In-Hospital Stroke: Characteristics and Outcomes

Abstract:

In-hospital stroke (IS) made up 6.5% of strokes recorded in the Irish National Stroke Register in 2012. International research has demonstrated poorer outcomes post IS compared to out of hospital stroke (OS). We aimed to profile all IS and IS patients presenting to the Emergency Department (ED) as not gathering data from the HSE portal is a major limitation of current national stroke registers. The study site is a primary care centre. IS represented 11% (50/458) of total strokes with over half (27/50, 54%) occurring on the day the patient was admitted. IS patients were older (75.8 +/- 14.7 vs. 63.9 +/- 14.4 years; p<0.01) and more likely to have cardiovascular disease (42% vs. 27%; p<0.01). Despite this, the extent of this can be underestimated in hospital activity data, where admission diagnosis is usually recorded as the primary diagnosis. IS tend to be more severe than out of hospital stroke (OS). Despite this, it is somewhat under-represented in clinical research. Each of the published literature on IS focuses on strokes occurring in the post-operative period, especially post coronary or carotid revascularization, with the incidence of post-operative stroke reported generally as 0.05-7%. In 2012, 6.5% of strokes recorded in the Irish National Stroke Register were listed as inpatient strokes. Optimal management of IS is often compromised by the fact that patients may be post-operative or have significant medical comorbidities, either of which may preclude intravenous thrombolysis, or inhibit subsequent treatment and rehabilitation. Even when a subject with IS is thrombolysed, they tend to have worse outcomes compared to thrombolysed OS patients. We aimed to profile all in-hospital and out of hospital stroke patients over a 22 month period from September 2011 to June 2013, and compare the two groups.

Methods

We gathered data from the HIPE portal electronic stroke register, including baseline characteristics and data on aspects of their care, as well as outcome data. Data on all patients diagnosed as having a stroke and admitted to the hospital are recorded on the database. Data for TIA-9 Classifications IS1 (primary intracerebral haemorrhage) and IS3 (Cerebral Infarction) were included. Data for TIA and Subarachnoid haemorrhage were not included as many of these subjects presenting to our ED were not admitted to hospital with the same classifications. The study site is a 1000 bedded university teaching hospital. It is a primary care centre, providing 24-hour thrombolysis for acute stroke and an acute stroke unit, as well as unselected general medical and surgical take. It is a national tertiary referral centre for multiple specialties including cardiothoracic surgery, oncology and oncology surgery. Proportions of patients in IS and OS groups were compared using Chi Square Statistics.

Results

Characteristics

IS represented almost 11% (50/458) of total strokes during the study period. There were no statistically significant differences in age and gender between groups (Table 1). There was a lower number of haemorrhagic strokes in the IS group (1/50, 2%) compared with the OS group (28/408, 7%) (p = 0.18). 24% (13/50) of the IS group were identified as having post-operative stroke and haemorrhage compared with 21% (84/408) (p=0.38) of the OS group. 27/50 (54%) of the IS group were admitted initially with medical complaints. The most common presenting symptom was breathlessness (8/27), followed by falls (6/27) and chest pain (3/27). 23/50 (46%) were post-operative, with seven strokes post cardiac surgery. Over one third (18/50) of the IS patients had a known malignancy prior to the stroke. If we consider post-operative stroke and haemorrhage stroke as a contraindication for intravenous thrombolysis, 25/50 (50%) of stroke in the IS group was not amenable to this treatment.

Stroke Care

The median length of stay in the IS group was 79.2 +/- 45.9 days, compared with 21.9 +/- 45.9 days in the OS group (p < 0.01). The thrombolysis rates in the IS and OS groups were 1/50 (2%) and 51/408 (13%) respectively (p = 0.03). 2% (1/50) of the IS group received care in the acute stroke unit, compared with 33% (136/408) in the OS group (p<0.01).

Outcomes

There was a statistically significant higher mortality in the IS group (26%, 13/50) compared to the OS group (10%, 39/408) (p<0.01). Patients in the IS group were less likely to be discharged home also (Table 1).

Discussion

This study demonstrates the significant morbidity and mortality associated with in-hospital stroke in an Irish hospital. Previous international studies have demonstrated that stroke in-hospital tend to be more severe with a lower likelihood of intravenous thrombolysis and increased risk of requiring nursing home care. Our study found similar poor outcomes with IS patients having significantly higher mortality rates and significantly less chance of being discharged home. There are some limitations to this study which need to be noted. In general this study is retrospective but the data collection is prospective and organized. Despite this however it is possible that some in-hospital strokes were not recorded because they may not have been recognized or reported by the primary team. Also unfortunately we do not have data on specific measures of stroke severity, such as the NIHSS, to compare the two groups.

The population served by the study site is elderly and underprivileged and as such, may have higher levels of chronic medical illness than seen elsewhere. This may lead to higher rates of IS than one would normally expect, especially given that the majority of IS followed medical admission rather than operations or invasive procedures. Additionally, the number of IS may be influenced by the fact that the study site is a tertiary centre for oncology and cardiothoracic surgical services and our data certainly reflects this. Conversely the study site does not have on-site neurosurgical services so some cases may be transferred to another site for neurological input and not recorded in the HIPE.

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R Briggs, R McDonagh, O Mahon, J Harbison

Stoke Service, Medicine for the Elderly Department, St James Hospital, James St, Dublin 8
database. This may partially explain the low rates of haemorrhagic stroke seen in the study. Despite the absence of delay to presentation, previous studies have shown that assessment for thrombolysis can take longer in IS compared to OS. While protocols are often in place to streamline acute stroke management in the ED this is often not the case in the inpatient ward setting, potentially creating unnecessary delay in acute care. Also, nursing and other care staff on surgical or general wards are less likely to be experienced in the recognition of early stroke signs and provision of acute stroke care.

While intravenous thrombolysis may be contraindicated in the post-operative setting, and almost 50% of the IS group were post-operative, intra-arterial options such as thrombectomy may present an alternative method for revascularization. Enhanced awareness of, and access to, such services may impact positively on thrombolysis rates in this cohort. In the context of the Irish health service, currently acute strokes are often redirected away from smaller hospital EDs to permit acute interventions and stroke unit care. These hospitals will continue to have in-hospital strokes however and it is unclear whether they have the expertise or capacity to manage these patients. Perhaps there may also be a role for redirecting IS in a similar manner, or for the development of standardized protocols and policies for optimal management. Efforts should be made to optimize identification of acute stroke in this cohort and enhance care for patients post-in-hospital stroke with the aim of improving outcomes in this group.

Correspondence: R Briggs
Stroke Service, Medicine for the Elderly Department, St James's Hospital, James's St, Dublin 8
Email: briggsr@tcd.ie

References