huge strides have been made with regard emergency access to CT neuroimaging in a timely manner in all sites, with 100% of sites having 24 hour access to on-site CT scanning. Importantly this has involved reorganisation of services so that patients are directed to sites with this level of access. As well as having access to CT, the speed with which imaging is performed has also improved, with over three-quarters of patients being scanned within 24 hours of stroke onset as compared to 40% in INASC. The primary reason people are not scanned within 24 hours is due to late presentation.

Outside of emergency access to CT, which is a 24-7 service, all sites report access to routine CT scanning within 48 hours, although outpatient CT scanning access varied greatly from site to site and was also influenced by outpatient use of MR imaging for suspected stroke or TIA.

MRI was rarely available outside of normal working hours, although 2 sites reported 24-hour access. 85% of hospitals have access to MRI during the normal week, although this was not always on-site and in certain cases involves arrangements with other institutions to access the MR scanner, which has the potential to cause delays. This was evident in that only 2 hospital groups have hospitals that all have access to emergency MRI within 24 hours and only 1 hospital group has access for all its hospitals for more routine imaging within 48 hours. Notwithstanding this finding, 45% of patients had a MRI performed at some point during their admission.

Similarly urgent access to carotid imaging varies nationally and within the hospital groups. This deficit was often offset by the use of CT angiography imaging of carotid vessels. However not all sites routinely performed CT angiography or they had CT scanners which were underpowered to perform the necessary scan. This difficulty also has implications with regard the hyperacute management of stroke, which is discussed later.

Most notable was the impact that access to imaging and diagnostics had on TIA/neurovascular services, with only 26% of hospitals providing neurovascular clinics, with great variation in number of clinics per week in the different sites. Coupled with this was the finding that only 26% of sites had

agreed protocols with the primary care services on the rapid assessment of potential TIA patients. In the context of these findings and driven by the need for consistent access to diagnostics the majority of sites choose to admit potential TIA patients and expedite their tests as inpatients. Thus 74% of sites reported they provided a service, which enabled patients to be seen and investigated within 7 days of their potentially minor stroke, or TIA, which is a significant improvement from the 16% of sites reported in INASC2008, aided in part by the development of the national guidelines.

TIA should be viewed as a continuum of stroke disease, and no less serious. The most important element to TIA management is timely access to diagnostics and specialist opinion. In some sites for example this has been achieved through medical admission to short stay units, where other sites have successfully developed rapid access outpatient based services. Essentially sites need to ensure that the model of care they provide is timely to access and efficient in its use of resources (Lavallée et al 2007).

Cardiac diagnostics including heart rhythm analysis e.g. Holter monitoring and echocardiography are also essential tools in the assessment and management of patients with stroke or suspected stroke. It is perhaps a deficit in this audit that access to these tests was not more formally assessed. However it was clear from the site visits and the clinical notes that patients often require admission to access these tests or have prolonged admissions in view of need for these diagnostic tests to ensure appropriate management and treatment.

### 5.5 Thrombolysis of ischaemic stroke

In total 81 cases of patients who received thrombolysis for ischaemic stroke were identified within the clinical audit. The relative sporadic and unpredictable nature of potential cases meant that sites' individual thrombolysis rate are far from absolute, hence confidence intervals were included with the quoted rate which on an individual site basis was a small cohort of patients. The absence of a specific HIPE code for a patient with a stroke which was thrombolysed and the variable uptake in use of the stroke register makes it difficult to obtain a true value from a clinical audit point of view. However it is a variable on the stroke register (HIPE Portal Add-On Screen) which is available to all acute hospitals. It remains a key performance indicator of the national stroke programme so the ideal circumstance is to improve the input of data into the stroke register.

Limitations aside, the improvements seen in access and delivery of thrombolysis therapy has been a major success of the national stroke programme. At the time of the previous audit thrombolysis was virtually nonexistent. With 82% (22/27) of sites providing a 24-7 service, comparable to the SSNAP UK (83%), and redirect procedures in place in a further 15% (4/27) of sites, the vast majority of the country has a system where a patient with early symptoms consistent with stroke will be directed to a centre which can deliver thrombolysis treatment. The FAST tool is now incorporated into the paramedical transfer notes further improving identification of potential patients who may benefit from this intervention.

On arrival to the emergency department procedures are in place for rapid access to neuroimaging, with two-third of sites having a stroke team on call either 24-7 or during normal working hours to perform the clinical assessment. The decision to proceed with thrombolysis is always made at consultant level, in 63% of sites the decision being made by a physician with specialist knowledge in stroke. The primary site for delivery of the thrombolytic agent is the emergency department.

The national thrombolysis rate of between 10 -11% is comparable to international rates, with the UK rate in SSNAP UK 2014 being approximately 12% of all strokes. It also validates the KPI rate reported on a quarterly basis from the national stroke register. The site specific rates demonstrate a few interesting findings. Firstly sites receiving redirected patients have higher rates than the average as would be expected. Secondly variation in rates should be taken in the context that certain regions have higher rates of haemorrhagic stroke, or have significant geographical challenges in patients presenting rapidly, and also as mentioned above may have been assessed in a period of low activity.



An important finding to highlight is that patients aged between 36 to 93 years received thrombolysis and that 37% of patients were 80 years or older. This is in keeping with the evidence that older people potentially can have more to gain from this intervention (Emberson et al 2014). It is also worth noting that nearly half of the patients spent a period in a high dependency bed, in the vast majority of cases for the purpose of post thrombolysis observation. There is an argument for developing the stroke units' hyperacute capabilities in terms of monitoring, staffing and infrastructure as this could release a large volume of high dependency bed days. It would also allow for a specialist stroke multidisciplinary team to provide assessment and intervention for these patients, not always possible when patients are placed in high dependency beds separate from the stroke unit.

With regards standards of care, the thrombolysed group of patients is accessing HSCP assessment more consistently than the overall group, probably due to higher rates of stroke unit admission. The higher rates of pneumonia compared to the national rate (22% versus 16%) in this group are a concern. Generally low rates of swallow screening within 3 hours may be correlate. Also of concern are high rates of catheter insertion (32%), and although an excess of urinary tract infections was not noted, urinary catheters are restrictive from a mobility point of view.

The success of the development of a national strategy for thrombolysis needs to embed the culture of hyperacute management of stroke, particularly in the view of recent advances in intervention and thrombectomy.

## 5.6 Stroke unit

Central to the model of best practice in stroke management is access to a stroke unit (Stroke Unit Trialists 2013). Progress has been made since the development of the national stroke programme in the development of this key infrastructure. With 78% (21/27) of sites having a stroke unit, this represents major progress from the single unit that existed at the time of INASC 2008. A further 11% (3/27) of sites have a strong ethos in stroke care but are lacking the discrete geographical space within the hospital to be identified as having a stroke unit.

Sites self-reported on the type of unit that was available to patients from three models of stroke unit. However in practice the units' model of care was affected by overall patient flow within the hospital, both in admission from the emergency department into the unit and egress out of unit. Protected beds were not standard throughout the units. Only 29% of patients were admitted directly to a stroke unit, and even taking into account admissions to higher dependency beds, this only rises to 40% of patients. With regard to national KPIs, 54% of patients were cared for in a stroke unit at some point during their admission (National KPI >50%) and 47% of patients spent over half their admission on a stroke unit (National KPI >50%).

Inconsistency exists in availability of features recommended in each stroke unit. Most notable inconsistencies included access to continuous physiological monitoring and in nurse training in stroke assessment specifically swallow screening. Just over half of the sites reported undertaking a needs assessment identifying appropriate bed numbers for their population. However a number of units were oversubscribed, with over 60% of patients being managed outside of a stroke unit at the time of the organisational audit. This potentially created inconsistency in the care each stroke patient received. The discrepancy between available beds and the number of stroke inpatients was most marked in the larger hospitals.

Staffing of the stroke units will be discussed in the section below on the individual health care professionals but it is important to state that stroke units need to be staffed by appropriate numbers of specialist multidisciplinary team members.

Novel and resourceful ideas for patient care were documented during the site visits to the various units around the country. This innovative practice should be commended and encouraged. These ideas grew out of having an environment where the focus is on the needs of stroke patients specifically, and it is important that each stroke unit is ultimately defined by the quality of care it delivers and not just the infrastructure the unit provides. An environment of sharing knowledge

throughout the country should also be encouraged and this is already been seen through links established by the clinical nurse specialists in stroke.

More work needs to be done to ensure patients' first admission point is the stroke unit and that as many patients as possible access this level of care. The role of the stroke unit can also continue to develop within the current system, by potentially reducing requirement on higher dependency beds through clearer bed designation and staffing.

### 5.7 Multidisciplinary team access

The multidisciplinary team approach is an essential element to an effective stroke service. This team functions best when the patients they care for are managed on a dedicated unit, with appropriate numbers of the team available to manage that hospital's workload. This allows for timely assessment, early mobilisation, patient engagement in goal setting, and multidisciplinary team meetings for sharing of information. Individual discipline findings are discussed below, however it is important to highlight some general points with regard the multidisciplinary team.

- Despite the recruitment nationally of a number of multidisciplinary team members, all disciplines show substantial deficits in staff numbers, with the low levels of psychology available to patients particularly evident.
  - Patients are being seen for assessment more consistently and more quickly than noted in INASC 2008.
  - Assessment does not equate to intervention. No patient receives the recommended level of daily therapy to promote recovery.
  - Weekly multidisciplinary team meetings are occurring in all sites, although recording of agreed plans could be better documented.
  - Swallow screening levels are inadequate, particularly when compared with the SSNAP UK 2014 figures.
  - Cognition and mood screening are haphazard and often overlooked
  - Information provided to patients with regards diagnosis, recovery and services needs to be improved.
  - Agreed protocols and assessment tools are more standardised across the sites than previously noted.
  - There is a paucity of HSCP clinical specialists available to lead stroke care in Ireland, despite evidence of significant specialist skills within this staffing group.
  - Admissions to wards other than the stroke unit is restricting patient access to the multidisciplinary team.
  - Access to rehabilitation is inconsistent with an absence of early supported discharge in a number of urban areas.
- **Medical**

Although improvements have been made in the numbers of specialists working in Ireland, there is still inconsistent and inequitable access to this specialist knowledge throughout the country, with some areas more affected than others. Most specialists work in a dual role, a stroke physician coupled with the responsibilities of a general physician or general neurologist. The opportunities to develop services is restricted by large front line commitments, not least the participation in thrombolysis on-call rotas.

This high level of commitment also has the knock on effect of restricting training time to NCHDs, thus missing the opportunity to appropriately train future stroke physicians. This creates an environment where retention of doctors become increasingly challenging, as trainees travel abroad to continue their professional development, leaving positions unfilled and stroke services understaffed. The current doctors working in the stroke service need increased support to avoid this problem escalating. Every effort should be made to retain NCHDs in quality training posts in Ireland, with an ethos of patient-centered care coupled in an innovative and academic environment (Imrie 2014, Macraith 2014).

- **Nursing**

There have been many improvements in stroke specific nurse training in accordance with the Stroke Clinical Care Programme. At least one CNS is in post in 85% (23/27) of hospitals compared to 14% (5/37) in INASC 2008. There are currently two advanced nurse practitioners (ANPs) in post. The specialist nursing role has assisted with the development of a number of key areas including staff training, patient communication, policy development and service audit. All sites should have access to a clinical nurse specialist in stroke, and the role should continue to develop including an expansion of the number of ANPs.

Nurses, particularly those working in stroke units, need to be trained specifically in stroke medicine in a formal way with a focus on neurological monitoring, careful positioning and handling, and dysphasia screening and while there have been improvements in the development of clinical specialism there is some concern related to the care available to patients at the bedside.

Stroke patients require high levels of nursing care, with intensive monitoring particularly in the first 72 hours (BASP 2014). This report highlights that nursing staff levels were found to be below the minimum 1.2 WTEs in 86% (18/21) of stroke units. This is particularly concerning as it does not include the required nurse 2.9 WTE per bed in the first 72hrs. If this level were applied only one unit nationally has appropriate staffing levels. A stroke unit operating with below-average nurse/bed ratios may be associated with increased risk of death (Bray, 2014). This deficit is particularly stark at nighttime and weekends. Given that 55% (484) of patients present outside of office hours it is important that nurse-staffing levels are maintained at appropriate levels at nighttime and at weekends.

In general terms difficulty arises in estimating stroke unit staffing requirements, which are dependent on the designation of stroke unit beds at each site. It is possible that a patient would require high levels of nursing input in the acute phase of their illness, and then clinically transition to step-down status and then onto the rehabilitation phase in the same hospital bed, particularly in a combined stroke unit model. Clear designation of stroke bed type would help to ensure there is an appropriate nurse staffing level 24/7 and assist workforce planning.

- **Physiotherapy**

Symptoms related to loss of muscle power or control were the most common, being reported in over 70% of patients, with 79% of patients referred to physiotherapy at some point during their admission. All sites reported access to physiotherapy within 24 hours during the normal working week, and 68% of appropriate patients were seen within 48 hours. Agreed protocols for assessment of motor impairment was reported in 70% of hospitals.

These findings are in the context of a staffing deficit for physiotherapy of 50.2% and represents the disciplines ability to primarily provide assessment. The emphasis often has to be on the newest admission thus limiting rehabilitation opportunities for those already inpatients. Staffing levels would need to be improved in order for patients to receive recommended daily levels of therapy.

- **Speech and language therapy (SLT)**

The rates of swallow screening in general are still low, only 52% of hospitals report that there is access to swallow screening in the emergency department. Access to early swallow screening (within 3 hours) falls well below the recommended and UK rates. When considered in conjunction with increasing rates of pneumonia, training of members of the stroke multidisciplinary team in performing standardised swallow screening is an urgent requirement. Currently swallow screening is only available during the regular working week, whereas to ensure swift access on call, weekend and night staff should be included in training.

For those identified as having a possible swallow problem or speech deficit it is important they can access SLT promptly. Over 43% of patients presented with evidence of either a speech deficit or symptom and a total of 62% of patients were referred to SLT at some point during their admission. By 48 hours, 56% of patients requiring SLT review were seen and 78.9% of patients had a formal communication assessment performed within 7 days.

These findings are in the context of a staffing deficit for SLT of 30.9% and as with all HSCPs, represents the disciplines ability to primarily provide assessment. Assessment is also often prioritised to swallow assessment only, as staffing levels allow, leaving speech assessment often delayed in the early phase of recovery. Staffing levels would need to be improved in order for patients to receive recommended daily levels of therapy.

- **Occupational therapy (OT)**

The organisational audit highlighted the shortfall in OT numbers compared to the BASP recommendation in the vast majority of sites, with an overall deficit of 61.2%. This shortfall was reflected in the clinical audit where the percentages of patients seen by OT in the first 48 hours was lower than PT and SLT, (between 30 to 48% seen by OT in the first 48 hours), although the referral rates for OT were equivalent to PT and SLT in the first 48 hours.

There was an improvement in the numbers seen by occupational therapy in the first seven days post stroke with over 70% of the stroke patients seen for initial occupational therapy assessment. This finding perhaps highlights the more acute medical needs in the first 48 hours post stroke and maybe less need for occupational therapy involvement at this very early stage, but an increased need for occupational therapy involvement once the patient has been medically stabilised and is ready to commence more active rehabilitation. However, there is still a shortfall with regard to occupational therapy assessment within the first seven days post stroke with just over 20% of stroke patients not seen by occupational therapy. Only 12 sites had reported access to vocational rehabilitation after stroke.

Cognition screening and assessment, which is often requested from OT, is performed in 58% of patients by discharge. The emphasis for OT is often placed on other areas due to staffing restrictions, such as seating assessment. In order for patients to receive the recommended level of OT input staffing numbers need to be improved.

- **Clinical nutrition**

Only 37% of patients had evidence of nutritional screening performed within 48 hours of admission. However 91% of patients were receiving some means of nutrition by 48 hours. Only 71% of appropriate patients had evidence of being weighed by discharge. With 70% of sites reporting access to community clinical nutrition, just 3% of all patients were discharged with a plan of referral to community clinical nutrition.

A deficit in staffing in clinical nutrition was noted nationally of 68.9% as per BASP guidelines for multidisciplinary team members, with the majority of dietetics services are not dedicated time and are provided from general medical or care of the elderly services. In the majority of clinical nutrition services, provision is limited to priority cases only i.e. enteral (tube) feeding. This has implications when using nutritional screening tools identify at risk patients but service restrictions means they cannot access assessment and intervention.

- **Medical social work**

Significantly low whole time equivalents are reported nationally for medical social work, a profession which is recommended to be available to all patients admitted with stroke. In a number of sites the role of medical social work is performed by other professions e.g. discharge coordinators. However that role covers a very narrow spectrum of the role of medical social work in the care of patients with stroke, missing opportunities for more

detailed provision of information about services and vocational options, as well as counseling and family/carer support. Where resourcing is lacking, reduced referral or awareness for requirement for referrals are likely sequelae. As for all hospitals staffing should be considered relative to patient need, but complete absence of services is hard to justify.

- **Psychology**

Acknowledged as a poorly developed service in stroke care in Ireland, psychology has the lowest number of whole time equivalents of any discipline. Only 3.5 % of patients are referred to psychology within 7 days of admission, despite the high levels of psychological symptoms which people who suffer a stroke develop (Hackett et al 2014). Mood and cognitive screening are low, but in the absence of psychological services to support the stroke team, screening currently just further highlights the dearth of referral options available.

- **Other HSCP**

Although not specifically assessed in this audit it is also worth noting the potential role of a clinical pharmacist to the stroke service as part of the multidisciplinary team, which has been piloted in some services. The benefits include medication reconciliation both on admission and discharge, inpatient medication prescription review, and patient education and assistance with medication concordance in patients with aphasia for example.

It is also important to highlight the contribution of the health care assistants, therapy assistants and other support staff e.g. catering, who all adopt the principles of patient-centered multidisciplinary stroke care, particularly on the stroke units.

### 5.8 Casemix and risk factor profile

Levels of functional independence pre-stroke were proportionately higher when compared to INASC 2008, 80% versus 73%. Preadmission accommodation levels were very similar with over 90% of people living at home before their stroke event. Approximately one in five people were current smokers. When comparing with previous results, rates of prevalence of risk factors for stroke were comparable to the INASC 2008, with rates of existing atrial fibrillation (24% versus 22%) and of previous stroke or TIA (23% versus 25%). A concern would be the high proportion of patients with multiple comorbidities, with over 50% of patients having two or more comorbidities associated with increased stroke risk.

Prevention is better than cure, and when the two of the most common risk factors associated with stroke are both often asymptomatic but relatively easily assessed, consideration of how the nation's health is screened from a primary prevention point of view will need to be addressed. Education and people being empowered to make healthy choices could help reduce the health care utilization into the future.

The results of documented aetiologies of stroke are within expected rates, 71% (617/874) of patients having a cause of their stroke identified by discharge (Kelly et al 2012). Within that identified group there is a high proportion of atrial fibrillation (44%; 269/617). The reported causes underline the heterogeneous nature of stroke as a potential common pathway for many different disease processes. The increased reporting of more uncommon causes of stroke is coupled somewhat to the access to more sophisticated neuroimaging and the increase nationally to access to expert knowledge.

Improvement in discussions with patients around lifestyle modification should be highlighted. A challenge to promoting change in patient lifestyle behavior may be that the behavior is very well established. However the benefits and cost effectiveness of improving uptake in regular exercise, healthy diet, smoking cessation and sensible alcohol consumption has been clearly documented.

## 5.9 Medication trends

A significant area assessed in this audit involved data gathering on medications prescribed to prevent stroke and treatment both on admission and discharge. Appropriate evidence based prescribing is of utmost importance for the patient and the health service alike in terms of cost, medication effectiveness, and safety (Gallagher et al 2008, Cahir et al 2010).

In simple terms, more patients were on medications such as antihypertensives or statins on admission than noted in INASC 2008. The rate of statin prescription was particularly marked with 43% of patients on statin therapy in comparison to 21% in INASC 2008. This increased trend was seen in most drug classes. Anticoagulation rates before admission were 12%, which is double the 6% seen in INASC 2008. 61% of patients were on at least one antihypertensive drug although the exact indication for the medication was not documented, with over 30% of patients on two or more antihypertensives.

When just taking the drug classes relevant to stroke almost 8% of patients had evidence of polypharmacy (5 or more medications), which can have implications with regard increased adverse events and hospital admissions (Hajjar et al 2007). These results further support the case for secondary prevention strategies at a population level.

ACE inhibitors/Angiotensin Receptor Blockers remain the most widely prescribed antihypertensive medications patients are leaving hospital taking, with a noted drop in prescribing of thiazide diuretics from 10% to 5%. Half of the patients are discharged on aspirin. Anticoagulant prescribing shows similar proportions of patients discharged on warfarin (12% versus 13%), despite 10% of patients being prescribed novel anticoagulants which were unavailable at the time of INASC 2008. This implies that more people are being anticoagulated possibly due to higher rates of atrial fibrillation being identified in hospital and application of guidelines on inappropriate use of aspirin in the secondary prevention of stroke in nonvalvular atrial fibrillation. Almost two-thirds of patients are discharged on a statin.

Following a stroke, patients are often faced with the prospect of being on multiple medications for the rest of their life. In view of this it is important that guidelines are closely followed with regard appropriate prescribing so as not to overburden patients with unnecessary tablets while also being mindful of the cost of inappropriate prescribing.

### 5.10 Communication and patient engagement

In targeting a patient-centred model of care, communication is key. Patients should be fully informed and full participants in their care and management. Documented evidence of discussion of diagnosis in the medical notes has improved since INASC 2008, but still almost 50% of cases had no evidence to support the discussion taking place. Similarly documentation of collaborative goal setting, specifically patient involvement in goal setting, was low. These two areas are good examples of elements of care that are likely frequently performed but often not documented. This also highlights the need for a discussion on what are key entries in the medical record in communicating the patient's care to members of the multidisciplinary team.

Multidisciplinary team communication is further challenged by disparate clinical records for these patients. Only 29% of patients had a unified clinical record. Only 19% of stroke units use an interdisciplinary care pathway during stroke unit admission. Increasing standardisation of care pathways, communication and documentation should be key aims to improving equity and access of care. This would provide a framework to evidence positive practice which is currently either not documented or not occurring.

A strength of sites having access to a stroke unit not highlighted earlier is that it provides a hub for the provision of information about stroke and its impact for patients and carers and also aids coordination of education sessions, particularly through the role of the clinical nurse specialists and HSCPs. Stroke units had better access than general wards to patient friendly information on stroke, vocational

support, and information on community services. However this was not seen at all sites and is an important part of the principle of a stroke unit.

In general terms communication and links with the primary care physician needs to be improved. Clear pathways need to be in place to ensure that these doctors know where to refer patients and how quickly they can be expected to be seen, particularly in case of TIAs. There also needs to be much clearer discharge communication with primary care physicians, particularly if the patient is not for further follow up. Duplication of testing and referrals, medications errors, unnecessary emergency department attendances are just some of the potential sequelae from poor communication between hospitals and the community.

### 5.11 Rehabilitation and community services

The assessment of the organisation of rehabilitation and community services was outside of the remit of this audit. However as a way of laying the groundwork for further audit of both external rehabilitation and community services, data was gathered on where and to who patients are referred. This does not give a measure of level of access, waiting times or where non referral results from absent services. However the findings will inform the next phase of audit planned for the coming years.

The three early supported discharge (ESD) teams now servicing four centres show levels of activity that are improving patient flow, and most importantly discharging to their own homes in a timely fashion. National access to ESD teams would likely have a significant impact on discharge home rates when compared to UK rates. These successful teams may be replicated in other jurisdictions with similar success.

### 5.12 Outcomes

Improving outcomes is at the centre of the aims of the national stroke programme and the Irish Heart Foundation, specifically reducing unnecessary disability and mortality. The results of National Stroke Audit 2015 show a number of key improvements in patient outcomes following stroke.

The inpatient mortality rate of 14% among the cases assessed is 5% lower than noted in INASC 2008. This is in the context of a higher proportion of intracerebral haemorrhage in the current audit (15.4% versus 12%) which is associated with a higher mortality rate.

The average length of stay is over one week shorter than previously found in INASC 2008, with the median length of stay reduced by three days. However the median length of stay is four days longer than the SSNAP UK 2014, potentially related to more accessible and developed community services, and more widely available early supported discharge in the UK.

A more useful measure of performance of a stroke service is admissions to nursing homes. The results show that 11.4% of patients were discharged to nursing homes, however only 8% of the patients were newly institutionalised compared with 15% in INASC 2008, with the caveat that some patients who were transferred to offsite rehabilitation may have ultimately required nursing home care. Over half of the patients were discharged with little or no impairment of activities of daily living (Barthel 19-20).

Overall these outcome measures would support the opinion that acute stroke care in Ireland has improved markedly since INASC 2008. Coupled with the clear benefits to patients, is the financial saving to the state from people returning to work or maintaining independence at home rather than in residential care. These savings should be reinvested in providing the national stroke programme the means to build on the work done, and to acknowledge the dedication and hard work of frontline staff caring for people with stroke, all despite the challenging work and financial backdrop of recent years.





## APPENDICES

### Appendix 1.

Irish Heart Foundation/ HSE  
National Stroke Audit  
2015

#### ORGANISATIONAL AUDIT PROFORMA

*The Audit Proforma that has been chosen for use in the audit of hospital-based stroke services in Ireland mirrors the proforma used in INASC 2006 which itself was adapted from the Royal College of Physicians (UK) National Sentinel Stroke Audit 2004 Organisational Audit Proforma. This is a well developed and validated audit tool and will allow for comparison of data with the previous INASC and recent UK data. It is for this reason that significant variations from previous INASC 2006 have not been encouraged. It was necessary, however, to make some adjustments for application in relation to the most up to date guidelines and the Irish context.*

**This proforma should describe your stroke services as at date \_\_\_/\_\_\_/\_\_\_ .**

Please complete all questions. In some cases you will either be directed to a later question or a response will apply based on answers to key questions.

---

**SECTION 1 SITE CODE: [     ]**

---

**Auditor Discipline: (tick all that apply)**

Doctor     Ward Manager     CNS     Therapist     Other  (please specify)

[.....]

**IMPORTANT, PLEASE NOTE:**

**Did your hospital manage >20 cases of acute stroke in 2014?    YES        NO**

**If yes, then please proceed with completing proforma. If your hospital had <20 cases in 2014 then no need to proceed further. Please return this form to Project Team, National Stroke Audit , Old Stone Building, Trinity Postgraduate Centre, St James's Hospital, Dublin 8.**

**ACUTE HOSPITAL**

1. What is the size of the hospital / number of beds [ ]

**HOSPITAL CASELOAD**

2i. How many patients with acute stroke are there in the hospital site on the day of form completion? [ ]

2ii. How many of these patients would you estimate presented acutely to the Emergency Department/MAU? [ ]

**PRESENTATION AT HOSPITAL**

3. (i) Are there specific arrangements with the local ambulance service for emergency/rapid transfer to hospital for acute stroke patients?

Yes  No

If no, why not?

[.....]

(ii) How do the majority of Stroke Patients present to the hospital?

Please select only one option from:

- Via ED
- Admit direct to hospital
- Transfer for Intervention
- Unknown

(iii) Are there agreed stroke protocols between acute and primary care service(s)?

Yes  No

(iv) Emergency Services at the hospital for Stroke Patients

Who is the stroke patient normally first seen by?

Please select only one option from:

- ED/MAU Nurse
- ED/MAU NCHD
- ED Consultant
- Stroke Consultant
- Medical Consultant
- Medical NCHD
- Stroke NCHD
- Other, specify

(v) Is there a Stroke Team on call?

- No
- Yes, 24 hours, 7 days
- Yes, 9-5 Mon-Fri
- Yes, other specify  [.....]

(vi) Is there access to CT imaging for patients in ED/MAU?

- Yes (24/7)
- Yes (Other)  [.....]
- No
- Unknown

**If yes is it;**

- On site 24/7
- On site 9-5 Mon-Fri
- Off site 24/7
- Off site 9-5 Mon-Fri
- Off site Out of Hours
- Other

[.....]

(vii) Is there access to MRI imaging for patients in ED/MAU?

- Yes
- No
- Unknown

**If yes is it:**

- On site
- Off site

(viii) Do you provide a routine thrombolysis service?

- Yes, 24 hrs, 7 days
- Yes, 9-5, Mon-Fri
- Yes, other  [.....]
- No
- Unknown

(ix) For patients presenting acutely, most commonly where is thrombolysis delivered?

- ED
- MAU
- Stroke Unit
- HDU/ICU
- Other  [.....]

(x) Who normally assesses the patient for thrombolysis?

- ED/MAU NCHD
- ED Consultant
- Stroke NCHD
- Stroke Consultant
- Medical Consultant
- Other  [.....]

(xi) Who decides to proceed with thrombolysis?

- ED NCHD

ED Consultant	<input type="radio"/>
Stroke NCHD	<input type="radio"/>
Stroke Consultant	<input type="radio"/>
Medical Consultant	<input type="radio"/>
Other	[.....]

(xii) Does your hospital provide endovascular treatment e.g. thrombectomy?

Yes, 24 hrs, 7 days

Yes, other

No

Unknown

**If yes:** (

a) How many patients underwent endovascular treatment in the last 12 months?

[.....]

(b) How many patients were transferred to your hospital for assessment for endovascular treatment? [.....]

(c) Of the transferred patients, how many patients required admission to your hospital?

[.....]

(d) How many consultant level interventional radiologists are on the emergency endovascular rota? [.....]

(xiii) Is there multidisciplinary assessment in ED?

	Yes	No	Unknown
- Physiotherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Speech & language therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Occupational therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Clinical Nurse Specialist	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Medical social work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Swallow Screening	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Psychology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Dietician	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Other [Specify]	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(xiv) Is there multidisciplinary assessment within 24 hours of referral?

	Yes	No	Unknown
- Physiotherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Speech & language therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Occupational therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Clinical Nurse Specialist	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Medical social work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Swallow screening	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- |   |                 |                       |                       |                       |
|---|-----------------|-----------------------|-----------------------|-----------------------|
| - | Psychology      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| - | Dietician       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| - | Other [specify] | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

4. Which ward is a patient with acute stroke **most likely** to be admitted to? (select one option)

Medical Assessment Unit

General medical ward

Care of the Elderly

Stroke unit

Surgical ward

Other

If other please specify .....

## SECTION 2 STROKE UNIT MODELS

---

### ORGANISATION OF CARE

#### Stroke Unit

**Definition:** *Stroke Unit*

*A dedicated, geographically clearly defined area or ward in a hospital, where stroke patients are admitted and cared for by a multiprofessional team (medical, nursing, and therapy staff) who have specialist knowledge, training, and skills in stroke care with well-defined individual tasks, regular interaction with other disciplines, and stroke leadership. This team shall coordinate stroke care through regular (weekly) multiprofessional meetings.*

5. Does the hospital have a specialist stroke unit or units? Yes  No

**IF YES,**

6. What is the total number of specialist stroke unit beds? [ ] specialist stroke beds

**If NO go straight to Question 17**

### SECTION 3 TYPE OF STROKE UNIT

---

Answer the following questions according to the type(s) of unit(s).

#### ACUTE STROKE BEDS

**Definition:** Patients are accepted acutely but discharged or transferred early (usually within 7 days)

#### REHABILITATION STROKE BEDS

**Definition:** accepts patients after a delay of usually 7 days or more and has a focus on rehabilitation

#### COMBINED STROKE BEDS

**Definition:** No separation between acute and rehabilitation beds. Accepts patients acutely but also provides rehabilitation for at least several weeks if necessary.

#### ACUTE STROKE BEDS

**Definition:** Patients are accepted acutely but discharged or transferred early (usually within 7 days)

7. i) Number of beds designated for acute stroke care [ ]  
(If you do not have a unit of this type answer 0)
7. ii) Which of the following features does this unit provide?  
(Tick all that apply)
- a. continuous physiological monitoring (ECG, oximetry, blood pressure)
  - b. access to scanning within 3 hours of admission
  - c. a policy for direct admission from A&E
  - d. specialist ward rounds at least 5 times a week
  - e. acute stroke protocols/guidelines
  - f. access to 24 hour brain imaging
  - g. nurses trained in swallow screening
7. iii) How many of the following *nursing* staff are there usually on duty at 10.00 am in the morning (on a normal week-day) on the acute stroke unit?
- a. Qualified nurses (excludes student nurses) [ ]
  - b. Care assistants [ ]  
Enter 0 if no staff of that grade
7. iv) How many whole-time equivalents (WTE) *nursing* staff are there usually on duty over a 24-hour period?
- a. Qualified nurses (excludes student nurses) [ ] WTE
  - b. Care assistants [ ] WTE

**REHABILITATION STROKE BEDS**

**Definition:** accepts patients after a delay of usually 7 days or more and has a focus on rehabilitation

8. i) Number of beds designated for stroke rehabilitation [ ]  
(If you do not have a unit of this type answer 0)
8. ii) How many of the following *nursing* staff are there usually on duty at 10.00am in the morning (on a normal week-day) on the rehabilitation stroke unit?
- a. Qualified nurses (excludes student nurses) [ ]
- b. Care assistants [ ]  
Enter 0 if no staff of that grade
9. If you have both acute and rehabilitation stroke units are they on the same ward? Yes  No

**COMBINED STROKE BEDS**

**Definition:** No separation between acute and rehabilitation beds. Accepts patients acutely but also provides rehabilitation for at least several weeks if necessary.

10. i) Number of beds if combined stroke unit [ ]  
(If you do not have a unit of this type answer 0)
10. ii) How many of the following *nursing* staff are there usually on duty at 10.00am in the morning (on a normal week-day) on the combined stroke unit?
- a. Qualified nurses (excludes student nurses) [ ]
- b. Care assistants [ ]  
Enter 0 if no staff of that grade

**SECTION 4 ALL STROKE UNITS****ALL STROKE UNITS**

11. Has a needs assessment been undertaken by your hospital to identify the appropriate number of beds for the population served before the stroke unit opened? Yes  No
12. How many stroke patients are there in total on your stroke unit(s) today? [ ]
13. If you have a stroke unit/stroke units, is there a named Social Worker attached to the multi-disciplinary team? Yes  No
14. (i) Do(es) your stroke unit(s) operate admission criteria? Yes  No





16. How many sessions of nonconsultant hospital doctors (NCHD) time are there per week in total for each of the 3 types of stroke unit (where applicable)?

Acute SU	Rehab SU	Combined SU	Total Sessions
[      ]	[      ]	[      ]	[      ]

## SECTION 5 OTHER MODELS OF STROKE CARE

### *OTHER MODELS OF STROKE CARE*

- 17 Is there an agreed policy that all or / the majority of acute stroke patients are admitted under a lead Consultant Physician with an interest in stroke?  
Yes  No  Other [please specify.....]

#### **Mobile Stroke Team**

**Definition** – a multidisciplinary team (excluding specialist ward-based nursing staff) providing care / consultation to acute stroke patients admitted to a variety of teams in the hospital in a variety of settings

- 18 i) Do you have a mobile stroke team? Yes  No

#### **IF NO, go to question 19**

#### **IF YES,**

- 18 ii) Which of the following are regular members of the team? (Tick all that apply)

- |                                  |                                     |
|----------------------------------|-------------------------------------|
| a. Specialist doctor             | <input type="radio"/> [      ] WTE* |
| b. Stroke CNS                    | <input type="radio"/> [      ] WTE  |
| c. Social worker                 | <input type="radio"/> [      ] WTE  |
| d. Speech and language therapist | <input type="radio"/> [      ] WTE  |
| e. Physiotherapist               | <input type="radio"/> [      ] WTE  |
| f. Occupational therapist        | <input type="radio"/> [      ] WTE  |
| g. Dietician                     | <input type="radio"/> [      ] WTE  |
| h. Psychologist                  | <input type="radio"/> [      ] WTE  |
| i. Other (please specify) .....  |                                     |

\* A specialist doctor would include a consultant trained in stroke e.g. Geriatrician or Neurologist or a Physician with a particular interest in stroke

- 18 iii) How many “multidisciplinary ward rounds” are conducted per week? [      ]

- 18 iv) How many patients has the team seen in the last week? [      ]

- 19 i) Do you have a specialist early supported discharge team especially for stroke?  
Yes  No

**IF NO, go to question 20****IF YES,**

19 ii) Which of the following are regular members of the team? (Tick all that apply)

- |                                  |                                    |
|----------------------------------|------------------------------------|
| a. Specialist doctor             | <input type="checkbox"/> [ ] WTE * |
| b. Stroke CNS                    | <input type="checkbox"/> [ ] WTE   |
| c. Social worker                 | <input type="checkbox"/> [ ] WTE   |
| d. Speech and language therapist | <input type="checkbox"/> [ ] WTE   |
| e. Physiotherapist               | <input type="checkbox"/> [ ] WTE   |
| f. Occupational therapist        | <input type="checkbox"/> [ ] WTE   |
| g. Dietitian                     | <input type="checkbox"/> [ ] WTE   |
| h. Psychologist                  | <input type="checkbox"/> [ ] WTE   |
| i. Other (please specify).....   |                                    |

\* A specialist doctor would include a consultant trained in stroke e.g. Geriatrician or Neurologist or a Physician with a particular interest in stroke

20 (i) Is there a specialist stroke community team (i.e. treats stroke only) in your area for continuing longer- term management? Yes  No

20 (ii) Is there a generic community team (i.e. treats stroke among other conditions) in your area for continuing longer-term management? Yes  No

**SECTION 6 MIXED REHABILITATION UNITS****MIXED REHABILITATION UNIT (GENERIC REHABILITATION UNIT)**

**Definition:** A Mixed rehabilitation unit (generic rehabilitation unit) – a multidisciplinary team (including specialist nursing staff) in a ward providing a generic rehabilitation service but not exclusively caring for stroke patients.

21. Do you have, or have access to a mixed (generic) rehabilitation unit (managing patients with a range of problems including stroke)?

Yes  No

**If NO, please proceed to Q 21 (iv)**

**If you avail of more than one off site unit please combine the total beds**

21. i) Is this unit On site  Off site  Other

Tick all that apply.



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**SECTION 7                      IMAGING**


---

22.

<b>Imaging Services</b>	<b>CT</b>	<b>MRI</b>	<b>Duplex Carotids</b>
i) Do your inpatients have 24/7 access to the following?	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>
ii) Access Mon-Fri 9-5 only?	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>
iii) Routine scanning within 48 hours?	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>
iv) Emergency Scanning within 24 hours?	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>
v) Access to consultant neuroradiologist cover for stroke patients within 3 hours of admission	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>	N/A
vi) Access to consultant radiologist cover for stroke patients within 3 hours of admission	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>	N/A
vii) Outpatient scanning within 2 weeks for minor stroke/TIA	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>
viii) Rapid access for patients discharged from ED/MAU within 24 hours	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>
ix) Rapid access for patients discharged from ED/MAU within 7 days	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>

**SECTION 8 TIA/NEUROVASCULAR SERVICE****TIA/NEUROVASCULAR OUTPATIENT SERVICE**

23. Do you have a neurovascular clinic? Yes  No
- IF YES,
24. i) How many clinics within a 4 week period? [ ]
- ii) What is the current average waiting time for an appointment? [ ] days
25. i) Do you have a service, which enables patients to be seen and investigated
- Within 24 hours of minor stroke or TIA? Yes  No
  - Within 7 days of minor stroke or TIA? Yes  No
- ii) How many TIAs would your service admit for assessment and investigation? [ ]
26. Are there agreed TIA protocols between acute and primary care service(s)?  
Yes  No
27. i) Did you receive annual funding from the National Stroke Programme to assist TIA services?  
Yes  No
- ii) If yes, what was the funding used for?  
[.....]

**SECTION 9 ENDARTERECTOMY/ENDOVASCULAR TREATMENT****CAROTID ENDARTERECTOMY**

These questions do not relate to quality standards but are to provide validation of carotid endarterectomy audit data.

28. i) Is carotid endarterectomy surgery performed within the hospital?  
Yes  No
- If NO;** Which hospital do you send your patients to?  
.....
28. ii) **If YES,**
- a) No. of surgeons performing carotid endarterectomy within the hospital  
[ ]

- b) No. of procedures performed within the last 12 months in the hospital  
[ ]
- c)\* No. of patients referred from stroke services for carotid endarterectomy  
[ ]

29. Do you have a formal arrangement in place with an endovascular centre for the transfer of your patients?

Yes  No

30. Have any of your patients undergone carotid stenting?

Yes  No

## SECTION 10 SPECIALIST ROLE

---

### MEDICAL STAFF

31. i) Is there a consultant physician with specialist knowledge of stroke who is **formally recognised** as having principal responsibility for stroke services?  
Yes  No
31. ii) How many formal sessions are there per week of senior doctor time for the management of stroke (including Outpatient Clinics):
- a) Consultant [ ] sessions per week
- b) Registrar [ ] sessions per week
- c) Senior House officer [ ] sessions per week
- d) Is this reflected in a formal sessional commitment? Yes  No

### OTHER STROKE SPECIALIST ROLES

#### A CLINICAL NURSE SPECIALIST IN STROKE CARE

**DEFINITION:** is a nurse in specialist practice who has undertaken formal recognised post registration education relevant to stroke at higher diploma level. Such formal education is underpinned by extensive experience and clinical expertise in stroke care. The specialist practice will encompass a major clinical focus, which comprises assessment, planning, delivery and evaluation of stroke care given to patients and their carers in hospital, community and outpatient settings. The specialist nurse will work closely with medical and paramedical staff and may make alterations in prescribed clinical options along agreed protocol driven guidelines. The specialist also participates in nursing research and audit and acts as a consultant in education and clinical practice to nursing colleagues and the wider multidisciplinary team.

32 i) <b>Stroke Specialist Nurse e.g. clinical nurse specialist</b>	Do you have a stroke Specialist nurse? Yes <input type="radio"/> No <input type="radio"/>			
	If Yes: Services offered (Tick all that apply)			
	Clinics	Service Development	Therapy planning	Long term community support
Inpatient	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outpatient	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

32 ii) <b>Specialist therapist/s with specialist knowledge of stroke</b>	Do you have a specialist therapist/s with specialist knowledge of stroke? Specify therapist [.....] .....] How many? [     ] Yes <input type="radio"/> No <input type="radio"/> If Yes Services offered (Tick all that apply)			
	Clinics	Service Development	Therapy planning	Long term community support
Inpatient	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outpatient	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

---

## SECTION 11 INTERDISCIPLINARY SERVICES

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### INTERDISCIPLINARY SERVICES (refers to on site services only)

For the following questions answers for Stroke Unit apply to any type of stroke unit (acute, rehabilitation or combined) and are distinct from a generic rehabilitation unit (managing patients with a range of problems including stroke). And All wards, Some and None refer to all wards in the hospital other than stroke unit or rehabilitation unit wards

33. Is access to specialist nursing support routine for: (please mark all that apply)
- |                               | If applicable            |                          | Other wards in the hospital |                       |                       |
|-------------------------------|--------------------------|--------------------------|-----------------------------|-----------------------|-----------------------|
|                               | Stroke Unit              | Rehab Unit               | All Wards                   | Some                  | None                  |
| i. Continence advice?         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="radio"/>       | <input type="radio"/> | <input type="radio"/> |
| ii. Pressure sore prevention? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="radio"/>       | <input type="radio"/> | <input type="radio"/> |
| iii. Stroke Care?             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="radio"/>       | <input type="radio"/> | <input type="radio"/> |

**Continuing Education**

34.i) Is there an in-house programme for the continuing education of qualified staff in management of stroke?

<u>If applicable</u>		<u>Other wards in the hospital</u>		
Stroke Unit	Rehab Unit	All Wards	Some Wards	None
<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

34.ii) Is there an identified in-house training programme, which includes issues relevant to the management of stroke for non-qualified clinical staff?

<u>If applicable</u>		<u>Other wards in the hospital</u>		
Stroke Unit	Rehab Unit	All Wards	Some Wards	None
<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

34iii) Do patients have access to a clinical psychologist and provision of the following aspects of care?

Mood assessment	Yes	<input type="radio"/>	No	<input type="radio"/>
Higher Cognitive Function Assessment	Yes	<input type="radio"/>	No	<input type="radio"/>
Mood treatment	Yes	<input type="radio"/>	No	<input type="radio"/>
Higher Cognitive Function Treatment	Yes	<input type="radio"/>	No	<input type="radio"/>

Non-Cognitive behavioural problems assessment and/or treatment Yes  No

If no to all above, do other disciplines perform assessment? OT  SALT

34.iv) Do patients have access to services which support them to remain in, return to, or withdraw from work AND/OR education or vocational training?

Yes  No

**TEAM WORKING**

Records

35. i) Do all professions contribute to a single set of patient records for the management of stroke? (please mark all that apply)

<u>If applicable</u>		<u>Other wards in the hospital</u>		
Stroke Unit	Generic Rehab Unit	All Wards	Some Wards	None
<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

35. ii) Does the Hospital have an interdisciplinary care pathway for stroke?

Yes  No



**SECTION 12 TEAM MEETINGS**

---

**TEAM MEETINGS**

36. (i) Are there team meetings for the interchange of information about individual patients? (please mark all that apply)

<u>If applicable</u>		<u>Other wards in the hospital</u>		
Stroke Unit	Generic Rehab Unit	All Wards	Some	None
<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(ii) Are these meetings exclusively for stroke patients? Yes  No

(iii) How often are team meetings held? [ ]

(iv) Which of the following disciplines regularly attend the team meetings? (please mark all that apply)

		<u>If applicable</u>		<u>Other wards in the hospital</u>		
		Stroke Unit	Generic Rehab Unit	All Wards	Some	None
a.	Clinical Psychology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b.	Dietetics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c.	Medicine (senior doctor)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d.	Nursing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e.	Occupational Therapy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f.	Physiotherapy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g.	Medical Social Work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h.	Speech & Language Therapy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i.	Other (state which)	[ ]	[ ]	[ ]	[ ]	[ ]

**SECTION 13**

**AGREED ASSESSMENT MEASURES**

37. Is there a locally agreed assessment protocol for stroke, which indicates the appropriate use of agreed measures for the following?

- |      |   |  |
|------|---|--|
| i)   | Conscious level (e.g. Glasgow coma scale)     | Yes <input type="radio"/> No <input type="radio"/> |
| ii)  | Motor impairment ((e.g. MRC, Motricity Index) | Yes <input type="radio"/> No <input type="radio"/> |
| iii) | Cognitive function (e.g. Mental Test score)   | Yes <input type="radio"/> No <input type="radio"/> |
| iv)  | Activities of Daily Living (eg Barthel, FIM)  | Yes <input type="radio"/> No <input type="radio"/> |
| v)   | Stroke Severity Scale (e.g. SSS, NIH )        | Yes <input type="radio"/> No <input type="radio"/> |

### Availability of Information to Inform Practice

38. Do staff have ready access to: (please mark all that apply)

	<u>If applicable</u>		<u>Other wards in the hospital</u>		
	<b>Stroke Unit</b>	<b>Generic Rehab Unit</b>	<b>All Wards</b>	<b>Some</b>	<b>None</b>
i Reference information on the functional assessment/measurement tools used locally?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ii. Practice / hospital guidelines on:					
a) Clinical management of stroke	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Continence management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Swallowing difficulties	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Pressure area care	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iii. Up-to-date information on local and national patients/ carers support organisations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iv. Records of all patients' management in the acute phase of stroke?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## SECTION 14 COMMUNICATION

### COMMUNICATION WITH PATIENTS AND CARERS

	<u>If applicable</u>		<u>Other wards in the hospital</u>		
	<b>Stroke Unit</b>	<b>Generic Rehab Unit</b>	<b>All Wards</b>	<b>Some</b>	<b>None</b>
39. Does the organisation of the ward/unit enable patients to have access to their management plan? (Please mark all that apply)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

40. Is there patient information literature **displayed** in unit/ward on the following?  
(please mark all that apply)

	<u>If applicable</u>		<u>Other wards in the hospital</u>		
	Stroke Unit	Generic Rehab Unit	All Wards	Some	None
i) Patient / carer information literature on stroke	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ii) Patient versions of national or local guidelines/standards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iii) Community Services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iv) Carer's Benefit/allowance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
v) Local voluntary agencies e.g. Volunteer Stroke Scheme VSS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
vi) How to complain?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

41. Does the Stroke service have formal links with patients' and carers' organisations for communication on service provision, audit and future plans?

Yes  No

42. Is there a community user group for stroke?

Yes  No

43. Is there a policy to give patients a named contact on transfer from hospital to community?

Yes  No

## SECTION 15 DISCHARGE PLANNING / REHABILITATION

- 44 (i) Do you send a discharge summary to the GP? Yes  No

- 44 (ii) Do you have a hospital / community stroke liaison person/nurse? Yes  No

- 44 (iii) Do you have access to the following community services?

(please rate level of access - tick all that apply)

- a. Public Health Nurse Yes  No
- b. Physiotherapist Yes  No
- c. Occupational Therapist Yes  No
- d. Social Worker Yes  No

- e. Speech/language therapist                      Yes     No
- f. Dietician    Yes     No
- g. Psychologist                                        Yes     No
- h. Community Liaison Psychiatric Nurse                      Yes     No
- i. Community Liaison Psychiatric Service                      Yes     No

j. Other (please specify).....

44 (iv) Do you have a day hospital in your hospital?                      Yes                       No

**IF No, please proceed to Q45**

44 (v) In the day hospital is there open access to those under 65 years with stroke?

Yes                       No

44 (vi) Does the day hospital have therapy cover?                      Yes                       No

(please mark all that apply and indicate WTE)

- a. Nursing    Yes  No  [    ] WTE
- b. Physiotherapist                                      Yes  No  [    ] WTE
- b. Occupational therapist                              Yes  No  [    ] WTE
- c. Social worker                                        Yes  No  [    ] WTE
- d. Speech and language therapist                      Yes  No  [    ] WTE
- e. Psychologist                                        Yes  No  [    ] WTE
- f. Dietician    Yes  No  [    ] WTE
- g. Other please specify.....

44. (vii)                      How often can patients be seen in the day hospital? [    ]

44. (viii)                      How many patients are seen in the day hospital in one year? [    ]

44. (xi)                      How many of these are stroke patients? [    ]

**SECTION 16 STROKE SERVICE PLANS**

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**STROKE SERVICE PLANS**

45. What are your hospitals plans for stroke services?

46. Have you submitted a plan for stroke services in your service plan?

**NOTES**

*This section is for you to clarify your answers to any questions. Identify the question number(s), which applies to each comment.*



**APPENDIX 2. Members of the IHF/HSE National Stroke Audit 2015 steering group**

Ms	Carmel	Brennan	Programme Manager National Stroke programme
Ms	Heather	Coetzee	Speech and language therapy manager Mater Misericordiae University Hospital
Dr	Paul	Cotter	Consultant Geriatrician, St Luke's Hospital, Kilkenny
Dr	Rachael	Doyle	Consultant Geriatrician, St Columcille's Hospital
Prof	Joe	Harbison	National Clinical Lead Stroke Programme (Gerontology)
Prof	Anne	Hickey	Senior Lecturer RCSI
Ms	Frances	Horgan	Stroke Council Representative
Prof	Peter	Kelly	National Clinical Lead Stroke Programme (Neurology)
Ms	Cliona	Loughnane	Researcher IHF
Mr	Chris	Macey	Head of Advocacy, Irish Heart Foundation
Mr	Paul	Marsden	Researcher Department of Public Health Tullamore
Dr	Dominick	McCabe	Consultant Neurologist, AMNCH
Ms	Joan	McCormack	Project Manager National Stroke Audit
Dr	Paul	McElwaine	Research Fellow National Stroke Programme
Prof	Riona	Mulcahy	Consultant Geriatrician, University Hospital Waterford
Ms	Imelda	Noone	Advanced Nurse Practitioner Stroke, St Vincent's University Hospital
Dr	Emer	Shelley	Specialist in Public Health
Dr	Tadhg	Stapleton	Stroke Council Representative
Prof	David	Williams	Stroke Physician Beaumont Hospital & RCSI

Appendix .

**IHF/HSE National Stroke Audit 2015**

**CLINICAL AUDIT PROFORMA**

The patient cases to be audited are retrospective consecutive cases with a primary diagnosis of stroke (ICD 10 codes: I61, I63 and I64 or ascertained via other methods) discharged from hospital from the National HIPE listing over a 6 month period from the January 2014 – March 2014 and July 2014 – September 2014. Please refer to accompanying help booklet and video for instruction on how to complete the form. The number of charts reviewed is relative to the number of stroke cases managed per annum.

Patient Numbers	Stroke Admissions <100/yr	Stroke Admissions 100-150/yr	Stroke Admissions 150-200/yr	Stroke Admissions >200/yr
Minimum Charts to be audited	25	30	35	40
Number of consecutive thrombolysed cases*	5	10	10	15

\*cases can be included in minimum chart total

Helpline: 018963554 Email: [jmccormack@irishheart.ie](mailto:jmccormack@irishheart.ie)

Date Completed: \_\_\_\_/\_\_\_\_/\_\_\_\_

**SITE CODE:** [ \_\_\_\_\_ ] (to be issued by Project Manager)

Auditor Discipline(s)  
 A1) Clinical Audit     Medicine     CNS/Nursing     Therapy     Other   
 Specify \_\_\_\_\_  
 Auditor Initial: \_\_\_\_\_

**PATIENT AUDIT NUMBER:** [ \_\_\_\_\_ ]  
 (Please ensure this is accurately documented- number will be assigned by clinical audit lead)



**DEMOGRAPHIC INFORMATION**

B1) Age: \_\_\_\_\_

B2) Gender: Male  Female 

B3) Occupation (if known): \_\_\_\_\_

B4) Was the patient already an inpatient at the time of stroke? Yes  No **If Yes, do not include case in data set****Was the patient thrombolysed (+/-endovascular intervention)? Yes  No** **If yes, please take note of chart number on master list provided and keep chart available for review by project team. Supplemental data will be obtained by project team on thrombolysis delivery. Proceed with proforma from section 1 as normal.****If no, then proceed to section 1**

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**SECTION 1 STROKE ONSET AND HOSPITAL STAY**

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*Please make every effort to find the date and time of stroke*

1.1 Date of stroke/Time of Onset: [ \_\_\_ / \_\_\_ / \_\_\_ ] [ \_\_\_ : \_\_\_ ] (dd/mm/yyyy) (hh:mm 24hour clock)

1.1i This **date** is precise  This date is a best estimate Stroke during sleep  Not known 1.1ii This **time** is precise  This time is a best estimate Stroke during sleep  Not known 

1.2i Date of presentation to ED: [ \_\_\_ / \_\_\_ / \_\_\_ ] (dd/mm/yyyy)

1.2ii Time of presentation: [ \_\_\_ : \_\_\_ ] (HH:MM, 24 hr clock) Not known 

1.2iii Date of admission: [ \_\_\_ / \_\_\_ / \_\_\_ ] (dd/mm/yyyy)

1.2iv Time of admission: [ \_\_\_ : \_\_\_ ] (HH:MM, 24 hr clock) Not known 1.3 Did the patient die whilst still an inpatient? Yes  No 

1.4 Date of discharge (If discharged alive): [ \_\_\_ / \_\_\_ / \_\_\_ ] (dd/mm/yyyy)

1.4i Length of stay to discharge alive: [ \_\_\_ ] days

1.5 Date of death( if applicable): [ \_\_\_ / \_\_\_ / \_\_\_ ] (dd/mm/yyyy) Not applicable 

1.6 To the best of your knowledge was the patient still alive 30 days after the onset of their stroke?

Yes  No  Not known

**ADMISSION/DISCHARGE**

1.7 Did the patient arrive by ambulance? Yes  No   
Don't Know

**If yes**

1.7(i) Is there a copy of the ambulance transfer notes? Yes  No

1.7(ii) Were they classed as a FAST positive or Stroke by ambulance service assessment)? Yes  No

1.8i Where was the patient initially admitted to?

Medical assessment unit   
Clinical decisions unit   
Coronary care unit   
Intensive care unit/  
High dependency unit   
Acute/combined stroke unit   
Other ward   
Discharged from ED

1.8ii Is it evident from the that the patient spent >4hours in the Emergency Department following decision to admit? Yes  No  Unknown

1.9 Was the patient treated in a Stroke Unit (or units) at any time during their stay? Yes  No

1.10 Was the patient admitted to an Acute or Combined stroke unit within 4 hours of arrival at hospital? Yes  No

1.11i Did the patient spend over 50% of their stay on a stroke unit? Yes  No

1.11ii If **yes**, what type of unit did they spend that time in? (Tick all that apply)

Acute stroke unit   
Rehabilitation stroke unit   
Combined stroke unit

1.11iii If **no**, where did the patient spend over 50% of their time?

Medical assessment unit   
Coronary Care Unit   
Intensive Care Unit   
General   
Geriatric Ward   
Generic Rehabilitation Unit (ie not a stroke rehab unit)   
Other   
Specify \_\_\_\_\_

1.11iii Did the patient any period of their admission in a high dependency bed i.e

ICU/HDU/CCU? Yes  No

1.12 Date of admission to stroke unit [ \_\_\_\_/\_\_\_\_/\_\_\_\_ ] (dd/mm/yyyy) (if known)

1.13 Date of discharge from stroke unit [ \_\_\_\_/\_\_\_\_/\_\_\_\_ ] (dd/mm/yyyy) (if known)

1.14 During their stay was the patient under the direct care (not a consultation only) of a:

- (tick all that apply)
- |   |                              |                             |                                     |
|---|------------------------------|-----------------------------|-------------------------------------|
| Consultant Geriatrician                                   | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Don't know <input type="checkbox"/> |
| Consultant Neurologist                                    | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Don't know <input type="checkbox"/> |
| Consultant in Rehabilitation Medicine (Rehabilitationist) | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Don't know <input type="checkbox"/> |
| General Physician (non-geriatrician)                      | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Don't know <input type="checkbox"/> |
| Other   | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Don't know <input type="checkbox"/> |

### SCAN

1.15 Did the patient have a brain scan after the stroke? Yes  No  Not known

If **No**:

- 1.15i Reason the patient did not have scan:
- Patient refused/unable to co-operate
  - Palliative care (comfort measures only)
  - Scan not routinely available
  - Not considered clinically indicated

If **Yes**:

1.15ii Date of first brain scan after the stroke [ \_\_\_ / \_\_\_ / \_\_\_ ] (dd/mm/yyyy) Not known

*\*Please make every effort to find the date and time of scan*

1.15iii Time of first brain scan after the stroke [ \_\_\_ : \_\_\_ ] (HH:MM, 24 hr clock) Not known

1.15iv Has a brain scan been carried out within 24 hours of the stroke? Yes  No

If **no**, reason the patient did not have a scan within 24 hours:

- Patient refused/unable to co-operate
- Palliative care (comfort measures only)
- Scan not routinely available
- Not considered clinically indicated
- Patient did not arrive at hospital within 24 hours
- Other
- If other, specify \_\_\_\_\_

1.15v Following the scan what was the pathological diagnosis?

- Infarct
- Normal Scan but clinical assessment consistent with acute ischaemic stroke
- Intracerebral Haemorrhage (does not include extradural, subdural, subarachnoid haemorrhage)

1.16 Did the patient have an MR Brain performed during admission? Yes  No

**SECTION 2 CASEMIX****CO-MORBIDITIES and RISK FACTORS**

2.1 Did the patient have any of the following co-morbidities prior to admission?

Yes  No

2.1i If **yes**, please select all that apply

Atrial fibrillation   
 Previous stroke or TIA   
 Diabetes mellitus   
 Hyperlipidaemia (total cholesterol >5 or LDL >3.0 mmol/L)   
 Hypertension (systolic >140 or diastolic >85)   
 Myocardial infarction or angina   
 Valvular heart disease (aortic or mitral valves)

2.2 Did the patient have any of the following risk factors? Yes  No

2.2i If **yes**, please select all that apply

Current smoker   
 Alcohol excess (no. of units per week > 14 for females, > 21 males)

**PRE-ADMISSION**

2.3i Living accommodation pre stroke:

Home Yes  No

If **yes**, Lived alone? Yes  No

If **yes**, with existing home care package? Yes  No

Residential / Nursing home Yes  No

Hospital Yes  No

Other Yes  No

2.3ii Was the patient independent in everyday activities before the stroke? (e.g. *Barthel 19-20, Rankin <3*) Yes  No  Not known

2.3iii Living accommodation at discharge:

Home Yes  No

If **yes**, Living alone? Yes  No

If **yes**, with home care package? Yes  No

Residential / Nursing home Yes  No

Hospital Yes  No

Off-site rehab Yes  No

Other Yes  No

2.3iv Was the patient discharged to long-term residential care?

Yes temporarily

Yes permanently

No

Not known

2.4 Was the patient on the following medication before admission? Yes  No

2.4i If YES which classes of drugs were prescribed? (tick all that apply):

Antihypertensives		Antiplatelet/thrombotic		Lipid lowering treatment	
ACE inhibitor or Angiotensin-II receptor antagonists	<input type="checkbox"/>	Aspirin	<input type="checkbox"/>	Statin	<input type="checkbox"/>
Alpha Blocker	<input type="checkbox"/>	Clopidogrel	<input type="checkbox"/>	Ezetimibe	<input type="checkbox"/>
Beta Blocker	<input type="checkbox"/>	Dipyridamole	<input type="checkbox"/>	Niacin	<input type="checkbox"/>
Calcium Channel blocker	<input type="checkbox"/>	Warfarin	<input type="checkbox"/>	Fibrates	<input type="checkbox"/>
Thiazide diuretic or thiazide-like diuretic	<input type="checkbox"/>	NOACs	<input type="checkbox"/>	Omega 3	<input type="checkbox"/>
Other	<input type="checkbox"/>	Aspirin/dipyridamole combination* (Asasantin Retard)	<input type="checkbox"/>	Other	<input type="checkbox"/>
None	<input type="checkbox"/>	Other	<input type="checkbox"/>	None	<input type="checkbox"/>
		None	<input type="checkbox"/>		

### DURING ADMISSION

2.5 Did the patient have any of the following during **the first 24 hours**?

- |                                   |     |                          |    |                          |           |                          |
|-----------------------------------|-----|--------------------------|----|--------------------------|-----------|--------------------------|
| i Dysphasia                       | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Not known | <input type="checkbox"/> |
| ii Dysarthria                     | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Not known | <input type="checkbox"/> |
| iii Motor deficits                | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Not known | <input type="checkbox"/> |
| iv Sensory Impairment             | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Not known | <input type="checkbox"/> |
| v Cognitive Difficulties          | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Not known | <input type="checkbox"/> |
| vi Visual/Perceptual Difficulties | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Not known | <input type="checkbox"/> |
| vii Changes in mood               | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Not known | <input type="checkbox"/> |

2.6 Did the patient develop a urinary tract infection in the first 7 days of admission as defined by having a positive culture or clinically treated? Yes  No

2.7 Did the patient develop pneumonia which was a) treated with antibiotics or b) decision not to treat documented by medical team during their admission after stroke? Yes  No

2.8 What was the worst level of consciousness at the time of maximum severity within the first 24 hours after stroke?

- |   |                          |
|---|--------------------------|
| Fully conscious                                 | <input type="checkbox"/> |
| Drowsy  | <input type="checkbox"/> |
| Semi-conscious (not fully rousable)             | <input type="checkbox"/> |
| Unconscious (responds to pain only/no response) | <input type="checkbox"/> |

## 2.9 With regard therapy during admission:

	Physiotherapy	Occupational Therapy	Speech and Language	Psychology
2.9i Was the patient referred for the following therapy at any point during the admission?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
2.9ii If therapy was indicated were rehabilitation goals documented for this therapy?	Yes <input type="checkbox"/> No <input type="checkbox"/> No but* <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> No but* <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> No but* <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> No but* <input type="checkbox"/>
2.9iii Is there evidence of patient participation during goal setting?	Yes <input type="checkbox"/> No <input type="checkbox"/> No but <input type="checkbox"/> *	Yes <input type="checkbox"/> No <input type="checkbox"/> No but <input type="checkbox"/> *	Yes <input type="checkbox"/> No <input type="checkbox"/> No but <input type="checkbox"/> *	Yes <input type="checkbox"/> No <input type="checkbox"/> No but <input type="checkbox"/> *

\*No but where patient chose not to participate or was not able to participate because of the severity of their cognitive and linguistic impairments, or therapy not indicated)

## 2.10 Dependency at discharge (using the Barthel ADL Functional Assessment Scale)

<b>Bowels</b>	0 = Incontinent (or needs to be given enemata) 1 = Occasional accident (once/week) 2 = Continent	0 1 2	<input type="radio"/> <input type="radio"/> <input type="radio"/>
<b>Bladder</b>	0 = Incontinent, or catheterised 1 = Occasional accident (max once per 24 hrs) 2 = Continent (over 7 days)	0 1 2	<input type="radio"/> <input type="radio"/> <input type="radio"/>
<b>Grooming</b>	0 = Needs help with personal care 1 = Independent face / hair / teeth / shaving	0 1	<input type="radio"/> <input type="radio"/>
<b>Toilet Use</b>	0 = Dependent 1 = Needs some help, can do something alone 2 = Independent (on and off, dressing / wiping)	0 1 2	<input type="radio"/> <input type="radio"/> <input type="radio"/>
<b>Feeding</b>	0 = Unable 1 = Needs help cutting, etc 2 = Independent (food in reach)	0 1 2	<input type="radio"/> <input type="radio"/> <input type="radio"/>
<b>Mobility</b>	0 = Immobile 1 = Wheelchair independent including corners etc. 2 = Walks with help of one person (verbal or physical) 3 = Independent (may use stick etc.)	0 1 2 3	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
<b>Transfer</b>	0 = Unable - no sitting balance 1 = Major help (one / two people) can sit 2 = Minor help (verbal or physical) 3 = Independent	0 1 2 3	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>

<b>Dressing</b>	0 = Dependent	0	<input type="radio"/>
	1 = Needs help, can do half unaided	1	<input type="radio"/>
	2 = Independent (including buttons, zips, laces etc)	2	<input type="radio"/>
<b>Stairs</b>	0 = Unable	0	<input type="radio"/>
	1 = Needs help (verbal/physical)	1	<input type="radio"/>
	2 = Independent	2	<input type="radio"/>
<b>Bathing</b>	0 = Dependent	0	<input type="radio"/>
	1 = Independent	1	<input type="radio"/>

SCORE \_\_\_\_\_ / 20

---

**SECTION 3 STANDARDS WITHIN THE FIRST 48 HOURS**


---

Where the patient has been transferred from another hospital and data for the questions below is not available use the "No but.." option.

**PATIENT ASSESSMENT FIRST 24 HOURS**

3.1i Has a validated swallow screening test (not gag reflex) been specifically recorded in the 3 hours?

Yes  No  No, but

Answer **No, but** if: impaired level of consciousness is documented (e.g. NIHSS)

3.1ii Has a validated swallow screening test (not gag reflex) been specifically recorded in the first 24 hours?

Yes  No  No, but

Answer **No, but** if: impaired level of consciousness is documented (e.g. NIHSS)

3.2 Is there a formal assessment documented of?

i) Visual fields Yes  No  No, but   
 ii) Sensory testing Yes  No  No, but

Answer **No, but** if impaired level of consciousness/communication is documented.

3.3 Is there a documented falls risk assessment? Yes  No

**PATIENT ASSESSMENT FIRST 48 HOURS**

3.4 Had the patient commenced Aspirin by 48 hours after stroke?

Yes  No  No, but

Answer **No, but** if: the patient died, patient had intracerebral haemorrhage, there was a documented contraindication to aspirin or they were given an alternative antiplatelet or anticoagulant

3.5 Has swallowing been assessed within 48 hours of admission by a speech and language therapist?

Yes  No  No, but

Answer **No, but...** if: patient's swallowing is documented as normal: patient is still unconscious; patient died within 48 hours; patient is receiving palliative care.

3.6 Has the patient been assessed by a physiotherapist within 48 hours of admission?

Yes  No  No, but

Answer **No, but...** if: patient died within 48 hours; patient is receiving palliative care, no physical need/deficit

3.7 Was the patient assessed by an occupational therapist within 48 hours of admission?

Yes  No  No, but

Answer **No, but...** if: patient died within 48 hours; the patient was still unconscious; it is documented that the patient had no difficulties performing everyday activities; patient is receiving palliative care.

3.8 Was a nutritional screening (e.g. MUST) completed within 48 hours of admission?

Yes  No  No, but

Answer **No, but...** if: patient refused or patient receiving palliative care

3.9i Was the patient receiving nutrition by 48 hours of admission?

Yes  No  No, but

Answer **No, but...** if: patient refused or patient receiving palliative care

If yes,

3.9ii Which of the following methods was in use?

Oral   
Nasogastric/PEG   
Intravenous

## SECTION 4 STANDARDS WITHIN 7 DAYS

4.1 Has there been an initial assessment of communication problems by the speech and language therapist within 7 days of admission?

Yes  No  No, but

Answer **No, but...** if: patient died within 7 days; the patient was still unconscious; it is documented that the patient had no communication problems; patient is receiving palliative care.

4.2 Was the patient assessed by an occupational therapist within 7 days of admission?

Yes  No  No, but



Answer **No, but...** if: patient died within 7 days; the patient was still unconscious; it is documented that the patient had no difficulties performing everyday activities; patient is receiving palliative care.

4.3 Did the patient have *an indwelling* urinary catheter in the first week after admission?  
 Yes  No  No, but

If yes which of the following have been documented as the reason for urinary catheterisation?

Please select all that apply

- a.  urinary retention
- b.  pre-existing catheter
- c.  urinary incontinence
- d.  need for accurate fluid balance monitoring
- e.  critical skin care
- f.  not documented
- g.  other  
please specify

4.4 Is there a plan to promote urinary continence?  
 Yes  No  No, but

Answer **No, but...** if: patient is continent; patient died within 7 days; patient is unconscious; patient is receiving palliative care.

## SECTION 5 BY DISCHARGE

5.1 Is there evidence that the patient was weighed at least once during admission?  
 Yes  No  No, but

Answer **No, but...** if patient died within 7 days; patient unconscious throughout.

5.2 Is there evidence in the multi-disciplinary notes of a social work assessment within 7 days of referral?  
 Yes  No  No, but

Answer **No, but...** if: patient not referred to Social Worker; patient died within 7 days; or patient refused.

5.3 Is there evidence that the patient's mood has been assessed, either by medical team/multidisciplinary team documenting mood status or through use formal assessment tool?  
 Yes  No  No, but

Answer **No, but...** if: patient unconscious throughout; or patient died within 7 days

5.4 Is there evidence that the patient's cognitive status has been assessed using a valid screening tool, or a function-based assessment by an occupational therapist for whom formal screening is not appropriate e.g. Patients with communication difficulties?  
 Yes  No  No, but

Answer **No, but...** if: patient unconscious throughout; or patient died within 7 days, or receiving palliative care.

**CARE PLANNING**

- 5.5 Is there documented multidisciplinary team case discussion with senior decision maker? Yes   No   No but

Answer **No, but...** if: patient died / discharged within 7 days; patient is receiving palliative care.

**SECTION 6 RISK FACTORS AND SECONDARY PREVENTION****STROKE RISK FACTORS DEFINED AT DISCHARGE**

6.1i Has(ve) the probable underlying cause(s) for the stroke been identified?

Yes  No  Not documented

If **yes**,

6.1ii Which of the following? (Tick all that apply)

- |  |                          |
|--|--------------------------|
| Carotid stenosis                                       | <input type="checkbox"/> |
| Current smoker   | <input type="checkbox"/> |
| Alcohol abuse no. of units per week (21 female 28 men) | <input type="checkbox"/> |
| Atrial Fibrillation                                    | <input type="checkbox"/> |
| Myocardial Infarction within the past month            | <input type="checkbox"/> |
| Hypertension   | <input type="checkbox"/> |
| Diabetes mellitus*                                     | <input type="checkbox"/> |
| Other  | <input type="checkbox"/> |

If other specify \_\_\_\_\_

6.2 Have the following risk factors been discussed with the patient and/or carer? Yes   No   No but

- |                   |                          |                          |                          |
|-------------------|--------------------------|--------------------------|--------------------------|
| Smoking cessation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Alcohol reduction | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Exercise          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Diet              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Answer **No, but...** if patient died; remained profoundly impaired, risk factor not relevant

6.3 i) Is there a documented measure of blood cholesterol?

Yes  No  No, but

This may include any point in the year prior to this episode)

Answer **No, but...** if: patient died in hospital; remained profoundly impaired

- ii) If **YES**: What was the Total Cholesterol \_\_\_\_\_  
 LDL \_\_\_\_\_  
 HDL \_\_\_\_\_

If **YES** to (ii)

iii) Has the patient received dietary advice to reduce fat intake?

Yes  No  No, but

Answer **No, but...** if: remained profoundly impaired

6.4i Has blood pressure been recorded as above normal after the acute phase (first 3 days) (systolic >140, or diastolic > 90) on 3 or more occasions?

Yes  No  No, but

Answer **No, but...** if: blood pressure was normal; patient died; patient refused

6.4ii If **YES** what classes of drugs were prescribed (tick all given):

ACE inhibitor   
 Angiotensin-II receptor antagonists   
 Alpha blocker   
 Beta blocker   
 Calcium channel blocker   
 Thiazide diuretic   
 Other   
 None

6.5i Which treatment was the patient on at discharge?

(Tick all that apply. If "none" select the reason)

Antihypertensives		Antiplatelet/thrombotic		Lipid lowering treatment	
ACE inhibitor or Angiotensin-II receptor antagonists	<input type="checkbox"/>	Aspirin	<input type="checkbox"/>	Statin	<input type="checkbox"/>
Alpha Blocker	<input type="checkbox"/>	Clopidogrel	<input type="checkbox"/>	Ezetimibe	<input type="checkbox"/>
Beta Blocker	<input type="checkbox"/>	Dipyridamole	<input type="checkbox"/>	Niacin	<input type="checkbox"/>
Calcium Channel blocker	<input type="checkbox"/>	Warfarin/other anticoagulant	<input type="checkbox"/>	Fibrates	<input type="checkbox"/>
Thiazide diuretic and thiazide-like diuretic	<input type="checkbox"/>	NOAC	<input type="checkbox"/>	Omega 3	<input type="checkbox"/>
Other	<input type="checkbox"/>	Aspirin+Dipyridamole (Asasantin Retard)*	<input type="checkbox"/>	Other	<input type="checkbox"/>
None	<input type="checkbox"/>	Other	<input type="checkbox"/>	None	<input type="checkbox"/>
		None	<input type="checkbox"/>		

6.5ii If **None**, reasons for not prescribing

Antihypertensives		Antiplatelet/thrombotic		Lipid lowering treatment	
Not indicated	<input type="checkbox"/>	Not indicated	<input type="checkbox"/>	Not indicated	<input type="checkbox"/>
Patient refused	<input type="checkbox"/>	Patient refused	<input type="checkbox"/>	Patient refused	<input type="checkbox"/>
Under review	<input type="checkbox"/>	Under review	<input type="checkbox"/>	Under review	<input type="checkbox"/>
Contra-indications	<input type="checkbox"/>	Haemorrhagic stroke	<input type="checkbox"/>	Patient life expectancy <2 years	<input type="checkbox"/>
		Other Contra-indications	<input type="checkbox"/>	Other Contra-indications	<input type="checkbox"/>

## SECTION 7 PATIENT COMMUNICATION AND RESEARCH

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### COMMUNICATION

7.1 Is there documented evidence that there has been discussion with the patient about:

	Yes	No	No but
i. Diagnosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ii. Prognosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Answer **No, but...** if patient unconscious throughout or died or has severe receptive or cognitive difficulties.

7.2 Were the carer's needs for support assessed separately?

Yes  No  No, but

Answer **No, but...** if it was documented that there was no carer,

7.3 Is there evidence that the skills required to care for the patient at home were taught?

Yes  No  No, but

Answer **No, but...** if: patient died; patient discharged to institutional care; it is documented that the carer is not participating in the patient's care; patient was self-caring by discharge.

7.4 Was a home visit performed?

Yes  No  No, but

Answer **No, but...** if: the patient was sent to another hospital/institution; or was functionally competent; or there was no change in functional ability from before stroke or if plan to perform visit on discharge, or; patient died; or patient or carer refused.

If yes,

7.4i was this:

by a professional with the patient?   
by a professional without the patient?

### RESEARCH

7.5 Is this patient in a research study where they (or a relative) have given written consent/assent?

Yes  No

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## SECTION 8 DISCHARGE PLANNING FROM HOSPITAL AND ONWARD REFERRAL

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### Information to GP

8.1i Is there documented evidence that on the day of discharge (or the day following death) the GP was informed (by fax, phone, e-mail or letter) of the patient's discharge / death?

8.1ii If **no** is there evidence that a letter was sent at some stage Yes  No

include date of letter dd/mm/yyyy [ / / ]

## 8.2 Does the discharge summary to the GP have any of the following?

Diagnosis	<input type="checkbox"/>
Treatment	<input type="checkbox"/>
Complications	<input type="checkbox"/>
Medications on discharge	<input type="checkbox"/>
Functional ability on discharge	<input type="checkbox"/>

## 8.3 What are the plans for this patient's onward referral for rehabilitation after discharge from the acute hospital?

Early Supported Discharge Team	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Public Health Nurse	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Community HSCP Services		
Physiotherapy	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Occupational therapy	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Speech and language therapy	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Clinical Nutrition	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Psychology	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Liaison Psychiatry	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Community Rehabilitation Team	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Hospital based therapy out patients	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Day Hospital	Yes <input type="checkbox"/>	No <input type="checkbox"/>
In patient rehabilitation unit	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Off site Rehabilitation Unit	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Baggot Street (for Dublin Hospitals)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
National Rehabilitation Hospital	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Volunteer Stroke Scheme	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Headway	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Other	Yes <input type="checkbox"/>	No <input type="checkbox"/>
If other specify _____		

## 8.4i On discharge did the patient is there evidence that the patient required any of the following:

New Home Care Package	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Long term Care	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Equipment to Support Discharge	Yes <input type="checkbox"/>	No <input type="checkbox"/>

8.4ii If **yes** to any of the above is there any evidence of delays in accessing these services

New Home Care Package	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Long term Care	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Equipment to Support Discharge	Yes <input type="checkbox"/>	No <input type="checkbox"/>

**Notes:**

**This section is for you to clarify your answers to any questions. Identify the question number (s) which apply to each comment. (Online version allows you to enter comments next to each individual question)**

## Appendix 4

	Lead Auditor Name	Auditor Name	Auditor Name	Auditor Name	Auditor Name
<b>MMUH</b>	Ms. Tara Daly	Annik De Dios	Prof. S Murphy	Bridget Flanagan	Dr. R Finnegan
		Leona Higgins	Libby Cunningham	Dr M O'Hare	
		Niamh Davis	Leona Higgins	Dr Kirstyn James	
<b>SVUH</b>	Ms. Imelda Noone	Dr T Hayakawa	Ruth Maxwell	Dr D O'Shea	
		Dr B McAuliffe	Mervyn Hollywood	Mary Kate Meagher	
<b>MRHM</b>	Ms. Sinad Gallagher	Dr C Fallon	Dr S Tselapeck	Dr S Ahmad	
	Dr S Carter	Dr S G Chong	Dr B Drumm	Caroline Colgan	
<b>WGH</b>	Ms. Karina Somers				
<b>SLHK</b>	Ms. Hannah Murugan	Dr P Cotter	Dr R McGovern		
<b>OLHN</b>	Ms. Mary Flanagan	Dr N Wrigley Kelly	Dr R Ali	Dr R Mehmood	
<b>SJH</b>	Ms. Suzanne Walsh	Helen Flynn	Anne Connolly	Dr R McDonagh	
		Dr N O'Regan	Roisin Kelly		
<b>AMNCH</b>	Ms. Nicola Coogan	Suzanne Green			
<b>NGH</b>	Ms. Trish Daly				
<b>MRHT</b>	Dr. Teresa Donnelly	Dr. M S Khan	Dr. A Ibrahim		
<b>MRHP</b>	Mr. Mark Hough	Siobhan McCann	Catriona Blackie	Wendy Yell	
<b>OLOL</b>	Ms. Fiona Connaughton	Claire Prendergast			
<b>CGH</b>	Ms. Frances Smith				
<b>BH</b>	Ms. Emma Hickey	Dr A Leahy	Dr E Gaynor	Leonie Weekes	
<b>CH</b>	Dr P McElwaine				
<b>UHL</b>	Ms. Nora Cunningham	Monica Clancy	Frances Shinkins		
<b>UHW</b>	Ms. Breda Jones	Dr M S Zaheer			
<b>STGHC</b>	Dr Sinead Stoneman	Dr A Arooj			
<b>CUH</b>	Mr. Glen Arrigan	Elizabeth Maloney	Denis Curtin	Ronan McGinty	Elaine Shanahan
		John Quealy	Stephen Ryan	Marie Gaughan	
<b>KGH</b>	Dr. Helena Moore				
<b>MUH</b>	Ms. Karen Fitzgerald	Nan Kearney			
<b>BGH</b>	Ms. Noreen Lynch	Dr B Carey			
<b>UCHG</b>	Dr. Stephanie Robinson	Trish Daly	Paul Marsden		
<b>PH</b>	Mary J Barrett	Geraldine Devine			
<b>MGH</b>	Ms. Niamh Murtagh	Dr T O'Malley	Dr I Marion	Dr O Whelan	
<b>SGH</b>	Ms. Una Moffat				
<b>LGH</b>	Dr. Sara Mello				

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