

In-Hospital Stroke: Characteristics and Outcomes

Abstract:

R Briggs, R McDonagh, O Mahon, J Harbison
Stroke Service, Medicine for the Elderly Department, St James's Hospital, James's St, Dublin 8

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 OS over a 22 month period and compare the two groups by gathering data from the HIPE portal stroke register. The study site is a primary stroke centre. IS represented 11% (50/458) of total strokes with over half (27/50, 54%) admitted initially with medical complaints. IS patients had a significantly longer length of stay (79.2 +/- 87.4 days vs. 21.9 +/- 45.9 days, $p < 0.01$) and higher mortality (13/50 vs. 39/408, $p < 0.01$). Patients in the IS group were also less likely to receive stroke unit care (1/50 vs. 136/408, $p < 0.01$). This study demonstrates the significant morbidity and mortality associated with IS and highlights the need for efforts to be made to optimize identification and management of acute stroke in this cohort.

Introduction

Stroke can be viewed as the neurological manifestation of systemic disease, and is commoner in patients with complex medical backgrounds and multiple medical comorbidities, especially cardiovascular disease. In-hospital stroke (IS), occurring after a patient is admitted to hospital for another reason, makes a significant contribution to total stroke morbidity and mortality. 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. Much 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 ICD-9 Classifications I61 (primary intracerebral haemorrhage) and I63 (Cerebral Infarction) were included. Data for TIA and Subarachnoid haemorrhage were not included as many of these subjects presenting to the Emergency Department (ED) are not admitted, but are either referred to outpatients or to neurosurgical services. This data was then compared to data from patients admitted after having a stroke out of hospital with the same classifications. The study site is a 1000 bedded university teaching hospital. It is a primary stroke 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%) ($p = 0.18$). 26% (13/50) of the IS group were identified as having atrial fibrillation on admission 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 haemorrhagic 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 IHS group was 79.2 +/- 87.4 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 neurosurgical input and not recorded in the HIPE

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

1. O'Donnell MJ, Xavier D, Liu L, Zhang H, Chin SL, Rao-Melacini P, Rangarajan S, Islam S, Pais P, McQueen MJ, Mondo C, Damasceno A, Lopez-Jaramillo P, Hankey GJ, Dans AL, Yusuf K, Truelsen T, Diener HC, Sacco RL, Ryglewicz D, Czlonkowska A, Weimar C, Wang X, Yusuf S; INTERSTROKE investigators. Risk factors for ischaemic and intracerebral haemorrhagic stroke in 22 countries (the INTERSTROKE study): a case-control study. *Lancet*. 2010 Jul;376:112â23.
2. Blacker DJ. In-hospital stroke. *Lancet neurology*. 2003 Dec;2:741â6.
3. Kimura K, Minematsu K, Yamaguchi T. Characteristics of in-hospital onset ischemic stroke. *European neurology*. 2006;55:155â9.
4. Likosky DS, Leavitt BJ, Marrin CA, Malenka DJ, Reeves AG, Weintraub RM, Caplan LR, Baribeau YR, Charlesworth DC, Ross CS, Braxton JH, Hernandez F Jr, O'Connor GT; Northern New England Cardiovascular Disease Study Group. Intra- and postoperative predictors of stroke after coronary artery bypass grafting. *The Annals of thoracic surgery*. 2003 Aug;76.
5. Ng JL, Chan MT, Gelb AW. Perioperative stroke in noncardiac, nonneurosurgical surgery. *Anesthesiology*. 2011 Oct;115:879â90.
6. Moradiya Y, Levine SR. Comparison of short-term outcomes of thrombolysis for in-hospital stroke and out-of-hospital stroke in United States. *Stroke; a journal of cerebral circulation*. 2013 Jul;44:1903â8.
7. Farooq MU, Reeves MJ, Gargano J, Wehner S, Hickenbottom S, Majid A; Paul Coverdell National Acute Stroke Registry Michigan Prototype Investigators. In-hospital stroke in a statewide stroke registry. *Cerebrovascular diseases (Basel, Switzerland)*. 2008;25:12â20.
8. Cumbler E, Murphy P, Jones WJ, Wald HL, Kutner JS, Smith DB. Quality of care for in-hospital stroke: analysis of a statewide registry. *Stroke; a journal of cerebral circulation*. 2011 Jan;42:207â10.
9. Chalela JAl, Katzan I, Liebeskind DS, Rasmussen P, Zaidat O, Suarez JI, Chiu D, Klucznick RP, Jauch E, Cucchiara BL, Saver J, Kasner SE. Safety of intra-arterial thrombolysis in the postoperative period. *Stroke; a journal of cerebral circulation*. 2001 Jun;32:1365â9.

[LOG IN TO TAKE TEST](#)

[LOGIN](#)