Knowledge of Thrombolytic Therapy Amongst Hospital Staff
Preliminary Results and Treatment Implications

Lisa Mellon, PhD; Husain Hasan; Stuart Lee, MB; David Williams, PhD; Anne Hickey, PhD

Background and Purpose—In-hospital stroke is associated with slower access to thrombolysis than community-occurring stroke. It has been suggested that lack of knowledge regarding appropriate stroke response among hospital staff may contribute to delays in referral, assessment, and treatment of in-hospital stroke.

Method—A survey was conducted among hospital ward staff members using the Stroke Awareness Questionnaire, which was adapted for use among hospital staff to assess their knowledge of stroke symptoms, acute treatments, and hospital protocols for treatment of stroke.

Results—Ninety-six staff members were interviewed, 81% of whom were clinical staff (medical, nursing, allied health professionals). Ninety-two percent of staff could name ≥3 stroke symptoms. Only 49% of staff were aware of thrombolysis treatment, and only 48% could identify the time window for thrombolysis administration, with staff from stroke-related specialties likely to name thrombolysis as an acute treatment for stroke (71%; odds ratio =3.36, 95% confidence interval 1.17–9.61) and identify the correct treatment window (71%; odds ratio =3.55, 95% confidence interval 1.24–10.16). Only 52% of staff on general wards were aware of an in-hospital stroke protocol.

Conclusions—Hospital staff had adequate knowledge of stroke signs and symptoms; however, there was low awareness of thrombolysis therapy and its correct treatment time window among hospital staff. Targeted educational programmes among hospital staff regarding stroke are required to optimize acute stroke care. (Stroke. 2015;46:3551-3553. DOI: 10.1161/STROKEAHA.115.010327.)

Key Words: acute therapy ■ data collection ■ education ■ stroke ■ thrombolysis

Between 6.5% and 15% of all stroke cases occur within the acute hospital setting.1 Mortality for in-hospital stroke (IHS) is approximately double that of community-occurring stroke, ≤54%,1,2 indicating that IHS are a vulnerable group with more comorbidities and greater likelihood of misdiagnosis.1 Given the proximity to clinical staff and diagnostic and treatment resources, it is reasonable to assume that IHS should benefit from faster recognition, assessment, and treatment. However, delays to assessment and treatment are substantial for IHS. Delayed referral to the appropriate specialties accounts for the largest portion of delay, with <30% of patients assessed by stroke physicians within 90 minutes of stroke onset and over 25% not seen within 12 hours of symptom recognition.3

There may be a perception among hospital staff that IHS, particularly perioperative cases, may not be suitable cases for thrombolytic therapy. However, with growing evidence to support the use of endovascular therapy, such as the Treatment for Small Core and Anterior Circulation Proximal Occlusion With Emphasis on Minimizing CT to Recanalization Times (ESCAPE) trial,4,5 it is imperative that staff outside of neu- rological wards are trained to recognize stroke and respond appropriately to maximize potential treatment options for the patient. It has been suggested that ≤15% of IHS cases suitable for thrombolysis were denied treatment because of delays in diagnosis.6

Public awareness of stroke symptoms has improved in the past decade owing to ongoing public education initiatives; however, there are limited data examining stroke knowledge among hospital staff. Analysis of US stroke registry data highlighted that evaluation times for IHS remains twice the recommended times, and further investigation of the reasons for these delays in IHS is needed.8 The aim of this exploratory study was to assess knowledge of stroke symptoms, acute treatments, and in-hospital protocols for stroke management among general hospital staff in a large teaching hospital.

Methods
A cross-sectional face-to-face survey was conducted with a convenience sample of hospital staff working on inpatient wards in one acute hospital, including doctors, nurses, allied health professionals, support staff, orderlies, and students. The hospital serves a population of ≈290000 and provides a 24/7 thrombolysis and thrombectomy service, together with an acute stroke unit. Convenience sampling was used with staff on all acute medical and surgical wards. After consultation with the Research Ethics Committee of the participating hospital, this study was considered to be a service evaluation of hospital
staff awareness of protocols for recognition, referral, and treatment of IHS and therefore did not require Research Ethics Committee approval.

**Stroke Awareness Questionnaire**
A modified version of the Stroke Awareness Questionnaire was used to assess knowledge of stroke symptoms, acute stroke treatments, and hospital protocol for treatment of stroke. The development of this tool has been previously described. When used previously with the general population, adequate stroke knowledge was defined as naming ≥3 stroke symptoms. In this sample in the hospital setting with professional training and experience, stricter criteria for adequate stroke knowledge was applied, defined as naming ≥3 warning signs of stroke.

**Statistical Analysis**
Doctors, nurses, and allied health professionals were classified as clinical staff, and other staff members were classified as nonclinical staff. Staff members with common stroke exposure (neurology, cardiology, and geriatric medicine departments) were classified as working in stroke-related specialties. Groups were compared using Wilcoxin rank-sum and Kruskal–Wallis nonparametric tests and logistic regression.

**Results**
A total of 96 staff members participated in the anonymous survey, with a response rate of 81.4%. The majority of the sample was female (81.3%), with 67% having >3 years’ experience in their current role. Mean age was 33.6 years (±10.03). Seventy-seven percent were classified as clinical staff, and 31% of the sample was classified as working in stroke-related specialties (Table). Nursing staff accounted for half of the sample (50%), followed by allied health professionals (18%), doctors (9%), medical and nursing students (9%), support staff (7%), orderlies (5%), and administrators (2%).

**Stroke Knowledge**
The most common warning sign identified by hospital staff was unilateral weakness, identified by 93.8% of the sample, followed by slurred speech (90.6%) and facial weakness (87.5%). Dizziness was the least commonly reported symptom (4%). All staff members surveyed were able to name at least one correct warning sign of stroke, and application of the criteria for adequate stroke knowledge for a hospital sample (≥3 symptoms) revealed that 92% of the sample had adequate stroke knowledge. Staff from stroke-related specialties named more stroke symptoms than general hospital staff (4.7 [±1.8] versus 3.7 [±1.05]; P<0.01).

**Hospital Wards Sampled for Study Cohort**

<table>
<thead>
<tr>
<th>Hospital Ward</th>
<th>Respondents N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical</td>
<td>26 (27)</td>
</tr>
<tr>
<td>Medical</td>
<td>20 (21)</td>
</tr>
<tr>
<td>Neurology</td>
<td>20 (21)</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>12 (13)</td>
</tr>
<tr>
<td>Orthopedic</td>
<td>8 (8)</td>
</tr>
<tr>
<td>Cardiology</td>
<td>8 (8)</td>
</tr>
<tr>
<td>Geriatric Medicine</td>
<td>2 (2)</td>
</tr>
</tbody>
</table>

**Acute Treatments for Stroke**
Hospital staff were asked to name acute treatments available for an acute stroke. The most commonly identified appropriate treatment was aspirin (70%). Just under half of the overall sample (49%) named thrombolysis as an emergency stroke treatment. Staff from stroke-related specialties were more likely to name thrombolysis as an acute treatment for stroke (71%; odds ratio =3.36, 95% confidence interval 1.17–9.61), with 89% of clinical staff able to identify thrombolysis as an acute treatment.

Staff were also asked to specify the time window for thrombolysis administration in the case of an acute ischemic stroke. Participants had correct knowledge if they reported unprompted a treatment initiation window of ≤4.5 hours from symptom onset. Less than half of the overall sample (47.9%) could identify ≤4.5 hours as the correct time window. Staff from stroke-related specialties were more likely to identify the correct treatment window (71%; odds ratio =3.55, 95% confidence interval 1.24–10.16), with only 52% of clinical staff identifying the correct thrombolytic treatment window.

**Hospital Protocol for Acute Stroke Management**
Finally, staff were asked about their knowledge of existing hospital protocols for referral and assessment of patients who develop a stroke or transient ischemic attack on the hospital ward. Only 52% of general staff and 67% of stroke-related specialties indicated that they were aware of hospital protocols for the management of IHS, and only 49% of general staff and 57% of stroke-related specialties would contact the on-call stroke team if stroke symptoms were suspected.

**Discussion**
This study identified 3 key findings of relevance to IHS. First, staff stroke symptom knowledge was high, with over 90% naming ≥3 stroke symptoms. Second, less than half of the overall sample were aware of thrombolytic therapy for an acute ischemic stroke, and third, when prompted, only 48% of the sample could identify the time window for thrombolysis administration. This highlights a lack of familiarity with assessment of and treatment options for patients with acute stroke among general staff. This has potential negative consequences for the timely treatment of IHS, particularly for thrombolysis administration.

This was the first study, to our knowledge, to adopt a multidisciplinary approach to examination of staff stroke knowledge. Previous studies have focussed on a single discipline, such as nursing. Although nurses are typically the first responders on a ward, our approach targeted all staff on inpatient wards who may observe changes in a patient’s condition indicative of stroke onset and therefore require adequate stroke knowledge. Our findings were encouraging, with 92% of all staff displaying adequate stroke knowledge regardless of professional role, which is higher than previous reports. Interestingly, the most commonly identified stroke symptoms reflected those advertised by public stroke education campaigns, suggesting that concerted efforts to educate the public using mass media may also impact on those in healthcare facilities. As this was a single-site survey, the results may not
be generalizable to other institutions, and future work with a larger sample is recommended.

Our results highlight the significant gap in knowledge of thrombolytic services for stroke among general hospital staff and the need for routine, hospital-wide education and advertisement of code stroke procedures to all hospital staff.

Disclosures
None.

References
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