



# Real Time Telephone Application Use for Consultation in Emergency Medical Services

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## Abstract

**BACKGROUND:** Emergency medical services (EMS) are an operation that requires speed and prompt decision-making to provide patients treatment and rescue them from crisis. A telephone application was created to be a communication channel. However, the effectiveness of EMS consulting through telephone application has not been well studied.

**AIM:** The aim of this study was to describe the use of real-time telephone application use for consultation in EMS.

**METHODS:** A cross-sectional, single EMS centered study at Srinagarind Hospital in Thailand. Data were gathered from LINE<sup>®</sup> Application under the name of "Current training EMKKU" and the EMS database throughout 2020–2021.

**RESULTS:** A total of 11550 messages with 6221 general text; messages were not involved in patients' consultant (53.86%). The consultation mostly took place during the afternoon shifts (4 PM to 0 AM) accounted for 45.11%. We found that Thursday (19.63%) was the day with most frequent consulting services, followed by Tuesday (16.05%) and Friday (16.03%) regarding the consultation. There were 45 active users in the LINE<sup>®</sup> Application under the name of "Current training EMKKU." The mean age of the participants was 32.10±5.60 years, and 51.11% (n = 23) of them was female.

**CONCLUSIONS:** The real-time telephone application is used for consultation related to patients' symptoms during EMS operations and ER patient care was most commonly in the afternoon and on Thursdays and Tuesdays.

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## Introduction

Emergency medical services (EMS) are an operation that requires speed and prompt decision-making to provide emergency treatment to patients from crisis. The medical oversight of EMS is divided into direct and indirect aspects. In terms of direct medical oversight of EMS, telemedicine technology was used to coordinate information between the physicians serving in the hospitals with the operating personnel leaving for the scene of the incident. The previous study was found that the use of telehealth in EMS was rare in number when compared to other medical services [1]. Furthermore, the studies have shown that when telehealth was used in EMS, it resulted in reduced delivery to the emergency room (ER) by 6.7% and reduced time of the ambulance returning to hospitals for preparation by 44 min. In the COVID-19 outbreak situation, studies have shown that

it is 53.8% more likely to use telemedicine services through the WhatsApp<sup>®</sup> program and reduce time of travelling to the hospitals [2], [3]. However, the use of such technology must always be governed by ethical issues [4]. A study of the orthopedic consultation system found that 72% of the consultants were non-doctors and only 7% was physicians [5]. In previous studies, the consultation systems in various specialist at the ER were the primary duty of emergency physicians (EPs) to communicate effectively under the expectation of both patients and health-care professionals with both pressures and time constraints. Therefore, communication skills should be practiced while having a training related to emergency medicine resident program [6], [7].

In terms of Thailand EMS operations, there are personnel operating as EPs, emergency nurse practitioners, advance emergency medical technicians (EMTs), and EMTs who have the opportunity to use online consultation systems from

outside hospital to provide accurate advice on how to best treat their patients and reduce ER delivery in mild cases [8], [9], [10]. Studies have shown that using the telephone for consultation is an easy-to-use device. It is convenient and reduces repetitive work as well [11], [12], [13]. As for the EMS, Srinagarind Hospital provides a 24-h service in the operating area covering almost half of Mueang District, Khon Kaen Province (15<sup>th</sup> largest city area in Thailand). In the operations by the Khon Kaen EMS Dispatch Center to be categorized resuscitation patients (red color from telephone based dispatch), there will be a 1<sup>st</sup>-year-to-3<sup>rd</sup> year emergency medicine resident training with at least one person in all EMS operation. In the event of an EMS problem that needs to be consulted on patient care, there will be a communication channel through LINE<sup>®</sup> Application under the name of “Current training EMKKU” which has a regular EPs instructor to give advice all the time. There are currently 45 members of the channel. The study on using mobile applications for consultation with an EMS operation will benefit in the design and development of a patient service system with highest efficiency.

## Methods

### Study design and setting

This was a cross-sectional, single EMS centered study at Srinagarind Hospital, Thailand. Data were gathered from LINE<sup>®</sup> Application under the name of “Current training EMKKU” and the EMS database throughout 2020–2021. Ethical approval was provided by the Khon Kaen University Ethics Committee for Human Research (HE641203). The requirement for informed consent was waived since confidentiality protection had already been guaranteed. Accordingly, participants were not identified by name, but instead by a unique study number.

### Participants and data collection

Chat room was created on March 6, 2020, by EPs instructor under the name “Current training EMKKU,” which is used as a 24-h channel for consultation of the patient’s symptoms for emergency medicine resident training while conducting EMS.

We gathered all messages communicated in this channel from March 6, 2020, to March 6, 2021, in the LINE<sup>®</sup> Application and convert them to text, and then trained research assistants (Bachelor’s degree) classified all texts into three types: (1) General texts, (2) text messages for consultation of patient symptoms while in the ER, and (3) messages to discuss the symptoms of patients during EMS operations, with

review by two EPs instructor to confirm the types of messages.

### Sample size and statistical analysis

Based on the previous study in prevalence of EMS operations [14], the sample size was calculated. To achieve a significance level of 0.05, power of test of 80% and absolute precision 0.02, we determined that a sample size of 1801 would be required. Statistical analysis was performed with Khon Kaen University license (SPSS Inc., Chicago, IL, USA) by IBM SPSS for Windows version 26.0. Categorical data were presented as percentages, with continuous data presented employing mean and standard deviation. Univariable analysis was carried out using a two sample t-test for numerical data and Pearson’s correlation for data relationships between groups.

## Results

In the 1-year data collection (March 6, 2020 - March 6, 2021), there were 45 active users in the LINE<sup>®</sup> Application under the name of “Current training EMKKU”, and the characteristics of which are shown in Table 1. The mean age of the participants was 32.10±5.60 years, and 51.11% (n = 23) of them was female. The most common roles in EMS members were EPs instructor accounted for 31.11% followed by years 1<sup>st</sup> to 3<sup>rd</sup> emergency medicine resident (20.00% each).

**Table 1: Characteristics of the subjects**

Characteristics (n=45)	Number (%)
Age (years) mean ± SD	32.10 ± 5.60
Gender: female	23/45 (51.11)
Role in EMS members	45 (100.00)
EPs instructor	14 (31.11)
1 <sup>st</sup> year emergency medicine resident	9 (20.00)
2 <sup>nd</sup> year emergency medicine resident	9 (20.00)
3 <sup>rd</sup> year Emergency medicine resident	9 (20.00)
Administrator	4 (8.89)

SD: Standard deviation, EMS: Emergency medical services, EPs: Emergency physicians.

The observation of overall messages in telephone application “Current training EMKKU” revealed a total of 11550 messages with 6221 general text; messages not involved in patients consultant (53.86%), as shown in Table 2. The consultation mostly took place during the afternoon shifts (4 PM to 0 AM) (45.11%). When analyzing the days of consultant, we found that Thursday (19.63%) was the day with most consulting services, followed by Tuesday (16.05%) and Friday (16.03%), respectively.

The analysis of factors that affect EMS consultant in application (Table 3) revealed that female ( $P = 0.012$ ), emergency medicine resident ( $P < 0.001$ ), and afternoon shift ( $P = 0.014$ ) are factors that significantly affect EMS consultant.

**Table 2: Characteristics of the chat messages**

Characteristics (n=11550)	Number (%)
Overall messages	11550 (100.00)
General text	6221 (53.86)
ER consult	3110 (26.93)
EMS consult	2219 (19.21)
Consultation time	
Morning shift	3544 (30.69)
Afternoon shift	5210 (45.11)
Night shift	2796 (24.20)
Days of consultant	
Sunday	1204 (10.42)
Monday	1614 (13.97)
Tuesday	1854 (16.05)
Wednesday	1836 (15.90)
Thursday	2267 (19.63)
Friday	1851 (16.03)
Saturday	924 (8.00)

ER: Emergency room, EMS: Emergency medical services.

**Table 3: Factors affecting EMS consultant in application**

Factors (n=2219)	Action (%)	Not action (%)	p-value
Female	1562 (70.39)	657 (29.61)	0.012*
Emergency medicine resident	2006 (90.40)	213 (9.60)	< 0.001*
Afternoon shift	1511 (68.09)	708 (31.91)	0.014*

\*Statistical significance.

## Discussion

This study was a telephone application use in the Line<sup>®</sup> program under the name “Current training EMKKU” which is employed as a communication channel between trained doctors in emergency medicine and EPs instructor to discuss problems during patient care. Out of the 11550 communications, nearly half of all messages are related to patient care at the ER and in the EMS. This is consistent with previous studies in various fields of communication. There will be correspondence of information both relevant and irrelevant to the patients [8], [9].

Most of the consultation time was afternoon shift, which was in accordance with the previous studies that had a higher number of afternoon EMS operations than any other shifts [14], [15], [16], [17]. Furthermore, during the afternoon, there is only one EPs left to the ER department, unlike the morning shift with the EPs at two to four staffs which can direct communication without using the consultation through the application.

We also found that as for days with highest frequency of consulting services, it is most common on Thursday, followed by Tuesday. This corresponds to the teaching model of the training physicians in the field of emergency medicine which in both days there will be academic activities in which all physicians will be required to acquire theoretical and practical knowledge. All medical examinations are the responsibility of the EPs instructor. Thus, the EMS information is communicated through a Line<sup>®</sup> application, which once a clinician completes the academic activity, he/she can track the patient's information immediately.

When studying the factors affecting the use of telephone application for consultation during patient care, the researcher found that the female gender,

emergency medicine resident and operation in the afternoon shift are all related to the use of telephone applications for problem discussion during EMS care, thus developing a communication channel with real time telemedicine that can visualize the whole picture, voice, and two-way communication will be effective for providing useful advice to EMS operators.

However, this study contained some limitations, including information available from a single hospital that may differ in aspects of patient type or the training style of emergency medicine physicians. In addition, the present research's pattern is a retrospective study that may not contain complete information [16], [17], [18].

## Conclusion

The real-time telephone application is used for consultation regarding patients' symptoms during EMS operations and ER patient care were most common in the afternoon and on Thursdays and Tuesdays.

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