

Effectiveness of Emergency Medical Services Networks

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ABSTRACT

Inhomogeneous patterns of Emergency Medical Services (EMS) Networks in each province of Thailand lead to different outcomes of prehospital services. Therefore, the researchers examined the effectiveness of the operation process of the EMS organization networks and the suitable model of EMS for Thailand was proposed. With a high gap of different performance, EMS networks systems in Khon Kaen and Nonthaburi provinces of Thailand were studied. The research methodology, including in-depth interviews, non-participatory observation, group discussions, and documentary research were used. The results showed that Khon Kaen province had high effectiveness in governing the EMS organization network because the number of members enrolled in the network was expanded adequately to cover the entire services of the province. System of communication and coordination between subunits in networks was well arranged and performed quickly. This enabled quick access to emergency patients and provided on-site treatment for a proper time. Learning process by knowledge management and sharing in networks was a key factor to knowledgeable and skillful organizations. The emergency medical dispatch center provided treatment and advice to the emergency medical care providers under the control and responsibility of emergency medicine physicians. These quality services could save a large number of patients' lives. Nonthaburi EMS network governance was less productive because the number of members in-network was not sufficient. Lack of enough communication tools was another problem in the network. In addition, arrangement of knowledge management was not performed evenly through all the entire networks. There is no one-size-fits-all model for Thailand. However the appropriate EMS model for each province should be modified based on the EMS provider skills and hospital accessibility of each area.

KEYWORDS: Network Effectiveness, Emergency Medical Services, Network Governance

1. INTRODUCTION

The emergency illness such as cerebrovascular disease, coronary heart disease, and traffic accidents is ranked in the top five leading causes of death in Thailand. Provision of EMS is

considered as the medical and public health services that can save lives and improve the quality of life of people in the country. Therefore, providing people to have access to urgent care and essential health services in a safe and timely manner is a basic health service that people should have the right of thorough and equal access. Pre-hospital care is very important for surviving from illness or disability. On-scene patient care or when notified, patient transport of ambulances which are part of pre-hospital care, as well as the management of the organization network management system related to EMS, are considered very important to the survival and quality of life of the emergency patients. To carry on this task, collaboration and coordination between the relevant organizations are required. The relevant organizations consist of the main units: National Institute for Emergency Medicine (NIEM), Ministry of Public Health, public and private hospitals, Provincial Public Health Offices, Local government organization, and private non-profit sector; and the supporting units: Department of Disaster Prevention and Mitigation, Ministry of Interior, Ministry of Defence, Ministry of Information and Communication Technology, National Telecommunication Commission, Royal Thai Police, Provincial Disaster Prevention and Mitigation Office, and other related agencies.

The concept of EMS can be classified into two main models: Franco-German model and Anglo-American model. The first model is an EMS as part of the health service governed by health agencies, which relies on doctors to provide treatment and focuses on on-scene service. While the second model is an EMS as part of the public safety service governed by internal security agencies, which provides health care by paramedics and focuses on quickly transport to hospital. However, in practice, it is found that which model will be adopted depends on the context and the development of the system of each country, and it is not separated into any form [1,2].

The EMS system in Thailand is divided into four phases: (1) Pioneer Phase (before 1994) [3] – in the early of this phase, patients are brought to hospital, it is developed from volunteers from various foundations such as Poh Teck Tung Foundation, and later the government has taken responsibility and established “Police Medical Evacuation Center” and “Narenthorn EMS Center”. In the end of this phase, the referral system for accident patients has been developed until it becomes to “Trauma Center” in Khon Kaen Province;

(2) Prototyping Phase (1994-2004) [3,4] – in this phase, “Trauma Center” is established in Khon Kaen Province as a model of the emergency medical system in Thailand and expanded throughout the country later. In addition, more rescue centers are increased in Bangkok area, with the number 1554 for coordinating with Narenthorn EMS Center, Ministry of Public Health, and with the number 1669 for medical emergency call expanding service areas to some provinces of the Central region. Moreover, the first curriculum for producing emergency medical professionals is established at the Sirindhorn College of Public Health and the accident and disaster action plan is included in the Seventh National Economic and Social Development Plan [5]. When the plan ends, tertiary care hospitals, and primary care hospitals have established more than 90 rescuer centers;

(3) Extension Phase (2005-2008) [3,4,6] – since 2005, EMS both inside and outside hospital have been expanded to the central, regional, and local areas by leaps and bounds, with four levels of actions from the preliminary level (by volunteers) to the advanced level (by professionals). The role of local administrative organizations (LAO) began to appear with support for rescue services at the sub-district level and there are some internal medicine emergency services such as acute coronary syndrome and acute ischemic stroke, in Bangkok areas and some province in the region. The National Health Security Office (NHSO) supports the

system development to support all such services, with cooperation of Ministry of Public Health as the master of most government services in the region. The significant difference between this phase and the first phase is further expansion of the role of the government in developing the system even further by using more budgets and the development plan, including the implementation of the plan more systematically;

(4) Post-promulgation phase of the Emergency Medical Act of B.E. 2551 (2008) [7] – in this phase, National Institute of Emergency Medicine (NIEM) is especially established to support the development of the emergency medical system to be different from the past. During the first four years after the establishment of NIEM, the support of NHSO is still available. For the hospital section, NIEM focuses only on the development of the EMS system according to the same direction of NHSO performed, that is, encouraging local administrative organizations into the main role, especially in emergency, making the compositions of the EMS system more concrete. For example, there are courses for supporting production and registration under the criteria of NIEM, durable objects and equipment for the standard service, and money for supporting and developing the service. However, although many aspects may have been obviously developed, the overall quality of the country is unclear, and there is also a significant disparity between areas.

Network governance is coordination for the purpose of creating efficient public services in the modern era. For traditional public administration under the concept of bureaucratic and hierarchical orders, the nature of operational structure will be commanded by high-level public officials or authorities who do not have close relations with low-level public officials who put the policy into practice, or people who may benefit from such public services. This results in the vertical working between organizations [8], which lower-level public officials and the public cannot directly reflect the problems encountered to high-level public officials who set the policies. Thus, the resulting public services do not meet the needs of the public [9]. When new public management occurs, the concept of working like a private sector is introduced, leading to the delegation of a private sector as the authority for providing public services, which it helps improve public service quality. However, when a private sector becomes an operator of public services, the public have no right to complain about problems since the private sector has no any responsibility to the public. Such public services are not able to meet the needs of the public [10]. Therefore, the concept of new public governance has been developed as a guideline for the government administration in order to fill in such gaps through a process known as the government management network.

Government management network is a process of building cooperation between government organizations and non-governmental organizations [11,12]. The process of networking is initiated by an organization that has the ability to persuade and establish public services [13]. The result of building a management network is a new type of organization that can bring power from the government to various organizations with higher working ability, including avoiding the hierarchy and horizontal operation resulting in co-operative forms of decision-making for the organizations within the network. Moreover, the network can achieve its goals faster than working with only government agencies [14]

From managing the EMS network in Thailand in the past, it was found that management structure, support of associate networks (agencies that obviously cooperated in the development of EMS system, with a formal agreement, and long-term goal), and associate supporters (agencies that provided cooperation in the development of EMS system for organizing some activities or for a period of time, with no formal agreement and short-term goal) of the provincial

EMS system, including supporting resources to be sufficient for the operation of each province in Thailand were considerably different, resulting in the performance and the effectiveness of the EMS network of each province different. In addition, it was found that there were conflicts between mechanisms within the EMS network, for example, between the State Audit Office of The Kingdom of Thailand and local administrative organizations, between the foundations and hospitals or municipal/subdistrict administrative organization, which this conflict affected the effectiveness of EMS. Based on the Annual Report 2016 of the National Institute for Emergency Medicine, it was found that the proportion of critical emergency patients who received an emergency response within 8 minutes was significantly different in each province. Nonthaburi province had the lowest proportion, accounting for 23.72% and Songkhla province had the highest proportion, accounting for 73.80% [15]. In addition, it was found that most of the past performance did not achieve the set target, both promoting the public awareness of emergency prevention, accessing the EMS system, and providing pre-hospital care. Currently, managing the standard of the provincial EMS centers and command centers in each province was quite different.

Provan and Millard [16,17] divided the measures of the network effectiveness into three levels: community level, network level, and organization level. In the study on the effectiveness of health service network, Provan and Milward (1995) [16] selected the effectiveness of community-level network, with well-being of people as an indicator because well-being was the most important aspect of health service.

Glickman et al (2010) [18] measured the success of the EMS network, and the El Sayed MJ (2012) [19] measured the quality of the EMS system, by considering the structures, processes and results of the services. The results were considered as an indicator that reflected the overall effectiveness of EMS. The results were measured from (1) mortality rates; (2) subsequent disease; (3) residual disability; (4) resulting illness; (5) patient satisfaction; and (6) value of service (6D's: Death, Disease, Disability, Discomfort, Dissatisfaction, Destitution).

From the problems in managing EMS networks in Thailand, the objectives of this study were to: (1) study the operational process of EMS network organization; (2) study the effectiveness of the management of EMS network organization; and (3) present a model of EMS suitable for Thailand.

From reviewing the study on the effectiveness of network management, measuring the success and quality of the above-mentioned EMS network, in this study, the researcher measured the effectiveness of EMS network at the community level based on (1) access to EMS; (2) mortality rate of emergency patients; (3) perception of information on EMS; and (4) public awareness and understanding about EMS. The initial conceptual framework for this research was defined as a process conceptual framework as shown in Figure 1

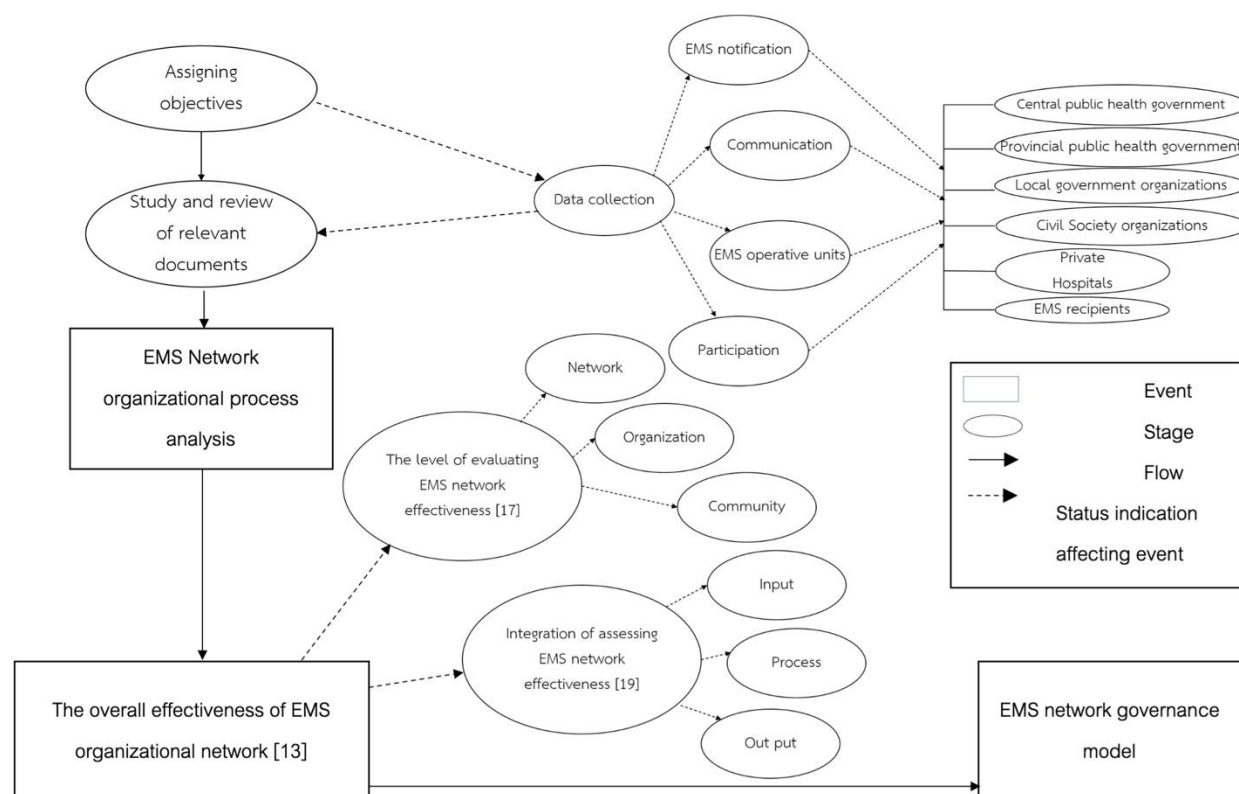


Figure 1: The initial conceptual framework of the research.

2. METHODOLOGY

This study was conducted by using qualitative research methodology, with multiple case studies design as a guideline for acquiring answers of the research questions. The purposeful selection of study area was defined in order to obtain sufficient data and cover the subjects of study (information-rich cases). There were two study areas as follows: Khon Kaen and Nonthaburi provinces.

The researcher determined the scope of the study on the EMS network, consisting of National Institute for Emergency Medicine, Subcommittee on Provincial Emergency Medical System Administration, Local Administrative Organizations (PAO, MAO, and SAO), Medical Excellence Center (such as Trauma Center, Cardiac Center), Provincial Public Health Office, District health service networks (Contracting Unit of Primary Care: CUPs), private hospitals, civil societies, associations and foundations, focusing on the process of pre-hospital care. The main framework covering EMS reporting system, communication system, EMS operating unit and network participation were defined.

There were two types of data for analyzing and acquiring the answers for this research. The first, primary data were obtained from in-depth interviews, focus group, both participant and non-participant observations – key Informants were personnel working in the emergency medical network both from (1) central sector: World Health Organization and National Institute for Emergency Medicine; (2) Provincial Public Health: namely provincial public health offices, provincial hospitals, community hospitals, and primary care units; (3) local administrative

organizations: provincial administrative organizations, municipal administrative organizations, and sub-district administrative organizations; (4) Non Governmental Organizations (NGO), civil societies, foundations, associations and private hospitals; (5) patients. There were totally 44 key informants. The second, secondary data were obtained from studying research literatures, emergency medical information systems, and field data. The data were analyzed by descriptive analysis from January 2020 to March 2021.

3. RESULTS AND DISCUSSION

3.1 Khon Kaen Province

3.1.1 Khon Kaen EMS Network Governance

The first EMS is established in Khon Kaen province and it is the starting point for the systematic EMS in Thailand. Dr. Wittaya Chatbanchachai, MD, a surgeon at Khon Kaen hospital, is the initiative to build the EMS team and network in order to develop a patient referral system in 1989. The World Health Organization has supported budget for establishing an accident center at Khon Kaen hospital, pre-hospital care development committee, private and public rescue units, paramedic unit, communication and command center, as well as preparing courses for producing emergency medical personnel and pushing for legislation to support the emergency medical system. Later, the accident and disaster programs are included in the National Economic and Social Development Plan, tertiary care hospitals and primary care hospitals have established many rescue centers. To provide internal and external EMS, the hospital has expanded its services to the central, regional and local areas. There are four levels of emergency response unit: basic, beginner, intermediate, advanced levels.

The network of emergency medicine response unit in type of medical practice or the rescue center of Khon Kaen Province highly covered the area of the province, resulting from the surgeon at Khon Kaen Hospital building trust and cooperation with the provincial governor and the leaders of the local administrative organizations jointly build a network of EMS jointly, as well as continuing expansion of the network by allowing personnel in the organization to use humility to promote the integration of emergency medical work in the area. Therefore, LAO plays a key role in the provision of basic life support unit (BLS) and First life support unit (FR), and these life support unit covers 85% of the area [19].

“Ambulance services quite cover the service area, especially in the area of Muang district. There are both ambulances of local authorities, foundations, and volunteers and all is free when calling the service via the number 1669” (Registered Nurse, Clinic, Nong Kung Primary Care Cluster, 2019: interview)

For emergency reporting in Khon Kaen province, accident victims or those who found the emergency accident can report the case via the emergency number 1669, which is available at the emergency medical dispatch and command center, Khon Kaen hospital, without any charge.

Emergency medical dispatch and command center of Khon Kaen Province is at an advisory level because there are emergency medicine physicians who supervise and ensure the correctness in the decision-making process.

Pattern of communication between various departments in the EMS network of Khon Kaen Province uses the EMS Day meeting, which has been held regularly and continuously for a

long time, with the Director of the Accident and Crisis Center acting as a chairman. This is an important channel of both formal and informal communication with all organizations in the EMS network and is an important mechanism for building unity, for resolving conflicts, sharing resources, building and exchanging the knowledge for management of the emergency medical network. EMS Rally has regularly been held to communicate and strengthen a good relationship between the emergency response unit in the network and social media is used for informal communication between organizations in the network in order to communicate quickly and thoroughly.

Khon Kaen Province began planning and building an EMS network together with the local administrative authorities for more than 20 years, causing municipalities and SAOs in Khon Kaen Province to highly participate in the EMS network. However, the participation is limited at service and benefits aspects. For the evaluation aspect, it is only the evaluation of the performance of the EMS rescuer teams within their own agencies.

3.1.2 Effectiveness of the Khon Kaen EMS network.

1. Access to emergency medical services

Access to EMS is that emergency patients had received an EMS by the standard response unit from the scene of the accident to the medical facility under the command of the emergency medical dispatch center. From considering the record of emergency patients for the past one year, there were 20.09% of the emergency patients who received the service through the emergency medical system (EMS) of Khon Kaen province [19].

2. Mortality rate of emergency patients

The deaths of emergency patients in Khon Kaen province for the past one year, the result of basic care showed that 146 emergency patients died at the scene of the accident, representing 0.15%; 17 emergency patients died at during transport to hospital, representing 0.01%. The result of hospital treatment showed that 483 patients died at hospital, representing 0.49%.

Critical emergency patients received the emergency medical response within 8 minutes in 2019 in Khon Kaen province were 62.18% [19].

3. Perception of EMS information

The perception of information about EMS determined from the record of calling the number 1669 in case of emergency illness in Khon Kaen province for the past one year, it was found that emergency patients reported the case via the emergency number 1669 were 72.14% [19].

4. Public's perception and understanding of EMS

Public relations to build awareness of the public in the area, the organizations that provide EMS in Khon Kaen province, such as government hospitals, provincial public health offices, and local government organizations, have publicized the EMS information in order to build awareness and understanding of the public for the primary care and response to emergency illnesses.

“Khon Kaen province has created a network of community resuscitation unit in municipalities, social medicine units of every hospital, volunteers, relatives of chronic disease patients, teachers, students in the community to notify accident case, to provide the first aid care before EMS unit arrived, which requires the knowledge and understanding of reporting incidents to the dispatch and command center, and to provide pre-hospital care to patients while waiting for the ambulance” (Officer of Khon Kaen Provincial Public Health Office, 2019: Interview)

However, most people thought that they did not have the knowledge and ability to perform CPR, even if they had been trained. They were not sure when they encountered a real situation, they can do it. If there was not any practice after CPR training, so they may forget it. As a result, if there was any mistake during performing CPR; they may be sued. Some people still believe that the duties of emergency or accident cares belong to physicians, nurses, paramedics, VHV and village leaders. People using the service or living in the area of Local Administration Organization (LAO), and the members of emergency medical network will know and call for EMS through LAO or the number 1669, due to the publicity of LAO.

“Someone taught me how to perform CPR a long time ago. I can't remember now. So, I think I can't do it right now” (People in Nong No Sub-District, 2019: Interview)

“I don't want to do CPR on anyone. Because if he dies, I'm afraid his relatives may sue me” (People in Nong No Sub-District, 2019: Interview)

“If I meet an unconscious patient and performing CPR is required. I'll call SAO EMS or VHV because they have more knowledge and experience of performing CPR than me” (People in Nong No Sub-District, 2019: Interview)

“Call the paramedics of LAO to report the emergency case, they respond faster than calling 1669. If they are under an operation or their ambulances are not available, they will contact and coordinate with another EMS center” (Professional Nurse, Family Physician Clinic, Nong Prung Health Promoting Hospital, 2019: Interview)

From the conclusion of the above quantitative and qualitative data, it was found that the EMS network organization of Khon Kaen province had high efficiency. The number of patients who died from emergency accidents was low. Most of LAOs cooperated to provide the emergency response units, leading to having the emergency response unit in almost sub-districts. Moreover, all relevant organizations had advertised the public about the use of EMS. As a result, most people called 1669 when an emergency occurred and most of the emergency patients received a response within 8 minutes after reporting the case through the number 1669. Most people also lacked the knowledge and confidence in the first aid care in an emergency.

3.2 Nonthaburi

3.2.1 Nonthaburi EMS Network Governance

The systematic pre-hospital EMS in Nonthaburi Province started from Phranangklaao Hospital which had established “Phranangklaao Rescuer Team” in 2004. This EMS center provided out-of-hospital emergency care service in conjunction with Poh Teck Tung Foundation and Ruamkatanyu Foundation. At that time, they were under the command of the Office of EMS, known as Narenthorn EMS Center, Ministry of Public Health, and provided EMS for patients who had been notified to Phranangklaao hospital, including bedridden patients. The Emergency Medical Act was promulgated on March 7, 2008, along with the establishment of the NIEM to be responsible for managing the coordination between relevant agencies both the private and public sectors and set up at least one emergency medical dispatch and command center in every province. Therefore, Phranangklaao hospital had established Nonthaburi provincial emergency medical dispatch center in accordance with the requirements and standards of the NIEM, providing the service via the number 1669 within the area of Nonthaburi province under the emergency medical department of Phranangklaao hospital. Phranangklaao Rescuer Team became to be an emergency medical rescuer team but still use the same name “Phranangklaao Rescuer Team”. There was no meeting, discussion, or agreement between the management of each party, whether it be Central Public Health, Provincial Public Health, or local government organization, about jointly establishing a network of EMS in the area yet. Currently, Phranangklaao hospital is still responsible for managing the Nonthaburi Provincial EMS dispatch center.

Emergency medical dispatch center of Nonthaburi Province is at a basic level because there is no appointment of Medical Director at the dispatch center. However, in practice, emergency physicians at the emergency room of Phranangklaao hospital has provided consulting services for 24 hours a day. Therefore, it is not different from Khon Kaen hospital, emergency physicians are responsible for supervising, training and passing on the academic knowledge to the personnel in the emergency medical dispatch center. Moreover, the dispatch center is a learning center for personnel in the Public Health Region 4 (including Nonthaburi, Pathum Thani, Saraburi, Lopburi, Nakornnayok, Singburi, Angthong and Phra Nakhon Sri Ayutthaya) EMS systems. Especially, Nonthaburi provincial EMS dispatch center has the paramedics for providing the accurate pre-hospital triage to identify patients’ severity levels and to provide appropriate pre-hospital emergency care advice which affects the survival of the emergency patient.

Attempting to build a network of emergency medicine in Nonthaburi province is still only a role for personnel in the provincial public health authorities. While the regional public health authorities and the local administrative organizations have not consulted to build mutual trust. The network of EMS is therefore limited to certain areas and coverage of emergency response unit is only 25% of the area.

Nonthaburi Emergency Medical Network has no meeting between all organizations in the EMS network. There is only a joint meeting within the regional public health authorities a few times a year. EMS Rally has never been held to strengthen the relationship between the emergency response unit in the network and social media is used for informal communication between organizations in the network, similar to Khon Kaen Province.

Participation of civil societies in the provision of emergency medical response unit in Nonthaburi province mainly relies on the network of emergency medical response unit of

foundations and associations to provide services to people in the area. However, participating in activities of foundations, associations, and volunteers is uncertain as it is not a regular task. The mismanagements of some private hospitals in Nonthaburi Province recognize the importance of saving the lives of outpatients and it is considered as a social responsibility. Therefore, they have participated in the network of EMS by using their own resources and organizing high-level emergency response team for serving people in the responsible areas. They have been recognized by the Nonthaburi emergency medical network as an important force in helping emergency patients and take part in benefiting from saving lives making a reputation and promoting the organization to be known and accepted by the public.

“It’s my own car including tools I bought them myself. This hard collar I ordered from America at my expense. Last time, I got 30 pieces and then gave them to other agencies and people in need. Anyone who doesn’t have it can come and get it. When I transfer patients with hard collar to hospital, I always tell them do not leave it when not in use, just call me to collect it. I never ask for donation of this thing because people might think that I find benefits. I’m here to be a volunteer, I do it with my heart I like this task” (Nonthaburi Provincial Medical Emergency Volunteer, 2019: Interview)

“I come to be a volunteer after work. I like driving at night due to less traffic. And day time I have to work. The service car is my own car. It’s a van and I also bought many tools. I will go shopping and buy stuffs, normal saline, equipment from a pharmacy near Siriraj hospital” (Nonthaburi Provincial Medical Emergency Volunteer, 2019: Interview)

“Now volunteer is not much because the economy is not good and each time you come out, you have to spend money, whether it be expenses for foods and drinks, gas, tools, as well as medical equipment. We do not get paid or compensation from a foundation, it is a volunteering. I’m ready and would like to help others. Unlike the permanent staff of a foundation, they get salary from the foundation. Support vehicles in some areas are insufficient and the existing volunteers have to work in the field. Ruam Katanyu Foundation has provided four support vehicles to Nonthaburi province, that is, two ambulances for daytime service, one head body carrying vehicle for daytime service and one for nighttime service. When they get off work, then I undertake to continue the task at night” (Nonthaburi Provincial Medical Emergency Volunteer, 2019: Interview)

3.2.2 Effectiveness of the Nonthaburi EMS network

1. Access to emergency medical services

Critical emergency patients who came to hospital through Emergency Medical Systems (EMS) of Khon Kaen Province and Nonthaburi Province for the past one year were 13.75% [19].

2. Mortality rate of emergency patients

507 emergency patients died at the scene of accident, representing 2.39%, and 10 emergency patients died during transport, representing 1.97%. From the result of treatment, 130 patients died at hospital, representing 0.61% [19].

Critical emergency patients received the emergency medical response within 8 minutes in 2019 in Nonthaburi province were 18.71%.

3. Perception of EMS information

From the record of calling 1669 in the case of emergency illness in Nonthaburi province for the past one year, it was found that 80.21% of emergency patients reported the accident via the emergency number 1669[19].

Most people have known or have heard of the emergency number 1669 through various media such as billboards, brochures, radio, public relations from SAO officials, VHV, CEV, and community leaders, and more than 80% of emergency service in 2020 were called via the emergency call number 1669 [19]. Foundations and associations also promote the public to call for EMS via their own direct numbers rather than the number 1669. Some people still feel that calling 1669 have to answer many questions and providing the service is more delayed than going to hospital by themselves and they feel insecure about using the services of rescue volunteers since they are afraid of accident and thought that rescue car is used for transporting dead bodies.

"I prefer to take your own car as it's easy to go...don't have to wait, and don't know when they will come."

"The foundation's rescue pickup truck with roof was used for transporting dead bodies. I'm afraid of it"

"Afraid of an accident. The driver turns the siren on and drive so fast. Cutting in and out of traffic all the time. I'm afraid that they will not reach the hospital"

(People using EMS in Nonthaburi, 2019: Interview)

4. Public's perception and understanding of EMS

Although the public knows the emergency number 1669, from interviewing the public who used the service, it was found that public relation did not make the public thoroughly understand the purpose of having the emergency number 1669. Some people still understand that EMS are only for accident patients, charge service fees, and are not available for calling 24-hour ambulance service. Some people do not understand the purpose of questioning via telephone, leading to dissatisfaction with the inquiries of call center staff. Some people who have used EMS before do not call for the service again because they find that it is difficult to inform the patient information and the location the accident. Some feel that the emergency number 1669 is not easy to memorize during a panic attack.

"I know the number 1669. But my father has chest pain, not car or motorcycle accident. So, I brought him to the hospital, didn't call 1669" (Relative of a patient in emergency room, Central Chest Institute of Thailand, 2019: Interview)

"Some patients call the wrong number like 1966 or 1169. So, they cannot report the accident" (Nonthaburi Medical Emergency Volunteer, 2019: Interview)

"The patient's relatives told me that it was very difficult for calling 1669 and no one answered the call. So, I asked to check the telephone number and found that they

dialled the wrong number such as 1666, 1966, or 1996”(Nonthaburi Medical Emergency Volunteer, 2019: Interview).

"To be honest, at that time I was shocked and hurry....I didn't think of the emergency number 1669 at all”(Relative of a patient in emergency room,Bangyai Hospital, 2019: Interview)

From the above quantitative and qualitative data, it can be concluded that the EMS network organization of Nonthaburi Province was not as effective as it should be. The proportion of patients who died from an emergency accident in Nonthaburi Province was higher than that of Khon Kaen Province. Local government organizations rarely played attention to the provision of EMS. The emergency response unit from volunteers, foundations, or associations were mainly relied on, causing insufficiency for the areas and lack of holding meetings among all network parties of EMS in the province. There was only a joint meeting between the regional public health organizations, which was irregularly held.

The network of out-of-hospital EMS in Khon Kaen and Nonthaburi provinces started from helping emergency and accident patients like other countries, both developed and developing countries[20-26]. The development of Thailand's emergency medical system was similar to that of the United States of America [22]. In the early stage, there was no a supporting law, lack of the medical care standard, and no supervision. Moreover, the management of emergency medicine services in each province was not unity until the Emergency Medical Act B.E. 2551 (2008) was enacted, resulting in the systematic development of emergency medicine services. Currently, the provision of EMS in Thailand has a similar problem with developing countries such as Nepal, which has not yet integrated the network systems or organizations and the provision of EMS is not sufficient to meet the needs of people, as well as lack of equality in access to services, lack of specialized personnel and personnel operating in the system have been not properly trained, leading to lack of the knowledge and expertise[26].

The network of EMS in the context of Thailand today, the central and regional governments are unable to provide adequate services to the public. Most local government organizations have not participated the EMS network. Civil society plays an important role in providing EMS to the people. It is considered as a model in line with the concept of new public governance arose because of the changing of the global society in many aspects such as politics, economy, society, and environment, which impact on a wide scale and involve many parties. Traditional public administration may not be the solution [27-30]. It is important to coordinate and cooperate between stakeholders and other parties, to persuade each party to utilize resources in order to achieve the public goals, and to deal with conflicts that may arise from the joint process between networks [31]. The EMS in Thailand correspond to four major compositions of new public administration: 1) network governance; 2) reducing blurring boundary reduction; 3) Resource Exchange and Joint Investment; and 4) promoting and maximizing civic engagement and co-production.

Reporting a case via the emergency telephone number 1669 of Khon Kaen and Nonthaburi provinces will be used only for the emergency case. This number will be available in the dispatch centers of such provinces and free for service. Reporting other case uses different numbers. It is similar to developing countries. For example, Nepal and Maldives uses the number 102 for emergency ambulance service, which is operated by a non-profit organization [21, 26]. Ubon Ratchathani Province includes all types of emergency reporting in the single number 1669,

it is similar to many other developed countries as follows: The United States of America and Canada which use the number 911; the European Union uses the number 112 [23]; Hong Kong uses the number 999 [20]; Japan [32] and Taiwan use the number 119 [24]; Singapore uses the number 995 [33], to integrate rescuers and firefighting. Especially, USA, EU and Hong Kong use the same number for police report as well. The use of different emergency numbers can lead to confusion among people, especially in emergency situations. Integrating all types of emergency numbers into one number, using 3-digit number in order to remember easily, which can increase the patient's access to EMS and improve communication efficiency. This is consistent with the studies by Bhandari, D. and Yadav N.K. (2020) Shah and Mishra (2018), Herbosa (2005) and European Commission (2013) (26,22,21,34,35).

3.3 Models of Emergency Medical Services

From this study, the researcher found that the current EMS in Thailand focused on transporting patients to hospitals as quickly as possible were not always the most appropriate way. In the context of Thailand which had the limitation on the number of personnel in the EMS, each area had different technology and infrastructure. Therefore, the researcher presented the models of EMS. There were four types of EMS governance suitable for Thailand. For implementing which model, consideration of factors in access to hospitals together with the ability and skill of emergency response units was required. There were four cases of EMSs shown in Figure 2; the details were as follows:

1. In the case that the scene of emergency was not far from hospitals and the EMS providers lacked the expertise in treating emergency patients, transferring the patients to hospitals safely as quickly as possible should be concerned (Scoop and Run).
2. In the case that the scene of emergency was far away from hospitals and the EMS providers had the expertise in treating emergency patients, the pre-hospital care should be performed at the scene of accident until the patient was safe and then transiting the patient to hospital (Stay and Play).
3. In the case that the scene of emergency was not far from hospitals and the EMS providers had the experience and expertise in the emergency care, the pre-hospital care should be performed as quickly as possible, making on-scene care and transport to hospital more efficient (Play and Run).
4. In the case that the scene of emergency was far from hospitals and the EMS providers had lack of knowledge and expertise in treating emergency patients, the first emergency response unit should perform pre-hospital care in accordance with the potential and advice of the emergency response and command center, and then transport the patient to the nearest hospital quickly (Stabilize and Scoop).

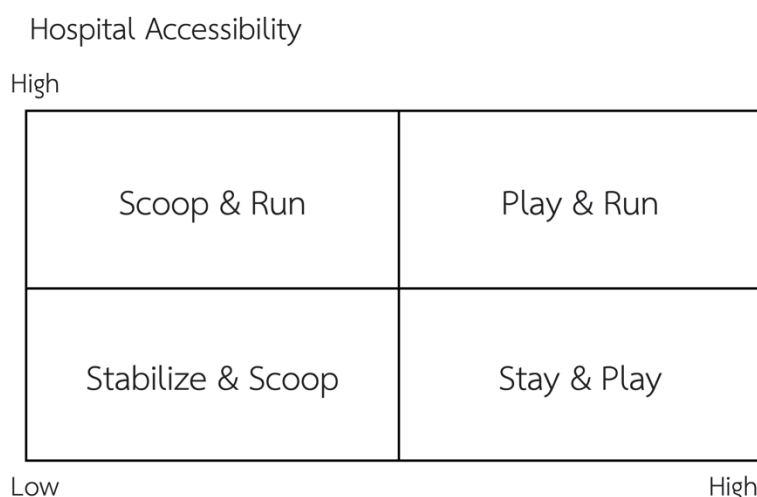


Figure 2: Model of emergency medical services in accordance with the EMS provider skills and hospital accessibility

4. CONCLUSION

Khon Kaen province had high effectiveness of the management of the EMS network organization, which can build and increase the number of members within the network sufficiently and cover the entire province, and coordinate between networks quickly, resulting in access to emergency patients within a reasonable and timely manner. The collaborative learning system allowed the organizations in the network to have appropriate knowledge. The case reporting center provided treatment advice to the response unit in the network under the control of emergency medicine physician, thus leading to quality service and save a number of patients' lives. For the effectiveness of the management of the EMS network in Nonthaburi province was less. Members in the network were not enough, since the leaders of various organizations were not concerned with building the network, including lack of activities to strengthen relations and participation among organizations in the network, and knowledge management that did not cover the entire network.

ABBREVIATIONS

| | |
|-------|---|
| NHSO | National Health Security Office |
| NIEM | National Institute for Emergency Medicine |
| PAO | Provincial Administrative Organizations |
| SAO | Subdistrict Administrative Organization |
| PPHO | Provincial Public Health Office |
| STEMI | ST-Elevation Myocardial Infarction |
| VHV | Village Health Volunteer |

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