Journal of Science and Technology, Vol. 43, No. 1 (2025), pp 80-87

https://dx.doi.org/10.4314/just.v43i1.6

# DISPARITIES IN STROKE THROMBOLYSIS KNOWLEDGE ACROSS VARIOUS CADRES OF STROKE CARE PROVIDERS IN A GHANAIAN HOSPITAL

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## ABSTRACT

**Background**: *Most hospitals in Low-and-Middle-Income Countries (LMICs) do not provide thrombolysis as part of routine acute stroke care. Deficiencies in the knowledge level of healthcare providers may be an additional, but neglected contributor to the low utilization of stroke thrombolysis in Low-and-Middle-Income Countries (LMICs).*

**Objectives:** *To assess the level of awareness of stroke thrombolysis among various categories of clinical staff involved in acute stroke care at Komfo Anokye Teaching Hospital (KATH), a tertiary facility in Ghana.*

**Methods:** *Cross-sectional surveys were conducted among health workers directly involved in acute stroke care including, internal medicine physicians, emergency physicians, residents, medical officers, house officers, emergency and stroke nurses. Their level of knowledge regarding stroke thrombolysis was assessed.*

**Results:** *About 97% of all participants (113 out of 117) were aware that thrombolysis was recommended for acute ischemic stroke treatment. However, up to 63.0% of junior staff (63.0%) were not conversant with the source of this recommendation, in contrast to 29.4% of senior staff (p=0.010). 64% of junior staff members rated their knowledge of stroke thrombolysis as either fair or poor, compared to 11.8% of senior staff members (p= 0.005). Of the junior category staff, only 42% correctly identified the recommended thrombolytic agents compared to 82.4% of senior staff (p<0.001), 72% were aware of the common complications compared to 88.23% of senior staff, 46% were uncertain of the time window compared to only 5.9% of seniors (p<0.001) and 61% were aware of associated costs compared to all senior staff members (p= 0.036).*

**Conclusion:** *The level of stroke thrombolysis knowledge was low among junior staff at KATH. To ensure sustainable implementation of mainstream stroke thrombolysis, targeted educational interventions should be instituted to bolster the capacity and support for stroke thrombolysis among all stroke care providers.*

**Keywords:** Implementation Science, Awareness, Alteplase, Acute strokes, LMICs, Health workers.



# INTRODUCTION

Stroke constitutes a significant burden on healthcare systems and societies, worldwide.(Feigin et al., 2022a) Timely and appropriate management of acute stroke is essential to mitigating the occurrence of adverse outcomes.(Herpich & Rincon, 2020) Thrombolysis has been established as a recommended therapy for acute ischemic stroke based on evidence from several landmark trials such as the National Institute of Neurological Disorders and Stroke rt-PA Stroke Study (NINDS) and European Cooperative Acute Stroke Study (ECASS) III.(Hacke et al., 2008; National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group, 1995) Increasing thrombolysis access among patients with acute Ischemic Strokes is essential for improving functional outcomes.(Ehlers et al., 2007; Penaloza-Ramos et al., 2014; Tan Tanny et al., 2013) Nevertheless, the adoption of this evidence into routine care has been slow in LMICs, where the majority of strokes occur. (Feigin et al., 2022b; Khatib et al., 2018) The implementation of stroke thrombolysis in these settings has been hampered by high levels of inertia among key stakeholders in stroke care.(Badachi et al., 2015; Ghandehari, 2011; Katan & Luft, 2018; Opare-Addo et al., 2023; Philip-Ephraim et al., 2015)

Health workers play a critical role in the delivery of acute stroke care, right from initial assessment, to treatment decisions and rehabilitation.(Green et al., 2021; Jarva et al., 2021) Their level of knowledge and skills significantly influence the successful implementation of stroke interventions. (Mellon et al., 2015; Sim et al., 2021) End-user awareness is crucial to the successful implementation of any innovation, as indicated by Rogers' Diffusion of Innovations Theory. This theory explains how end-users may accept or reject a new intervention depending on how it is communicated. (Salwen, 2008) The knowledge stage forms an essential part of the diffusion process during which people become aware of the new intervention and attempt to understand it. The integration of new therapies depends heavily on this phase.(Salwen, 2008)

Top-down initiatives that fail to engage end-users are typically opposed and inevitably fizzle out.(Albright et al., 2021) Evaluating the awareness levels of providers during the pre-implementation phase of initiatives may help identify potential knowledge gaps that may warrant the development of targeted interventions to facilitate smooth incorporation into routine care.

The objective of this study was therefore to assess the level of awareness of stroke thrombolysis among various categories of clinical staff involved in acute stroke care at Komfo Anokye Teaching Hospital.

# METHODS

## Study Design

We administered cross-sectional surveys to health workers directly involved in acute stroke care including, internal medicine specialists, emergency physicians, residents, medical officers, house officers, stroke unit, and emergency unit nurses.

## Study site

The study was conducted at Komfo Anokye Teaching Hospital (KATH), the second-largest tertiary referral hospital in Ghana, located in Kumasi, the capital city of the Ashanti region.

## Study Procedures

Cross-sectional surveys were administered to assess the level of stroke thrombolysis awareness among stroke care providers at Komfo Anokye Teaching Hospital as part of the pre-implementation assessment for the "Advancing Stroke Care Through Implementation of IV Thrombolytic Therapy in Acute Stroke" (ACTIVATE) project. Participants were selected by stratified

random sampling. A sample size of 172 was derived using the Yamane sample size formula for a finite population, considering a margin of error of 0.05 and a population of 304 stroke care providers at the hospital.

The list of all acute stroke care providers in the hospital was obtained from the hospital's staff directory and stratified according to directorates and roles. Participants were randomly selected from each stratum, contacted by phone, and invited to complete the survey via Google Forms. These individuals were made aware that the completion of the survey was completely voluntary, and that no personal identifiers would be collected. After reading the participant information included in the google form, participants were asked to provide consent before proceeding to take the survey. Out of 172 staff contacted to take the survey, 117 responses were received. The recruitment process lasted a period of 4 months, from December 2022 to March 2023.

### Assessment of Stroke Treatment Awareness

We employed a 23-item questionnaire based adapted from the modified version of the stroke awareness questionnaire, which is validated for assessing stroke treatment awareness among health workers. (Mellon et al., 2015) This questionnaire has, however, not been previously validated in the Ghanaian population. The first 6 items of the questionnaire captured the participants' demographic data including age, gender, role, rank, and directorate. Staff with consultant, senior specialist or specialist rank were classified as senior staff while the rest were classified as junior. The knowledge of staff regarding acute stroke treatment was evaluated by the next 10 items (emphasizing the basic level of stroke thrombolysis knowledge). The knowledge of the existence of stroke treatment hospital protocols was evaluated by the next 3 questions. The remaining 4 items evaluated the sources of knowledge about stroke thrombolysis and offered suggestions for raising the level of awareness.

### Statistical Analysis

Data were analyzed using SPSS version 28. Socio-demographic data were summarized as frequencies and proportions for categorical data, while mean with standard deviation were used for numerical variables with a normal distribution and median with inter quartile range were used for those that are skewed. Socio-demographic characteristics and knowledge level parameters were stratified according to ranks. Group comparison was with chi-square and Fisher's exact test. The level of significance was set at a p-value of 0.05.

### Ethical Considerations:

Ethical approval was obtained from the Komfo Anokye Teaching Hospital- Institutional Review Board (ref: KATH/IRB/AP/104/22). All participants were provided informed consent.

## RESULTS

### The sociodemographic characteristics of stroke care providers

Most of the staff in the senior category (88.2%) were aged 30–40 years, whereas most of the junior category staff (55%) were in the 30–40-year age range or younger (40%) (p=0.005). Male employees accounted for 56.4% of the responses received. Eighty-three percent of the survey responses came from doctors; the response rate among nurses was 32.9%, while that of doctors was 92.2%. Table 1.

### Knowledge of acute stroke treatment among stroke care providers

The majority of respondents (97%) were aware that IV thrombolytics were recommended for acute ischemic stroke treatment and 85.5% agreed that it was an effective intervention. Nonetheless, a considerable proportion of

junior staff (63.0%) lacked knowledge about the origin of this recommendation, in contrast to senior staff (29.4%; p = 0.010), Table 2.

Sixty-four percent of junior staff members self-assessed as having either fair or poor knowledge of stroke thrombolysis, compared to just 11.8% of senior staff members who shared the same opinion (p = 0.005). Regarding the indicated thrombolytic agents, 42% of junior category staff members correctly identified IV alteplase or Tenecteplase; the remaining 20% were either uncertain or mentioned other therapies such as clexane or aspirin (38%). However, most senior staff members (14 out of 17) knew which thrombolytic drugs were appropriate (p<0.001). 46% of junior staff compared to 5.9% of seniors were uncertain of the time window for stroke thrombolysis (p<0.001). Compared to 72% of junior staff, 88.23% of senior staff members correctly identified hemorrhagic transformation and allergic reaction as common complications of stroke thrombolysis (p=0.007). While all senior staff members were aware of the cost of thrombolytic medicines, only 61% of respondents in the junior staff category had a fair idea (p= 0.127).

It is worth highlighting that neither of the staff in the junior or senior category indicated that they used the intervention regularly. Additionally, similar proportions of both senior and junior staff expressed a lack of confidence in their ability to make decisions concerning stroke thrombolysis or administer it (58.8% Vs 78.0%**,** P= 0.071).

### Knowledge of the existence of stroke Protocols

As shown in Table 3, while 65.8% of staff were uncertain if there were any existing stroke protocols in the hospital, 24.8% were certain it was non-existent. Of the 117 participants, 63.2% were unsure while 29.9% said there was no existing stroke thrombolysis checklist or algorithms. A staggering 94.8% deemed stroke thrombolysis at Komfo Anokye Teaching Hospital to be either partially implemented or yet to be implemented.

### Sources of knowledge and recommended strategies to improve the level of knowledge.

Most acute stroke care clinicians at (KATH) Komfo Anokye Teaching Hospital (41.03%) were unable to name their primary source of information about stroke thrombolysis, with 29.06% citing the internet. While 91.5% of respondents said that the department held formal meetings regularly to discuss patient care, the majority (81.2%) reported that updates regarding stroke treatments were not given during these meetings. While 27.35% mentioned the existence of a dedicated stroke team, 51.28% indicated that protocol-based training might help raise their level of understanding regarding the use of thrombolysis for acute ischemic stroke management. However, 5.98% recommended exposure at centers where thrombolysis is routinely performed and 15.38% suggested Telemedicine. (Table 4)

## DISCUSSION

As part of efforts to obtain a comprehensive overview of the obstacles impeding the full-scale implementation of stroke thrombolysis, we conducted a cross-sectional survey among various categories of clinical staff directly involved in acute stroke care delivery at Komfo Anokye Teaching Hospital (KATH). Our study revealed that a significant proportion of the workforce providing stroke care at Komfo Anokye Teaching Hospital (KATH) were relatively young and had fewer years of working experience. Additionally, more doctors, as compared to nurses, formed the majority of those who responded to the invitation to take the survey. This demographic pattern gives a hint of the operational dynamics that could potentially impact the

successful implementation of relatively new interventions such as thrombolysis. To encourage more diverse participation in the implementation process, teamwork, task shifting, task sharing, and bidirectional engagement between doctors and nurses should be employed.(Okoroafor & Christmals, 2023) Shared leadership behavior must be encouraged to promote cohesiveness. This can be achieved by identifying change agents from junior staff members. Such individuals should be assigned leadership roles in the implementation program to foster collaborative effort.(Imam & Zaheer, 2021)

Although almost all staff were aware that IV thrombolytics were recommended for the treatment of acute ischemic stroke, which is relatively higher than previous studies conducted in other jurisdictions,(Mellon et al., 2015) noteworthy differences were observed in the level of knowledge across different ranks of acute stroke care providers. A significant percentage of junior staff members were not aware of the source of the recommendation for thrombolysis use in treating ischemic stroke patients. A sizable percentage of junior personnel were ignorant of the recommended thrombolytic agents, common complications, time window, and associated costs. Generally, the implementation of relatively new health interventions requires full team participation. (Brooks et al., 2012; Buljac-Samardzic et al., 2020) Although specialists are expected to have a better grasp of interventions specific to their professions, other care providers who directly deal with acutely ill patients must have a basic degree of cognizance. Non-specialized providers must possess a fundamental level of knowledge even if not to the same depth of insight as the experts. (Detsky et al., 2012; Larson et al., 2004; Lumley, 1993) Challenges in communication flow and deficient knowledge transfer are potential underpinnings of such observations. (Albright et al., 2021; Barbazza et al., 2015)

The findings from our survey underscore the need for targeted workshops, and ongoing education programs designed to accommodate various learning styles and preferences. To ensure that team members are at par in terms of fundamental know-how is imperative to institute periodic refresher courses that strategically cover newly qualified personnel. Feedback systems and frequent evaluations to track progress are also imperative. Also, unambiguous and tailored communication channels must be established to guarantee that information is extensively disseminated to foster collaboration amongst all staff categories. (Albright et al., 2021)

It is worth emphasizing that neither the staff in the junior or senior category indicated that they used the intervention regularly. Also, comparable proportions of both senior and junior staff expressed a lack of confidence in their ability to make decisions concerning stroke thrombolysis or administer it. This demonstrates a lack of proficiency in utilizing stroke thrombolysis among all the categories of providers at KATH. Despite the specialists' considerable degree of knowledge, which was probably accrued from years of experience and formal training, there are still major deficits. Presumptions made from anecdotal evidence that all medical personnel are knowledgeable about current treatment protocols and skilled in delivering recommended therapies may be deceptive. (Alvarez-Galvez et al., 2021; Fagerlin et al., 2005; Grilli et al., 1998)

Another key finding was the fact that the majority of staff were either unsure of or certain that stroke protocols or stroke thrombolysis checklists/algorithms were non-existent at the facility. The majority believed that stroke thrombolysis had either not yet been introduced or had only been partially performed at the facility. Even though departments regularly convened formal meetings to discuss patient care, updates

regarding stroke treatments were not given during these sessions. Most clinicians were unable to name their primary source of information about stroke thrombolysis. There is a need to ensure that all staff members, regardless of seniority, have access to consistent and comprehensive training to boost their confidence in delivering thrombolytic therapy. Ongoing educational interventions geared to match the range of experience and skill sets should be instituted to strengthen the workforce capacity. (Matovu et al., 2013)

## LIMITATIONS

This was a cross-sectional study and as such no inference of causality could be drawn. Additionally, even though the questionnaire used has been previously validated for assessing stroke treatment awareness among health workers, it has not been previously validated in the Ghanaian population

## CONCLUSION

There are notable differences in the level of knowledge across different cadres of clinical staff responsible for treating acute stroke patients at KATH. To ensure the widespread adoption of stroke thrombolysis, robust implementation strategies that provide explicit justifications, supply the required procedural knowledge, and promote reciprocal engagement and task sharing are required.(Powell et al., 2019; Proctor et al., 2013)

### Sources of funding

FSS is supported by funding from the National Heart, Lung, and Blood Institute (R01HL152188), NINDS (R21 NS103752-01), and NINDS (R01NS129133).

### Declarations of interest

none

### Data sharing statement:

Copies of the questionnaire and all de-identified data are available and will be shared upon request via email to the corresponding author.

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