



Royal College of Surgeons  
in Ireland



Trinity College Dublin

**Irish National Audit of Stroke Care (INASC)  
Irish Heart Foundation in Association with the  
Department of Health and Children**

**Clinical Audit: Hospital Services 2007**

**Prepared on behalf of the Irish Heart Foundation National  
Stroke Review Group**

**by**

**The National Audit of Stroke Care Research Team  
(Royal College of Surgeons in Ireland and Trinity College Dublin)**

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## **National Audit of Stroke Care Clinical Audit: Hospital Services**

**Report prepared by the National Audit of Stroke Care Research Team**

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## **Executive Summary**

### **Background and Methods**

Stroke is the third leading cause of death and disability worldwide and constitutes a formidable burden of disability for patients, their families, health professionals and the wider community. A local evidence base is essential in planning and evaluating service delivery. In the absence of such information in Ireland, the overall aim of the project was to conduct a national stroke audit of hospital and community stroke services in the Republic of Ireland.

The objective of the audit of hospital based stroke services was to establish the current level and functioning of services available for the care of stroke patients in acute Irish hospitals. This comprised an audit of organisational aspects of stroke care in acute hospitals and a clinical audit of care involving review of clinical case notes for a national sample of patients with stroke. The clinical audit is described in this report.

The 36 public hospitals which provide acute services for stroke patients and participate in the Hospital In-Patient Enquiry Scheme (HIPE) were contacted and all agreed to participate. The chart review was based on the Clinical Audit Proforma of the Royal College of Physicians London (United Kingdom) (RCPUK) National Sentinel Stroke Audit. Stroke cases admitted to Irish hospitals over a six-month period in 2005 were identified by ICD-10-AM codes. Patient charts were reviewed by local staff following training to audit standards by RCPUK Sentinel audit trainers. The reliability of the audit tool was assessed by independent re-audit of 8% of charts across all hospitals. Reliability was very acceptable.

### **Results and Discussion**

These findings present for the first time a national overview of the processes of care in acute hospitals in the Republic of Ireland Irish National Audit of Stroke Care (INASC). A total of 2570 charts were sought. 9% were miscoded and 7% were missing. A final set of 2173 charts were individually audited.

### **Demographic Profile**

- The age and gender profile of patients was similar to Sentinel populations: half of the cases were men 52% and 47% were women. 19% were aged less than 65 years.
- The majority (92%) were living at home at the time of the stroke with 73% recorded as independent in terms of ADL pre-stroke.
- The preadmission co-morbidity profiles were quite similar with hypertension (51%), previous stroke or TIA (25%) and atrial fibrillation (22%) being the most common in both patient groups.

### **Stroke Unit Provision**

- Inadequate provision of stroke unit care was evident with 2% of INASC patients treated on a Stroke Unit vs. 54% in Sentinel 2006.
- The majority (69%) of patients spent more than 50% of their stay on a general medical ward.
- The majority (61%) were under the care of a general physician.

### **Brain Imaging Following Stroke**

- There was extremely poor access to rapid neuro-imaging with only 40% having the scan within 24 hours after stroke and a delay of 2.6 days from stroke time to scan (vs. one day in Sentinel 2006). Only, 4% were scanned within 3 hours of their stroke compared with 9% in Sentinel UK 2006.
- One percent of patients were thrombolysed.

### **Stroke Onset and Hospital Stay**

- The majority (71%) were admitted to hospital on the same day as their stroke and this was comparable to Sentinel 2006 (72%).
- However, the proportion getting to hospital within 2 hours of stroke was substantially lower in Ireland: 5% admitted within 2 hours compared with 39% in Sentinel 2006.
- Nineteen percent of stroke patients died as inpatients.
- Mean (median) length of stay to discharge alive was 30 (14) days. These were similar to Sentinel 2006 rates.

### **Discharge Outcomes**

- Irish patients were more disabled at discharge with 28% independent in activities of daily living when discharged in contrast to 39% in the UK (Sentinel 2006).
- The proportion of patients institutionalised directly from acute care in INASC was somewhat higher than Sentinel (15% vs. 13% Sentinel 2006). Since some patients were discharged to intermediate care facilities, some of these may also have subsequently been institutionalised.

### **Secondary Prevention and Medication**

- Over half of patients were on antihypertensive medication and antiplatelet / thrombotic therapy prior to their admission, while a quarter were on lipid lowering treatment.
- Just under half, 45% of patients had commenced aspirin by 48 hours after their stroke. This compares unfavourably with the most recent Sentinel data (2006) where 71% had commenced aspirin by 48 hours after stroke.
- The majority of patients were discharged on cardiovascular medications. This profile is similar to Sentinel 2006.

### **Risk Factor Management**

- The causes identified were most commonly hypertension (56%) followed by atrial fibrillation (28%). A similar profile was evident in Sentinel 2006.
- Generic lifestyle factors to promote secondary prevention following stroke, i.e. smoking cessation and physical activity, diet and alcohol management, were documented as having been discussed with the patient and their carer in only a small proportion of cases.
- Two thirds had blood cholesterol levels documented, 39% of these had elevated cholesterol and 29% of those with elevated cholesterol received dietary advice on reducing their cholesterol through dietary management.

### **Management / Care Planning and Multidisciplinary Assessment**

- The levels of assessment of impairments were substantially lower for all three areas specified compared with Sentinel 2006 audit figures.
- Just over a quarter of patients were screened by staff within the first 24 hours of admission after stroke to see if they could swallow safely, in contrast to 66% in Sentinel 2006.
- There were considerable deficiencies in timely access to these allied health professionals. The gap was particularly notable for speech and language therapy where there was a formal speech and language therapy (SLT) swallow assessment within 72 hours in 25% of cases vs. 67% in Sentinel 2006. A formal SLT communication assessment within 7 days occurred in 29% of cases in INASC vs. 69% in Sentinel 2006.
- Access to physiotherapy was also lower than in the UK, 43% of patients were assessed by a physiotherapist within 72 hours vs. 71% of cases in Sentinel 2006.
- Access to occupational therapy was also low with just over a fifth of patients assessed within 7 days of admission for stroke vs. 68% in the recent Sentinel audit (Sentinel 2006).
- Social work assessment within 7 days took place in 13% of cases vs. 56% in Sentinel 2006.
- The high proportions of patients not seen within 72 hours and 7 days is worrying since early intervention by a multidisciplinary team can elicit functional benefits.
- A lower proportion of INASC patients had a mood assessment, 28% compared to 55% in Sentinel 2006.
- The majority of patients were receiving nutrition (81%); most of these (82%) were on oral nutrition.

### **Communication with Patients and Carers**

- The proportion of patients with documented evidence of a discussion in relation to stroke diagnosis and prognosis was low 22% and 18% in contrast to 69% and 59% in Sentinel 2006.
- There was an assessment of carers' needs in only a quarter of patients (24%), in contrast to over two-thirds of patients (68%) in Sentinel 2006.

- A very small proportion (12%) had documented evidence that the skills required to manage stroke patients at home were taught (vs. 71% Sentinel 2006).
- A home visit took place in a very small number of cases (7%), in contrast to over 60% of patients in the 2006 and 1998 Sentinel audits.
- In 56% of cases there was evidence that the general practitioner was notified by the day of discharge. The mean notification lag from discharge was 18 days (SD 35). The median was 5 days (IQR 0-22 days).
- The documented plans for onward referral were varied with the public health nurse (PHN) being involved in about a third of cases but ongoing therapy occurring in a small minority only.

### **Comparison of Results with the UK Sentinel Audit: 12 Key Indicators**

- The Irish audit reported lower coverage on all 12 key indicators than both the 2004 and 2006 Sentinel audits.
- Particularly notable was the virtual absence of stroke unit care in Ireland while over half were treated in such units by 2006 in the UK.
- While initiation of appropriate medication, technological assessment, in-patient physiotherapy and patient body weight assessment was conducted for over 40% of Irish patients, services requiring other members of a multidisciplinary team (swallow, occupational therapy needs, mood assessment and multidisciplinary discharge goals for rehabilitation) were available to only about one in four stroke patients.
- Home assessment was also a service for a minority in Ireland (7%) and the majority (>60%) in the UK.

### **Conclusion**

- This report indicates substantial deficits in primary prevention, timely and thorough assessment, investigation and treatment, rehabilitation, secondary prevention, discharge planning and preparation of patients and family for discharge.
- Performance across a broad range of indicators of quality of stroke care was much poorer in Ireland compared to the UK. In absolute terms, it is important to note that the UK profile is in itself far from optimal, thus the Irish profile requires considerable investment to reach best practice. Evidence in successive rounds of the UK audit system is that changes can be made and demonstrated towards improved practice. Thus this Irish audit should be seen as a first step in a cycle of continual planning, intervention for improvement and outcome evaluation.
- These findings from the clinical audit are consistent with, and amplify the nature and extent of the deficits of the systems for stroke care outlined in the organisational audit of the INASC. They represent a major cause of concern for people with stroke, their families, as well as to healthcare professionals. The findings point to the need for a radical and urgent review of stroke services in Ireland to improve the current situation and provide appropriate care for Irish people with stroke.

## **Recommendations**

[For further discussion with Review Group]

## Table of Contents

Chapter Title	Page number
<b>Executive Summary</b>	<b>7</b>
<b>Chapter 1 Introduction</b>	<b>13-16</b>
<b>Chapter 2 Methods</b>	<b>17-21</b>
Aim	17
Sample / participation	17
Procedure / organisation of clinical audit	17
Standardisation	18
Data collection tool	18
Audit sample	18
Data sources	19
Data collection time-frame	19
Case ascertainment	19
Reliability of data collection tool and reliability analyses	19
<b>Chapter 3 Results: Summary across all Hospitals</b>	<b>22-45</b>
Introduction	22
Patient demographic profile	22
3.1 Stroke onset and hospital stay	23
3.2 Case-mix	27
3.3 Standards within 72 hours	32
3.4 Standards within 7 days	35
3.5 By discharge	36
3.6 Risk factors and secondary prevention	37
3.7 Patient communication and research	42
3.8 Discharge planning from hospital and onward referral	43
3.9 Clinical Audit - 12 key indicators	45
<b>Chapter 4 Discussion</b>	<b>46-55</b>
<b>Chapter 5 Recommendations</b>	<b>56</b>
<b>References</b>	<b>57-61</b>
<b>Appendices</b>	<b>62-109</b>
1. List of 36 participating hospitals	
2. Hospital In-Patient Enquiry Scheme (HIPE)	
3. Summary of modifications to Clinical Audit Proforma	
4. Irish Stroke Audit Clinical Audit Proforma 2006	
5. Irish Stroke Audit Clinical Audit Helpnotes	
6. Table 2.3 Kappas for other Clinical Audit Proforma Questions	
7. Irish Heart Foundation National Stroke Review Group Members	

## Chapter 1 Introduction

Stroke is the third leading cause of death and disability worldwide and constitutes a formidable burden of disability for patients, their carers and the wider community. There were approximately 10,000 people admitted to hospital in the Republic of Ireland each year with stroke disease as a primary diagnosis (HIPE data ESRI) and it is estimated that over 30,000 people in Ireland are survivors of stroke, many of whom have significant residual disability including hemiparesis (48%), inability to walk (22%), need for help with activities of daily living (24-53%), clinical depression (32%), and cognitive impairment (33%) (Council on Stroke, IHF, 2001). Many strokes are preventable and recent developments have shown that fast and effective treatment can rescue brain tissue from being damaged and significantly reduce further damage and residual disability. The recent National Audit Office Commission's report in the UK highlighted the disproportionate differences in status and resourcing of coronary heart disease (CHD) compared to stroke. The annual direct healthcare costs for stroke were £2.8 billion in contrast to £1.9 billion for CHD. The number of inpatient hospital bed days annually were 2.6 million for stroke and 3 million for coronary heart disease. The average length of stay for stroke was 28 days and 7 days for CHD (National Audit Office 2005). However the status awarded to stroke in terms of services has not been commensurate with other leading diseases, such as heart disease. Services for coronary heart disease are well established in Ireland (Coughlan, 2004) however organised stroke care is in its infancy.

The organisation of stroke services has received considerable attention and it is now recognised that the way services are organised can have an important effect on patient outcome (Langhorne & Dennis, 1998). The profile of stroke care in the United Kingdom is increasing and several factors have contributed to this change, including the National Clinical Guidelines for Stroke (2000), which were updated in 2004. The stimulus for these guidelines stemmed from the findings of the first round of the National Sentinel Audit of Stroke (Intercollegiate Working Party for Stroke, 2001-2002), which confirmed suboptimal stroke care. There is now a considerable amount of research evidence supporting the components of an integrated stroke service. Secondary prevention measures considerably reduce the risk of stroke (Elkind, 2005). Most evidence exists for comprehensive stroke units with associated reductions in mortality and length of stay and improved patient outcomes. There is also some evidence for the effectiveness of rehabilitation units (Kalra et al, 2000). What is clear from experience elsewhere, particularly the evolving profile of service improvement across the three rounds to date of the Sentinel UK audit, is that improvement can be achieved in a reasonable timeframe through a continuous cycle of investment, evaluation and planning. In view of the evidence of organised stroke unit care, many lives can be saved: extrapolating UK data, it is likely that 350-500 deaths a year could be saved by the introduction of stroke unit care in Ireland. The early supported discharge team model has been tested in a small number of randomised controlled trials, and while early results support reduced length of stay and better long-term patient functional outcomes, the economic analysis of such a

model of care is not available (Early Supported Discharge Trialists 2002, Fjaertoft et al, 2005, Langhorne et al 2005). Many reports have articulated the unmet service and information needs of stroke patients and their families and carers after discharge from hospital (Martin et al, 2002).

The Royal College of Physicians Clinical Effectiveness and Evaluation Unit (CEEU) conducted the first round of National Sentinel Stroke Audit in the United Kingdom (UK) in 1998 and three further rounds in 1999-2002 and 2004. The first and second rounds were funded by the Department of Health and the third round by a consortium of funders including the Stroke Association. The fourth round was funded by the Healthcare Commission. The objective of the Sentinel Audit is to assess the quality of care for people who have had a stroke and to help trusts use audit as a means of quality improvement. The audit is based on evidence-based standards for the organisation of services and process of care agreed by the representatives of the Colleges and professional organisations of the disciplines involved in the management of stroke. The Royal College of Physicians, on behalf of the Intercollegiate Working Party for Stroke, conducted the fifth round of the National Sentinel Audit of Stroke in 2006 (Intercollegiate Working Party for Stroke. Concise report on the National Sentinel Audit of Stroke 2006) to monitor the progress of stroke care delivery following the launch of the National Service Framework for Older People (NSF). It was funded by the Healthcare Commission and builds on the work of previous rounds which have demonstrated that national audit can help improve the quality of care by involving trusts across the country in large-scale audit that enables them to compare their results to the national data. The aims of the Sentinel Audit are: to enable Trusts to benchmark the quality of their stroke services compared to national standards; to identify changes in stroke service organisation and quality of care for stroke patients since the 2004 National Sentinel Audit; to evaluate the extent to which the National Clinical Guidelines for Stroke have been implemented.

Despite the fact that there is international evidence for over a decade that stroke units reduce death and disability by 25% (Langhorne et al, 1993), a fact confirmed by the recent UK National Sentinel Stroke Audit (Rudd et al, 2005), preliminary Irish evidence suggests that hospital services are poorly prepared for this major advance in stroke care (Coughlan, 2004). Community services appear to be under-resourced and ill-focussed to the needs of Irish people with stroke (Noone et al, 2002, Swanton et al, 2004). This is against a background of no overall national or regional policy on stroke within the Irish health services. The Council on Stroke of the Irish Heart Foundation made four principal recommendations to the Irish Government in 2000. These have yet to be adopted.

The report recommended the following:

1. Prevention and health promotion: to develop active programmes for primary, secondary and tertiary prevention for stroke. Primary prevention could most usefully be undertaken in conjunction with the National Cardiovascular Health Strategy. Secondary and tertiary prevention should be based in Stroke Services.

2. Acute treatment and rehabilitation: that in every general hospital admitting patients with acute stroke, people with stroke should be admitted to a Stroke Service under the care of a dedicated specialist(s) in stroke care, associated interdisciplinary team, appropriate diagnostic technology (e.g. CT/MRI) and a clearly defined continuum of care. Access to tertiary services (e.g. carotid endarterectomy) should also be available. Rehabilitation strategies should start from admission and should be continued during the hospital stay.
3. Community rehabilitation: Out-patient rehabilitation should be made available for all patients of all ages in each Health Board area, on the basis of 250-300 patients discharged to the community/year per 250,000 population. These should encompass the full interdisciplinary team with either a domiciliary focus or adequate transportation if provided as out-patient care. Services should be available at any age and the model of the stroke services at Baggot St Hospital (Dublin) should be considered. The activities of the Volunteer Stroke Scheme should be developed and supported.
4. Stroke Register: As stroke is such a devastating and costly illness, and since little data is available on stroke in Ireland, a register of people with acute stroke should be established as a priority, similar to that of the cardiac surgery, coronary care and cancer registries.

It has been a cause of considerable concern to those affected by stroke and professionals involved with stroke that there is a dearth of reliable data on the provision of services for stroke. This project provides an important advance in quantifying the preparedness of Irish hospitals for modern stroke treatment, as well as providing a nationwide profile. The aim of the project is to conduct a national audit of hospital and community stroke care for the Republic of Ireland.

The objective of the Audit of hospital based stroke services is 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 hospital-based services has two components:

- i) An Audit of the Organisational Aspects of Stroke Care in acute hospitals with regard to their resources for organised stroke care; and
- ii) A Clinical Audit of Stroke Care involving review of clinical case notes for a selected national sample of patients with stroke.

The first parts of the Irish National Audit of Stroke Care (INASC), commissioned by the Irish Heart Foundation in association with the Department of Health and Children, reveal substantial shortcomings in stroke care in Ireland (INASC Report 2007).

- Stroke services in Ireland were notable by the complete absence, with one exception, of the recommended standard of stroke units for optimal care of patients following stroke. Only one hospital, representing 3% of relevant Irish hospitals, had a stroke unit.

- There were only 12 designated stroke unit beds nationally. These figures indicate an overall ratio of 0.03 beds per stroke patient in comparison to 0.82 beds per stroke patient in the UK (Intercollegiate Working Party for Stroke Sentinel Audit UK 2006).
- Thrombolysis services for persons with stroke were not available in Ireland.
- 30% of hospitals did not have routine access to routine CT scanning within 48 hours of stroke.
- Only 16% of Irish hospitals had TIA services.
- Overall, staffing levels and profiles indicate a lot of stroke service provision by interested staff with little opportunity to specialise or consolidate either stroke services or related professional skills.
- Persons with stroke under age 65 years were seen to experience particular difficulties in accessing rehabilitation and community services.
- Most encouraging was the finding that 23 hospitals had already submitted service plans for stroke care to local health service executive (HSE) health managers.

This report presents the findings of the second of these components – the National Audit of the Processes of Stroke Care.

## Chapter 2 Methods

### 2.1 Aim

To conduct a Clinical Audit of Stroke Care involving review of clinical case notes for a selected sample of patients with stroke.

### 2.2 Sample / Participation

The audit was planned for all 37 relevant public acute hospitals in the Republic of Ireland. The final sample was the 36 hospitals (**Appendix 1**) which participated in the Hospital In-patient Enquiry Scheme (HIPE) Scheme. Ethical approval for the research protocol was provided by the Royal College of Surgeons in Ireland Research Ethics Committee. In advance of the audit, permission was also granted by the National Hospitals Office, Health Service Executive and the Chief Executive Officers of the relevant hospitals. Additional ethical approval was requested and granted in a small number of hospitals.

### 2.3 Procedure / Organisation of Clinical Audit

The audit of clinical aspects of stroke care involved a retrospective review of clinical case notes for a selected sample of patients in 36 public acute hospitals. There were approximately 10,000 people admitted to hospital in the Republic of Ireland each year with stroke disease as a primary diagnosis (HIPE data ESRI) and approximately 5,000 of these are of the type classified as acute stroke in the UK National Stroke Audit (i.e. excluding certain types of stroke such as subarachnoid haemorrhage). Resources permitted the review of approximately 2,500 cases. Stroke has a long recognised seasonal variation with greater incidence and mortality in winter compared to summer (Haberman et al 1981).

Therefore a 6-month period was selected for the audit and was divided into two 3-month periods (January – March and July – September 2005). The stroke cases were identified through the Hospital Inpatient Enquiry Scheme (HIPE). HIPE is the principal source of national data on discharges from acute hospitals in Ireland. The HIPE unit at the Economic and Social Research Institute (ESRI) is responsible for overseeing the collection, coding and processing / reporting of data for all hospitals. In addition, local HIPE offices in all 36 acute hospitals can generate this data with specialised software. Files for all patients discharged from January 1<sup>st</sup> 2005 are now coded using the International Classification of Diseases, Tenth Revision (ICD-10-AM) coding classification, which is internationally recognised (for further information on HIPE see **Appendix 2**). Data from consecutive discharges for the specified periods with a primary diagnosis of stroke using ICD-10-AM in 2005 were extracted for each of the 36 hospitals (**Appendix 1**) for the chart review. Following the generation of HIPE data for the specified period in each of the 36 public acute hospitals, the staff in Medical Records retrieved the charts. Local chart auditors were identified through the stroke physician and contact with relevant hospital departments, and included medical, nursing and allied health professional staff grades. 76 chart auditors were identified and underwent training in November 2006. The data collectors received training in the use of the proforma. The Audit Proforma to be used for the chart review

was the Royal College of Physicians United Kingdom (RCPUK) clinical audit proforma used in the Sentinel Audit (UK audit of stroke services). Some minor modifications (**Appendix 3**) were necessary for the Irish context in addition to those recommended by the National Stroke Review Group (**Appendix 4** Clinical Audit Proforma).

#### **2.4 Standardisation**

The chart auditors received training in the use of the Clinical Audit Proforma by Mrs Alex Hoffmann who was Project Manager of the UK Sentinel Audit on Stroke in November 2006. In addition, Clinical Audit Help Notes (**Appendix 5**) were generated and circulated to all chart auditors. Frequently Asked Questions were circulated and a helpdesk operated to address queries that arose during the data collection period.

#### **2.5 Data Collection Tool**

The audit proforma used was the Royal College of Physicians London (United Kingdom) (RCPUK) National Sentinel Stroke Audit 2006 Clinical Audit Proforma (**Appendix 4**). The RCPUK National Sentinel Stroke Audit 2006 Clinical Audit Proforma has 7 sections as follows:

- Section 1     Stroke onset and hospital stay
- Section 2     Casemix
- Section 3     Standards within 72 hours
- Section 4     Standards within 7 days
- Section 5     By discharge
- Section 6     Risk factors and secondary prevention
- Section 7     Patient communication and research

Some questions were dropped from the 2006 UK Clinical Audit Proforma, e.g. discharge planning from hospital and onward referral. Questions relating to blood pressure, cholesterol and living accommodation were added into the 2006 Irish Clinical Audit Proforma. Some minor modifications were necessary for the Irish context as recommended by the National Stroke Review Group and are detailed in **Appendix 3**. In addition some minor modifications were necessary following initial pilot studies. The final Proforma used in the Irish National Clinical Audit of Stroke Care is presented in **Appendix 4**. In the Results Section, reference will be made to the questions asked in the proforma (e.g. Q12). Comparisons with previous UK Sentinel Audits will be made where appropriate.

#### **2.6 Audit Sample**

The audit sample included consecutive discharged cases with a primary diagnosis of stroke (ICD 10 codes: I61, I63 and I64 including subcategories) during the specified six-month period: January February and March, July August and September 2005. The number of patients discharged over the six-month period was 2570.

##### *Inclusion criteria:*

- Intracerebral Haemorrhage (I61),
- Cerebral Infarction (I63),
- Stroke, not specified as haemorrhage or infarction (I64).

*Exclusion criteria:*

Cases with subarachnoid haemorrhage (160)  
Subdural and extradural haematoma (162) were excluded from this audit sample.

## **2.7 Data Sources**

The clinical audit used the hospital medical charts including the notes of all disciplines involved with each case.

## **2.8 Data Collection Timeframe**

Data collection commenced on Monday December 4<sup>th</sup> 2006 and concluded on Friday 2<sup>nd</sup> March 2007.

## **2.9 Case Ascertainment**

The methodology used to select cases required strict adherence to the audit sample description outlined. To confirm that this was being followed, chart auditors were asked to submit an Excel spreadsheet at the end of the clinical audit which specified the date of discharge for all stroke patients for the six-month period in 2005, with an explanation of how the cases were ascertained (via clinical coding or admission books, stroke register) and to give the reason for omission of any consecutive cases (e.g. coding incorrect, chart unavailable). All possible effort was expended to locate missing notes, as this contributed to the data quality and data completeness in the final audit report.

## **2.10 Reliability of the Data Collection Tool and Reliability Analyses: 2006 Irish National Audit of Stroke Care**

Seventy-six chart auditors were identified in the 36 participating hospitals and they received training in the use of the clinical proforma in November 2006 prior to the commencement of data collection. Each chart auditor received help notes and had access to a help desk to deal with any queries that arose during data collection. Each site was visited by the project manager (FH) and research fellow (KG) for the purpose of quality assurance / reliability and re-entered a sample of charts. Reliability data was sought for 163 of 2173 (8%) cases. Reliability (agreement between auditors) is not the same as validity (accuracy of measure). However establishing good agreement between auditors is an important part of the process of validation, as valid data by definition will have to be reliable. For categorical data the kappa statistic was used to measure agreement. Kappa values of 0.41 to 0.60 are said to indicate moderate levels of agreement, values of 0.61 – 0.80 indicate good agreement whilst values of over 0.80 are very good. The advantage of kappa is that it measures the agreement in excess of the amount we would expect by chance. In practice any value of kappa much below 0.50 will indicate inadequate agreement. Kappa values above 0.60 are adequate with over 0.80 preferable. The levels of agreement for categorical data were generally very good with the majority of questions having kappa values of greater than 0.81 and higher (kappa median 0.985, Interquartile range 0.82-1). The lowest

kappa values were for visual and sensory assessments and thrombolysis questions. Data on chart time and date reliabilities is presented in Tables 2.1 and 2.2. Further details on other variables are in an extended Table (Table 2.3, Appendix 5) in the Appendix.

Table 2.1 Rate of agreement for Clinical Audit Proforma 'Date' Questions

Question	Rate of agreement between auditors INASC 2006 N=163	Rate of agreement between auditors Sentinel 2006 N=624
Date of birth	100% (163/163)	95%
1.1 Date of stroke	98% (159/163)	90%
1.2 Date of admission	98% (160/163)	96%
1.4 Date of discharge	99% (162/163)	90%
1.5 Date of death	100% (163/163)	96%
1.12i Date of first brain scan	97% (158/163)	94%
8.3* Date of Carotid imaging	99% (161/163)	NA
1.10 Date of admission stroke unit	100% (7/7)	84%
1.11 Date of discharge stroke unit	100% (7/7)	88%
Not available in Sentinel 2006		

Table 2.2 Rates of agreement for Clinical Audit Proforma 'Time' Questions

	Rate of agreement between auditors INASC 2006 N=163	Rate of agreement between auditors Sentinel 2006 N=624
1.1 Time of stroke	96% (156/163)	78%
1.2 Time of admission	95% (155/163)	67%
1.12ii Time of first brain scan	94% (153/163)	81%

The higher kappa values obtained in this study, in comparison to the UK Sentinel audit may reflect in part the high profile of the audit as the first Irish stroke audit, the involvement of many senior staff as audit staff in hospitals, the relatively small team of auditors and the contact between research team members and auditors by visits to all data collection centres. The results are reassuring in terms of the quality of the data retrieved.

## Chapter 3 Summary of Results

### Introduction

This section summarises the cross-section of stroke cases for INASC in terms of a wide range of characteristics. Comparisons are made with cycles of the UK Sentinel Audit.

There were 76 chart auditors from a wide range of disciplines. The disciplines represented were as follows: doctors 39% (n=30), nurses 29% (n=22), physiotherapists 17% (n=13), occupational therapists 3% (n=2), clinical nutritionists 4% (n=3), speech and language therapists 3% (n=2), clinical audit staff 3% (n=2), cardiovascular strategy researcher 1% (n=1) and HIPE officer 1% (n=1).

Clinical audit data relating to the process of care was returned from the 36 participating acute hospitals. There were 2570 cases identified through HIPE for the specified six-month period in 2005. There were 170 (7%) missing charts with 227 (9%) charts identified as miscoded. The final number of cases identified as stroke was 2173.

### Patient Demographic Profile – Gender and Age

Half of the cases were men 52% (n=1124) and 47% were women (n=1021). Gender data was missing in 28 cases (1%). In Sentinel 2006 48% cases were men and 52% women. The mean age was 75 years (SD 13) and median age was 78 years (range 18-100). Approximately 19% of patients were aged less than 65 years. Gender and age comparisons are presented in Tables 3.1 and 3.2. The UK and Irish gender and age profiles are notably similar.

Table 3.1 Age profile INASC 2006

INASC 2006	<65 years	65-74 years	75+ years	Mean (SD)
Male	24%	27%	49%	72 (13)
Female	13%	17%	71%	78 (13)

Table 3.2 Age profile for Sentinel 2001/2 and 2006

Sentinel	<65 years	65-74 years	75+ years	Mean
2001/2				
Male	23%	28%	49%	73
Female	11%	19%	70%	79
Sentinel 2006	NA	NA	NA	75 sd 13 median 78 (68-85)

### 3.1 STROKE ONSET AND HOSPITAL STAY

#### Date of Stroke and Admission

The date of stroke was known for 1737 cases. In 71% of these cases the date of stroke coincided with the date of admission (n=1224). This compares with 72% of cases where the date of stroke coincided with the date of admission in Sentinel 2006 and 74% in Sentinel 2001/2. The mean time from stroke to hospital admission (Q1.1 and 1.2) was 1.1 days (n=1737, SD 4, range 0,53). In Sentinel 2006, 39% of cases were admitted within 2 hours of stroke onset, while 5% (85/1737) were admitted within 2 hours in INASC 2006.

#### In-Patient and 30-day Mortality

Inpatient mortality data (Q1.3) was available for 2078 of 2173 cases (95, 4% missing). Nineteen percent (n=408) of stroke patients died as an inpatient while 80% survived (n=1670) (Q1.3i). The confirmed mortality rate (Q1.6) within 30 days of the stroke was 15% (n=317). 72% (n=1571) were reported as alive at 30 days after stroke while data was not known for 13% (n=286) cases.

Table 3.3 In-patient (Q1.3) and 30-day mortality (Q1.6)

	INASC 2006 % (N)	Sentinel 2006	Sentinel 1998
Died in hospital	19% (408)	26%	NA
Unknown	4%	1%	
30-day mortality	15% (317)	22%	29%
Unknown	13%	5%	

NA not available

#### Hospital Length of Stay

Length of stay data for survivors (Q1.4) was available for 1594 of 1670 (95%) cases and was missing for 76 (5%) cases. The mean length of stay was 29.8 days (SD 47.2). The median length of stay was 14 days (range 0-388).

Table 3.4 Hospital length of stay (Q1.4 and Q1.5)

	INASC 2006	Sentinel 2006	Sentinel 1998
Length of stay to discharge alive (Q1.4)	Mean 29.8 sd 47.2 Median 14 IQR 7-30	Mean 27.7 Median 15	Mean 36
Length of stay to death (Q1.5)	Mean 26 days sd 59 Median 9 IQR 3-24	Mean 18.6 Median 10	Mean 17

NA not available

IQR Interquartile range

### Admission / Discharge Profiles

The organisational audit revealed only one stroke unit in the Republic of Ireland. In the present audit, only 1.9% (n=42) patients were treated in a stroke unit (Q1.7). This compares with 62% of patients being treated in a stroke unit in the 2006 Sentinel audit. Only one of the 42 cases treated in a stroke unit was admitted to the stroke unit within 4 hours of arrival at hospital (Q1.8). Twelve percent were admitted to a stroke unit within 4 hours of admission in the 2006 Sentinel audit.

The mean time from hospital admission to admission to the stroke unit was 6 days (sd 6, range 0-24 days, median 4, IQR 0-24). This compares to a median delay of 1 day from stroke to admission to a stroke unit in Sentinel 2006 (IQR 1-4). The mean length of stay on the stroke unit was 31 days (sd 50, median 15, IQR 11-31) (Q1.10 and Q1.11). This compares to a mean length of stroke unit stay of 24 days (median 14 days, IQR 6-31 days) in Sentinel 2006. Only 1% of the overall Irish sample spent over half of their stay in a stroke unit (n=24) in comparison to 54% in Sentinel 2006. Further details are outlined in Table 3.5.

The majority (69% n=1496) of patients spent more than 50% of their stay on a general ward followed by 'other wards' and geriatric ward.

Table 3.5 (Q1.9) Location of patient for over half of their hospital stay (n=2173)

	INASC 2006 % (N)	Sentinel 2006 %	Sentinel 1998
General ward	69% (1496)	33%	NA
Geriatric ward	8% (183)	NA*	
Rehabilitation unit	4% (78)	6%	
Stroke unit	1% (24)	54%	
ICU	2% (52)	13%	
AMAU	1% (21)	13%	
Neurology ward	0.9% (19)	5%*	
Neurosurgery unit	0.8% (17)	NA	
AE	0.5% (11)	3%	
CCU	0.3% (7)	7%	
Other ward* (including not specified)	12% (265)	2%	

AE Accident and Emergency

AMAU Acute Medical Admissions Unit

ICU Intensive Care Unit

CCU Coronary Care Unit

NA\* not asked in Sentinel 2006

NA not available

\*Sentinel 2006 Neurology/Neurosurgery

### Patient Management by Medical Speciality (Q1.11i\*)

The majority (61%, n=1322) of stroke patients were under the care of a general physician, followed by 31% (n=675) consultant geriatrician, 7% (n=155) consultant neurologist and 1% (n=26) consultant in rehabilitation medicine. This question was not asked in the 1998 or 2006 Sentinel audits.

### CT Scanning Following Stroke

Data in relation to CT scanning after stroke (Q1.12) was available for the majority of cases (2116, 97%). In total 2028 cases (93%) had a scan after their stroke (Q1.12iii), with 40% (n=867) having the scan within 24 hours after stroke. This figure is somewhat lower than the recent UK Sentinel figures (Table 3.6).

Table 3.6 Brain scan within 24 hours of admission after stroke (Q1.12iii) (n=2173)

Brain scan within 24 hours after stroke	INASC 2006 % (N)	Sentinel UK 2006	Sentinel UK 1998
Yes	40% (n=867)	42%	49%
No	37% (n=805)		
Not known	23% (n=501)	0.5%	

Most patients were confirmed as having had ischaemic strokes, similar to the UK Sentinel 2006 profile (Table 3.7).

Table 3.7 Stroke type as shown by scan (Q1.12iv) (n=2007 166 missing)

(Q1.12iv)	INASC 2006 % (N)	Sentinel UK 2006	Sentinel UK 1998
Ischaemic infarct	64% (1389)	68%	NA
Primary ICH	12% (271)	12%	
Haemorrhagic Infarct	3% (61)	3%	
Unknown	13% (286)	18%	
Missing	8% (167)		

ICH = Intracerebral haemorrhage

NA not available

(Sentinel 1999 - Ischaemic infarct 77%, Primary ICH 22%, Haemorrhagic Infarct 8%)

Charts which did not document a brain scan (n=83) within 24 hours of stroke were (Q1.12v) checked to identify a reason(s) why. Patient death or palliative care status were the most common reasons in INASC, accounting for almost half (48%) of the cases (Table 3.8). These categories accounted for 84% of cases in Sentinel 2006. Notably 10% of cases without CT scans in Ireland cited 'scan not routinely available' as the reason. This was never cited as a reason in the UK.

Table 3.8 Reason why patient did not have a scan (Q1.12v) (n=83)

	INASC 2006 % (N) N=83/2173	Sentinel UK 2006 N=865/11786	Sentinel UK 1998
Patient refused / unable to cooperate	6% (5)	8% (61)	NA
Palliative care	27% (22)	78% (563)	
Scan not routinely available	10% (8)	NA	
Other (patient died)	21% (17)	6% (46)	
Other valid reason	37% (31)	4% (32)	
Patient already had a scan	NA	2% (16)	

NA not available

Data in relation to the interval from time of stroke to scan (to the nearest day) was available for 1726 cases (79%). The mean time from time of stroke to scan was 2.6 days (sd 7, median, 1 range 0-156). The average time from stroke to scan was median 1 day (IQR 1-3) in Sentinel 2006. Data in relation to time of admission and time of scan (to the nearest hour) was available for 1420 cases and allowed the estimation of scan intervals. Only 4% of cases (n=60) were scanned within three hours of admission, 5% (n=68) at 6 hours and 9% (n=121) were scanned within 12 hours of stroke (Q1.12i and Q1.12ii). This is very low in comparison to 9% scanned within 3 hours of admission in the Sentinel 2006 audit.

Table 3.9 Time from scan to stroke in hours (n=1420)

Time from stroke to scan in hours	INASC 2006 N=1420 %(N)	Sentinel 2006 N=6559 %(N)
0 -1	0.04% (6)	2% (99)
2	1% (17)	4% (247)
3	3% (37)	3% (213)
4	4% (50)	3% (201)
5	4% (63)	NA
6	5% (68)	NA
7	5% (78)	NA
8	6% (92)	NA
9	7% (103)	NA
10	8% (110)	NA
11	8% (116)	NA
12	9% (121)	NA
Within 3 hours	4% (54)	9%

NA not available

## 3.2 CASEMIX

### Co-morbidities

The presence of known co-morbidities prior to admission (Q2.1) and newly detected co-morbidities since admission with stroke (Q2.1i\*) were noted from the case notes. The majority (83%) of stroke patients had a medical co-morbidity (Table 3.10). The most common co-morbidities were 51% with hypertension (n=1108), 25% with previous stroke or TIA (n=541) followed by 22% (n=469) with atrial fibrillation (Table 3.10).

Table 3.10 Known co-morbidities prior to admission with stroke (Q2.1) (n=2173)

Co-morbidity	INASC 2006 %(N)	Sentinel UK 2006	Sentinel UK 1998
Atrial fibrillation	22% (469)	20%	NA
Previous stroke/TIA	25% (541)	29%	NA
Impaired glucose tolerance	1% (22)	NA	NA
Diabetes mellitus	12% (260)	16%	NA
Hyperlipidaemia*	17% (372)	19%	NA
Hypertension <sup>^</sup>	51% (1108)	53%	NA
MI or angina	14% (307)	20%	NA
Valvular heart disease	4% (92)	3%	NA
Other	18% (388)	5%	NA
None apply/detected	17% (362)	21%	NA
None of the above	22% (479)	21%	NA
1 of the above	29% (626)	29%	NA
2 of the above	24% (524)	27%	NA
3 or more of the above	25% (544)	23%	NA

\* Hyperlipidaemia = total cholesterol >5 or LDL >3.0mmol/L

<sup>^</sup> Hypertension = systolic > 140 or diastolic > 85

Other = Congestive cardiac failure (CCF) and Polymyalgia Rheumatica

NA not available

Nearly half of all stroke patients (49%) had newly detected co-morbidities since their admission with stroke (Table 3.11). This was a new question for INASC and was not included in the previous Sentinel audit proformas. The most common newly detected co-morbidities were hyperlipidaemia (12%) and hypertension (11%) (Table 3.11).

Table 3.11 Newly detected co-morbidities since admission (Q2.1i\*) (N=2173)

Co-morbidity	INASC 2006 %(N)	Sentinel UK 2006	Sentinel UK 2004	Sentinel UK 1998
Atrial fibrillation	7% (155)	NA*	NA	NA
Previous stroke/TIA	1% (28)	NA*	NA	NA
Diabetes mellitus	4% (85)	NA*	NA	NA
Hyperlipidaemia	12% (251)	NA*	NA	NA
Hypertension	11% (229)	NA*	NA	NA
MI or angina	1% (28)	NA*	NA	NA
Valvular heart disease	12% (255)	NA*	NA	NA
Other	12% (267)	NA*	NA	NA
None apply/detected	49% (1063)	NA*	NA	NA
None of the above	60% (1299)			
1 of the above	30% (645)			
2 of the above	8% (180)			
3 or more of the above	2% (48)			

\* Hyperlipidaemia = total cholesterol >5 or LDL >3.0mmol/L

^ Hypertension = systolic > 140 or diastolic > 85

NA = not available.

NA\* This question was not asked in the 2006 Sentinel audit.

### Accommodation Pre-Stroke and at Discharge

In relation to living accommodation before the stroke (Q2.1ii\*), data was available in the majority of cases (n=2103, 97%). The majority (92%, n=1934) were living at home prior to their stroke (Table 3.12). Pre-stroke residence was quite similar in Ireland and in the Sentinel audit 1998 (questions not asked in Sentinel 2006).

Table 3.12 Accommodation pre-stroke (Q2.1ii\*) (n=2103)

INASC 2006 Accommodation	%(N) (YES)	Sentinel UK 2006	Sentinel UK 2004	Sentinel UK 1998
Live at home	92% (1934)	NA*	90%	82%
<i>Alone</i>	25% (515)		41%	
<i>With family</i>	50% (1056)			
<i>Missing</i>	17% (363)			
Residential/NH	6% (127)	NA*	10%	9%
Hospital	0.7% (15)	NA*	0.3%	NA
Other	1% (27)	NA*	NA	NA

NA = Not applicable

NH = Nursing home

NA\*= Not available. This question was not asked in the 2006 Sentinel audit.

Of those who were alive at discharge (n=1670), 56% (n=931) were discharged home (Table 3.13). While similar proportions lived at home pre-stroke in Ireland and Sentinel 1998 (the only UK comparable date), more were discharged home in the UK (67 and 77 Sentinel 1998 and 2006 vs. 56%).

Table 3.13 Accommodation at discharge (Q2.1iii\*) (n=1670)

INASC 2006	%(N) (YES)	Sentinel UK 2006	Sentinel UK 2004	Sentinel UK 1998
Live at home	56% (931)	NA*	77%	67%
<i>Alone</i>	12% (198)	33%		
<i>With family</i>	38% (629)			
<i>Missing</i>	6% (104)			
Residential/NH	19% (324)	NA*	18%	20%
Hospital	12% (204)	NA*	5%	NA
Other	8% (127)	NA*	NA	NA
Missing	5% (84)	NA*	NA	NA

NA\*= Not available. This question was not asked in the 2006 Sentinel audit.

NA = Not applicable/available

NH = Nursing home

### Institutionalisation

This question focused on patients who were newly institutionalised (Q2.2) after their stroke: 15% (253 of the 1670 discharged alive) in INASC were newly institutionalised. 148 of 253 cases, 58% of which were permanent placements in institutional care. This compares to 13% of patients were newly institutionalised in Sentinel 2006.

### Pre-admission Medication

Over half of all stroke patients (58%, n=1266) were on medication before admission (Q2.3). Nearly a quarter were not on medication pre-admission (24.6%, n=534) and data was missing in 373 (17%) of cases. More details in relation to the medications are provided in Table 3.14 and 3.15. Over half of patients were on antihypertensives and antiplatelet/thrombotic therapy prior to their admission, while a quarter were on lipid lowering treatment (Q2.3i).

Table 3.14 Cardiovascular medication profile pre-admission (Q2.3i)

	INASC 2006 % (N)	Sentinel 2006
Antihypertensives	56% (1219)	57%
Antiplatelet/antithrombotic	52% (1133)	51%
Lipid lowering treatment	25% (546)	33%

Table 3.15 (Q2.3i) Details of Pre-admission Medications (n=2165, 8 missing)

Medications	INASC 2006 % (N)	Sentinel 2006	Sentinel 1998
<i>Antihypertensives</i>			
Ace inhibitor	26% (567)	30%	NA
Alpha blocker	3% (71)	4%	
Beta blocker	18% (386)	22%	
Calcium channel blocker	10% (208)	16%	
Thiazide diuretic	9% (189)	17%	
Other	5% (105)	4%	
None	44% (954)	43%	
<i>Antiplatelet/antithrombotic</i>			
Aspirin	33% (724)	40%	NA
Clopidogrel	5% (114)	5%	
Dipyridamole	0.5% (11)	4%	
Warfarin	6% (136)	7%	
Asasantin Retard	1% (29)	3%	
Other	0.7% (15)	0.6%	
None	48% (1040)	NA	
<i>Lipid lowering treatment</i>			
Statin	21% (455)	32%	NA
Ezetimide*	0.1% (3)	NA	
Niacin*	0% (0)	NA	
Fibrates	0.05% (1)	NA	
Omacor*	0.1% (3)	NA	
Other	0.1% (3)	NA	
None	75% (1627)	NA	

\* This item added for INASC 2006

NA not available

Percentages sum to > 100% as patients were frequently prescribed > 1 medication

### Level of independence: Functional Level pre-Stroke

The majority of patients (73%; n=1591) were independent in their daily activities prior to the stroke (Q2.4), while 13% (n=290) were dependent. Information was missing in 13% of cases (n=292). Sentinel 2006 found that 77% of patients were independent in everyday activities before stroke and with 49% independent in the 1998 Sentinel Audit.

### Dependency at Discharge

Functional dependency at discharge (Q2.5) was noted by estimating the Barthel Score for those alive at discharge. The Barthel Index is an activities of daily living scale (ADL) scale and assesses 10 areas including: bowels, bladder, grooming, toilet use, feeding, mobility, transfer, dressing, stairs and bathing. Each item is scored using an ordinal score ranging from 0-2 or 0-3. The score range is 0-20 with 20 indicating complete independence in ADL. The chart recorded completion rate was high (94%) with Barthel Index data available for 1563 of 1670 surviving cases. The average Barthel score at discharge was mean 13.5 (SD 7.1), median 17 and range 0-20). Sentinel UK 2006 completion rates for Barthel scores at discharge were similar (92%).

Table 3.16 Level of Independence (Q2.5) (n=1563)

Barthel Score	INASC 2006 % (N)	Sentinel 2006	Sentinel 1998
Independent (20)	28% (445)	39%	35%
Mild disability (15-19)	26% (410)	24%	28%
Moderate disability (10-14)	15% (238)	15%	17%
Severe disability (5-9)	14% (221)	8%	9%
Very severe disability (0-4)	16% (249)	13%	11%

### Clinical Status at Time of Maximum Severity

For items in this section it should be noted that measures were based on time of maximum severity within the first week after stroke. It was not possible to classify stroke severity as a stroke rating scale was not included in the proforma and was not generally noted in the 2005 case notes. Details in relation to maximum severity of stroke in the first week were ascertained in relation to level of consciousness (Q2.6). Data was available for 2091 cases while 82 (4%) were missing details for this question (Table 3.17).

Table 3.17 Maximum severity category for stroke patients in first week (Q2.6) (n=2173)

Maximum severity week 1	INASC 2006 % (N)	Sentinel UK 2006	Sentinel UK 1998
Fully conscious	60% (1300)	62%	61%
Drowsy	17% (378)	16%	18%
Semiconscious*	5% (102)	8%	7%
Unconscious^	14% (311)	14%	14%
Missing	4% (82)	NA	2%

Semiconscious\* = not fully rousable.

Unconscious^ = responds to pain only/no response

NA – not asked

### 3.3 STANDARDS WITHIN 72 HOURS

Patient assessment in relation to three aspects of function – swallow, visual function and sensory function, were noted in the first 24, 48 and 72 hours after stroke. This serves as a marker of quality of care. Just over a quarter (26%) had screening for a swallow disorder within the first 24 hours of admission after stroke (Table 3.18). Over half had sensory testing (53%), almost half had visual assessment (46%). Levels of assessment were substantially lower for all three areas when compared with UK Sentinel 2006 audit figures.

Table 3.18 Patient assessment in first 24 hours (Q3.1-3.2) (n=2173)

Standards	INASC 2006 % (N)	Sentinel UK 2006	Sentinel UK 1998
Screening for swallow disorders (Q3.1)			
Yes	26% (564)	66%	54%
No	55% (1188)		
No but	17% (365)		
Missing	2% (56)		
Formal assessment visual fields (Q3.2i)			
Yes	46% (992)	74%	44%
No	29% (633)		
No but	22% (479)		
Missing	3% (69)		
Sensory testing (Q3.2ii)			
Yes	53% (1157)	81%	50%
No	21% (466)		
No but	22% (471)		
Missing	4% (79)		

The 'No but' answer applied if an impaired level of consciousness or level of communication was noted.

### **Thrombolysis and Aspirin**

Only 29 of 2173 patients (1%, 14 of 36 sites) were documented as receiving thrombolysis (Q3.3). This was not asked in the 2006 or 1998 Sentinel audits. Thrombolysis was given to less than 1% of patients (17 of 246 sites, n=27 cases) in the 2004 Sentinel audit.

Just under half, 45% (n=950) of patients had commenced aspirin by 48 hours after their stroke (Q3.3), 32% had not (n=672) and 22% (n=470) answered 'no but' where the patient had died or aspirin was contraindicated. The question was not answered in 82 of 2173 cases. This compares with the most recent Sentinel data (2006) where 71% had commenced aspirin by 48 hours after stroke, while 67% had commenced aspirin at 48 hours in the 2004 Sentinel audit.

### **Multidisciplinary Assessment**

While 26% of patients were screened by staff for swallow problems within 24 hours, only 25% had a formal swallow assessment by a speech and language therapist in the first 72 hours since admission for stroke. Less than half were assessed by a physiotherapist (43%) within this time. The majority of patients were receiving nutrition (81%); most of these (82%) were on oral nutrition.

Again, assessment of patient deficits was substantially lower than in the most recent Sentinel (2006) audit. The gap was particularly notable for speech and language therapy (INASC 25% vs. Sentinel 2006 67%).

Table 3.19 Patient assessment in first 72 hours of admission after stroke (n=2173)

Standards	INASC 2006 % (N)	Sentinel UK 2006	Sentinel UK 1998
<b>Swallow assessment by SLT (Q3.4)</b>			
Yes	25% (548)	67%	55%
No	39% (844)		
No but*	33% (713)		
Missing	2% (47)		
<b>Physiotherapy assessment (Q3.5)</b>			
Yes	43% (929)	71%	56%
No	41% (895)		
No but**	13% (282)		
Missing	3% (67)		
<b>Patient receiving nutrition (Q3.6)</b>			
Yes	81% (1767)	93%	NA
No	7% (152)		
No but^	8% (176)		
Missing	4% (78)		
<b>Type of nutrition n=1767 (Q3.6i)</b>			
Oral	82% (1455)	NA	NA
Nasogastric / PEG	12% (216)		
Intravenous	4% (70)		
Missing	1% (26)		

\* Answer 'No but' = if patient's swallow is documented as normal; patient is still unconscious, patient died within 72 hours; patient is receiving palliative care.

\*\*Answer No but' = if patient died within 72 hours; patient is receiving palliative care.

^Answer No but' = if patient refused or patient receiving palliative care

SLT = Speech and Language Therapist

PEG = Percutaneous Endoscopic Gastrostomy

NA not available

### 3.4 STANDARDS WITHIN 7 DAYS

Standards of care in relation to communication, occupational therapy assessment and catheterisation within the first 7 days of admission. Over a quarter of patients had a formal communication assessment by the speech and language therapist, while a fifth of patients were assessed by the occupational therapist. Just over a quarter of patients were catheterised. Overall, 26% of patients were catheterised, most commonly because of urinary incontinence (31% of those catheterised). In 25% of cases the reason for catheterisation was not documented.

Table 3.20 Patient assessment within 7 days of admission after stroke (n=2173)

Standards	INASC 2006 % (N)	Sentinel UK 2006	Sentinel UK 1998
<b>Communication assessment by SLT (Q4.1)</b>			
Yes	29% (637)	69%	61%
No	30% (658)		
No but*	37% (804)		
Missing	3% (74)		
<b>Occupational therapy assessment (Q4.2^)</b>			
Yes	22% (476)	68%	43%
No	45% (977)		
No but**	30% (646)		
Missing	3% (74)		
<b>Indwelling catheter (Q4.3)</b>			
Yes	26% (569)	29%	NA
No	70% (1515)		
Missing	4% (89)		
<b>Reason for catheterisation (n=569)</b>			
Urinary retention	15% (83)	22%	
Pre-existing catheter	2% (14)	9%	
Urinary incontinence	31% (179)	44%	
Fluid balance monitoring	21% (119)	28%	
Critical skin care	6% (36)	17%	
Not documented	25% (145)	19%	
Missing	5% (30)	NA	

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

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

NA not available

There was a documented plan to promote urinary continence (Q4.4) in only 13% (n=278) of cases, while for 23% there was no plan (n=498). In the 2006 Sentinel audit 54% of cases had a plan to promote urinary continence and 46% in the 1998 Sentinel audit. The need to have a plan to promote continence did not apply in 58% (n=1255) of cases where the patient was continent, had died, was unconscious or was receiving palliative care. Data was missing for 7% of cases (n=142) in relation to this question.

### 3.5 BY DISCHARGE

#### Screening and Functional Assessment

Forty-one percent of stroke patients had documented evidence in their charts that they had been weighed during the hospital admission with 13% assessed by a social worker within 7 days of referral. Mood was assessed in 28% of patients while 41% had had an assessment of cognition.

Table 3.21 Standards of care by time of discharge after stroke (Q5.1-5.4) (n=2173)

Standards	INASC 2006 % (N)	Sentinel UK 2006	Sentinel UK 1998
<b>Patient was weighed (Q5.1)</b>			
Yes	41% (891)	57%	40%
No	45% (980)		
No but*	11% (242)		
Missing	3% (60)		
<b>Social work assessment (Q5.2)</b>			
Yes	13% (283)	56%	38%
No	38% (835)		
No but**	45% (982)		
Missing	3% (73)		
<b>Assessment of mood (Q5.3)</b>			
Yes	28% (612)	55%	45%
No	56% (1222)		
No but^	13% (278)		
Missing	3% (61)		
<b>Assessment of cognition (Q5.4)</b>			
Yes	41% (879)	71%	35%
No	42% (922)		
No but^^	14% (314)		
Missing	3% (58)		

\*Answer 'No but' = if patient died within 7 days; patient unconscious throughout.

\*\*Answer 'No but' = if patient not referred to social worker; patient died within 7 days; or patient refused.

^Answer 'No but' = if patient unconscious throughout; or patient died within 7 days.

^^Answer 'No but' = if patient unconscious throughout; or patient died within 7 days, or receiving palliative care.

## Management / Care Planning

In relation to care planning (Q5.5) there was written evidence of rehabilitation goals agreed by the multidisciplinary team in 22% (n=474) of cases. This compares to 76% in the 2006 Sentinel audit and 56% in the 1998 Sentinel audit. Rehabilitation goals were not applicable in 24% of cases (n=523) where the stroke patient had died or been discharged within 7 days or was receiving palliative care. Data was missing in a further 58 cases (3%).

## 3.6 RISK FACTORS AND SECONDARY PREVENTION

### Risk Factor Management

This section relates to risk factors for stroke that were identified at the time of discharge (Q6.1). In just over half, 51% (n=1114), the probable underlying cause for the stroke had been identified. The cause for stroke was recorded as not identified in 9% of cases (n=192) and was not documented in 29% of cases (n=630). Data were missing in 11% of cases (n=237). In the 2006 Sentinel audit the underlying causes for the stroke were identified in 73% of cases. The causes identified are outlined in Table 3.22, and were most commonly hypertension (56%) followed by atrial fibrillation (28%). A similar profile was evident in Sentinel 2006.

Table 3.22 Probable causes for stroke as recorded by discharge (Q6.1i) (n=1114)

Standards	INASC 2006 % (N)	Sentinel UK 2006	Sentinel UK 1998
Carotid stenosis	11% (118)	9%	NA
Current smoker	14% (156)	17%	
Alcohol abuse*	6% (67)	6%	
Atrial fibrillation	28% (317)	27%	
MI in last month	4% (48)	4%	
Hypertension	56% (623)	62%	
Diabetes mellitus	14% (154)	NA	
Missing	46% (516)	NA	

\*Alcohol abuse no of units per week > 21 female and > 28 male

MI = Myocardial infarction

NA not asked in Sentinel 2006

Percentages sum to > 100% as more than one cause for stroke was given

Generic lifestyle factors to promote secondary prevention following stroke, i.e. smoking cessation and physical activity, diet and alcohol management, were documented as having been discussed with the patient and their carer in only a small proportion of cases.

Table 3.23 Record of discussion about secondary prevention strategies (Q6.2) (n=2173)

Standards	INASC 2006 % (N)	Sentinel UK 2006	Sentinel UK 1998
<b>Smoking cessation</b>			
Yes	9% (199)	79%	28%
No	52% (1128)		
No but*	29% (626)		
Missing	10% (220)		
<b>Alcohol reduction</b>			
Yes	7% (149)	80%	28%
No	55% (1190)		
No but*	28% (613)		
Missing	10% (221)		
<b>Exercise</b>			
Yes	8% (193)	41%	28%
No	59% (1277)		
No but*	26% (571)		
Missing	6% (132)		
<b>Diet</b>			
Yes	14% (318)	42%	28%
No	54% (1181)		
No but*	25% (556)		
Missing	5% (118)		

No but\* = if patient died; remained profoundly impaired

Question 6.2 related to levels of blood cholesterol and subsequent management and was included in INASC. It was included in Sentinel 2004 but not in Sentinel 2006. Two thirds had blood cholesterol levels documented, 39% of these had elevated cholesterol and 29% of those with elevated cholesterol received dietary advice (Table 3.24) on reducing their cholesterol through dietary management.

Table 3.24 Documented blood cholesterol levels and management (Q6.2\* i-iii)

	INASC 2006 % (N)	Sentinel 2006	Sentinel 2004	Sentinel 1998
Q6.2*i Documented blood cholesterol (n=2173)	Yes 67% (1464) No 17% (378) No but 12% (251) Missing 4% (80)	NA*	NA	NA
Q6.2*ii Documented blood cholesterol > 5 total or > 3 LDL (n=1464)	Yes 39% (578) No 60% (876) Missing .006% (10)	NA*	32%	NA
Q6.2*iii if yes to 6.2*ii did patient receive dietary advice to reduce fat in diet (n=578)	Yes 29% (169) No 56% (323) No But 13% (75) Missing 2% (11)	NA*	43%	NA

NA\* not asked in Sentinel 2006

NA = not available

Nearly half of all cases (47%, n=1012) had elevated blood pressure in the acute phase after stroke (Q6.2iv\*), 26% (n=567) did not, 23% not applicable (n=491 i.e. normotensive, patient died, patient refused) and data was missing in 103 cases. This question was not asked in the 2006 Sentinel audit, Sentinel 2004 found that 17% had elevated blood pressure. Ace inhibitors were the most commonly prescribed medication for management of hypertension (40%, n=402), followed by beta blockers 21% (n=212), calcium channel blockers 15% (n=148), thiazide diuretic 9% (n=93), angiotension II receptor antagonists 7% (n=72) and alpha blockers 5% (n=50).

The majority of patients were discharged on cardiovascular medications: antihypertensives 78% (n=1306), antiplatelet/antothrombotics 85% (n=1423) and lipid lowering medications 70% (n=1177) (Q6.3). This profile is similar or higher, particularly concerning antihypertensives to Sentinel 2006.

Table 3.25 Cardiovascular medication profile at discharge (Q6.3)

	INASC 2006 % (N)	Sentinel 2006
Antihypertensives	78% (1306)	57%
Antiplatelet/antithrombotic	85% (1423)	86%
Lipid lowering treatment	70% (1177)	79%

A detailed profile of types of medication is provided in Table 3.26. Ace inhibitors, aspirin and statins were the most common types of medication prescribed in the Irish and Sentinel 2006 audits.

Table 3.26 Discharge medications (Q6.3) (n=2078, 95 missing)

Medications	INASC 2006 % (N)	Sentinel 2006	Sentinel 1998
<i>Antihypertensives</i>			
Ace inhibitor	45% (941)	47%	NA
Alpha blocker	4% (89)	4%	
Beta blocker	22% (453)	20%	
Calcium channel blocker	12% (256)	18%	
Thiazide diuretic	10% (213)	17%	
Other	4% (89)	3%	
None of above	17% (350)	30%	
<i>(N=350)</i>			
Not indicated	56% (196)	81%	
Patient refused	0.6% (2)	1%	
Under review	8% (29)	12%	
Contraindicated	4% (14)	6%	
No reason given	31% (110)	NA	
<i>Antiplatelet/antithrombotic</i>			
Aspirin	50% (1037)	69%	NA
Clopidogrel	9% (191)	8%	
Dipyridamole	2% (46)	25%	
Warfarin	13% (274)	11%	
Asasantin Retard*	7% (137)	23%	
Other	1% (25)	2%	
None	13% (261)	NA	
<i>(N=261)</i>			
Not indicated	21% (54)	29%	
Patient refused	0.4% (1)	2%	
Under review	7% (17)	7%	
Haemorrhagic stroke	33% (86)	50%	
Other Contraindications	10% (26)	14%	
No reason given	30% (79)	NA	
<i>Lipid lowering treatment</i>			
Statin	56% (1158)	78	NA
Ezetimide*	0.4% (9)	NA	
Niacin*	0.05% (1)	NA	
Fibrates*	0.1% (2)	NA	
Omacor*	0.05% (1)	NA	
Other	0.7% (15)	NA	
None	20% (407)	NA	
<i>(N=407)</i>			
Not indicated	51% (207)	67%	
Patient refused	0.5% (2)	2%	
Under review	5% (21)	11%	
Patient life expectancy <2 years	8% (31)	15%	
Other Contraindications	2% (9)	6%	
No reason given	34% (138)	0%	

\* added for INASC 2006

NA = not available

### 3.7 PATIENT COMMUNICATION AND RESEARCH

#### Communication with Patients and Carers

A formal discussion in relation to stroke diagnosis and prognosis was recorded as taking place in about a fifth of cases. The carer's needs were assessed in 24% of cases, while there was evidence that the skills required to care for the patient at home were taught in 12% of cases. More detail is provided in Table 3.27.

Table 3.27 Communication with patient and their carer (Q7.1-7.4) (n=2173)

Standards	INASC 2006 % (N)	Sentinel UK 2006	Sentinel UK 1998
Discussion with patient about diagnosis (Q7.1i)			
Yes	22% (469)	69%	51%
No	50% (1087)		
No but*	24% (530)		
Missing	4% (87)		
Discussion with patient about prognosis (Q7.1ii)			
Yes	18% (382)	59%	51%
No	53% (1162)		
No but*	25% (533)		
Missing	4% (96)		
Assessment of carer's needs (Q7.2)			
Yes	24% (524)	68%	31%
No	39% (857)		
No but**	32% (692)		
Missing	5% (100)		
Skills required to care for patient at home were taught (Q7.3)			
Yes	12% (257)	71%	29%
No	19% (400)		
No but^	65% (1420)		
Missing	4% (96)		
Home visit performed (Q7.4)			
Yes	7% (153)	63%	66%
No	27% (588)		
No but^^	62% (1342)		
Missing	4% (90)		

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

\*\*Answer 'No but' = if it was documented that there was no carer.

^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.

^^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; patient died; or patient or carer refused.

### **Home Visit**

Of those patients particularly needing a home assessment, chart review confirmed that 7% (153) had a home visit before discharge. This is very different to the UK with over 60% of patients having home visits in both Sentinel 2006 and 1998 audits. Of those who had a home visit, the home visit took place with the professional and the patient (Q7.4i) in 77% of cases (n=118) and by the professional without the patient in 18% of cases (n=28). Data was missing in 7 cases (5%).

### **Research Participation**

One percent (n=28) of the 2173 patients had documented participation in a research study (Q7.5), 90% (n=1948) had not, while data was missing in 197 cases (9%). Three percent of patients participated in research in the 2006 Sentinel Audit.

## **3.8 DISCHARGE PLANNING FROM HOSPITAL AND ONWARD REFERRAL**

The last section of the clinical proforma addressed details in relation to discharge planning from hospital and onward referral. This section was not asked in the 2006 Sentinel audit but was felt to be very important in the context of triangulating findings from other studies in INASC, e.g. the survey of general practitioners. In 56% of cases (n=1218) there was evidence that the general practitioner was notified by the day of discharge (Q8.1\*). In 40% of cases (n=858) the GP was not notified on the day of discharge and data was missing in 4% of cases (n=97). In the UK, 65% of GPs were notified of the patient's discharge in 2004 and 54% in the 1998 Sentinel audits.

When the GP was not notified by day of discharge, there was evidence in 53% of cases that the GP was notified at a later date (Q8.1\*). The average notification lag from discharge was on average 18 days (SD 35). The median was 5 days (IQR 0-22 days). Thus about half of those GPs notified after discharge were notified within a working week.

The GP summary letter included a description of the patient's functional ability (Q8.2\*) in 24% of cases (n=512). This question was not included in the 2006 Sentinel audit. In the 2004 clinical audit 57% of GP summaries included functional mobility details (65% in 1998).

Thirty-five percent of patients (n=767) had carotid imaging within three months of their stroke (Q8.3\*) while 31% did not. For 26% carotid imaging was not indicated, and data was missing in 7% of cases. The mean interval from stroke onset to carotid imaging was 21 days (SD 62) median 7 days (range 0-115). This question was not included in the 2006 Sentinel audit. In the 2004 clinical audit 50% of cases had carotid imaging performed within 3 months to check for carotid stenosis.

In relation to onward referral to the public health nurse (PHN) and allied health professionals (AHP) (Q8.3i\*), there was evidence that the PHN was informed of the patient's discharge in 18% of cases, and AHP in 7% of cases.

The documented plans for onward referral were varied (Q8.4\*) indicating that most patients were referred to the PHN and community physiotherapy, with very small proportions referred to the Volunteer Stroke Scheme. Further details are outlined in Table 3.28.

Table 3.28 Plans for Patients' Onward Referral (Q8.4\*) (n=931 discharged home)

Onward referral to community services	INASC 2006 % (N)	Sentinel 1998 – 2006
Public Health Nurse	Yes 38% (354)	NA* for all
Physiotherapy	Yes 21% (191)	
Occupational therapy	Yes 17% (156)	
Speech and Language Therapy	Yes 9% (88)	
Clinical Nutrition	Yes 4% (37)	
Clinical Psychology	Yes 0.8% (7)	
Liaison Psychiatry	Yes 2% (22)	
Community Rehabilitation Team	Yes 7% (68)	
Hospital Outpatients	Yes 27% (253)	
Day Hospital	Yes 14% (134)	
In-Patient Rehab Unit	Yes 9% (88)	
Off-Site Rehab Unit	Yes 19% (177)	
Baggot Street CSRU	Yes 1% (9)	
National Rehabilitation Hospital	Yes 4% (40)	
Volunteer Stroke Scheme	Yes 0.9% (8)	

OT = Occupational therapy

SLT = Speech and language therapy

CRSU = Community stroke rehabilitation unit

NA\* = not available, this was a new question for INASC and has not been asked in the Sentinel audits

### 3.9 CLINICAL AUDIT: 12 KEY INDICATORS

Following the third round of the Sentinel audit in the UK in 2002, a minimum dataset was selected to represent the total clinical process for each hospital. In 2004 a further item was added bringing the dataset to 12 key indicators (Table 3.29). The Irish and UK results on these key indicators are presented to give an overview of quality of hospital care. In all but two indicators (brain scan within 24 hours and home visit by discharge), Sentinel 2006 performed better than Sentinel 2004, as would be hoped for in a continuous quality improvement audit cycle.

Table 3.29 12 Key standards and indicators of stroke care INASC vs. Sentinel

Key standards % Compliance with indicator	INASC 2006	Sentinel 2004	Sentinel 2006
<i>Patients</i>	<i>2173</i>	<i>8697</i>	<i>13625</i>
	<i>%</i>	<i>%</i>	<i>%</i>
Q1.2iii Brain scan within 24 hours	40	59	42
Q1.7 Treated on a stroke unit during their stay	2	46	62
Q1.9 > 50% stay on a stroke unit	1	40	54
Q3.1 Screened for swallow within 24 hours	26	63	66
Q3.3 Aspirin started by 48 hours	45	68	71
Q3.5 Physiotherapy assessment within 72 hours of admission	43	63	71
Q4.2 Occupational therapy assessment within 7 days of admission	22	57	68
Q5.1 Weighed at least once during admission	41	52	57
Q5.3 Mood assessed by discharge	28	47	55
Q6.3 On anti-thrombotic therapy by discharge	85	95	100
Q5.5 Rehabilitation goals agreed by MDT	22	68	76
Q7.4 Home visit performed by discharge	7	69	63
<b>Average for 12 indicators</b>	<b>30</b>	<b>61</b>	<b>65</b>

The Irish audit reported lower coverage on all 12 key indicators than both the 2004 and 2006 Sentinel audits. Particularly notable was the virtual absence of stroke unit care in Ireland while over half were treated in such units by 2006 in the UK. While initiation of appropriate medication, technological assessment, physiotherapy and patient body weight assessment was conducted for over 40% of Irish patients, services requiring other members of a multidisciplinary team (swallow, occupational therapy needs, mood assessment and multidisciplinary discharge goals for rehabilitation) were available to only about one in four stroke patients. Home assessment was also a service for a minority in Ireland (7%) and the majority (>60%) in the UK.

The audit results and their implications are discussed in the next section.

## **Chapter 4 Discussion**

### **Introduction**

These findings present the first national overview of the processes of hospital-based stroke care of stroke patients in acute hospitals in the Republic of Ireland. As with the Sentinel audits in the UK, the aim is to use these findings to inform all involved in funding, organising and delivering care about the performance of the Irish system against pre-determined standards for stroke care. There was a high chart retrieval rate (93%) across all centres on the national HIPE system in this audit. This rate is similar to other national audits, for instance the census of acute coronary syndromes (Montgomery et al 1995). This provides a robust dataset from which to draw national conclusions.

### **Comparison of Results with the UK Sentinel Audit**

The INASC data has been compared to the UK Sentinel data to facilitate comparison with a neighbouring country and to allow observation of the potential improvements that can occur with appropriate funding. Caution however must be used in directly comparing the two audits due to the different way in which stroke patients were identified (prospectively in the UK study and retrospectively in the INASC study). As very few hospitals in Ireland had (or have) active stroke registers there was no alternative to this method of case finding for this audit. Retrospective identification of stroke cases using ICD codes can lead to miscoding (Benesch et al 1997, Goldstein 1998) and may lead to a less representative group with patients with extremes of stroke severity (both more severe and less severe) being more likely to be missed. While comparison of process of care indicators are likely to be valid, direct comparison of outcome (which is dependent on stroke severity as well as treatment received) should be used very cautiously.

### **Audit Process**

This audit depends on recorded actions in hospital charts. As in other audits such as Sentinel or EuroAspire (a cardiac patient audit system across European countries), one response to findings showing incomplete assessment (e.g. of smoking status or communication with patient about diagnosis) is that these actions are routinely conducted and may simply not have been recorded in a particular patient's chart. While this is undoubtedly true, it is also the case that unrecorded actions reflect incomplete standards of care. One of the likely effects of regular audit is of a more complete awareness of the needs for documentation of actions taken. Results discussed here are based on the assumption that actions recorded are actions confirmed as having been delivered.

### **Accuracy of Case Ascertainment and Reliability of Audit Tool**

Seven percent of charts could not be found and 9% of charts turned out to be miscoded (i.e. admission not due to acute stroke). Eighty-four percent of cases identified by HIPE as new stroke cases were therefore verified by the chart review as accurate. While all systems strive to higher levels of accuracy, the levels here provide data that enabled a robust benchmark from which to

compare the current Irish system with the ideal and with a parallel system in the UK. This audit exercise did not involve independent clinician agreement on case ascertainment. Such a task would be very complex and suit more the needs of a prevalence than a quality of care study. For current purposes, the completeness of the data available in charts identified enabled a good profile of stroke presentation and care in the acute context and are consistent with results from others (Ellekjaer et al 1999, Rinaldi et al 2003, Leone et al 2004, Kokotailo & Hill 2005, Leone et al 2006). Similarly, the high intra-rater reliability results signal the robustness of the dataset.

### **Patient Profiles**

The patient profile for INASC was similar in several aspects to the Sentinel profiles. The age and gender profile of patients was similar to Sentinel populations: 19% were under age 65 years. The majority (92%) were living at home at the time of the stroke with 73% recorded as independent in terms of ADL pre-stroke. They were similar in relation to type of stroke with 64% having an ischaemic stroke. The maximum severity profile at week one was similar with 60% of INASC cases being fully conscious vs. 62% in Sentinel 2006. The preadmission co-morbidity profiles were quite similar with hypertension (51%), previous stroke or TIA (25%) and atrial fibrillation (22%) being the most common in both patient groups. While similar proportions lived at home pre-stroke in Ireland and Sentinel 1998 (the only UK comparable date), more were discharged home in the UK (67 and 77% Sentinel 1998 and 2006 vs. 56% in Ireland). In addition Irish patients were more disabled at discharge with 28% independent in activities of daily living when discharged in contrast to 39% in the UK (Sentinel 2006).

### **Mortality**

Mortality levels in Irish hospitals appeared to be lower than in Sentinel. This may be due to the different method of identifying cases in the two studies (see above) and direct comparisons are unlikely to be valid here. Furthermore, mortality status at 30 days was unknown in a significant proportion of cases in INASC (13%) compared to the UK audit (5%) so no clear comparison can be drawn for this statistic.

### **Stroke Onset And Hospital Stay**

The majority (71%) were admitted to hospital on the same day as their stroke and this was comparable to Sentinel 2006 (72%). However, the proportion getting to hospital within 2 hours of stroke was substantially lower in Ireland with only 5% being admitted within 2 hours compared with 39% in Sentinel 2006.

### **Level of Dependency at Discharge**

The proportion of patients institutionalised directly from acute care in INASC was somewhat higher than Sentinel (15% vs. 13% Sentinel 2006). Since some patients were discharged to intermediate care facilities, some of these may also have subsequently been institutionalised. This may reflect the relative unavailability of home support systems in Ireland in comparison to many other European countries. For instance, approximately 5% of people over 65 years in Ireland are provided with home help services in comparison

to 20% in the UK, 12% in the Netherlands and 18% in Norway (Timonen et al 2006). The low level of home visiting by the hospital team in advance of discharge in Ireland (7% vs. 60%+ in the UK) may reflect a view that it is not of value as support services would not be available and/or may in itself contribute to decisions to institutionalise rather than refer home.

### **Stroke Unit Provision and Stroke Care**

In the first phase of INASC, the organisational audit revealed shortcomings in stroke unit care in Ireland. With one exception stroke units were notable by their absence in the Republic of Ireland. The one hospital with a stroke unit in accordance with the definition set out in the UK organisational audit represents 3% of Irish hospitals in contrast to 79% of hospitals in the United Kingdom (Sentinel 2004) and more recently 91% (Intercollegiate Working Party for Stroke 2006) who have a stroke unit. The inadequate provision of stroke unit care is reflected with 2% of INASC patients treated on a Stroke Unit vs. 54% in Sentinel 2006. The inadequate provision of stroke unit care in Ireland is contrary to the considerable international evidence of the benefits of organised stroke unit care. The Stroke Unit Trialist's Collaboration demonstrated that within clinical trials, there were fewer deaths and less morbidity for those patients admitted to stroke units (Stroke Unit Trialist's Collaboration 2002). Jarman et al (2004) showed that hospitals with an acute stroke unit were associated with an 11% lower odds of death. Based on the clinical audit data from Sentinel 2002, nearly two thirds of patients in the UK were not managed in a stroke unit (Intercollegiate Working Party for Stroke 2002). Based on incidence data the authors estimated that patients managed on non-specialist wards had a 14% - 25% higher mortality rate than those managed in stroke units. The reorganisation of stroke care provision would translate into the potential to save lives.

Despite the overwhelming evidence supporting the benefits of stroke unit care, and the recommendations of the Irish Heart Foundation Stroke Report (2000), the Republic of Ireland is at present very underdeveloped with regard to the provision of specialised stroke units in the acute hospital setting. The majority of patients were treated on a general ward (69% vs. 33% Sentinel 2006), while 8% were treated in a care of the elderly unit and 4% in a rehabilitation unit. The majority of patients were under the care of a general physician (61%), 31% a geriatrician, 7% neurologist and 1% consultant in rehabilitation medicine. The organisational audit of INASC found that only ten hospitals of 37 reported that there was an agreed policy that all or the majority of stroke patients were admitted under a lead consultant physician with an interest in stroke. Twelve of the 37 hospitals had a recognised consultant physician for stroke care, but this was recognised with a formal sessional commitment in only five cases.

### **Brain Imaging**

The majority of patients (93%) had CT imaging after stroke. The National Clinical Guidelines for Stroke (2004) recommend scanning within 24 hours of stroke. However, only 40% achieved this standard in INASC. There was a similar picture in Sentinel 2006 with only 42% performed within 24 hours. The extremely poor access to rapid neuro-imaging was striking with a delay of 2.6

days from stroke time to scan vs. one day in Sentinel 2006, with only 4% being scanned within 3 hours of their stroke compared with 9% in Sentinel UK 2006.

The lack of access to rapid neuro-imaging has implications for the introduction of thrombolysis in Ireland. Thrombolysis is not available routinely in any Irish hospital in comparison to 18% of UK hospitals that now offer thrombolysis (Intercollegiate Working Party for Stroke 2006). One percent of INASC patients were thrombolysed.

From 5-30% of patients in leading international centres are treated with emergency thrombolytic stroke therapy, depending on the degree of stroke service development and level of education of the public. This treatment reduces mortality and disability with an efficacy equivalent to the impact of Acute Stroke Unit care itself. It is recommended by expert international bodies and is rapidly becoming best practice internationally. It should be available to all patients in Ireland irrespective of where they live and on a 24/7 basis. While thrombolysis has the potential to improve outcome of patients with cerebral ischaemia, it is a high risk treatment and should only be administered by personnel trained in its use, in a centre equipped to investigate and monitor patients appropriately (Intercollegiate Working Party for Stroke National Clinical Guidelines for stroke 2004). Thrombolysis therapy needs to be administered within three hours of onset of stroke symptoms assuming all criteria for therapy have been met. In addition to thrombolysis, other therapeutic options may be coming on stream shortly which will further justify rapid transfer of stroke patients to acute hospitals with acute stroke units (e.g. thrombolysis therapies with longer time windows of opportunity for treatment e.g. up to 9 hours, enhanced thrombolysis with transcranial ultrasound and micro-bubbles, thrombus retrieval with mechanical devices and recombinant factor VII) for acute treatment of primary intracerebral haemorrhage.

There are several barriers within the patient pathway, which can prevent early administration of thrombolytic therapy in patients admitted with acute stroke (Kwan et al 2004). The reported barriers include the following: the patient or family did not recognise symptoms of stroke or seek urgent help, the general practitioner (rather than an ambulance) was called first; the paramedics and emergency department staff triaged stroke as non-urgent; and system delays in neuroimaging, inefficient process of in-hospital emergency stroke care, difficulties in obtaining consent for thrombolysis, and physicians' uncertainty about administering thrombolysis. While these processes were not directly assessed in INASC, deficiencies in neurovascular imaging capability were confirmed and need to be addressed to ensure equitable and accessible care. Attention to in-hospital system delays, alongside public education in relation to stroke as a medical emergency and the role of trained paramedical staff will all need to be addressed if thrombolysis is to be administered to stroke patients efficiently and equitably. Lessons learned in Ireland and elsewhere regarding promoting more rapid and comprehensive thrombolysis delivery to acute coronary syndrome patients now need to be transferred to stroke care.

## **Management / Care Planning**

The levels of assessment of impairments were substantially lower for all three areas specified compared with Sentinel 2006 audit figures. A lower proportion were screened for visual and sensory impairments visual 46% vs. 74%. Just over a quarter of patients were screened by staff to see if they could swallow safely in contrast to 66% in Sentinel 2006. Dysphagia (swallow disorder) is common especially in the early stages post stroke. Dysphagia affects between one and two thirds of patients with acute stroke (Perry & Love 2001). Dysphagia carries a sevenfold increased risk of aspiration pneumonia and is an independent predictor of mortality (Singh & Hamdy 2006). The National Clinical Guidelines for Stroke (2004) recommend swallow screening within 24 hours of stroke.

A lower proportion of INASC patients had a mood assessment, 28% compared to 55% in Sentinel 2006. Post stroke depression (PSD) is a common clinical consequence of stroke. Post stroke depression is associated with poor functional and social outcomes, reduced quality of life, the presence of cognitive impairment, and increased mortality. Despite the potential benefit associated with the identification and treatment of PSD, it often remains unrecognised and under treated (Salter et al 2007). All persons with stroke should be screened for mood disturbance. This should occur initially and at regular intervals thereafter and at key stages during the rehabilitation process. There should be adequate provision of specialist staff including stroke physicians, liaison psychiatry and clinical psychology to allow timely referral and comprehensive assessment and management.

The majority of patients (81%) in INASC were receiving nutrition in the first 72 hours after stroke, which compares with 93% in Sentinel 2006. Nutritional status among stroke patients has received limited attention despite the fact, that it may have an influence on clinical outcome. Previous studies have estimated that 15-20 % of patients suffer from malnutrition in the acute phase of stroke (Byringsen et al 2007). Forty-one percent of patients had documented evidence in their charts that they had been weighed during their hospital admission in contrast to 57% in Sentinel 2006.

The assessment of cognition (41%) was considerably lower than 71% in Sentinel 2006. Stroke may affect cognitive function in several ways and may result in impairments such as neglect/inattention or apraxia/dyspraxia, and in difficulties with attention, memory and executive functioning. These cognitive deficits may adversely affect the stroke patient's ability to participate in therapy, perform activities of daily living and live independently. Cognitive impairment is common in the first weeks after stroke, with executive and perceptual disorders being the most frequent (Nys et al 2007). Depression and cognitive impairment after stroke are associated with physical functional outcomes. Improving depressive symptoms in stroke patients may accelerate functional recovery, but the level of physical functioning achieved post-stroke is determined by neurological and cognitive factors, consistent with the evidence that improvement of depressive symptoms through therapeutic intervention is limited by cognitive impairment (Saxena et al 2007). Estimates

of cognitive impairment in stroke populations is 35% with 20-25% estimated to experience severe depression (BPS, 2002). They estimated that 2 clinical psychologists and one assistant is needed to address stroke care for every hospital with a catchment area of 500,000 patients. Psychological needs (both cognitive and emotional) are relatively neglected given the paucity of services for physical rehabilitation and the focus on these.

Similar proportions of patients were catheterised, INASC 26% vs. 29% in Sentinel 2006. Urinary incontinence can affect 40-60% of people admitted to hospital after a stroke, with 25% still having problems on hospital discharge and around 15% remaining incontinent at one year (Thomas et al 2005). Evidence suggests that specialist professional input through structured assessment and management of care and specialist continence nursing may reduce urinary incontinence after stroke (Thomas et al 2005). A small proportion (13%) of INASC patients had a documented plan to promote continence National Clinical Guidelines for stroke specify that all wards should have management protocols for urinary incontinence. Yet, according to the recent Sentinel Stroke Audit, only 54% of patients had a documented plan to promote urinary continence (Brooks 2004).

### **Multidisciplinary Assessment**

The National Clinical Guidelines for Stroke (2004) set out standards for access to a range of therapists and social workers. The INASC data demonstrates considerable deficiencies in timely access to these allied health professionals. The gap was particularly notable for speech and language therapy where there was a formal speech and language therapy (SLT) swallow assessment within 72 hours in 25% of cases vs. 67% in Sentinel 2006. A formal SLT communication assessment within 7 days occurred in 29% of cases in INASC vs. 69% in Sentinel 2006. Access to physiotherapy was also lower than in the UK, 43% of patients were assessed by a physiotherapist within 72 hours vs. 71% of cases in Sentinel 2006. Access to occupational therapy was also low with just over a fifth of patients assessed within 7 days of admission for stroke vs. 68% in the recent Sentinel audit (Sentinel 2006). Social work assessment within 7 days took place in 13% of cases vs. 56% in Sentinel 2006. The high proportions of patients not seen within 72 hours and 7 days is worrying since early intervention by a multidisciplinary team can elicit functional benefits. The delays in initiating rehabilitation may impact on later functional recovery.

There was written evidence of rehabilitation goals agreed by the multidisciplinary team in 22% of cases. This compares to 76% in the 2006 Sentinel audit and 56% in the 1998 Sentinel audit. The UK National Service Framework (NSF) for older people has set guidelines for multidisciplinary (MDT) stroke care to ensure their effectiveness in rehabilitation. These guidelines state that the characteristics of a team should include 'clearly documenting plans for treatment, care and ensuring identified needs for treatment, care and rehabilitation are met'. The INASC organisational audit revealed that MDT team meetings took place in all the stroke and rehabilitation units but only on 22% of other wards. These were only stroke specific in three hospitals. Meetings were attended regularly by medical,

nursing, physiotherapy, speech and language therapy and occupational therapy with attendance by other specialties variable and attendance by psychology extremely limited. One of the most important aspects of stroke unit care is the early initiation of rehabilitation. The formal coordination between disciplines in rehabilitative stroke care takes place in stroke units at a MDT meeting where a range of professionals comprehensively assess the individual needs of the stroke patient and develop an individualised rehabilitation plan with set goals (Monaghan et al 2005). However, this audit depended on recorded actions in hospital charts and it is possible that higher numbers of patients may have been seen by members of the MDT and may simply not have been recorded in a particular patient's chart.

### **Communication with Patients and Carers**

The proportion of patients with documented evidence of a discussion in relation to stroke diagnosis and prognosis was low 22% and 18% in contrast to 69% and 59% in Sentinel 2006. As discussed earlier, this is likely to occur more commonly than recorded in clinical practice. However, a complete system needs records of such actions to ensure they are covered for all patients. It is estimated that 25-74% of stroke survivors require help with activities of daily living from informal caregivers and family members (Dewey et al 2002). The provision of accurate, timely information and advice is a recommended component of service provision in stroke. Integral to such an approach is effective communication with the stroke patient and their family/carer to ensure that they have a good understanding of their illness, possible problems and realistic goals (Smith et al 2004).

In INASC, there was an assessment of carers' needs in just under a quarter of patients (24%), in contrast to over two-thirds of patients (68%) in Sentinel 2006. A very small proportion (12%) had documented evidence that the skills required to manage stroke patients at home were taught (vs. 71% Sentinel 2006). Stroke is a major cause of disability and there is increasing pressure being placed on carers to provide on-going support to stroke survivors living in the community. Family members are required to provide increasingly complex care to relatives in the home (O'Connell & Baker 2004). There is some evidence that caregivers feel inadequately trained, poorly informed and dissatisfied with the extent of support available after discharge (Kalra et al 2004). O'Connell & Baker (2004) reported that carers experienced considerable uncertainty about their role as carers and their future and that they used a number of coping strategies to manage in their caring role. It is important for health care professionals to understand the complex role of the carers and to advise them on strategies they can use to assist managing this role.

A home visit took place in a very small number of cases (7%), in contrast to over 60% of patients in the 2006 and 1998 Sentinel audits. Stroke survivors rely on emotional and physical support from informal carers, typically family members. Informal carers have an indispensable role in patient care after stroke, and the ability of carers to manage this role effectively is crucial for stroke survivors to be able to return home. Ski & O'Connell (2007) found that the major concern identified by carers was poor follow-up procedures for

initiating rehabilitation in the home and that a lack of appropriate discharge planning, in conjunction with early discharge of stroke survivors, can have an impact on the rehabilitation process and place increased and unrealistic demands on carers.

### **Secondary Prevention and Medication**

In line with the deficiencies in assessment, diagnosis and management of stroke outlined above, stark differences were noticed between the INASC and the UK Sentinel audits. Secondary prevention is effective in stroke (Sacco, 2006). Key targets are life-style (smoking, exercise, diet and alcohol), blood pressure treatment, diabetes treatment, hypercholesteraemia treatment, and in thromboembolic stroke (the most common form), anti-platelet agents and anti-coagulation for atrial fibrillation.

Although failure to document may not always mean that an intervention did not occur, the gross discrepancies under each aspect of health behaviour advice for secondary prevention between the Irish and UK stroke audits raise very troubling questions about training and practice in secondary prevention of stroke, particularly in the light of evidence from one Irish centre that knowledge of risk factors can be improved by education (Collins, 2002). Only two thirds had blood cholesterol levels documented and 39% of these were elevated, yet only 29% received diet counselling reduction of fat in diet.

The performance on medications was more reassuring for the use of antithrombotic agents and antihypertensive agents, with discharge rates similar to the UK Sentinel Audit. Less impressive were the low rates of prescribing of statins, and given a rate of 28% for atrial fibrillation, also a low rate for anticoagulation, and are a cause of concern for education and training.

### **Primary Prevention**

The most clear example of missed opportunities in primary prevention in stroke is the low level of anticoagulation pre-stroke (6%) in a population where nearly 22% were known to have atrial fibrillation. This is consistent with the INASC audit in primary care, and is an indicator of the degree of development required in primary prevention of stroke.

### **Research**

There was a very low level of participation in research in the INASC, 1% compared to 3% in the UK Sentinel Audit. The fostering of research in stroke services in Ireland is an important component of an overall stroke system.

### **Discharge Planning from Hospital and Onward Referral**

The general practitioner (GP) was notified on day of discharge in half (53%) of cases and only 24% of discharge summaries had functional ability noted. Phase 1 of INASC found that all of the 37 acute hospitals sent a discharge summary to the GP as standard practice. However, the companion General Practitioner report in INASC identified problems with the receipt and/or timeliness of these reports. The Stroke Transfer of Care (ToC) form was developed by the Royal College of Physicians UK (RCPUK 2005) in response

to earlier Sentinel Audit findings (2004) to bridge a communication gap and to meet the needs of both the patient and primary care practitioners in the UK. Much of the responsibility for delivering effective secondary prevention and managing longer-term problems associated with stroke falls to the primary care team. Continuity of care is crucial to ensure a successful outcome for the stroke patient, and a key part of the management process is in the transfer of care from the secondary to primary care environment. The Stroke ToC form captures in a concise and accessible format the information essential to seamlessly transfer stroke patients to primary care, including key information regarding: initial diagnosis, investigations undertaken, assessments on transfer, medications (including secondary prevention), lifestyle advice, rehabilitation and follow-up appointments and home care arrangements. The Stroke ToC document was piloted in primary and secondary care. Nearly all of the GPs (88%) said the document helped them manage their patients more effectively (RCPUK 2005).

### **Some Comparisons with UK Sentinel Data**

The most recent round of the UK Sentinel audit (Intercollegiate Working Party for Stroke 2006) is now available. The comparative results in a number of key areas for the last three rounds of the UK audits clearly demonstrate that with investment from Government, progress has followed in key areas of service provision and specialisation. As was evident from direct comparisons of Irish and UK results, Ireland fared worse on all 12 markers in terms of quality of care.

Using mid-1990s costs, Ashburn (1997) estimated that an unrehabilitated stroke patient cost the UK health services UK sterling 64,000 more than a rehabilitated patient over their lifetime. Given these findings and the more general international literature documenting improved patient outcomes in terms of independence and lower mortality, the lack of stroke units in Ireland is particularly striking. Irish stroke care as documented here is inadequate, poorly organised and does not come near to best practice by international standards. Findings in relation to communication suggest it is not sufficiently patient-centred or carer-centred. The extremely poor access to rapid neuro-imaging is striking (4% scanned within 3 hours of admission). This deficit will have to be addressed in an equitable way throughout the country. The high percentages of co-morbidities among patients suggest significant potential for primary stroke prevention. Primary care has a significant role to play in this regard. As companion reports on nursing home resident and community residents and carers after stroke affirm, facilities currently appear to be even more patchy and incomplete in the community. Initiatives such as HeartWatch could be expanded from its current secondary prevention post acute coronary syndrome focus to a more expansive cardiovascular prevention role, giving equal emphasis to cardiac and cerebrovascular conditions. Until now, stroke has been a 'poor relation' in terms of care when compared with coronary heart disease. In the UK, the OXVASC study demonstrated that acute cerebrovascular disease was in fact more common than acute cardiac ischaemia at population level. Similarly, the NAO report (2005) showed the major disparity between funding and resources given over to heart disease compared with stroke. Audit can be the start of a process of more focused

care for those with stroke, as is evident in the UK with successive cycles of the Sentinel audit. Serial national audits for stroke and other high profile medical conditions in Ireland would be a helpful driver for change and improvements in services.

## **Conclusion**

Performance across a broad range of indicators of quality of stroke care was much poorer in Ireland compared to the UK. This report indicates substantial deficits in primary prevention, timely and thorough assessment, investigation and treatment, rehabilitation, secondary prevention, discharge planning and preparation of patients and family for discharge. These findings are consistent with, and amplify the nature and extent of the deficits of the systems for stroke care outlined in the organisational audit of the INASC, and must be considered to represent a major cause of concern for people with stroke, their families, as well as to healthcare professionals and the Irish government. The findings point to the need for a radical and urgent review of stroke services in Ireland to provide appropriate care for Irish people with stroke.

## **Chapter 5 Recommendations**

[For further discussion with Review Group]

[General comment to Review Group: it is difficult to make definitive recommendations until all information is triangulated from all the individual reports to make most useful recommendations]

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## **Appendix 1 – 36 Participating Hospitals**

Adelaide & Meath Hospital inc. National Children's Hospital Tallaght  
Beaumont Hospital, Dublin  
Connolly Hospital, Dublin  
Mater University Hospital, Dublin  
St. Colmcille's Hospital, Loughlinstown, Dublin  
St. James's Hospital, Dublin  
St. Michael's Hospital, Dunlaoghaire  
St. Vincent's University Hospital, Dublin  
Naas General Hospital  
St. Luke's General Hospital, Kilkenny  
South Tipperary General Hospital Clonmel  
Waterford Regional Hospital  
Wexford General Hospital  
Kerry General Hospital  
Cork University Hospital  
Mallow General Hospital  
Mercy University Hospital Cork  
South Infirmary Hospital Cork  
Midwestern Regional Hospital Ennis  
Midwestern Regional Hospital Limerick  
Midwestern Regional Hospital Nenagh  
Sligo General Hospital  
Letterkenny General Hospital  
Portiuncula Hospital, Ballinasloe  
University College Hospital Galway  
Roscommon County Hospital  
Merlin Park Regional Hospital Galway  
Mayo General Hospital  
Midland Regional Hospital Portlaoise  
Midland Regional Hospital Tullamore  
Midland Regional Hospital Mullingar  
Monaghan General Hospital  
Our Lady's Hospital Navan  
Louth County Hospital Dundalk  
Our Lady of Lourdes Hospital Drogheda  
Cavan General Hospital

## **Appendix 2 - Hospital In-Patient Enquiry Scheme**

The Hospital Inpatient Enquiry (HIPE) Scheme is a computer based health information system designed to collect medical and administrative data regarding discharges and deaths from acute hospitals in Ireland. HIPE was started on a pilot basis in 1969 and then expanded and developed as a national database of coded discharge summaries from the 1970s onwards. Each HIPE discharge record represents one episode of care and patients may be admitted to more than one hospital with the same or different diagnoses. The records therefore facilitate analyses of hospital activity rather than incidence of disease. Patient name and address are not submitted to the national HIPE database. Currently 61 hospitals participate in HIPE and close to 1 million records are collected annually. This represents approximately 96 per cent coverage of all day and inpatient discharges from acute public hospitals nationally. The HIPE system is managed by the Economic and Social Research Institute (ESRI) on behalf of the Department of Health & Children (DoH&C). In addition to managing and maintaining the national dataset, the ESRI also produce, install and support the data collection and reporting software in all participating hospitals and train personnel in the appropriate coding schemes and data entry and reporting procedures. In addition, the ESRI also have responsibility for data quality monitoring and undertake regular audits of data quality at the hospital and national level. HIPE data is used as part of the national case mix programme which estimates adjustments to acute public hospital budgets annually based on the case mix supported by the hospital and the hospital peer group. HIPE data is also used extensively by the DoH&C and the HSE for service planning and monitoring purposes. Annually, the HIPE team process over 200 requests for data from researchers active in health research. The data collected by the HIPE system can be logically grouped into administrative, clinical and demographic data.

### **Administrative Data**

- Patient name (retained within hospital)
- Hospital number
- Case reference number
- Dates of admission and discharge
- Dates of principal and first procedure
- Day case indicator
- Admission type
- Admission source
- Discharge status
- Discharge destination
- General Medical Service status (i.e. Medical Card)
- Admitting Consultant and Discharge Consultant (encrypted by hospital)
- Intensive Care days (ITU/CCU/HDU/PICU)
- Private Care Days
- Identification of NTPF admissions

- Identification of MAU admissions
- Ward Identification

### Clinical Data

- Principal diagnosis and up to **19** secondary (additional) diagnoses
- Principal procedure (when performed) and up to **19** secondary (additional) procedures

### Demographic Data

- Date of birth
- Sex
- Marital status
- Area of residence by county or country

For coding of morbidity data (diagnoses and procedures) the International Classification of Diseases, 10<sup>th</sup> edition, Australian Modification (ICD-10-AM) has been used since January 1<sup>st</sup> 2005. Prior to 2005 ICD-9-CM was used to code diagnoses and procedures. The stroke codes used in the INASC audit (ICD-10-AM I61, I63 and I64) were chosen to facilitate comparison with the UK Sentinel Audit data. Irish figures for the last six years for these codes are shown in Table below.

#### Discharges with Principal Diagnosis of Cerebrovascular Disease reported to HIPE

Discharges with Principal Diagnosis of Cerebrovascular Disease	
2001	4873
2003	4916
2004	5891
2005	5072
2006	5254

2001-2004

ICD-9-CM (The International Classification of Diseases, 9th Revision, Clinical Modification).

431 Intracerebral haemorrhage

434 Occlusion of cerebral arteries

436 Acute, but ill-defined, cerebrovascular disease

2005 and 2006

ICD-10-AM (The International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM), Fourth Edition).

I61 Intracerebral haemorrhage

I63 Cerebral Infarction

I64 Stroke, not specified as haemorrhage or infarction

Source: HIPE & NPRS Unit, Health Policy and Information Division, ESRI, August 2007.

When attempting to plan for future stroke services in Ireland, caution should be exercised when attempting to quantify the burden of stroke disease using HIPE-ESRI data alone. Such caution is justified on several fronts, given previous experience internationally which shows significant levels of inaccuracies in coding of ischemic stroke (Benesch et al 1997, Goldstein 1998) and also the recent and novel data from Oxfordshire, UK which shows, contrary to prior perceptions, that acute cerebrovascular events are more common than acute coronary events when same are

enumerated at a population level (3.36 versus 3.13 events per 1000 population per year, respectively) (Rothwell et al 2005). More recently, population based data from the USA has highlighted the likely large burden of unrecognised stroke disease which never comes to medical attention. In a national sample of 18,462 participants (mean age 65.8 years, 51% female) without a prior diagnosis of stroke or transient ischemic attack, 17.8% reported previous stroke-like symptoms. These episodes were more prevalent in racial minority groups, those with lower incomes and educational attainment and amongst those with poorer self-perceived health status (Howard et al 2006). Concerns regarding the potential for substantial underestimation (7 fold) of the need for assessment services for TIA have been expressed in the UK if planning for such services were to be based solely on prior recorded incidence rates of first ever TIA (Giles et al 2007).

## Appendix 3 - Summary of Changes Proforma Irish Stroke Audit 2006

### ROYAL COLLEGE OF PHYSICIANS NATIONAL SENTINEL STROKE AUDIT 2006 CLINICAL AUDIT OF STROKE

#### MODIFICATIONS

##### Preamble

The Audit Proforma that has been chosen for use in the clinical audit of stroke in Ireland is the Royal College of Physicians (UK) National Sentinel Stroke Audit 2006 Clinical Audit of Stroke. Not only does this provide our project with a thoroughly developed and validated audit tool, but it also allows for comparison of data with relatively contemporaneous data from the UK. It is for this reason that significant variations from the RCP Audit Proforma are not encouraged.

It is necessary, however, to make some adjustments for application in the Irish context.

##### Modifications

Dates need to be altered throughout to reflect your own project dates

Pg1            Add:            Review Date  
                 Amend:        Dates in Q3

Pg 5 / 14      Review the lists of medications  
                 Ensure that they are correct for the Irish environment

#### SECTION 1 STROKE ONSET AND HOSPITAL STAY

1.1 Time of stroke: new in UK 2006 Clinical Proforma and incorporated in INASC 2006 Proforma. Add 'don't know' option after INASC Pilot Study September and November 2006.

1.2 Time of admission: new in UK 2006 Clinical Proforma and incorporated in INASC 2006 Proforma. Add 'don't know' option after INASC Pilot Study September and November 2006.

1.9    Where did the patient spend over 50% of their stay add *geriatric ward* for INASC 2006

1.11i\* During their stay was the patient under the direct care of (not a consultation only) of a: consultant geriatrician; consultant neurologist; consultant in rehabilitation medicine; general physician and other. New question in INASC 2006 not asked in UK.

1.12ii Time of first brain scan after the stroke; new in UK 2006 Clinical Proforma and incorporated in INASC 2006 Proforma. Add 'not known' option after INASC Pilot Study September and November 2006.

1.12iii Has a brain scan been carried out within 24 hours after the stroke? Add 'not known' option after INASC Pilot Study September and November 2006.

## SECTION 2 CASEMIX

2.1i\* Newly detected co-morbidities since admission? New question in INASC 2006 not asked in UK.

2.1ii\* Living accommodation pre stroke: this question was in the UK 2004 Proforma and dropped from the UK 2006 Proforma. This question was included in the INASC Proforma.

2.1iii\* Living accommodation at discharge: this question was in the UK 2004 Proforma and dropped from the UK 2006 Proforma. This question was included in the INASC 2006 Proforma.

1.3i Medication table updated for INASC 2006. See \* for newly added medications.

## SECTION 3 STANDARDS WITHIN 72 HOURS

3.2iii\* Did the patient receive thrombolysis. This question was included in the INASC Proforma.

## SECTION 3 STANDARDS WITHIN 7 DAYS

4.2^ Was the patient assessed by an occupational therapist within 7 days of admission? This question was recently changes to 4 days for Sentinel 2006 based on a request from the UK organisation of Occupational therapists. To be consistent with the 7-day period for all other professionals for consistency and as this was the first Irish audit, the time was specified as 7 days.

## SECTION 6 RISK FACTORS AND SECONDARY PREVENTION

6.1i The list was amended to included diabetes as a risk factor for INASC 2006.

6.2\*i-iii The questions relating to cholesterol levels were dropped from the 2006 UK Proforma. They were asked in 2004 in the UK. These questions were added in to the INASC 2006 Proforma.

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

6.2 ii) If YES: Was it either >5 total or LDL >3.0 mmol/L

6.3 iii) If yes to 6.2ii Has the patient received dietary advice to reduce fat intake?

6.2\*iv The questions relating to blood pressure were dropped from the 2006 UK Proforma. They were asked in 2004 in the UK. These questions were added in to the INASC 2006 Proforma.

6.3 Additional medications were added to reflect the Irish health setting.

#### SECTION 8 DISCHARGE PLANNING FROM HOSPITAL AND PLANS FOR ONWARD REFERRAL

The section on Information to GP was dropped in the UK 2006 audit and was asked in Sentinel 2004. This information is very important and we felt it would be useful to triangulate with the INASC primary care report. Questions 8.1\* - 8.3\* were added to INASC 2006.

8.1\* Is there documented evidence that by 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?

8.2\*. Does the discharge summary to the GP include level of functional ability at discharge?

8.3\* Within the first 3 months of stroke was carotid imaging performed to check for carotid stenosis / if yes date?

Two additional questions were added for INASC 2006 and are not asked in the UK, questions 8.3i and 8.4i related to referral to AHP/PHN and plans for onward referral after acute hospital discharge.





**SCAN**

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

If yes,

1.12i Date of first brain scan after the stroke [ / / ] (dd/mm/yyyy)

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

1.12ii Time of first brain scan after the stroke [ ] HH (24 hr Clock) \*Not known

1.12iii Has a brain scan been carried out within 24 hours of stroke? Yes  No  \*Not known

1.12iv What did the scan show?

- Infarct
- Haemorrhage
- Haemorrhagic Infarct
- No relevant abnormality

1.12v If no,

Reason the patient did not have a scan:

- Patient refused/unable to co-operate
- Palliative care
- Scan not routinely available
- Other

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

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**SECTION 2 CASEMIX**

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**CO-MORBIDITIES**

2.1 Any history of known co-morbidities prior to admission?  
(please select all that apply)

- Atrial Fibrillation
- Previous stroke or TIA
- Impaired glucose tolerance / impaired fasting glucose\*
- 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)
- Other serious illness that influences prognosis or management of stroke  
Please specify \_\_\_\_\_

None of the above apply

2.1i\* Are there newly detected comorbidities since admission?  
(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)
- Other serious illness that influences prognosis or management of stroke  
Please specify \_\_\_\_\_

None of the above apply

2.1ii\* Living accommodation pre stroke:

- |                            |                           |                          |                                  |   |
|----------------------------|---------------------------|--------------------------|----------------------------------|---|
| Home                       | Yes <input type="radio"/> | No <input type="radio"/> | Live alone <input type="radio"/> | Live with spouse/family <input type="radio"/> |
| Residential / Nursing home | Yes <input type="radio"/> | No <input type="radio"/> |                                  |   |
| Hospital                   | Yes <input type="radio"/> | No <input type="radio"/> |                                  |   |
| Other                      | Yes <input type="radio"/> | No <input type="radio"/> |                                  |   |

2.1iii\* Living accommodation at discharge:

- |                            |                           |                          |                                  |   |
|----------------------------|---------------------------|--------------------------|----------------------------------|---|
| Home                       | Yes <input type="radio"/> | No <input type="radio"/> | Live alone <input type="radio"/> | Live with spouse/family <input type="radio"/> |
| Residential / Nursing home | Yes <input type="radio"/> | No <input type="radio"/> |                                  |   |
| Hospital                   | Yes <input type="radio"/> | No <input type="radio"/> |                                  |   |
| Other                      | Yes <input type="radio"/> | No <input type="radio"/> |                                  |   |

2.2 Was the patient newly institutionalised at discharge?

- Yes temporarily\*   
Yes permanently\*   
No   
Not known

**PRE-ADMISSION MEDICATION**

2.3 Was the patient on any of the following treatments before admission? Yes  No

2.3i If YES which classes of drugs were prescribed? (tick all that were prescribed):

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*	
Thiazide diuretic	<input type="checkbox"/>	Aspirin/dipyridamole combination* (Asasantin Retard)	<input type="checkbox"/>	Omacor* (Omega 3)*	
Other	<input type="checkbox"/>	Other	<input type="checkbox"/>	Other	
None	<input type="checkbox"/>	None	<input type="checkbox"/>	None	

2.4 Was the patient independent in everyday activities before the stroke? Yes  No  Don't know   
 (e.g. Barthel 19-20 or Rankin <3)

## Error!DEPENDENCY AT DISCHARGE

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

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

**Total [            ] (may be ascertained from notes\*)**

### MAXIMUM SEVERITY WITHIN FIRST WEEK

2.6 What was the worst level of consciousness at the time of maximum severity within the first week after stroke?

- Fully conscious
- Drowsy
- Semi-conscious (not fully rousable)
- Unconscious (responds to pain only/no response)

---

### SECTION 3 STANDARDS WITHIN 72 HOURS

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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

3.1 Has screening for swallowing disorders (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.

3.2 If the patient is alert and able to communicate, is there a formal assessment of? Yes No No but  
i) Visual fields     
ii) Sensory testing

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

3.2iii\* Did the patient receive thrombolysis? Yes  No

#### PATIENT ASSESSMENT FIRST 48 HOURS

3.3 Had the patient commenced aspirin by 48 hours after stroke? Yes No No but

Answer **No, but...** if: patient died; patient has intra-cerebral haemorrhage; it is documented that aspirin was contra-indicated.

#### PATIENT ASSESSMENT FIRST 72 HOURS

3.4 Has swallowing been assessed within 72 hours of admission by a speech and language therapist (or of stroke if the stroke occurred in hospital)? Yes No No but

Answer **No, but...** if: patient's swallowing is documented as normal: patient is still unconscious; patient died within 72 hours; patient is receiving palliative care.

3.5 Has the patient been assessed by a physiotherapist within 72 hours of admission (or of stroke if the stroke occurred in hospital)? Yes No No but

Answer **No, but...** if: patient died within 72 hours; patient is receiving palliative care.

3.6 Was the patient receiving nutrition by 72 hours of admission? Yes No No but

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

3.6i Which of the following methods was in use?  
Oral   
Nasogastric/PEG   
Intravenous

---

**SECTION 4 STANDARDS WITHIN 7 DAYS**

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**WITHIN SEVEN DAYS**

- 4.1 Has there been an initial assessment of communication problems by the speech and language therapist within 7 days of admission (or of stroke if the stroke occurred in hospital)?
- 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 (or of stroke if the stroke occurred in hospital)?
- 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

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.

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## SECTION 5 BY DISCHARGE

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- 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? 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? 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 written evidence of rehabilitation goals agreed by the multi-disciplinary team? Yes No No but

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



6.2iv\* Has blood pressure been recorded as above normal after the acute phase (first 3 days) (systolic >140, or diastolic > 85) on 3 or more occasions? Yes  No  No but

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

6.3 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	<input type="checkbox"/>	Aspirin+Dipyridamole (Asasantin Retard)*	<input type="checkbox"/>	Omacor* (Omega 3)*	<input type="checkbox"/>
Other	<input type="checkbox"/>	Other	<input type="checkbox"/>	Other	<input type="checkbox"/>
None	<input type="checkbox"/>	None	<input type="checkbox"/>	None	<input type="checkbox"/>

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"/>

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## 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
Diagnosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prognosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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

If yes,

7.4i was this:  
by a professional with the patient?   
by a professional without the patient?

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; patient died; or patient or carer refused.

### RESEARCH

7.5 Is this patient in a research study where they (or a relative) have given written consent/assent? Yes    No

## SECTION 8 DISCHARGE PLANNING FROM HOSPITAL AND ONWARD REFERRAL\*

### Information to GP \*

- 8.1\* Is there documented evidence that by 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? Yes  No
- 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 include level of functional ability at discharge? Yes  No  No but  Answer No, but... if: patient still in hospital / patient died.
- 8.3\* Within the first 3 months of stroke was carotid imaging performed to check for carotid stenosis? Yes  No  No but
- If yes, date of carotid imaging [ / / ]
- Answer No, but...if: haemorrhagic stroke; posterior circulation stroke; patient documented as too frail to be considered for carotid endarterectomy; patient refused surgery; profoundly impaired .
- 8.3i\* Is there documented evidence that by the day of discharge the PHN / AHP was informed (by fax, phone, e-mail or letter) of the patient's discharge?  
 PHN Yes  No  include date of letter dd/mm/yyyy [ / / ]  
 AHP Yes  No  include date of letter dd/mm/yyyy [ / / ]
- 8.4\* What are the plans for this patient's onward referral for rehabilitation after discharge from the acute hospital?
- |                                      |                           |                          |
|--------------------------------------|---------------------------|--------------------------|
| Public Health Nurse                  | Yes <input type="radio"/> | No <input type="radio"/> |
| Community AHP Services               |                           |                          |
| Physiotherapy                        | Yes <input type="radio"/> | No <input type="radio"/> |
| Occupational therapy                 | Yes <input type="radio"/> | No <input type="radio"/> |
| Speech and language therapy          | Yes <input type="radio"/> | No <input type="radio"/> |
| Clinical Nutrition                   | Yes <input type="radio"/> | No <input type="radio"/> |
| Psychology                           | Yes <input type="radio"/> | No <input type="radio"/> |
| Liaison Psychiatry                   | Yes <input type="radio"/> | No <input type="radio"/> |
| Community Rehabilitation Team        | Yes <input type="radio"/> | No <input type="radio"/> |
| Hospital based therapy out patients  | Yes <input type="radio"/> | No <input type="radio"/> |
| Day Hospital                         | Yes <input type="radio"/> | No <input type="radio"/> |
| In patient rehabilitation unit       | Yes <input type="radio"/> | No <input type="radio"/> |
| Off site Rehabilitation Unit         | Yes <input type="radio"/> | No <input type="radio"/> |
| Baggot Street (for Dublin Hospitals) | Yes <input type="radio"/> | No <input type="radio"/> |
| National Rehabilitation Hospital     | Yes <input type="radio"/> | No <input type="radio"/> |
| Volunteer Stroke Scheme              | Yes <input type="radio"/> | No <input type="radio"/> |
| Other                                | Yes <input type="radio"/> | No <input type="radio"/> |
- If other specify \_\_\_\_\_

### 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 5 – Clinical Audit Helpnotes

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# **IRISH NATIONAL SENTINEL AUDIT OF STROKE 2006**

## **HELP NOTES FOR CASE MIX AND CLINICAL AUDIT**

**Clinical Effectiveness and Evaluation Unit Royal College of Physicians, London**

on behalf of the Intercollegiate Stroke Working Party

**Irish Heart Foundation in association with the Department of Health and Children  
National Audit of Stroke Care in Ireland**

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**The National Audit of Stroke Care Research Team wish to acknowledge the assistance of the RCPUK in allowing us to use these Helpnotes and Clinical Proforma. Some adjustments have been made for application in the Irish Context.**

**Helpdesk: Dr Frances Horgan, Project Manager Hospital Stroke Audit, National Stroke Audit Research Group, Royal College of Surgeons in Ireland, 123 St Stephen's Green, Dublin 2, Ireland. Tel: + 353 1 402 2472 Fax: + 353 1 402 2471 Email: fhorgan@rcsi.ie**

# Table of Contents

	Page Number
Acknowledgements	iii
Introduction	1
Help Notes for the Clinical Audit	6-23

## ACKNOWLEDGEMENTS

The Research team for the Irish National Audit of Stroke Care wish to thank the Royal College of Physicians (London) for all assistance in the preparation of the Irish Clinical Audit of Stroke Care.

The Clinical Proforma and Helpnotes are reproduced by kind permission of the Royal College of Physicians (London)

### *Background / UK Sentinel Audit*

The Royal College of Physicians Clinical Effectiveness and Evaluation Unit first conducted the National Sentinel Audit of Stroke in 1998 and 1999, and demonstrated that although there were widespread variations in standards across the country, much was being done at local level to change services. Improvements were therefore demonstrated in the second round (Rudd et al 2001). The audit is based on standards agreed by the representatives of the Colleges and professional associations of the disciplines involved in the management of stroke. Phase one will be completed in April 2006 and assess the organisation of the stroke service. Phase two the clinical care of individual patients admitted to hospital following a stroke will be concluded in Spring 2006.

The Irish Heart Foundation, in association with the Department of Health and Children, commissioned a national audit of stroke services, which commenced in March 2006. It is planned that the results of the study will inform a much-needed national strategy on stroke care.

The aim of the project is to conduct a National audit of hospital and community stroke services for the Republic of Ireland. The hospital audit has two components:

- i) an Audit of the Organisational Aspects of Stroke Care in public acute hospitals (completed September 2006): and
- ii) a Clinical Audit of Stroke Care involving review of clinical case notes for a selected sample of patients with stroke (start date November 2006).
- iii) The community audit will involve a survey of general practitioners, allied health professionals, patients and carers, and nursing homes (ongoing).

The Clinical Audit is similar to the National Sentinel Stroke Audit in the UK, whereby a sample of case notes of all patients with stroke based on ICD 10 codes, discharged during a six month period in 2005, will be reviewed using a clinical proforma. The data will be fully anonymised and individual hospitals will not be named in the final report.

### *Ethical Considerations, Confidentiality and Data Protection*

No part of the sentinel audit requires patients or their carers to be contacted for information.

If your site is one of those selected to conduct a patient survey, you will have received information on this. In the interests of patient confidentiality no name or number that could be linked to an individual should be used on the audit documentation, or entered into the computer as part of the audit.

Only anonymised data are to be submitted. Each hospital site is allocated a site code by which they will be identified (will be issued to you by Dr Frances Horgan Project Manager). Each case included should be allocated an audit number, for example 1 – 80 (if 80 cases are audited), keeping a secure record as to which case note numbers correspond to the audit numbers for reference during analysis. This record should be destroyed once the audit report has been completed and any anomalies clarified.

The National Audit of Stroke Care has been approved by the Research Ethics Committee of the Royal College of Surgeons in Ireland and has the support of the National Hospitals' Office. If you have any queries please contact the Project Manager Dr Frances Horgan 01 4022472.

### **The Audit Tool**

*The audit tool is the Clinical Audit Proforma 2006 version, which is being used by kind permission of the Royal College of Physicians London. Some modifications have been made for the Irish context.*

### **Audit Sample**

The audit sample for includes consecutive discharged cases with a primary diagnosis of stroke (ICD 10 codes:I61, I63 and I64 including subcategories) during the following six-month period in 2005, January February and March, July August and September 2005.

I61 Intracerebral Haemorrhage

I63 Cerebral Infarction

I64 Stroke, not specified as haemorrhage or infarction

***NB Exclusions*** - Cases with subarachnoid haemorrhage (I60), subdural and extradural haematoma (I62) are excluded from this audit sample.

### **Case ascertainment**

The methodology used to select cases requires strict adherence to the audit sample description outlined. To confirm that this is being followed, you will be asked to submit an Excel spreadsheet at the end of the clinical audit which specifies the date of discharge for all stroke patients for the six-month period in 2005, January February and March, July August and September with an explanation of how the cases were ascertained (via clinical coding or admission books, stroke register) and to give the reason for omission of any consecutive cases (e.g. coding incorrect). All possible effort must be expended to locate missing notes, as this will contribute to the data quality and data completeness that will be rated in the audit report.

### **Data sources**

The clinical audit uses the notes of all the disciplines involved with each case.

**Data Collection time frame**

Data collectors may start data collection whenever they plan, we would plan to have about 50% of cases per site audited before end December 2006. Formally data collection will be **Monday December 4<sup>th</sup> 2006 to Friday 2<sup>nd</sup> March 2007**.

**Auditors / data collectors**

Data collectors have received training in November 2006 and should have access to the Help notes. The discipline and identity of the auditor should be known for the interpretation of the results.

Data quality

*Clinical involvement and supervision* - Each site will have a designated lead clinician who will have overall responsibility at the site. Further assistance is available from the Project Manager Dr Frances Horgan.

Data Analysis and Reporting

This will be carried out by the National Audit of Stroke Care Research Team.

**For further information and Audit Helpline**

Please contact: Dr Frances Horgan, Project Manager, National Audit of Stroke Care, School of Physiotherapy Royal College of Surgeons in Ireland, 123 St Stephen's Green, Dublin 2. Tel 01 4022472 email [fhorgan@rcsi.ie](mailto:fhorgan@rcsi.ie) Fax 01 4022471.

## **The Clinical Audit of Stroke Management**

**i) Data source** - For each case included in the clinical audit the source of information is the case notes (whether this is standard unidisciplinary notes (medical, nursing, or therapy professions) or multidisciplinary records). The audit questions deliberately do not stipulate which set of notes the information should be in because this may vary at local level. The audit will be easier for those who use multidisciplinary records.

**ii) Responses** - Most items in the clinical audit require one of three possible responses:

*Yes* - Indicates the information was recorded in the case notes.

*No* - Indicates that the information was not recorded but should have been.

*“No but...”* - indicates the standard was not applicable in this patient for the reasons indicated beside the question. The “No but” answers are excluded from the final results. The “No” answers are part of the analysis and detract from the final score. It is therefore important that auditors know whether a standard was appropriate in the particular case or not. To assist with this the audit Help booklet provides the rationale for the audit standards and guidance on the interpretation of each question and onscreen help is available.

### Quality Assurance and data checks

Site visits will be conducted by Dr Frances Horgan (Tel 01 4022472 email [fhorgan@rcsi.ie](mailto:fhorgan@rcsi.ie) and Ms Karen Galligan Research Fellow (Tel 01 4022717 email [kgalligan@rcsi.ie](mailto:kgalligan@rcsi.ie)). We will contact you in advance to schedule this visit.

### Sample clarification

For the purpose of this clinical audit the sample is specified as the 37 public acute hospitals in the Republic of Ireland. Patients will not be followed out of the 37 originating sites e.g. in the case of discharge to off site rehabilitation.

### ***Return of Completed Proformas***

*The Project Manager Dr Frances Horgan will discuss with individual sites the process for returning completed proformas and will make arrangements for same with data collectors.*

## NATIONAL SENTINEL AUDIT OF STROKE 2006

### Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
Site code Data collector code	Each hospital has been allocated a numeric site code for reasons of confidentiality		To be issued by Dr Frances Horgan	
<b>DEMOGRAPHIC INFORMATION</b>				
Patient Audit Number	To identify cases within the audit whilst observing confidentiality of patient information. There should be no duplicate patients (apart from the cases used in the reliability study)– see notes for question 3 below for patients with multiple admissions	Kept securely in the audit department for future reference during the analysis and reporting phase.	The patient audit numbers should be allocated instead of the hospital identification number. A record should be kept of how these numbers correspond until the completion of the reporting phase.	
Date of birth	Age associated with severity of stroke is an important predictive factor for outcome, both in terms of mortality and resulting dependency.	All clinical records.	i) Correct year for date of birth and use the format dd/mm/yyyy ii) The patient is over 16 years of age.	
Gender	Men are more likely to suffer a stroke, although gender does not seem to influence individual outcome.	All clinical records	Mark one box only.	
Auditor discipline	Staff of any discipline involved in the management of stroke and/or clinical audit staff are eligible to be auditors. Some may complete the audit in conjunction with one another.		Mark as many boxes as apply	

# NATIONAL SENTINEL AUDIT OF STROKE 2006

## Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
<b>SECTION 1 STROKE ONSET AND HOSPITAL STAY</b>				
<b>1.1 Date</b> and time of Stroke	An important index date relevant to the care received. Some of the standards in the audit are linked to this. You are also asked to make every effort to ascertain the time of stroke to nearest hour for the first time in this audit. If the patient woke with symptoms of stroke that were not present when he went to sleep, enter time the patient woke.	Team, medical or nursing records	Most usually on or before the date of admission. Some cases may have had the stroke after admission. Please make every effort to find this date, as it is key to many of the standards. Time is to the nearest hour on the 24-hour clock.	
<b>1.2 Date</b> and time of Admission	An important index date relevant to the care received. Standards in the clinical audit are linked to this.  Having time of admission and time of stroke will be used to calculate delay between stroke and admission Please make every effort to ascertain the time of admission to calculate delay between stroke and admission and admission and scan more accurately. Time is to the nearest hour on the 24-hour clock.	Team, medical or nursing records	Patients with more than one stroke during the audit time frame should have only their first episode of stroke audited. Patients who had a stroke during their in-patient stay for another surgical/medical condition should be included in the audit and answers given for the period following the stroke rather than from the initial admission.	
<b>1.3 Died</b> as inpatient <b>1.3i</b> If not, location of patient at time of data collection	This will be used to calculate the in-hospital mortality rate. If the patient was discharged alive state whether he/she is still in hospital for the initial episode or has been discharged.	Team, medical or nursing records		
<b>1.4 Date of discharge if discharged alive</b>	Length of stay can be an indicator of casemix in association with other factors.	Team, medical or nursing records	Date of discharge from acute hospital.	

## NATIONAL SENTINEL AUDIT OF STROKE 2006

### Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
<b>1.5</b> Date of death or Date of death not applicable.	Case fatality can be an indicator of case mix as well as quality of care. It will increase with age, will be higher in haemorrhagic stroke, and where there is pre-existing dependency or disease.	Team, medical, nursing or therapy records. Hospital patient administration system	If the patient died in hospital, this will also be the date of discharge (q1.4). Alternatively, this may have occurred in the months after discharge. The main priority for the audit will be to identify the 30-day mortality rate.	
<b>1.6</b> Patient alive at 30 days?	In order to calculate 30 day mortality	Team, medical, nursing or therapy records.	It is important to ascertain this for <b>all</b> patients in the sample. Ascertain from chart do not contact patients/GP.	
<b>ADMISSION/DISCHARGE</b>				
<b>1.7</b> Patient admitted to stroke unit at any time during stay?	The Stroke Unit Trialists Collaboration Cochrane reviews demonstrate that Stroke Units have better clinical outcomes.	Team, medical, nursing or therapy records acute hospital and stroke unit	This applies to any unit or ward within the hospital that has been defined in the organisational audit as a stroke unit.	
<b>1.8</b> Admitted to stroke unit within 4 hours of arrival?	To calculate speed of access to stroke unit			
<b>1.9</b> Where patient spent over 50% of stay	Service providers may find it useful to identify the type of ward where most care took place during the audit period.	Team, medical or nursing records.	Mark one box only	
<b>1.10</b> Date admitted to stroke unit	To calculate the delay from stroke to admission to a stroke unit and length of stay on a stroke unit		Enter in date format dd/mm/yyyy	
<b>1.11</b> Date of discharge from a stroke unit 1.11* During their stay under whose care was patient	To calculate the length of stay on a stroke unit  This is a new question added for the Irish Stroke Audit. Mark one box only.	Team, medical, nursing or therapy records acute hospital and stroke unit	If patient has not yet been discharged at time of completing data entry, leave blank. If patient transfers between different types of stroke unit – use discharge date from final unit.	

# NATIONAL SENTINEL AUDIT OF STROKE 2006

## Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
<b>SCAN</b>				
<b>1.12 Patient</b> have brain scan after stroke?	All patients should be scanned following stroke unless valid reason for not doing so (see 1.12iii)	Team, medical, nursing or therapy records acute hospital. X ray department records		
<b>1.12i and ii Date</b> and time of first brain scan after stroke	Delay to scan can be more accurately calculated with full date and time.	Team, medical, nursing or therapy records acute hospital. X ray department records	Enter in date format dd/mm/yyyy. NB this refers to the first brain scan after the stroke Time is to the nearest hour on the 24-hour clock.	
<b>1.12iii Brain</b> scan been carried out within 24 hours of stroke	This question is being asked in this format for comparison with previous rounds.	Team, medical, nursing or therapy records acute hospital. X ray department records		
<b>1.12iv</b> Type of stroke	The type of lesion may affect case fatality, speed of recovery and ultimate outcome and treatment	Team or medical records. It may be necessary to consult with the lead clinician.	NB Exclusions of subarachnoid haemorrhage and subdural and extradural haematoma, and cases that may have been incorrectly coded.	
<b>1.12v</b> Reason patient did not have scan	This is to identify compliance with standard for scanning.	Team or medical records. It may be necessary to consult with the lead clinician.		
<b>SECTION 2 CASEMIX</b>				
<b>2.1</b> History of Co-morbidities	Co-morbidities affect outcome from stroke and may be relevant to the drug history and choice of	Team, medical notes relating to	If there are no relevant co-morbidities select option "none of the following"	

# NATIONAL SENTINEL AUDIT OF STROKE 2006

## Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
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2.1* Newly detected co-morbidities since admission			<p>secondary prevention. Historical measurements of hypertension or hyperlipidaemia may not be available; a record that a diagnosis has been made is sufficient for these items.</p> <p>This is a new question added for the Irish Stroke Audit. Please note any newly detected comorbidities.</p>	<p>current episode or previous admissions and outpatients</p>
2.1ii*			<p>This is a new question added for the Irish Stroke Audit. Living accommodation pre stroke may influence discharge destination. Change in this at discharge may indicate increased level of dependency. (Sentinel Clinical Proforma 2004)</p>	<p>Team, nursing, medical, therapy or social work records.</p>
2.1iii*			<p>This is a new question added for the Irish Stroke Audit. An indication of the level of dependency at discharge: and/or local care provision. (Sentinel Clinical Proforma 2004)</p>	<p>Team, nursing, medical, therapy or social work records.</p>

## NATIONAL SENTINEL AUDIT OF STROKE 2006

### Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
<b>2.2</b> Newly institutionalised at discharge	To estimate institutionalisation rate	Medical notes.	Patients discharged to nursing or residential home for the first time after this admission.	
<b>2.3</b> Medication preadmission	Important in primary prevention of stroke	Medical notes.	Only select the “yes” option if the patient is on any of the medication specified or on another “other” within the groups listed. Otherwise tick the “no” option. Refer to the drug classification list provided with the audit. Consult with pharmacist.	
<b>2.3i</b> If yes which drugs prescribed*				
<b>2.4</b> Independent pre-stroke	This enables case-mix adjustment to be made.			
<b>2.5</b> Functional level at discharge (Barthel)	A measure of disability after stroke and the outcome of rehabilitation.	Team, nursing, medical, or therapy records.	If the Barthel or similar measure is not used it may be interpreted from what is documented of the patient’s function at discharge. Leave blank if this is not possible (following consultation with the lead clinician for the audit). Leave blank if patient died. A total will not be calculated on electronic form where incomplete but aspects of this information can be used and so complete as fully as possible.	
<b>MAXIMUM SEVERITY WITHIN FIRST WEEK</b>				
<b>2.6</b> Worst level of consciousness	Q 2.6 relates to maximum severity of clinical status during the first	Team, medical or nursing records.	Mark one box only. Consult with clinical colleagues as to how this may be	

# NATIONAL SENTINEL AUDIT OF STROKE 2006

## Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
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	week after stroke		d
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**NATIONAL SENTINEL AUDIT OF STROKE 2006**  
**Clinical Audit Help Notes**

# NATIONAL SENTINEL AUDIT OF STROKE 2006

## Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
<b>SECTION 3 STANDARDS WITHIN 72 HOURS</b>				
<b>FIRST 24 HOURS</b>				
<b>3.1</b> Screening for swallowing in first 24 hours	<p>Patients are routinely screened with a standardised screening procedure to check for dysphagia</p> <p>The ability to swallow should be assessed within 24 hours of admission. Difficulties may be temporary but carry increased risk of complications.</p>	Team, medical or nursing records	Refers to a <b>formal swallow screen</b> (performed by <b>any member</b> of the team). Presence or absence of the gag reflex is not sufficient as it is proven to be of little prognostic value for the ability to swallow	
<b>3.2i and ii</b> Patient alert and able to communicate	If the patient is alert and able to communicate, there is a formal assessment of visual fields. Recognition of field defects helps with localisation of the pathology and has therapeutic importance. Previous rounds of the audit have identified particularly low compliance with this element of the standard. Sensory deficits are often missed unless specifically looked for. It is a common reason for delayed recovery	Team, medical or nursing records	<p>They may be documented as two crossed circles drawn, or mention of hemianopia or quadrantanopia</p> <p>NB If the patient was unconscious in the first 24 hours the “No but.” Instructions should be followed.</p> <p>Ability to feel pain or the touch of cotton wool; may be the outline of a body drawn with stimuli recorded on it; or joint position sense (proprioception).</p>	
3.2iii Did the patient receive thrombolysis?	This is a new question added for the Irish Stroke Audit. (Sentinel Clinical Proforma 2004). This question is being asked to establish a baseline for the future.	Team, medical or nursing records	rtPA treatment to stroke patients within 3 hours of symptom onset.	
<b>FIRST 48 HOURS</b>				
<b>3.3</b> Commenced aspirin by 48 hours after stroke	Early commencement on aspirin has been proven effective in reducing mortality and disability after ischaemic stroke.	Consult medical records, drug chart.	NB Refers to first dose received by the patient within 48hrs, does not refer to the date prescribed.	
<b>FIRST 72 HOURS</b>				
<b>3.4 Swallowing</b>	If dysphagia is identified, patients are formally	Team, medical,	This standard applies to patients identified	

## NATIONAL SENTINEL AUDIT OF STROKE 2006

### Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
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assessed within 72 hours of admission	assessed by a Speech and Language therapist ( <i>time frame</i> within 72 hrs of admission or of stroke if stroke occurred in hospital).	nursing, or speech and language therapy records.	by di sv ca ca
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## NATIONAL SENTINEL AUDIT OF STROKE 2006

### Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
<b>3.5</b> Patients are assessed by a physiotherapist ( <i>time frame</i> within 72 hours of admission or of stroke if stroke occurred in hospital)	Early assessment by a physiotherapist so that: a) Physiotherapy can start as soon as the patient is able to participate b) Physiotherapy advice can be given where necessary regarding positioning, moving and handling	Team, physiotherapy, medical or nursing records.	The assessment may not be a full one at this early stage, but sufficient to identify the main problems and give advice to nursing staff accordingly.	
<b>3.6</b> Patients receiving nutrition by 72 hours of admission.	If it is stated that the patient was nil by mouth, was an alternative method of nutrition being used? FOOD trial	Team, medical or nursing records.		
<b>3.6i</b> If receiving nutrition by 72 hours of admission, which method used		Team, medical or nursing records.		
<b>SECTION 4 STANDARDS WITHIN SEVEN DAYS</b>				
<b>4.1</b> Patients with speech and language deficits are assessed by a Speech and Language therapist ( <i>time frame</i> within 7 days of admission or of stroke if stroke occurred in hospital)	Communication problems are amongst the most distressing for patients and carers.	Team, speech and language therapy, medical or nursing records.	Note - this standard applies only to patients who have been identified as having communication problems. The assessment may not be a full one at this stage.	
<b>4.2<sup>^</sup></b> Was the patient assessed by an Occupational Therapist ( <i>time frame</i> within 7 days of admission or of stroke if stroke occurred in hospital)	To promote early therapy and preparation for discharge.	Team, nursing, medical or OT notes.	The assessment may not be a full one at this stage, but sufficient to identify the main problems and give advice to nursing staff accordingly.	

# NATIONAL SENTINEL AUDIT OF STROKE 2006

## Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
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were they assessed by OT within 7 days				
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## NATIONAL SENTINEL AUDIT OF STROKE 2006

### Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
<b>4.3</b> Use of indwelling catheter within first week after admission				
<b>4.4</b> If incontinence exists there is evidence of a management plan to promote continence and/or manage the effects of incontinence.	Incontinence may be remediable by a programme of bladder training, or require specialist advice on management	Team, nursing care plan and records, or medical records.	Reference to regular toileting, referral and/or advice from continence advisor or other specialist recorded. Some drugs may be used e.g. oxybutynin, tolterodine.	
<b>SECTION 5 BY DISCHARGE</b>				
<b>5.1</b> Is there evidence that the patient was weighed at least once during admission.	This is a key indicator of nutritional assessment.	Team, medical, or nursing records	May be on TPR (Temperature, Pulse and Respiration) chart. Auditors should consult with clinicians, particularly nursing staff, as to how this is documented locally.	
<b>5.2</b> The initial Social Work involvement occurs within 7 days of referral.	Delays in referral for Community Care assessments can delay discharge and prolong length of stay.	Team, medical, nursing or Occupational Therapy records	Auditors need to work with the Social Work department to identify where this is most likely to be documented locally.	
<b>5.3</b> There is evidence that the patient's mood is assessed.	Depression, anxiety and emotionalism are common after stroke with potential effects on the patient's rehabilitation	Team, medical, nursing and therapy notes.	Notes may mention changes in mood; appearance of depression or tearfulness; or more formal methods of assessment.	
<b>5.4</b> There is evidence that the patient's cognitive status has been assessed		Team, medical, nursing or therapy notes	Notes may refer to assessment by a psychologist or record of Mental Test Score (MTS or AMTS)	

# NATIONAL SENTINEL AUDIT OF STROKE 2006

## Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
<b>CARE PLANNING</b>				
<b>5.5</b> There is written evidence of rehabilitation goals agreed by the multidisciplinary team.	Team goals (both short and longer term) promote forward planning and provide the framework for co-ordinated multidisciplinary care. If realistic, they can also help to motivate the patient	Team, medical, nursing or therapy notes.	This refers to the team goals for each patient i.e. not those of individual disciplines. Auditors should identify with their clinicians how these would be documented within their Hospital. Where it is documented that the team plan is palliative care answer "No but..."	
<b>SECTION 6 RISK FACTOS AND SECONDARY PREVENTION</b>				
<b>6.1</b> Underlying causes of Stroke Identified <b>6.1i</b> If yes which?	This provides the context for secondary prevention	Team, medical, dietetic or nursing records		
<b>6.2</b> Other risk factors are discussed with the patient and/or carer.  6.2i ii iii* Hyperlipidaemia is investigated and treated. (Sentinel Clinical Proforma 2004)	Life-style changes such as smoking cessation, reduction in alcohol intake, low salt diet and regular exercise improve cardiovascular health so may reduce the risk of further stroke. Treatments can have a significant impact on patients with addictive behaviour  Therapy with a statin should be considered for all patients with a past history of ischaemic heart disease and a total cholesterol > 3.5 mmol/l following stroke (Heart Protection Study). All patients should be given appropriate advice on lifestyle factors including diet, achieving satisfactory weight, and reducing the use of added salt. (Sentinel Clinical Proforma 2004)	Team, medical, dietetic or nursing records  Case records including nursing, and dietician's records: pathology results, drug chart, discharge summary, prescription for pharmacy	Advice may include: stopping smoking and discussion of nicotine substitutes; changes in diet and/or exercise, or reduction in alcohol intake if this was above the recommended norm before the stroke; referrals to psychiatrist, clinical psychologist, or social worker for addictions.  Refer to drugs list with help notes. Liaise with local lead physician.	
6.2 iv* Blood pressure	Hypertension after the acute phase should be treated. (Sentinel Clinical Proforma 2004)	Consult blood pressure charts,	This question applies to people diagnosed with persisting high blood pressure after	

# NATIONAL SENTINEL AUDIT OF STROKE 2006

## Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
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		<p>diagnosed as above normal after the acute phase (systolic &gt;140, diastolic &gt; 85) on 3 or more occasions</p>		<p>documentation could be in team medical, nursing records, medication charts or discharge summary.</p>
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## NATIONAL SENTINEL AUDIT OF STROKE 2006

### Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
<b>6.3</b> Treatments at discharge If yes drugs prescribed*	This provides information on compliance with standards for secondary prevention medication	Team, medical, nursing or therapy records	Information in discharge summary, drug sheets on discharge.	
<b>SECTION 7 COMMUNICATION &amp; RESEARCH</b>				
Discussion with patient about: <b>7.1i</b> Diagnosis <b>7.1ii</b> Prognosis is documented	Note: Where there are significant perceptual or speech and language difficulties clinical staff should involve some one to assist with explanations and discussion. E.g. speech therapist, language interpreter or health advocate. Studies of patient/carer opinion show that one of the greatest sources of dissatisfaction is with the amount of information given	Records of any of the professions involved.	There may be locally agreed methods of documenting information given or discussion with patients/family.	
<b>7.2</b> The carer's needs for support are assessed separately.	The carer's needs for support will be complex because they may have to make considerable adjustments to a previous lifestyle (with employment, financial, social and psychological consequences)	Team, or nursing records.	Auditors should consult with clinicians locally how this is most likely to be documented.	
<b>7.3</b> There is evidence that the carer is taught the skills required to care for the patient at home before discharge.	In line with the legal requirements in the Lifting and Handling regulations that moving and handling, help with transfers etc are taught to carers who will be required to assist patients at home	Team, therapy, nursing or medical records.	As above or in discharge planning records. Auditors should consult with clinicians for local methods of documentation.	
<b>7.4</b> A home visit is performed before discharge	To assess the home for living at the patient's level of disability and identify the aids required.	Team, medical, nursing or therapy notes	"Home visit" or description of the home circumstances following a visit is documented. Note the "No but ..." for exclusions.	
<b>7.4i</b> Was the home visit performed by professional with or	This provides further information about the format of the home visit.	Team, medical, nursing or therapy notes		

# NATIONAL SENTINEL AUDIT OF STROKE 2006

## Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
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without patient?				
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## NATIONAL SENTINEL AUDIT OF STROKE 2006

### Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
<b>7.5</b> Is the patient in a research study?	Clinical Research Studies comprise randomised controlled trials and other good quality clinical studies (including observational/epidemiological studies) requiring patient consent (or relative consent)	Team, or nursing records	Ask Patient or relative if they gave consent and consult with Research & Development Department.	
<b>8.1*</b> <b>By the day of discharge the patient's general practitioner (GP) is informed of the patient's discharge OR informed of the patient's death within one day</b>	Patients who have had a stroke may have long-term disabilities requiring the support of their doctor. The GP needs notice of this so appropriate support can be given. Similarly if the patient dies, the GP needs to appropriately support the family. (Sentinel Clinical Proforma 2004)	Team medical or discharge records	Mention of GP being informed by telephone, a copy of a fax, secure e-mail or letter dated by day of discharge. Include date of letter in the space provided.	
<b>8.2*</b> <b>The discharge summary includes information on the level of functional ability at discharge</b>	To enable the GP to give appropriate care and support taking into account the patient's need. (Sentinel Clinical Proforma 2004).	Discharge summary	Note instructions with the audit question	
<b>8.3*</b> <b>Carotid ultrasound should be performed on all patients who would be considered for carotid endarterectomy.</b>	Any patient with a carotid artery territory stroke and minor or absent residual disability should be considered for carotid endarterectomy. (Sentinel Clinical Proforma 2004).	Hospital records, vascular lab department records, discharge summary.		
<b>8.3i*</b>		Team, medical,	Include date of letter in the space provided.	

# NATIONAL SENTINEL AUDIT OF STROKE 2006

## Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
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<b>Discharge documentation to public health nurse or other allied health professionals</b>		nursing or therapy notes	
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## NATIONAL SENTINEL AUDIT OF STROKE 2006

### Clinical Audit Help Notes

Item	Rationale	Where most likely to be documented	Audit help notes	Local notes
<b>8.4*</b> <b>Onward referral for rehabilitation</b>	New question added for Irish Audit. What are the plans for this patient's onward referral for rehabilitation / other after discharge.	Team, medical, nursing or therapy notes	Off site rehab, on site rehab, community based, hospital out patient based, other facilities are included.	

## CARDIOVASCULAR SECONDARY PREVENTION DRUGS

<b>Beta Blockers</b>			
<b>GENERIC NAME</b>	<b>TRADE NAMES</b>	<b>MODIFIED RELEASE FORMULATIONS</b>	<b>COMBINATIONS</b>
Propranolol hydrochloride	Propranolol, Inderal	Half Inderal LA, Inderal LA	
Acebutolol	Sectral		
Atenolol	Atenolol, Tenormin		<u>With diuretic:</u> Co-tenidone, Kalten, Tenoret 50, Tenoretic <u>With Calcium Channel Blocker:</u> Beta-Adalat, Tenif
Bisoprolol fumarate	Bisoprolol fumarate, Cardicor, Emcor		
Carvedilol	Carvedilol, Eucardic		
Celiprolol Hydrochloride	Celiprolol, Celectol		
Esmolol hydrochloride	Brevibloc		
Labetalol Hydrochloride	Labetalol Hydrochloride, Trandate		
Metoprolol Tartrate	Metoprolol tartrate, Betaloc, Lopresor	Betaloc SA, Lopresor SR	With diuretic: Co-Betaloc
Nadolol	Corgard		
Nebivolol	Nebilet		
Oxprenolol Hydrochloride	Oxprenolol, Trasicor	Slow-Trasicor	With diuretic: Trasidrex
Pindolol	Pindolol, Visken		With diuretic: Viskaldix
Sotalol hydrochloride	Sotalol, Beta-cardone, Sotacor		
Timolol maleate	Betim		With diuretic: Moducren, Prestim

<b>Calcium Channel Blockers</b>			
<b>GENERIC NAME</b>	<b>TRADE NAMES</b>	<b>MODIFIED RELEASE FORMULATIONS</b>	
Amlodipine	Amlodipine, Istin		
Diltiazem hydrochloride	Diltiazem, Tildiem	Adizem SR, Adizem XL, Angitil SR, Angitil XL, Calcicard CR, Dilcardia SR, Dilzem SR, Dilzem XL, Slozem, Tildiem LA, Tildiem Retard, Viazem XL, Zemtard	
Felodipine	Felodipine, Plendil		
Isradipine	Prescal		
Lacidipine	Motens		
Lercanidipine hydrochloride	Zanidip		
Nicardipine hydrochloride	Nicardipine Cardene	Cardene SR	
Nifedipine	Nifedipine, Adalat	Adalat LA, Adalat Retard, Adipine MR, Adipine XL, Cardilate MR, Coracten SR, Coracten XL, Fortipine LA 40, Hypolac Retard 20, Nifedipress MR, Nifopress Retard, Slofedipine, Slofedipine XL, Tensipine MR	
Nimodipine	Nimotop		
Nisoldipine	Syscor MR		
Verapamil hydrochloride	Verapamil, Cordilox, Securon	Half Securon SR, Securon SR Univer, Verapress MR Vertab SR 240	

<b>Angiotensin-converting enzyme inhibitors (ACE Inhibitors)</b>			
<b>GENERIC NAME</b>	<b>TRADE NAMES</b>	<b>COMBINATIONS</b>	
Captopril	Captopril, Capoten	With diuretic: Co-zidocapt, Capozide	
Cilazapril	Vascace		
Enalapril Maleate	Enalapril Maleate, Innovace	With diuretic: Innozide	
Fosinopril Sodium	Fosinopril Sodium, Staril		
Imidapril Hydrochloride	Tanatril		
Lisinopril	Lisinopril, Carace, Zestril	With diuretic: Carace Plus, Caralpha, Lisicostad, Zestoretic	
Moexipril Hydrochloride	Perdix		
Perindopril Erbumine	Coversyl	With diuretic: Coversyl Plus	
Quinapril	Quinapril, Accupro	With diuretic: Accuretic	
Ramipril	Ramipril, Tritace	With calcium channel blocker: Triapin	
Trandolapril	Gopten	With Calcium Channel blocker: Tarka	

## *Angiotensin II receptor antagonists*

<i>GENERIC NAME</i>	<i>TRADE NAMES</i>	<i>COMBINATIONS</i>
Candesartan Cilexetil	Amias	
Eprosartan	Teveten	
Irbesartan	Aprovel	With diuretic: CoAprovel
Losartan Potassium	Cozaar	With diuretic: Cozaar-Comp
Olmesartan Medoxomil	Olmetac	
Telmisartan	Micardis	With diuretic: Micardis Plus
Valsartan	Diovan	With diuretic: Co-Diovan

## *Thiazide Diuretics*

<i>GENERIC NAME</i>	<i>TRADE NAMES</i>	<i>MODIFIED RELEASE</i>
Bendroflumethazide/ Bendrofluazide	Bendroflumethazide/ Bendrofluazide	
Chlortalidone	Hygroton	
Cyclopenthiazide	Navidrex	
Indapamide	Indapamide, Natrilix	Natrilix SR
Metolazone	Metenix 5	
Xipamide	Diurexan	

## *Alpha blockers*

<i>GENERIC NAME</i>	<i>TRADE NAMES</i>	<i>MODIFIED RELEASE</i>
Doxazosin	Doxazosin, Cardura	Cardura XL
Indoramin	Baratol	
Prazosin	Prazocin, Hypovase	
Terazosin	Terazosin, Hytrin	

## Antithrombotics

<b>Oral anticoagulants</b>			
<i>GENERIC NAME</i>	<b>TRADE NAMES</b>		
Warfarin sodium	Warfarin		
Acenocoumarol	Sinthrome		
Phenindione	Phenindione		
<b>Antiplatelets</b>			
<i>GENERIC NAME</i>	<b>TRADE NAMES</b>		<i>MODIFIED RELEASE</i>
			<i>COMBINATIONS</i>
Abciximab	Reopro		
Aspirin	Aspirin, Angettes 75, Caprin, Nu-seals Asprin		
Clopidogrel	Plavix		
Dipyridamole	Dipyridamole, Persantin		Persantin Retard
Eptifibatide	Integrilin		With aspirin: Asasantin Retard
Tirofiban	Aggrastat		

## *Lipid Regulating*

<i>GENERIC NAME</i>	<b>TRADE NAMES</b>		<i>MODIFIED RELEASE</i>
<b>Anion-exchange resins</b>			
Colestyramine (Cholestyramine)	Colestyramine, Questran, Questran Light		
Colestipol hydrochloride	Colestid		
<b>Fibrates</b>			
Bezafibrate	Bezafibrate, Bezalip		Bezalip Mono
Ciprofibrate	Modalim		
Fenofibrate	Fenofibrate, Lipantil, Supralip 160		
Gemfibrozil	Gemfibrozil, Lopid		
<b>Statins</b>			
Atorvastatin	Lipitor		
Fluvastatin	Lescol		Lescol XL
Pravastatin Sodium	Lipostat, Pravastatin		
Rosuvastatin	Crestor		
Simvastatin	Zocol, Simvastatin		With ezetimibe: Inegy
<b>Ezetimibe</b>			
Ezetimibe	Ezetrol		
<b>Nicotinic acid group</b>			
Acipimox	Olbetam		
Nicotinic acid	Nicotinic acid		Niaspan
<b><u>Omega-3 fatty acid compounds</u></b>			
Omega-3-acid ethyl esters	Omacor		
Omega-3-marine triglycerides	Maxepa		

Appendix 6 - Table 2.3 Kappas for other Clinical Audit Proforma Questions

Question	Kappa INASC N=163	NC	% INASC Agreement	Sentinel 2006 Kappa N=624
Gender (M/F)	1			0.99
1.3 Did the patient die whilst still an inpatient?	1			0.99
1.3i At the time of audit is the patient still in hospital for initial episode or been discharged?		NC	0.99	0.97
1.6 Patient alive at 30 days after stroke?	0.94			0.90
1.7 Patient treated in a Stroke Unit during their stay?	0.7			0.95
1.8 Admitted to a Stroke Unit within 4 hours of arrival hospital?	1			0.87
1.9 Where did the patient spend over 50% of their stay? (General / geriatric ward / Stroke unit/ Rehab unit/ Other)	0.99			NC
1.11i During their stay patient under the direct care of a Consultant Geriatrician	0.89			NA^
Consultant Neurologist	0.69			NA^
Consultant Rehabilitation Medicine	0.92			NA^
General Physician	0.88			NA^
Other	0.71			NA^
1.12i Did the patient have a brain scan after the stroke?	1			0.93
1.12iii Brain scan within 24 hours after the stroke?	0.97			0.73
1.12iv Type of stroke (Infarct / Haemorrhage / Haemorrhagic infarct / unknown)	1			0.87
1.12v Reason patient did not have scan: (refused/unable to co-operate palliative care / scan not routinely available)	1			NA
2.1 Co-morbidities prior to admission				
Atrial Fibrillation	1			0.86
Previous stroke / TIA		NC	0.97	0.85
Impaired glucose tolerance / fasting glucose	1			NA
Diabetes mellitus		NC	0.95	0.95
Hyperlipidaemia	1			0.62
Hypertension		NC	0.99	0.77
Myocardial infarction / angina	1			0.76
Valvular heart disease	1			0.55
Other serious illness		NC	0.97	NA
None apply	1			0.77
2.1i Newly detected comorbidities since admission				
Atrial Fibrillation	1			NA^
Previous stroke or TIA	1			NA^
Diabetes mellitus	1			NA^
Hyperlipidaemia	1			NA^
Hypertension		NC	0.95	NA^
Myocardial infarction / angina	1			NA^
Valvular heart disease	1			NA^
Other serious illness		NC	0.92	NA^
None apply		NC	0.99	NA^
2.1ii* Living accommodation pre stroke: (Home/live alone / live with family/ nursing home/hospital/other)	0.74			0.98*

2.1iii* Living accommodation at discharge: (Home/live alone / live with family/ nursing home/hospital/other)	1			0.93*
2.2 Newly institutionalised at discharge?	0.69			0.80
2.3 Medication before admission? (yes/no)		NC	0.98	0.91
2.3i ACE inhibitor or Angiotensin-II receptor antagonists		NC	0.98	0.88
Alpha Blocker		NC	0.89	0.88
Beta Blocker	1			0.88
Calcium Channel blocker		NC	0.96	0.88
Thiazide diuretic	1			0.83
Other Antihypertensives	1			0.83
None	1			0.89
Aspirin	1			0.90
Clopidogrel	1			0.91
Dipyridamole	1			0.91
Warfarin/other anticoagulant	1			0.90
Aspirin/dipyridamole combination* (Asasantin Retard)	1			NA^
Other Antiplatelet/thrombotic	1			0.90
None	1			0.89
Statin		NC	0.98	0.90
Other Lipid lowering treatment	1			0.90
None	1			0.90
2.4 Patient independent in everyday activities before stroke?	0.89			0.72
2.5 Barthel Index			92%	NC
2.6 Worst level of consciousness first week after stroke?	0.89			0.70
3.1 Screening for swallowing disorders first 24 hours?	0.79			0.70
3.2i Formal assessment of visual fields?	0.19			0.69
3.2ii Formal assessment of sensory testing?	0.69			NC
3.2iii* Did the patient receive thrombolysis?	0.23			0.5*
3.3 Commenced aspirin by 48 hours after stroke?	0.82			0.72
3.4 Swallowing assessed by SLT within 72 hours of admission?	0.88			0.68
3.5 Assessed by physiotherapist within 72 hours admission?	0.89			0.76
3.6 Patient receiving nutrition by 72 hours admission?	0.93			0.72
4.1 Assessment of communication by SLT within 7 days of admission?	0.85			0.67
4.2^ Assessed by occupational therapist within 7 days of admission?	0.76			0.71
4.3 Had <i>indwelling</i> urinary catheter first week (yes/no)	0.84			0.83
Due to: Urinary retention (yes/no)		NC	0.75	0.79
Urinary incontinence (yes/no)		NC	0.89	0.74
Critical skin care (yes/no)		NC	0.50	0.79
Reason not documented (yes/no)	1			0.74
4.4 Plan to promote urinary continence?	0.65			0.65
5.1 Patient weighed at least once during admission?	0.83			0.77
5.2 Social work assessment within 7 days of referral?	0.68			NC
5.3 Evidence patient's mood has been assessed?	0.74			0.74
5.4 Evidence patient's cognitive status assessed?	0.89			0.67
5.5 Written evidence of rehabilitation goals agreed by MDT?	0.82			0.71
6.1 Probable underlying cause(s) for stroke identified?	0.83			0.56

6.1i If Carotid stenosis	1			0.59
Current smoker		NC	0.928571	0.65
Alcohol abuse	1			0.64
Atrial Fibrillation	1			0.68
Myocardial Infarction within the past month	1			0.57
Hypertension		NC	0.98	0.59
Diabetes mellitus		NC	0.92	NA^
Other		NC	0.94	NA
6.2 Risk factors discussed with patient/carer?				
Smoking cessation		NC	0.76	0.68
Alcohol reduction	0.58			0.67
Exercise	0.59			0.65
Diet	0.79			0.67
6.2* i Documented measure of blood cholesterol?	0.83			0.80*
6.2* ii Blood cholesterol either >5 total or LDL >3.0 mmol/L?	0.98			0.87*
6.2* iii Patient received dietary advice to reduce fat intake?	0.83			0.71*
6.2iv* BP recorded above normal on 3 or more occasions?	0.84			0.68*
6.2vii If YES classes of drugs prescribed: ACE inhibitor		NC	0.97	0.93*
Angiotensin-II receptor antagonists	1			0.62*
Alpha blocker	0.8			0.70*
Beta blocker	0.9			0.91*
Calcium channel blocker	1			0.95*
Thiazide diuretic	1			0.87*
Other	1			0.68*
6.3 Medications at discharge?	1			
ACE inhibitor or Angiotensin-II receptor antagonists				0.91
Alpha Blocker	1			0.78
Beta Blocker	1			0.88
Calcium Channel blocker	1			0.81
Thiazide diuretic	1			0.83
Other Antihypertensives	1			0.57
Asprin		NC	0.99	0.90
Clopidogrel	1			0.94
Dipyridamole	1			0.88
Warfarin/other anticoagulant	1			0.90
Aspirin+Dipyridamole (Asasantin Retard)	1			NA^
Other Antiplatelet/thrombotic	1			0.66
Statin	1			0.87
Reasons for not prescribing Antihypertensives: (Not indicated/ under review/contraindications)	1			0.89
Reasons for not prescribing Antiplatelet/thrombotic: (Not indicated/ under review/contraindications)	1			0.89
Reasons for not prescribing Lipid lowering treatment: (Not indicated/ under review/contraindications/ Patient life expectancy < 2 years)	1			0.87
7.1i Discussion with the patient about diagnosis?	0.73			0.65
7.1ii Discussion with the patient about prognosis?	0.70			0.62
7.2 Carer's needs for support assessed separately?	0.89			0.55
7.3 Skills taught to care but for patient at home?	0.69			0.59

7.4 Home visit performed?	0.73			0.83
7.5 Patient in a research study?	1			NC
8.1* GP informed of patient's discharge/death by day of discharge/death?	0.95			0.63*
8.2* Discharge summary to GP includes functional ability at discharge?		NC	0.93	0.80*
8.3* Carotid imaging performed within 3 months to check for carotid stenosis		NC	1	0.80*
8.3i* Is there documented evidence that by the day of discharge the PHN was informed of the patient's discharge?		NC	0.96	NA^
Is there documented evidence that by the day of discharge the AHP was informed of the patient's discharge?		NC	1	NA^
8.4* Plans onward referral for rehabilitation after discharge?				NA^
Public Health Nurse	0.90			
Physiotherapist	0.87			NA^
Occupational Therapist		NC	0.846154	NA^
Speech and Language Therapist	0.86			NA^
Clinical Nutrition	0.74			NA^
Psychologist	0.49			NA^
Liaison Psychiatry	0.49			NA^
Community Rehabilitation Team	0.82			NA^
Hospital Based Therapist Out Patients	0.94			NA^
Day Hospital	0.85			NA^
In-patient Rehabilitation Unit	0.90			NA^
Off-site Rehabilitation Unit		NC	0.9	NA^
Baggot Street	0.66			NA^
National Rehabilitation Hospital	0.74			NA^
Voluntary Stroke Scheme	0.49			NA^
Other	0.92			NA^

NC – Not calculable because of blank cells

NA – Not available Sentinel 2006

NA^ - Not available in Sentinel 2004 or 2006 question added for INASC 2006

BP – Blood pressure

SLT – Speech and language therapist

\* - Kappa value from Sentinel 2004 as this question was not included in the Sentinel 2006 processes of care proforma

## **Appendix 7 - Irish Heart Foundation National Stroke Review Group Members**

The National Stroke Review Group members:

1.	Independent Chairperson	Dr John Bowman
2.	Health Services Executive (HSE)	Dr Siobhan Jennings
3.	Department of Health and Children	Vacant
4.	Faculty of Radiologists RCSI	Dr Paul Brennan
5.	Institute of Community Health Nurses	Ms Breda Cleary
6.	Irish Heart Foundation	Dr Brian Maurer
7.	Clinical Epidemiology/IHF Board	Dr Mary Codd
8.	Volunteer Stroke Scheme	Ms Anne Copeland
9.	Neurological Alliance of Ireland	Ms Audrey Craven
10.	Irish Association of Speech & Language Therapists	Ms Aisling Creed
11.	Royal College of Physicians Ireland	Dr Morgan Crowe
12.	Irish Association of Rehabilitation Medicine	Dr Mark Delargy
13.	An Bord Altranais	Ms Mary Durkin
14.	Irish Society of Chartered Physiotherapists	Ms Mary O'Mahoney
15.	Irish Consultant Neurologists Association	Professor Peter Kelly
16.	Psychological Society of Ireland	Ms Sheila Kennedy
17.	Faculty of Public Health	Dr Bob McDonnell
18.	Irish Society for Physicians in Geriatric Medicine	Dr Rhiona Mulcahy
19.	Irish Nutrition and Dietetic Institute	Ms Patricia Munnally
20.	Association of Occupational Therapists	Ms Tracy Swanton
21.	Royal College of Surgeons in Ireland	Mr AE Wood

### Other members

The ICGP has agreed to assist us with research involving its members, but has been unable to provide a representative to sit on the National Stroke Review Group.

Dr Denis O'Mahony, Cork University Hospital is also a member of the review group.