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Irish Association for Emergency Medicine submission to the National Stroke Strategy

1 Introduction

Stroke is an important human disease. It is the third leading cause of death and disability worldwide. In 2007, stroke will kill 59 million people.[1] Every year in the Republic of Ireland, 10000 people suffer a stroke. Of these, 2000 die and many who survive have significant ongoing disability including hemiparesis (48%), inability to walk (22%), need for help with activities of daily living (24-53%), depression (32%) and cognitive impairment (33%).[2]

In the United Kingdom, Stroke care costs the NHS about £2.8 billion a year in direct health care costs – significantly more than coronary heart disease (£1.9 billion) – and costs the wider community £1.8 billion in lost productivity and disability. In addition, the cost of home nursing and care provided by families is estimated at £2.4 billion per year.[3]

A recently published Irish Heart Foundation (IHF) survey highlights the huge shortfalls in current stroke care in Ireland.[4] In relation to the two major advances in stroke care of the last 15 years - stroke units and thrombolysis – only one of 37 surveyed Irish acute hospitals had a stroke unit and thrombolysis was not routinely available. A recent survey of IAEM members revealed that stroke thrombolysis was routinely considered in two hospitals and occasionally happened in a further six.

The IHF report highlighted significant deficits in the availability of emergency neuroimaging - 30% of surveyed hospitals did not have routine access to CT scanning within 48 hours of stroke and only 41% of hospitals had access to MRI within the same timeframe.

The IHF survey highlighted the lack of local policies for rapid transfer of stroke patients to an emergency setting, with only one of 37 hospitals having such an arrangement. At present, the Midland Ambulance Service is the only ambulance service that assigns the same dispatch priority to suspected stroke as to suspected myocardial infarction and it routinely uses the FAST screening test (an assessment tool for the rapid identification of possible stroke), including this as part of the notification to the Emergency Department. The Pre-hospital Emergency Care Council aims to add the FAST test to

ambulance patient report forms at the next update, likely to be before the end of 2007.

In light of the significant mortality, morbidity and economic burden associated with stroke, and the well documented deficiencies in Irish stroke care, the Irish Association for Emergency Medicine (IAEM) welcomes the advent of a National Stroke Strategy and welcomes the opportunity to be involved in the planning and delivery of the strategy.

2 Optimal Emergency Care

2.1 Emergency Medical Systems (EMS)

Early recognition of the clinical symptoms and signs of stroke is vital. The interval from symptom onset to seeking medical attention has been shown to be the major factor delaying early treatment for stroke, particularly thrombolysis.[2,5,6] Public information in relation to stroke symptoms is the first step in accessing timely care.

Hospital arrival is faster for patients who access care through the EMS than for those who are referred from primary care or who make their own way to hospital.[7,8] The National Institute of Neurological Disorders and Stroke (NINDS) has identified the need for education in stroke assessment for pre-hospital personnel. Appropriate education improves diagnostic accuracy and reduces pre-hospital times.[9] Validated screening tools have been developed e.g. Cincinnati Criteria, LA Criteria and the Frenchay Aphasia Screening Tool (FAST).

2.2 Emergency Department (ED)

Clinical history and examination

The initial evaluation of a patient with stroke is similar to that for other acute medical emergencies – the rapid identification and management of immediate life threats (ABC assessment). Beyond that, ED assessment is directed at the confirmation that the patient's symptoms and signs are the result of stroke and the exclusion of other conditions that may mimic stroke. Validated tools for the rapid identification of stroke in the ED are available.[10] International evidence suggests that emergency physician clinical diagnosis of stroke is generally accurate[11] and is enhanced by the use of a formal stroke score or scale such as the NIH stroke scale (NIHSS).[12]

Investigation

All patients suspected of having acute stroke should have the following emergency tests:[13]

- Serum glucose
- Complete Blood Count
- Serum electrolytes and renal function tests
- Coagulation studies (prothrombin time, international normalised ratio, activated partial thromboplastin time)
- Cardiac enzymes
- An electrocardiogram
- Neuroimaging

Selected patients should have:

- Pregnancy Test
- Liver function tests

- Blood Alcohol concentration
- Urine or Serum toxicology screening
- Arterial blood gas
- Chest radiograph
- Lumbar Puncture

Neuroimaging

There is debate about the preferred form of neuroimaging for stroke. No single modality is ideal but consensus opinion is that emergency, non-contrast CT scan is the recommended initial study.[14] Recent therapeutic advances in stroke care mandate that, where appropriate, thrombolytic treatment occurs with 3 hours of symptom onset. This narrow window for therapeutic intervention has significant consequences for Diagnostic Radiology services throughout the country.

Treatment

Much of the current focus in emergency stroke care is on thrombolysis. Access to this agent in a timely fashion is important, but should not direct attention from other aspects of general emergency medical treatment as follows:

General supportive care

- **Oxygenation**
  All patients should have adequate oxygenation. The target blood oxygen saturation should be more than 95%.[13] Advanced airway care, if required, should be undertaken by adequately trained personnel in a safe clinical environment.

- **Temperature control**
  Temperature regulation is important to patient outcome. Patients with pyrexia must be screened for a source of infection and treated appropriately. Consideration may be given to active patient cooling as a 1 degree centigrade reduction in body temperature is associated with an improvement in functional outcome. [16]

- **Cardiac monitoring**
  Continuous cardiac monitoring is essential as cardiac arrhythmias are common, especially atrial fibrillation. Malignant cardiac arrhythmias should be treated along ACLS guidelines.

- **Blood pressure management**
  Blood pressure management in acute stroke management remains controversial. In patients not eligible for thrombolytics, antihypertensive agents are not recommended unless diastolic blood pressure is higher than 120 mm Hg or systolic blood pressure is higher than 220 mm Hg. In patients eligible for thrombolysis, active treatment is recommended if diastolic blood pressure is

higher than 110 mm Hg or systolic blood pressure is higher than 185 mm Hg.[14]

- **Blood glucose control**
  Glucose control is mandatory in the stroke patient as variations from the normal serum level can be associated with unfavourable outcomes.[17] Hypoglycaemia commonly mimics stoke symptoms and resolution of symptoms can occur with the administration of dextrose.

- **Hydration**
  Patients should avoid oral intake until a swallow assessment is completed but adequate hydration must be maintained by intravenous fluids. Isotonic sodium chloride at 50ml/hour is the general regime of choice.

Thrombolysis

Acute ischaemic stroke treatment has been transformed since the approved introduction of recombinant tissue plasminogen activator (rt-PA) for selected patients.[15] Thrombolysis is not routinely available in any acute receiving hospital in Ireland compared to 18% of UK hospitals. International evidence suggests that up to 25% of patients with an acute ischaemic stroke present to hospital within 3 hours of onset of symptoms. On this basis, there is significant potential benefit to eligible patients if identified, evaluated and treated within this time frame.

Aspirin

Apart from thrombolysis, the administration of aspirin is the only other therapeutic agent shown to improve outcomes. Aspirin is associated with significantly fewer recurrent ischaemic strokes and no significant increase in haemorrhagic strokes at 14 days. Aspirin given within 48 hours of acute ischemic stroke reduces death and disability. [14]

3 IAEM recommendations

To ensure the provision of optimal emergency care to patients with stroke, the IAEM makes the following recommendations to the National Stroke Strategy:

3.1 Stroke is a medical emergency – Time is Brain

The optimal initial management of stroke demands a change from the long held view that little can be done early in stroke care other than admitting the patient to hospital. The recognition of the benefits of high quality supportive medical care and the acceptance of a role for thrombolysis in the early management of stroke in an important minority of patients mandate that stroke be viewed as a medical emergency. Stroke should be treated with the same sense of urgency as acute coronary syndromes or major trauma.

3.2 Emergency Medicine has a pivotal role in emergency stroke care

The IAEM endorses the Stroke Chain of Survival as espoused by the American Stroke Association and advocates its adoption by the National Stroke Strategy.[14]

Stroke Chain of Survival	
Detection	Recognition of stroke symptoms and signs
Dispatch	Call 911 and priority EMS dispatch
Delivery	Prompt transport and pre-hospital notification to hospital
Door	Immediate ED triage
Data	ED evaluation, prompt laboratory studies and CT imaging
Decision	Diagnosis and decision about appropriate therapy
Drug	Administration of appropriate drugs or other interventions

Emergency medicine has a prominent and recurring role along the chain of survival – from pre-hospital liaison to immediate triage, evaluation, investigation, diagnosis and treatment. The IAEM recommends that possible stroke patients be initially assessed in an appropriately resourced ED to facilitate the above.

3.3 Stroke thrombolysis should be developed in Ireland

Thrombolysis for stroke represents the single most important recent advance in emergency stroke care. Its benefits have been clearly demonstrated. However, 10 years after tPA was licensed for this indication in the US, thrombolysis remains the exception for eligible patients in Ireland. The IAEM recommends that the National Stroke Strategy addresses this shortfall.

The National Institute for Neurological Disorders (NINDS) has set down time goals for the management of acute stroke in the context of thrombolysis as follows:[18]

- Clinical assessment within 10 minutes of ED arrival
- CT scan performed within 25 minutes of ED arrival
- CT scan interpreted within 45 minutes of ED arrival
- Initiation of fibrinolytic therapy (if indicated) within one hour of ED arrival and three hours of onset
- Door-to-admission time of three hours

The IAEM has identified the following elements as critical to the success of a thrombolysis initiative in Ireland. Many of the elements were addressed in the context of thrombolysis for Acute Myocardial Infarction (AMI) and the lessons from that experience will be pertinent to stroke:

- **Early access to medical care**
  The time window for effective thrombolysis (three hours from stroke onset) is short. Public awareness programs emphasising symptom recognition and the need to seek early medical care are required. The American Stroke Association advises the public to call the emergency services if they experience the following:
    - Sudden numbness or weakness of face, arm or leg especially if unilateral.
    - Sudden confusion, difficulty in speaking or comprehending.
    - Sudden deterioration in vision in one or both eyes.
    - Sudden difficulty in walking, dizziness or loss or balance or co-ordination.
    - Sudden severe headache of unknown cause.

  The IAEM recommends that a similar education programme be planned and instituted in Ireland. This could be achieved through a campaign of media publicity and re-enforced by health care professionals. Patients with risk factors for stroke should be targeted in relation to continuing education and awareness.

- **Early access to hospital**
  EMS systems should respond to stroke as a time-critical medical emergency requiring ED notification prior to arrival. The IAEM supports enhanced education and the nationwide introduction of the FAST tool for pre-hospital personnel.

- **Early ED assessment and consideration for thrombolysis**
  Stroke should be treated with the same degree of urgency as cardiac-sounding chest pain. In many EDs, formal protocols exist for coronary reperfusion in AMI. A similar emphasis and similar pathways will need to be developed to enhance stroke recognition and facilitate timely investigation and treatment. The IAEM recommends that EDs develop and promote clinical guidelines for all staff involved in stroke patient assessment utilizing proven assessment tools e.g. the ROSIER recognition tool[10] and the NIHSS scale.[12]

  At the outset of thrombolysis for AMI, the treatment was often carried out in the coronary care unit. Published evidence from North America[19], Ireland[20], UK[21] and Australia[22] clearly demonstrated that where thrombolysis was led by Emergency Physicians in Emergency Departments, door-to-needle times were significantly shorter. Given the shorter time-frame for thrombolysis in stroke, the need for Emergency Medicine to be involved is even greater.

- **Early imaging**
  The provision of non-contrast CT within 25 minutes of ED arrival and its interpretation by appropriately trained radiologists within a further 20 minutes will pose major challenges to the implementation of a stroke thrombolysis program. While most major acute hospitals provide 24 hour emergency access to CT, capacity to meet the additional demand within the specified time frames will require significant additional investment in diagnostic radiology services – equipment and personnel. The potential for telemedicine links to specialist neuroradiology centres to address the requirement for expert reporting of scans should be explored. Any stroke thrombolysis initiative will require significant radiology involvement at the planning and delivery stages.

- **Early specialist input**
  In those Irish hospitals where stroke thrombolysis is routinely considered, the service generally involves Emergency Medicine in collaboration with a specialist medical service – Neurology or physicians with an interest in Stroke Medicine. Neurology services in Ireland are underdeveloped. Improving stroke care and implementing stroke thrombolysis will require the appointment of additional Consultant Neurologists.

- **Multi-disciplinary approach**
  Given the spectrum of stroke hospital care from ED to inpatient care to rehabilitation and the multiplicity of medical specialties and other disciplines involved, it is essential that a unified approach, under the stewardship of a nominated stroke lead clinician, be pursued in each hospital admitting patients with stroke. The IAEM supports the recommendation of the Intercollegiate Stroke Working Party[23] that thrombolysis should only be administered by personnel trained in its

use, in a centre equipped to investigate and monitor patients appropriately. This recommendation underlines the need for integration of emergency medicine, general medicine, neurology and neuroradiology services to optimise patient outcome.

- **Location of stroke services**
  All hospitals receiving acute stroke patients should have an appropriately resourced Emergency Department, with immediate access to Diagnostic Imaging, on a 24 hour basis, and support from Neurology or Acute Stroke Medicine teams. Acute Stroke units should be preferentially established at these sites. If a particular receiving unit is unable to achieve this, the EMS system should be resourced to bring patients who may benefit from thrombolysis directly to a unit that can provide this level of care. This is in line with recommendations from the American Stroke Association which advocates the preferential routing of patients with suspected stroke to the 'closest facility capable of treating acute stroke'. Such preferential routing has been shown to increase the proportion of patients treated with thrombolytic therapy.[14] However, this should not come at the expense of a significant increase in pre-hospital times.

In conclusion, the IAEM believes that the specialty of Emergency Medicine has a central role in acute stroke care and looks forward to working further with the National Stroke Strategy to progress the above recommendations and improve the emergency care of stroke in Ireland.

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