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The Role of Doctors in Ambulance Management of Stroke Patients in Emergency Medical Services

Korakot Apiratwarakul[1], Artit Boonrod[2], Nontaphon Piyawattanametha[3], Kamonwon Ienghong[1]*, Darunee Sripadungkul[4], Somsak Tiamkao[5], Lap Woon Cheung[6,7]

[1]Department of Emergency Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand; [2]Department of Orthopedic, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand; [3]Department of Surgery, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand; [4]Department of Anesthesiology, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand; [5]Department of Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand; [6]Department of Accident and Emergency, Princess Margaret Hospital, Kowloon, Hong Kong; [7]Emergency Medicine Unit, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Pokfulam, Hong Kong

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***Correspondence:** Kamonwon Ienghong, Department of Emergency Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen - 40002, Thailand. E-mail: kamonwan@kku.ac.th
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Abstract

BACKGROUND: Strokes are one of the most common of all neurological diseases and can be found in all genders and ages. Emergency medical services (EMS) are the first line of care with access to stroke patients from on the scene assessment to initial treatment. However, currently there are no studies regarding the role doctor's play in initial ambulance contact to assess stroke patients.

AIM: The aim of the study was to analyze the role of doctors in ambulances managing stroke patients in EMS.

METHODS: This was a retrospective study over a 5-year period (2017-2021) at Srinagarind Hospital EMS units. The information from the EMS database was transferred completely into the data record form and imported into the computer system for further data analysis.

RESULTS: A total of 10,329 EMS operations were examined. The mean age of the patients was 52.10 ± 10.24 years. A total of 64.4% (n = 6650) of them were male. The afternoon shift was the most common time for EMS operations with doctors in the stroke group (42.9%) and non-stroke group (59.3%). The distance from hospital to the scene in the stroke group was 12.6 ± 3.2 km. The average response time for stroke group and non-stroke group was 7.05 min and 9.50 min, respectively.

CONCLUSIONS: The role of doctors in the ambulance to manage stroke patients in EMS directly resulted in a decrease in time in arriving at the scene to diagnose, arriving at the laboratory, and arriving at the scene to activate the special team.

Introduction

Strokes being one of the most common neurological diseases, no age group or gender or particular lifestyle is spared [1], [2]. Stroke patients' lives are impacted significantly in many aspects such as medical treatment, livelihood, mental health, and social acceptance; this can be detrimental to the quality of life of patients [3], [4]. It is becoming more important today due to both the number of patients increasing over the past 10 years, and from the treatment process that depends on the time of diagnosis and appropriate medication.

Emergency medical services (EMS) are the first line of access to stroke patients from on scene assessment to initial treatment. The whole process requires personnel who have experience in caring for specific stroke patients [5], [6]. Srinagarind Hospital started a concrete EMS program, in 2007, developed in parallel with the training of specialists in the field of emergency medicine. At present, in patients with stroke-related symptoms, there is always a physician involved in the operation. The previous studies have shown advantages in terms of accuracy in diagnosis and the confidence of EMS members [7], [8]. However, no data on the role of doctors have been studied in Thailand.

From the guidelines for the care of stroke patients in emergency situations, there are five steps: Knowing the symptoms that are compatible with the disease, reporting to the emergency services, ambulance response, referral to proper hospital care, and rehabilitation after the disease. It can clearly be seen that the chain involved in EMS is crucial to the long-term outcomes of stroke patients. Having a doctor operating on an ambulance to assess symptoms and

prescribe timely treatment will be of great benefit to stroke patients.

Methods

Study design and patient recruitment

This was a retrospective study with the data gathered between January 2017 and December 2021 in the EMS unit of Srinagarind Hospital, which is a university hospital. There were more than 10,000 EMS operations carried out over the period of 5 years. The data from the study was also gathered from the electronic medical records of the Emergency Department and EMS database which consisted of the date and time of operation, distance from the hospital to the scene, response time, distance from the scene to the destination hospital, transport time, vital signs, primary diagnosis on ambulance, initial treatment on the ambulance, and EMS personnel operating.

Data collection

The data were collected by two trained EMS nurses. The information from the EMS database was into the computer system for further data analysis. The inclusion criteria consisted of the operation of the EMS unit at Srinagarind Hospital with a doctor who attended the operation. In the case of incomplete data or a physician not diagnosing a stroke, the information was excluded from this study.

Data analysis

The patients' characteristics were reported as mean ± standard deviation (SD) for continuous variables with a normal distribution. Number and percentage were used for categorical variables. For comparison between the two groups, an independent sample t-test and Mann–Whitney U test were used for continuous variables and Pearson's Chi-square or Fisher's exact test for proportions for categorical variables. All statistical analyses were performed using IBM SPSS statistics for Windows and Khon Kaen University license, version 27.0 (SPSS Inc., Chicago, IL, USA).

Ethical considerations

This study was conducted in accordance with the principles of the Declaration of Helsinki and Good Clinical Practice guidelines. The Khon Kaen University Ethics Committee for Human Research approved the study and waived the requirement for written individual informed consent (HE641669).

Results

Over the period of 5 years of study (2017-2021) 10,329 EMS operations were examined. Incomplete data were found in five cases excluded from this study. Therefore, the final number of cases in this study is 10,324 EMS operations, the characteristics of which are shown in Table 1. The mean age of the patients was 52.10 ± 10.24 years. A total of 64.4% (n = 6650) of them were male. The authors found that the average response time was 9.12 ± 4.32 min. For most EMS operations 66.9%, there was no doctor in the ambulance.

Table 1: Demographic data of EMS operations during 2017–2021 (n = 10324)

Characteristics	n (%)
Age (years) Mean ± SD	52.10 ± 10.24
Gender	
Male	6650 (64.4)
Female	3674 (35.6)
Operation time	
Morning shift (8 AM-4 PM)	4250 (41.2)
Afternoon shift (4 PM-0 AM)	4810 (46.6)
Night shift (0 AM-8 AM)	1264 (12.2)
Response time (min) Mean ± SD	9.12 ± 4.32
Transport time (min) Mean ± SD	12.24 ± 8.26
EMS member of operations	
Doctor in ambulance	3420 (33.1)
No doctor in ambulance	6904 (66.9)

EMS: Emergency medical services.

The present study showed that the afternoon shift was the most common time for EMS operations with a doctor in the stroke group (42.9%) and non-stroke group (59.3%). The distance from the hospital to the scene in the stroke group was 12.6 ± 3.2 km. The average response time for stroke group and non-stroke group was 7.05 min and 9.50 min, respectively, (p = 0.044; Table 2). The time from the arrival scene to diagnosis in the stroke group was 2.05 ± 0.20 min.

Table 2: EMS operations with doctor (n = 3420)

Characteristics	Stroke group (n = 282)	Non-stroke group (n = 3138)	p-value
Operation time n (%)			0.041*
Morning shift	104 (36.9)	1125 (35.9)	
Afternoon shift	121 (42.9)	1860 (59.3)	
Night shift	57 (20.2)	153 (4.8)	
Distance from hospital to scene (km) Mean ± SD	12.6 ± 3.2	10.9 ± 4.1	0.068
Response time (min) Mean ± SD	7.05 ± 1.20	9.50 ± 2.14	0.044*
Time in EMS (min) Mean ± SD			0.010*
Arrival at scene to diagnosis (n=282:2540)	2.05 ± 0.20	4.10 ± 0.25	
Arrival at scene to laboratory (n=281:1566)	3.11 ± 0.15	8.20 ± 2.20	
Arrival at scene to activation special team (n=280:1685)	5.02 ± 1.10	11.20 ± 1.45	

*Statistical significance, EMS: Emergency medical services.

Discussion

This study uses the information from EMS databases to study the roles of the doctors stationed on the ambulance in the care of stroke patients. It was

found that the most active time of EMS operations was in the afternoon. This is consistent with a previous study in Thailand related to social conditions and family relationships [5], [8]. The emergency patients are elderly people who are responsible for taking care of their children at home. In the event of an illness, a working child must return from work to find a medical emergency and call for EMS.

We also found that the response time of EMS was consistent with previous studies that show a time of usually <10 min except in the Bangkok area where traffic congestion may cause the response time to be later than other provinces of Thailand [5], [6], [7], [8]. In terms of transport time, it was found that this period used more time than response time, as a result of the hospital in this study being a university hospital where sometimes emergency patients use their rights to be treated at the provincial hospital which affects drive time.

The level of EMS operations also found that most operations were at a basic enough level which would not require a doctor to operate. In the case of caring for an advanced level or a specific condition, the doctors will also be involved in the operation. This study divided EMS operations with doctors into two groups. The first group was patients with symptoms of a stroke and the second group was patients with conditions other than those of a stroke. In the non-stroke group, the reason for using the EMS most commonly in the afternoon may be related to the cause of trauma, data from studies in Thailand found that the most likely time to be in a traffic accident is between 6 PM and 9 PM. There was an increase in the number in the afternoon.

The response time in the stroke group has a shorter time to arrive at the scene. This may be caused by staff in EMS recognizing the initial symptoms over the telephone triage causing the officers to rush into the operation. They realize the importance of the outcome of stroke patients that vary with the time of treatment.

For operations with doctors in stroke patients, it was found that the interval from arriving at the scene to diagnosis was shorter than the non-stroke group. It was caused by assessed stroke signs in pre-hospital care according to the F-A-S-T principle together with neurological assessment which we see when a doctor joins the operation and makes it possible to provide a quick diagnosis [9], [10], [11].

Operations that included doctors from the period at the scene until the blood was drawn for laboratory examination found that less time was used in patients with a stroke than the non-stroke group. This is due to the personnel in EMS, when diagnosed by a doctor with suspicion of stroke, the nurses participating in the operation immediately draw blood and collect the blood for delivery to the destination hospital. This was different from the non-stroke group in which the symptoms are mild and may not have drawn blood since arriving at the scene makes a time difference [12], [13].

In terms of activated specific teams [14], [15], it was found that in the stroke group with a doctor working together, time to the activated team at the destination hospital was shorter than the non-stroke group. This is because the doctor makes the personnel in the hospital system be more confident in the diagnosis. Therefore, there is an immediate response according to the guidelines.

Conclusions

The role of a doctor in an ambulance to manage stroke patients in EMS results in a decreased time in arriving at the scene to diagnosis, arriving at the scene to the laboratory, and arriving at the scene to the activation of the special team.

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