



# Response Times of Motorcycle Ambulances during the COVID-19 Pandemic

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## Abstract

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**BACKGROUND:** Motorcycles (motorlance) are often deployed as ambulances to the scene of an emergency to reduce response time. The COVID-19 pandemic has affected emergency medical services (EMS) in Thailand in many respects, and this study was conducted to examine its effect on motorlance operation time.

**AIM:** The aim of the study was to examine motorlance operation time during the COVID-19 pandemic in comparison to normal periods.

**METHODS:** This cross-sectional study examined all EMS motorlance operations dispatched from Srinagarind Hospital (Thailand). Data were collected from the Srinagarind Hospital EMS operation database and hospital information database system. Data from June 1, 2018, to December 31, 2019 (normal period) were compared with those from January 13 to April 21, 2020 (COVID-19).

**RESULTS:** Eight hundred seventy-one EMS operations were examined over two periods. Mean patient age during the COVID-19 pandemic was 41.5 ± 6.2 years, and 54.6% (n = 59) were male. Average response time was 6.20 ± 1.35 min during the normal period and 3.48 ± 1.01 min during the pandemic (p = 0.021). Transport time was also significantly shorter during the latter period (2.35 vs. 5.20 min).

**CONCLUSIONS:** Motorlance response and transport time during the COVID-19 pandemic were significantly shorter than usual.

## Introduction

Motorcycles (motorlance) are often deployed as ambulances to the scenes of emergencies in large cities with traffic problems or during rush hour to reduce response time [1]. They allow for rapid access to patients, reduced waiting times, and increased response to emergency expectations [2]. The motorlance can also be used to deliver patients with mild symptoms or pregnant women from primary care units to the hospital [3], [4]. In Scandinavian countries, motorlances are used in cases of cardiac arrest outside the hospital or severe accidents to allow for rapid access to the scene [5], [6]. In addition, a previous study found that the costs of using a motorlance were lower than those of van ambulances [7]. Motorlances can be used in both basic and advanced emergency situations, including those requiring a defibrillator [8]. In South Korea, there is a 5-min time limit to reach patients with out-of-hospital cardiac arrest (OHCA). In the United States, the time allowed to reach a trauma patient is no more than 9 min [9]. Because of this, various efforts have been made to reduce the time it takes to reach patients [10], [11], [12], [13].

The COVID-19 (novel coronavirus 2019, 2019-nCoV) pandemic, announced by the world health organization in mid-March 2020 and continuing into the present [14], [15], [16], [17], [18] has affected health services [19], [20], socioeconomics, and people's lifestyles, all of which are factors that impact emergency medical services (EMS). However, there have yet been no studies of motorlance response time during the COVID-19 pandemic. This study was thus conducted to compare EMS operation time through motorlance during the pandemic versus normal periods.

## Methods

The present study protocol was approved by the Khon Kaen University Ethics Committee for Human Research (HE631278). The requirement for informed consent from the patients was waived since patient confidentiality protection had been guaranteed by identifying them using a unique study number, rather than by name.

### Study population and design

This cross-sectional study examined all motorlance operations dispatched from Srinagarind Hospital through Thailand's emergency telephone services (number: 1669). Cases in which the patients were under 18 years of age or for which there were missing data were excluded from this study. Data were recorded using the operation national standard checklist for EMS in Thailand. Data were collected from the Srinagarind Hospital EMS operation database and hospital information database system.

### Definitions

Motorlance service during the COVID-19 pandemic was defined as operations in which a motorlance was deployed between January 13 and April 21, 2020 (the date of the first confirmed case of COVID-19 in Thailand according to the Ministry of Public Health and day 100). We used the period from June 1, 2018, to December 31, 2019, as a normal period for comparison. Activation time was defined as the time from dispatch to resources being en route, response time was defined as time from 1669 center call receipt to arrival on scene, on-scene time was defined as the time between the responding ambulance arriving on location and its departure with the patient to the emergency department, and transport time was defined as the time from the scene of the emergency to arrival at the hospital. Time from dispatch to the arrival of the automated external defibrillator (AED) on scene was defined as AED waiting time.

### Statistical analysis

The sample size was calculated based on the number of motorlance deployments from Srinagarind Hospital EMS by Apiratwarakul [13]. To achieve a significance level of 5% and power of test of 0.8, we determined that a sample size of 871 would be required. Statistical analysis was performed using SPSS for Windows version 16.0 (SPSS Inc., Chicago, IL, USA). Categorical data were presented as percentages, and continuous data were presented using mean and standard deviation. Univariable analysis was performed using a two-sample t-test for numerical data and a Pearson's correlation for data relationships between the two groups.

## Results

Eight hundred seventy-one EMS operations were examined over the two periods of the study, 108 (12.4%) of which were conducted during the COVID-19 pandemic. The characteristics of the subjects and services are

shown in Table 1. The mean age of patients who received motorlance service during the pandemic was  $41.5 \pm 6.2$  years, and 54.6% (n = 59) were male. Operations in both groups were most commonly performed on non-holidays (68.3% during the normal period and 59.3% during COVID-19). Most cases in both groups involved non-trauma patients. The severity of patients' signs and symptoms were classified by color according to the Thai criteria-based dispatch (CBD) triage system. During the COVID-19 pandemic, CBD codes were red in 11.1% of cases, yellow in 48.1%, and green in 40.8%.

**Table 1: Characteristics of the subjects**

Characteristics	Normal period (n = 763), n (%)	COVID-19 pandemic service (n = 108), n (%)	p-value
Age (years) Mean $\pm$ SD	38.4 $\pm$ 5.2	41.5 $\pm$ 6.2	0.202
Sex: male	398 (52.2)	59 (54.6)	0.852
Operation day			
Non-holiday	521 (68.3)	64 (59.3)	0.651
Holiday	242 (31.7)	44 (41.7)	0.752
Type			
Non-trauma	548 (71.8)	82 (75.9)	0.810
Trauma	215 (28.2)	26 (24.1)	0.740
EMS triage level			
Red	103 (13.5)	12 (11.1)	0.650
Yellow	375 (49.1)	52 (48.1)	0.742
Green	285 (37.4)	44 (40.8)	0.785

Activation times during the normal period and the COVID-19 pandemic were  $0.58 \pm 0.20$  and  $0.56 \pm 0.12$  min, respectively (p = 0.680; Table 2), and response times were  $6.20 \pm 1.35$  and  $3.48 \pm 1.01$  min, respectively (p = 0.021). Transport time during the pandemic was significantly lower than in the other period (2.35 vs. 5.20 min).

**Table 2: Operation time in motorlance**

Operation time (min)	Normal services (n = 763)	COVID-19 pandemic service (n = 108)	p-value
Mean $\pm$ SD			
Activation time	0.58 $\pm$ 0.20	0.56 $\pm$ 0.12	0.680
Response time	6.20 $\pm$ 1.35	3.48 $\pm$ 1.01	0.021*
On-scene time	6.41 $\pm$ 1.20	6.33 $\pm$ 1.17	0.577
Transport time	5.20 $\pm$ 0.58	2.35 $\pm$ 1.01	0.010*

\*Statistical significance.

Motorlances were dispatched to cardiac arrest patients a total of 38 times. Response times during the normal period and the COVID-19 pandemic were  $7.11 \pm 0.42$  min and  $4.01 \pm 0.20$  min, respectively (p < 0.001; Table 3). Mean AED waiting time during the pandemic was also significantly lower than in the normal period (3.20 vs. 5.20 min), but the mortality rates of the two groups were similar.

**Table 3: Motorlance services for cardiac arrest patients**

Procedures	Normal services (n = 33)	COVID-19 pandemic service (n = 5)	p-value
Response time (min) Mean $\pm$ SD	7.11 $\pm$ 0.42	4.01 $\pm$ 0.20	<0.001*
AED waiting time (min) Mean $\pm$ SD	5.20 $\pm$ 0.26	3.20 $\pm$ 0.36	<0.001*
Mortality, n (%)			
Survived	4 (12.1)	1 (20.0)	0.068
Did not survive	28 (87.9)	4 (80.0)	0.055

\*Statistical significance.

## Discussion

This study is a comparison of EMS motorlance operation during the COVID-19 pandemic versus normal

circumstances. Motorlance response and transport time during the pandemic were significantly lower than during the normal period [13], [21], [22], [23]. This is likely due to reduced traffic as a result of workplaces and schools being closed and more people staying home in general. The most important function of a motorlance is to reach the scene quickly, assess symptoms, and provide the necessary treatment. Less important is its role in delivering patients to the hospital, which is usually carried out using a traditional ambulance. However, in many African countries, the Motorlances play a greater role in patient transport, mostly because of shortages of other types of ambulance. Previous studies have found correlations between national economic indicators and EMS response time [15], [16], [17], [18].

We also found decreases in response and AED waiting times (when the AED is attached to a motorlance) for patients with OHCA during the COVID-19 pandemic. In addition, response time was lower than in previous studies, which has varied from 5 to 15 min depending on the country, but in most countries, it was 8 min. These findings demonstrate the efficiency of the EMS unit in terms of notification of the incident, response of EMS members, and management of the vehicle en route. It may also be due to the fact that the area for which Srinagarind Hospital EMS is responsible is relatively small, including only a university and the surrounding communities. In addition, the small roads in the area are more suitable for motorcycles than larger vehicles. Although response and AED waiting times for OHCA patients were lower during the pandemic, there was no significant difference in mortality rate between the two periods.

The present study was limited in that data were gathered from only one EMS center and that the study design was retrospective, which may have resulted in incomplete data collection [24], [25].

## Conclusions

The motorlance response and transport times during the COVID-19 pandemic were significantly lower than normal, both overall and in cases of OHCA.

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