Acute Stroke Unit Improves Stroke Management-Four Years on from INASC

Abstract:
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The Irish Heart Foundation carried out the Irish National Audit of Stroke Care (INASC) in 2008. Management practices were significantly poorer than those in the UK Sentinel audits. Since then an acute stroke unit has been established in University Hospital Limerick. A stroke database was established. 12 key indicators of stroke management audited by INASC were identified. Results were compared to those in INASC. 89 stroke patients were admitted. 8 of the 12 key indicators scored significantly better than in INASC. 92.5% had a brain scan within 24hrs (INASC-40%, p<0.001). 100% of ischaemic strokes received anti-thrombotics (INASC-85%, p<0.001). 94% had rehab goals agreed by MDT (22% in INASC p=0.008). 55% were treated in stroke unit (2% in INASC, p=0.008). MDT input improved with regard to physiotherapy (87% vs 43% in INASC, p<0.02) and SALT (74% vs 26%, p<0.02). Stroke management has significantly improved from 2008, however some deficiencies remain.

Introduction
Stroke is the third leading cause of death in Ireland and is the leading cause of acquired motor disability1. The World Health Organization (WHO) estimates that there were 1.1 million strokes in the European Union (EU) in 2001 and estimates that this figure will increase to 1.5 million per year by 2025. Acute stroke units have been shown to improve mortality rates, increase functional independence and reduce rates of discharge to long term care facilities2. Length of hospital stay, including rehabilitation, are significantly reduced. The cost savings due to treatment in an acute stroke unit have been estimated at 1.313 bed days and 3 nursing home admissions per 100 stroke patients. Despite this, in 2008, there was only one fully functioning acute stroke unit in Ireland3. The Irish Heart Foundation (IFH) was tasked with carrying out the Irish National Audit of Stroke Care (INASC) in 2008. Comparisons were made on the standard of care delivered in the United Kingdom, which had been assessed via the Sentinel Audits4,5. The Irish Heart Foundation (IFH) set the standard of care for acute stroke units in Ireland6. The Irish Heart Foundation (IFH) carried out the Irish National Audit of Stroke Care (INASC) in 2008. Management practices were significantly poorer than those in the UK Sentinel audits. Since then an acute stroke unit has been established in University Hospital Limerick. A stroke database was established. 12 key indicators of stroke management audited by INASC were identified. Results were compared to those in INASC. 89 stroke patients were admitted. 8 of the 12 key indicators scored significantly better than in INASC. 92.5% had a brain scan within 24hrs (INASC-40%, p<0.001). 100% of ischaemic strokes received anti-thrombotics (INASC-85%, p<0.001). 94% had rehab goals agreed by MDT (22% in INASC p=0.008). 55% were treated in stroke unit (2% in INASC, p=0.008). MDT input improved with regard to physiotherapy (87% vs 43% in INASC, p<0.02) and SALT (74% vs 26%, p<0.02). Stroke management has significantly improved from 2008, however some deficiencies remain.

Methods
A dedicated database of patients admitted with stroke was established in UHL as part of the National Stroke Programme. Data was prospectively collected and analysed for all patients admitted with stroke between April and September 2012. This was carried out in the form of an audit, with results compared to those found in INASC. Items audited included time to commencement of aspirin, proportion of patients admitted to the stroke unit, length of stay in the acute stroke unit and total hospital length of stay, time to neuro-imaging, thrombolysis rate, proportion of patients seen by the multidisciplinary team (MDT) and discussed at a multidisciplinary meeting (MDM). Times are expressed in terms of hours and minutes (hh:mm). All of the data relating to length of time were non-parametric; therefore data were expressed in terms of median, minimum (min), maximum (max) and inter-quartile range (IQR). Data was analysed using IBM Statistical Product and Service Solutions (SPSS) Version 20.

Results
89 patients were admitted with stroke, of which 39 (43.8%) were female and 50 (56.2%) were male. The median age was 74 years (min=36, max=95, IQR=16). The various stroke/TIA subtypes are shown in Table 1.

Length of Stay
The median length of acute hospital stay was 9 days (min<1, max=76, IQR=11).

Neuro-imaging
99% of patients received neuro-imaging post stroke. The median time from stroke onset to imaging was 12.5 hours (min=0:09, max=143:36, IQR=22:09). Data was available for 47 patients only. In the case of the remaining patients, the time of onset was either unrecorded and therefore unknown or was not recorded in the medical notes. 67% of patients received a CT scan within 24 hours of symptom onset. The median time from arrival to hospital to imaging was 4:58 hours (min=1:05, max=134:06, IQR=19:03). 38% of patients received imaging within 3 hours of arrival to hospital and 90% received it within 24 hours.

Anti-platelets/Anti-coagulants
81.5% of patients with ischaemic stroke were commenced on aspirin within 48 hours. Of those not commenced on aspirin, 1.2% had a haemorrhagic transformation, 7.4% were deemed palliative, 1.2% had a TIA while on aspirin and were changed to clopidogrel and 3.7% were on warfarin with sub-therapeutic INR and were treated with re-warfarinisation. In the case of the remaining 5% of patients, there was no identifiable reason for the delay in commencing anticoagulation. Although, 100% of appropriate patients were on anti-thrombotic therapy by discharge. 8.2% of ischaemic strokes received thrombolysis.

Stroke Unit
55% of patients were treated in the acute stroke unit and 31% spent more than half their length of hospital stay in the stroke unit.

MDT Input
87% of patients were assessed by a physiotherapist while 74% had a formal swallow assessment carried out by a speech and language therapist. Only 3% were seen by an occupational therapist. However, since this study was carried out, a dedicated stroke OT has been employed by the hospital. 94% had their rehab goals discussed at a dedicated stroke multi-disciplinary meeting. A comparison between the results and those found in INASC can be found in Table 2.

Discussion
Our findings show that major improvements have been made in stroke management in UHL in the 4 year period from when INASC was carried out until 2012. Although most areas of stroke management have improved, there are still further improvements to be made. 55% of our patients were admitted to the acute stroke unit compared to 2% in INASC. The IHF
advises that patients spend more than half their hospital admission in a stroke unit. The number of patients achieving this has increased from 1% to 31%. Treatment in an acute stroke unit is an essential element of stroke care with patients experiencing significantly better functional outcomes and higher rates of discharge home. The better outcomes likely reflect care coordinated by stroke specialist nurses, access to specially trained staff and early commencement of rehabilitation. The unit had four dedicated stroke beds compared to none in 2008. However, despite these 4 beds, there are still 44% of patients who do not get admitted to the stroke unit at any stage. This figure does incorporate some patients with a Transient Ischaemic Attack (TIA) who may be rapidly discharged prior to admission to the stroke unit, and some patients with severe stroke who died soon after hospital presentation, even allowing for this, a significant amount of patients are not currently receiving the standard of stroke care currently expected. This may reflect insufficient capacity in the 4 beds currently available. A new 6 bedded stroke unit is currently under construction in UHL and is due for opening in 2015.

The IHF recommends that CT scanning be carried out within 24 hours of symptom onset. This was achieved in 67% of patients with a median time of 12:30 hours compared to a mean of 2.6 days in INASC. This reduction has likely been achieved by a combination of factors. Ireland's first stroke awareness media campaign (FASST) led to an initial increase of 69% in UHL with a co-ordinated multidisciplinary department within 3.5 hours of stroke onset, which could reduce the time from stroke onset to imaging. An increase in the rate of stroke thrombolysis (8.2% in UHL vs 1% in INASC) has led to the necessity of rapid access to CT scanning on arrival to hospital. Despite these improvements, 33% of patients did not have a CT scan within 24 hours of symptom onset. However, only 10% did not have a scan within 24 hours of admission. Intravenous thrombolysis can reduce neurological deficit and improve functional outcomes when given to the appropriate patient population. One of the major deficiencies in stroke care identified by INASC was the lack of availability of thrombolysis, with a thrombolysis rate of just 1%. UHL currently has a thrombolysis rate of 8.2%. Since this data was collected, the guidelines for thrombolysis have changed, allowing thrombolysis to be administered up to 4.5 hours. This will likely lead to a further increase in the thrombolysis rate. The IHF recommends that patients should be commenced on aspirin once their CT scan excludes haemorrhage or other stroke mimics. Guidelines recommend that aspirin be commenced on admission within 48 hours. All patients should be commenced on anti-thrombotic therapy by discharge in order to address secondary stroke prevention. 100% of appropriate patients were on anti-thrombotic therapy by discharge.

MDT input is an essential component to stroke care that has been shown to improve outcomes. 94% of patients at UHL had their rehab goals assessed at a multidisciplinary meeting. This compares to just 22% of patients in 2008. INASC found that 43% were assessed by physiotherapy within 72 hours of admission and 22% were seen by occupational therapy within 1 week. We found that 87% of our patient population were assessed by physiotherapy during their admission. Although this audit was carried out directly, these results indicate that a proportion of patients are currently receiving expert physiotherapy input. Just 3% of our patients were receiving OT input. This was a severe deficiency in acute stroke care, however OT input was being provided in the rehabilitation hospitals, which were not part of this audit. Since this audit was carried out a full time OT has been employed by the hospital for the sole care of stroke patients. This has had an immediate impact on the hospital. OT input was available within 24 hours of stroke onset in INASC. This reduction in length of stay is likely multi-factorial. The provision of stroke units themselves has been shown to reduce hospital length of stay. Greater access to thrombolysis can lead to improved functional outcomes, therefore reducing length of stay. In addition, UHL has access to rehabilitation beds in 4 rehabilitation units providing a discharge route from the acute hospital.

Implementation of the National Stroke Programme has clearly led to improved outcomes in stroke care. In a large university teaching hospital, development of an acute stroke unit in line with a thrombolysis protocol has led to improved length of stay and stroke outcomes. Although there has been an overall improvement, further acute stroke beds are required to improve access for all patients presenting with stroke. It is hoped that the opening of two further acute stroke beds in 2015 will ensure that this occurs.

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