

Factors associated with prehospital delay among stroke patients in a developing African country

Dear editor,

In Nigeria, stroke has remained the most frequent cause of neurological admissions (1) and a significant cause of mortality. Successful acute stroke treatment and improved outcomes critically depend on early hospital presentation. Several studies in developed countries have evaluated the factors causing prehospital delays (2). In this study we investigated delays in presentation of stroke patients and explored factors associated with such delays in a tertiary health center of Nigeria.

To this end, we designed a prospective study of consecutive stroke admissions at the Emergency Department of the University of Calabar Teaching Hospital, Nigeria, over a six-month period (August 2012–January 2013). The time of stroke onset was defined as the time when the first

Correspondence: Andreas Charidimou*, National Hospital for Neurology and Neurosurgery, Box 6, Queen Square, London WC1N 3BG, UK.
E-mail: andreas.charidimou.09@ucl.ac.uk

Conflict of interest: None declared.

DOI: 10.1111/j.12469

symptom was noticed by the patient or a carer. Delay was defined as greater than three-hours from time of symptoms onset to presentation. Univariable and multivariable logistic regression analyses were used to explore factors associated with prehospital delay.

Eighty-one consecutive patients (47 males, 58%; mean age, SD: 57.6 ± 12.1 years) were recruited. Only 17 (21%) of the patients arrived at the hospital within three-hours of stroke onset, while 53 (65.4%) patients arrived >24 h after symptom onset. None of the patients were brought by ambulance service. More than half of the patients (55.6%) had no knowledge of stroke symptoms. In univariable analysis lack of awareness of symptoms of stroke and referral from other facilities were associated with late presentation (Table 1). In multivariable logistic regression, only lack of awareness of the symptoms of stroke was associated with delayed presentation (OR: 7.43; 95% CI: 1.47–37.4; P = 0.015) (Table 1).

Our study in a developing country reports considerable prehospital delays in patients with acute stroke symptoms presenting at the emergency department, in line with other recent studies in developing and emerging economies (3–5). Our data highlight the need for educational programs in order to increase awareness of stroke in Nigeria, including stroke

symptoms/warning signs and the limited time window for effective interventions.

E. E. Philip-Ephraim¹,
A. Charidimou^{2*}, A. A. Otu¹,
E. K. Eyong³, U. E. Williams¹, and
R. P. Ephraim¹

¹Department of Internal Medicine, University of Calabar Teaching Hospital, Calabar, Nigeria

²UCL Institute of Neurology and The National Hospital for Neurology and Neurosurgery, London, UK

³Department of Paediatrics, University of Calabar Teaching Hospital, Calabar, Nigeria

References

- 1 Philip-Ephraim EE, Eyong KI, Oparah SK *et al.* Profile of neurologic emergencies at the accident and emergency department of a tertiary hospital. *J Neurol Sci Turk* 2013; **30**:72–80.
- 2 Evenson KR, Foraker RE, Morris DL, Rosamond WD. A comprehensive review of prehospital and in-hospital delay times in acute stroke care. *Int J Stroke* 2009; **4**:187–99.
- 3 Jin H, Zhu S, Wei JW *et al.* Factors associated with prehospital delays in the presentation of acute stroke in urban China. *Stroke* 2012; **43**:362–70.
- 4 Nandigam K, Narayan SK, Elangovan S, Dutta TK, Sethuraman KR, Das AK. Feasibility of acute thrombolytic therapy for stroke. *Neurol India* 2003; **51**:470–3.
- 5 Siddiqui M, Siddiqui SR, Zafar A, Khan FS. Factors delaying hospital arrival of patients with acute stroke. *J Pak Med Assoc* 2008; **58**:178–82.

Table 1 (A) Univariable analysis of patients arriving at our center early (≤3 h after symptom onset) vs. late (>3 h after symptom onset). (B) Variables in the univariable analysis were included in a multivariable logistic regression model to identify independent predictors of early presentation (≤3 h) adjusting for any potential confounders. All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) IBM version 20.0

| A. Univariable analysis | | | |
|--|-----------------------|----------------------|---------|
| | Early arrivals (≤3 h) | Late arrivals (>3 h) | P value |
| Gender (male) | 10 | 37 | 0.940 |
| Age category (≥45 years) | 16 | 54 | 0.443 |
| Awareness of stroke symptoms | 12 | 24 | 0.015* |
| Ambulance use | 0 | 0 | – |
| Referred (yes) | 0 | 32 | 0.001* |
| Living alone (yes) | 0 | 7 | 0.335 |
| Distance of residence from hospital (<12.8 km) | 15 | 48 | 0.335 |
| B. Multivariable logistic regression model* | | | |
| Variable | OR (95% CI) | | P value |
| Age category | 3.42 (0.30–39.1) | | 0.322 |
| Gender (male) | 0.38 (0.07–1.93) | | 0.240 |
| Awareness of stroke symptoms | 7.43 (1.47–37.4) | | 0.015 |

*The model is also adjusted for referrals, living alone and distance from hospital.