Disaster Medicine in Thailand: A Current Update. Are We Prepared?

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Objective: *To investigate the level of major incident/disasters preparedness in Thailand by evaluating to-date data with main focus on past events and their outcomes to alert national medical societies for their roles in upcoming disasters/major incidents.*

Material and Method: *Besides data from past disasters/major incidents (Jan 2006-Dec 2010), including injury details in each event; all information about current disasters/major incidents preparedness systems, triage and pre-hospital management, standard of personnel, co-ordination and command centers, were reviewed by using data from Bangkok Emergency Medical Service, Narenthorn EMS of Rajavithi Hospital, Emergency Medical Institute of Thailand, Royal Thai Police, Department of Disaster prevention and mitigation (Ministry of Interior).*

Results: *There was neither a national registry, nor an authentic centralization of the preparedness system. The current organization was found to be functional, but incomplete. The main dispatch center responsible for medical service in Bangkok metropolitan during the present study period was Bangkok EMS ("Erawan center"). In provincial areas, emergency medical services (Ministry of Public Health) in each province act as dispatcher in their corresponding regions in cooperation with the emergency operation divisions in their related area. Several private organizations also volunteered to assist. There was an increase in the number of disasters/major incidents in Thailand between 2006 and 2010; with a total number of 60,999 deaths, 346,763 wounded patients and 73 missing and total costs of 47,453.69 million Baht (1,581.79 million US Dollar).*

Discussion and Conclusion: *There is an established and functional disaster management organization in Thailand with some overlapping difficulties and a need for improvement. Understanding the national need for registry, public information, preparedness, cooperation and coordination inside and outside hospitals, will not only save lives, but also would be beneficial for the country in terms of major economical measures.*

Keywords: *Disaster Medicine, Thailand, Major incident, Mortality, Injury, Update*

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A major incident is by definition an incident, which is so great or serious that all available resources should be organized, used and supervised in an extra-ordinary way. Such incident can be simple or complex depending on its impact on the affected area's infrastructure (simple when the infrastructure is intact). It can also be compensated or uncompensated due to the available resources. Many incidents start as uncompensated as the available resources are not enough to manage the situation in the beginning. A major incident which cannot be compensated within an acceptable period of time is a disaster[1]. The cause of a disaster is either natural *e.g.* Hurricane or man-made *e.g.* terrorist attacks. Therefore, the stipulation of health and medical care in response to any disaster often involves mass casualty management, which covers the build-up of command and control, co-ordination between various organizations, triage of victims based on vital physiological and anatomical clinical measures, clearing, transport, mental and environmental health managements. This kind of approach distinguishes disaster medicine from emergency medicine and normal community health

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measure practices and need to be learnt and practiced[1-4].

Disasters cannot be prevented, but they can be mitigated through adequate planning, provision and management in all involved organizations with the final goal of reinstating the health services and facilities to the pre-disaster situation as soon as possible. Disaster medicine is a young medical discipline, which not only discuss the provision of medical care to disaster survivors, but also the leadership of medically related disaster preparation, planning, response and recovery throughout the pre- intra- and post- disaster period[1,2,5,6]. Many countries lack disaster medicine as subject in their medical training programs and thus young doctors never get the chance to learn about the special approach needed at the time of major incident/ disaster[4,5,7].

Thailand has been involved in many natural disasters; Tsunami (2004, 5,078 deaths, 8,457 injured and 3,716 missing), typhoons (Xangsane 2006, 47 deaths) and flooding (2010 Thai floods with 257 deaths), but also many man-made major incidents; aviation (Bangkok airway flight 266, 2009 with 1 death and 41 injured and One-Two-Go airlines flight 269, 2007 with 89 deaths and 42 injured) and fire incidents (Santika pub fire 2009 with 66 deaths and 229 injured and Kader toy factory fire 1993 with 188 deaths and 500 severely injured), political conflicts in April-May 2010 with 91 deaths and 1,493 injured and others[8-10]. There is also an increasing number of motor vehicle incidents with a constant number of deaths registered since 1997[11].

Such major incidents/disasters not only make the country vulnerable to new ones, but also emphasize the need for better education in management of mass casualties and knowhow of cooperation with other involved organizations when the resources are insufficient. The latter is actually practiced on daily basis within the European and American healthcare as the economical constraints have made substantial changes in current healthcare systems with reduction in number of available beds, new treatment policies and daily purchase of materials. In such situation even daily disturbances within the healthcare system can jeopardize our ability to cope with major incidents and disasters and limit the national/regional preparedness by minimizing the surge capacity[2]. This may indicate a need for physicians to have basic training in the principles of major incident/disaster management. Particularly in Thailand, disaster medicine seems to be less recognizable in the medical societies, although increasing incidents were reported in latest years[11]. These issues activated many organizations in Thailand since 2000, in response to mounting need from the public, to establish the education and management systems to prepare for the increasing disasters[9].

The authors, therefore, aimed to investigate the level of major incident/disasters preparedness in Thailand by evaluating to-date data with main focus on past events and their outcomes and to alert national medical societies for their roles in upcoming disasters/ major incidents.

Material and Method

The current organization for management of major incidents/disasters in Thailand was reviewed[9,11-15]. All incoming data concerning major incidents and disasters in Thailand, between 1st of January 2006 and 31st of December 2010, was collected by using data from Bangkok Emergency Medical Service (EMS, Bangkok Metropolitan), Narenthorn EMS of Rajavithi Hospital and Emergency Medical Institute of Thailand (EMIT), Royal Thai Police, Department of Disaster prevention and mitigation (DDPM, Ministry of Interior, Thailand)[9,11-15]. Data collection included the number and causes of major incidents and disasters, mortality, morbidity, missing, and cost of reimbursement[9,11-15].

The same sources were used to retrieve data about current disasters or major incidents preparedness systems, triage and pre-hospital management, standard of personnel, co-ordination and command centers[9,11-15].

No statistical analysis was needed to perform.

Results

Managing organization

The current organization for major incident management is shown in Fig. 1. The organizations involved are Emergency operation center (EOC), Incident command post (ICP), Incident control room (ICR), Gold command suite, Incident commander of government (Bangkok Metropolitan, DDPM, Ministry of Interior, Emergency Medical Institute of Thailand (EMIT), Ministry of Public Health (MOPH)), Royal Thai police and supporting hospitals[9,11,13-15].

At the time of disasters/major incidents, ICP will be initially set up at the safe area near the incident zone/s. The ICP leader (scene medical commander) will be responsible for initiating the task by allocating various tasks to EMS personnel, identification of zones for primary and secondary triage, supervising the work-time schedule, the route for the transportation (in-and-

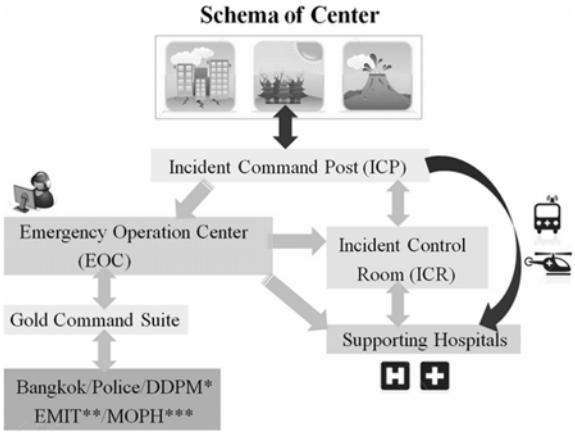

Fig. 1 The schema of the system of each center in Thailand (*DDPM: Department of Disaster prevention and mitigation, Ministry of Interior, Thailand, **EMIT: Emergency Medical Institute of Thailand, ***MOPH: Ministry of Public Health)

out bound), parking area for ambulances, including patients transfer zone[9]. The scene medical commander establishes communications with two separates entities; ICR and EOC. The ICP has also communication with supporting hospitals through ICR and EOC. The ICR will assist the ICP in terms of security, accountability, provisions, equipment and plan for the patient follow-up or for back-up by another supporting team[9]. The ICP will mainly report to EOC, which will act as the major coordination and communication centre. EOC leader (operation section chief) is responsible for declaring an incident as a disaster. After such declaration, EOC will immediately launch at least 4 ambulances (with 2 paramedics/ambulance), 2 physicians and one supporting team responsible for communication at the incident area[9]. The EOC leader is also responsible for recording the supporting resources used in the ongoing disaster, checking the accuracy of the data from ICP and its effectiveness, setting up the name and radio frequency of each supporting units at the scene, including introduction of back-up teams from other regions, if needed[9]. The EOC also summarizes the situation and convey the update data between ICP, ICR and Gold Command Suite to administrate overall situations and reports the information to Bangkok Metropolitan Administrator, Police, DDPM, EMIT or Ministry of Public Health, depending on the type of incident (Fig. 1)[9]. The Gold Command Suite leader (incident commander) establishes the strategy and direction of all centers and supporting teams to tackle with the incident in cooperation with the medical consultants, administrators and experienced physicians[9].

The administrative system at the time of disasters/major incidents was set along Thai Federal Act (March 2008). The Emergency Medical Institute of Thailand was appointed to be the national organization responsible for the preparedness strategy, expenditure allocation, system coordination, data collection-verification, post-audit and policy creation. The main dispatch center responsible for medical service in Bangkok metropolitan during the present study period was Bangkok EMS ("Erawan center"), which was also the main center in terms of personnel training, preparedness, system coordination and data collection in the corresponding area. Narenthorn EMS of Rajvithi Hospital and EMS center of Vajira Hospital also provided theirs support in Bangkok. In provincial areas, emergency medical services (Department of Public Health, Ministry of Public Health) in each province acted as dispatcher in their corresponding regions[9,16,17]. Several private organizations also volunteered to assist.

Education

The Bangkok EMS, Narenthorn EMS of Rajvithi Hospital, Emergency Medical Institute of Thailand and other related departments are responsible for establishing standard management and training systems *e.g.* basic curriculum for first responder (FR), Basic Life Support; Emergency Medical Technician Basic: EMT-B for Emergency Medical Technician and nurses, special curriculum for Emergency Medical Technician-Intermediate (EMT-I), Emergency Medical Technician-Paramedic (EMT-P) and Advanced Life Support for physicians and pre-hospital emergency nurses (PHEN)[9,14,17]. All physicians, EMT-B/I/P and nurses in EMS ambulances and the staff in private volunteered organizations have to pass the standard training courses to qualify for the job[17]. The Emergency Medical Institute of Thailand also provides many standard EMS courses such as 24-hour course for the call-taker, the structure course for emergency medical dispatcher, the curriculum for community emergency reporter, and the curriculum for ambulance vehicle driver and responder, etc[15]. In addition to the standard EMS courses, Bangkok EMS and other organizations also provide the enhancing courses such as the rehearsal mission in disaster situation, the refreshing course of triage Major Incident Medical Management and Support (MIMMS) for EMS personnel (annually since 2001), the refreshing course

of cardiopulmonary resuscitation (CPR) for EMS personnel (annually), the refreshing course of shock management for EMS personnel (annually), the practical course for the chemical major incidents and annual EMT-B 110 hour-courses in each main centers all over the country with attendants from EMS personnel, college students, hospital leaders, Thai Red Cross, Emergency Medical Institute of Thailand, Royal Thai Police, Bangkok Metropolitan officers and private volunteered-organization[9,14,15].

Prehospital healthcare system

The prehospital dispatchers in Thailand are basically distributed into Bangkok metropolitan area and the rest of the country. Most ambulances or emergency medical units are categorized into; 1) the first responder unit (staffed with 3 FRs), 2) the basic life support unit (staffed with 1 EMT-B and 2 FRs), 3) the intermediate life support unit (staffed with one EMT-I, one EMT-B and one FR) and 4) the advance unit (staffed with three personnel of PHEN, EMT-P or physician)[17].

In Bangkok, Bangkok EMS is the main dispatch center with call numbers (cn): 1646, 1669 and 199. There are nine EMS response zones with the emergency operation divisions in their corresponding region including various supporting hospitals[9]. In addition, the Narenthorn EMS of Rajvithi Hospital and EMS center of Vajira Hospital (cn 1554) also provide their services in Bangkok in cooperation with Bangkok EMS[9]. In other areas of Thailand, emergency medical service, Department of Public Health (Ministry of Public Health) (cn 1669, 191, 199) acts as dispatcher in each province and cooperates with the emergency operation divisions in their corresponding regions such as local EMS sectors, EMS unit of local or provincial hospital, etc[17]. Only 58% of all emergency medical cases are registered using cn 1669. Some overlap emergency numbers might also exist in some areas of the country[18]. The current covenants in the national model scheme in terms of task framework and action roles for the departments and personnel in the system operators is still insufficient and under development[17].

The Emergency Medical Institute of Thailand; a national body (under board of national emergency medical service and Minister of Public Health) acts as the policy-maker and system coordinator contributing to an upholding prehospital EMS in Thailand by formulating the system needed to fully cover all areas in the country and involving local divisions (public organizations, private centers and local managing sectors) to provide community-based health administration, including financial criteria for all emergency operation divisions and the current data collection system (EMS system database of Thailand via http://service.niems.go.th or ITEMS program)[13,15-17].

Major incidents/Disasters

The number of major incidents/disasters in Thailand has increased between Jan 2006 and Dec 2010 (64, 96, 113, 116 and 160 for 2006-2010, respectively) with the total number of 60,999 deaths, 346,763 wounded patients and 73 missing persons and a cost of 47,453.69 million Baht (1,581.79 million US Dollar) (Fig. 2).

The top 5 causes of total major incidents/disasters during the study period were 1) traffic injuries; road traffic injuries (80.29%), especially in the period of Songkran and New Year festival and air/naval traffic injuries (19.71%), 2) fire (nightclub, factory), 3) terrorism/political conflicts, 4) flood/landslide and 5) chemical-blast injuries (Fig. 3). The top 4 affected regions during the same period were Northern region, Northeastern region, Bangkok and central region and Southern region (first rank for terrorism events).

There was a marked reduction in morbidity rate during the study period. The level of mortality was slightly lowered (Fig. 4).

Discussion

Disasters and/or major incidents cannot be prevented, but their consequences may be mitigated by adequate planning, education and exercises. The number of fatal incidents, both natural and man-made, has been increasing during the last decades globally, with no exception for Thailand[19]. As the present study shows there is a clear increase in the number of major incidents/disasters in Thailand since 2006. However,

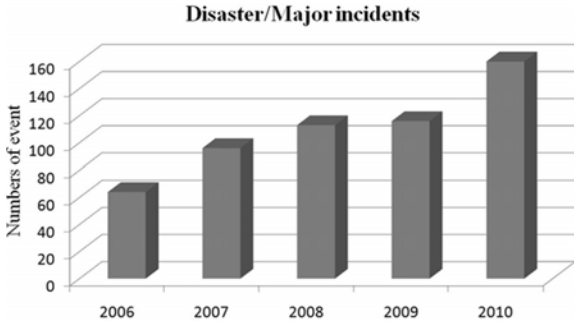

Fig. 2 The number of disasters/major incidents in Thailand between Jan 2006 and Dec 2010

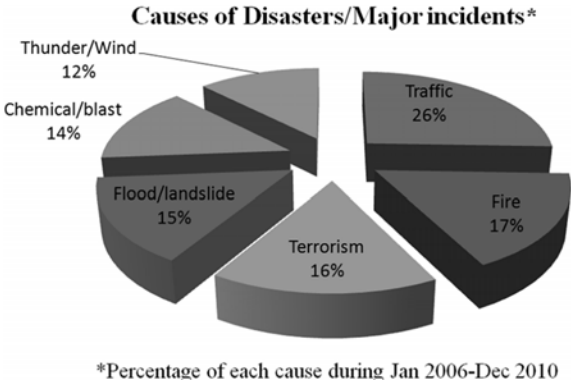

Fig. 3 The causes of disasters/major incidents were shown in percentages during 2006-2010

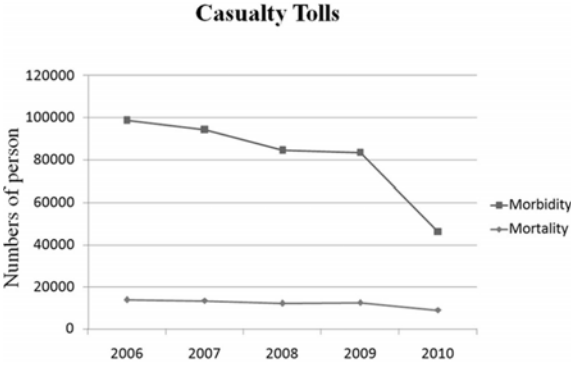

Fig. 4 The casualty tolls from Jan 2006 to Dec 2010

despite this continuous increase there is no increase, but a decrease in mortality and morbidity among the casualties. One possible explanation for this discrepancy may be the increasing governmental investment in education and management improvement for major incidents/disasters; including identifying and reducing the risk factors[9].

Some investigators and organizations have proposed a need for establishing a national registry for data collection from various incidents and services in Thailand[9,13,17,20]. There is thus, a reason to believe that the available data is not complete and some important figures dealing with mortality and morbidity are missing[18,21]. Therefore, the lack of a central registry may make the official data misleading. Scattering information has been identified as one major factor contributing to difficulties in collecting accurate data in Thailand[18]. In some studies initiation of registries like that of the trauma registries with large longitudinal databases for the investigation and strategy improvement have been proposed[22]. A national trauma registry may not only improve the data collection, but also will assist the researcher to analyze the data, understand the current situation, and discover a way to correct the existing and occult problems in the current disaster and trauma system in Thailand. Road traffic injuries, as an example, are one of the major public health problems in Thailand. Worldwide, it results in more than a million deaths and almost 50 million casualties every year[21,23]. However, by continuous use of registries and data collection, the results have been used to improve the overall systems in terms of prevention, education, pre-hospital/hospital care and to reduce the number of injuries and deaths. In addition, it has also resulted in cooperation between various authorities and departments[24]. Finally, the available and accurate data will also facilitate for system evaluation and simulation exercises[5]. The current data collection via ITEMS program needs to be improved for users in many aspects such as feasibility, accessibility, convenience and systematization. The analyses and utilization of the collected data must also be understood and developed[18].

Our review (2006-2010) shows that there is an established disaster management organization in Thailand. Although the system seems to be functional, there are still some overlapping difficulties in the system compare to other reported systems[25]. One major problem might be the insufficient and unclear national model scheme in terms of task framework and action roles for the departments and personnel in the system operators, which is due to ongoing covenants systematization[9]. Moreover, in the current system, some independent EMS volunteer sectors control their own activities, which may lead to the difficulties of collecting and analyzing the data such as response time. The widespread numbers of EMS and emergency call numbers, some of them owned by main hospitals and private organizations, make the system vulnerable to overlapping assignments and inefficient use of ambulance services and increasing number of ambulance diversions[18]. These issues might add to patient's confusion and unnecessary time loss[13,18]. Some reports indicate that an increased EMS response time may be a contributing factor in increasing the mortality rate[13,26]. As the authors have mentioned before, the mortality rate has slightly been decreased which may contradict the reported conclusion. Therefore, this statement should be validated when adequate data is available for further analysis. Many regions have just started to understand the importance of prehospital care and the ongoing data collection and their practice may diverge significantly, resulting

in different quality and capacity of services[16].

Another issue of interest in the current EMS system concerns the quality and quantity of the emergency personnel, in both governmental and private sections. Since 2008, the government has controlled the national EMS system along with Thai Federal Act. Registered FR, PHEN, EMT and physicians must be trained along with the standard courses and nowadays all registered personnel have the same education related to their working categories[9,17]. These measures might help in reducing the number of mortalities and morbidity and ensure the public to have more confidence in EMS system. However, the only throwback is the insufficient number of personnel in all categories, especially in the suburb and distant regions, as stated in the annual report of Emergency Medical Institute of Thailand in 2010[18]. Co-ordination within the current pre-hospital care system and common understanding of the role of EMS might be another aspect in the development of a better management system for major incidents and disasters within the current healthcare system[26]. Such improvement also needs to be approved by healthcare personnel at the hospitals. Emergency physicians and trauma surgeons together with all personnel working in these fields must be aware of their roles in such management system. Mutual courses and exercises are one important way to close the gaps between different organizations, to speak the same language and to have the same goal. To avoid a disaster there is a need for planning and such preventive measure needs cooperation between different specialties engaged in disaster planning, inside and outside hospitals.

Major changes might be needed in some developing countries such as Thailand[27]. The ability of the healthcare system in coping with a major incident or disaster should be built up on its ability and capacity at the peace time. Today, the majority of healthcare systems in Europe and USA are loaded with economical problems, resulting in reduction of resources and continuous overcrowding of emergency departments (EDs) and hospitals. Such situation presents an extra-ordinary situation for many hospitals in a daily basis, which need regional coordination[2,25]. All together such an extra-ordinary situation will not only increases the number of ambulance diversions, transport time between hospitals, but also leads to late treatments regimens and may also elevate mortality in severely injured patients[28-30]. However, the main impact of such disturbances in EMS activities is the minimizing the surge capacity. Khorram-Manesh el al has recently reported that the hospital-related incidents impacts the regional preparedness by minimizing the capacity in rush times[2]. The hospital bed shortage and technical problems at radiology departments, in addition to the increasing number of patients at EDs, were the main reasons for ED's overcrowding[2]. These problems also seem to exist in many hospitals in various regions of Thailand[31,32]. Thus, beside a validated registry and improved pre-hospital care, the hospital-related problems might be another issue to explore to improve the overall care of patients at the time of major incidents/disasters in Thailand.

In conclusion, there is an established and functional disaster management organization in Thailand. However, there are some areas which benefit from further improvement; a national registry, centralization of prehospital healthcare, public acknowledgement of the emergency medical service, and provision of the action roles in the national model scheme. Furthermore, increased knowledge in disaster planning and management along with continuous evaluation of the systems using pedagogic methods such as simulation exercises ought to be target for amendment. Since the medical approach to a major incident/disaster differs from that of emergency medicine, the principal of disaster medicine and other measures related to situations with short-coming and limitation in the available resource must be taught[5]. For Thailand, new challenges with increasing disasters are still to come. It would, therefore, be beneficial for the country and its inhabitants, if the current medical societies welcome new knowledge in disaster medicine, including the clarification of their roles, to improve the existing prehospital and management systems and realize the need and importance of planning and preparedness to cope with upcoming incidents/ disasters.

Potential conflicts of interest

None.

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รายงานการแพทย์สำหรับสถานการณ์หายนะภัยของประเทศไทยในปัจจุบัน

ชญานิน อ่างทอง, เพชรพงษ์ กำจรกิจการ, อัจฉริยะ แพงมา, เอเมียว โครัม มาเนช

วัตถุประสงค์: *งานวิจัยนี้เพื่อศึกษาระบบทางการแพทย์ของประเทศไทยในการเตรียมรับสถานการณ์หายนะภัยและสาธารณภัยโดยรวบรวม จากฐานข้อมูลล่าสุดโดยเน้นในส่วนของภัยคุกคามที่มีการบาดเจ็บเป็นหลักร่วมกับศึกษาความสัมฤทธิ์ผลของระบบดังกล่าว ทั้งนี้ส่วนหนึ่งของจุดประสงค์ของงานวิจัยนี้เพื่อให้เหล่าผู้ประกอบวิชาชีพทางการแพทย์ทั่วประเทศตื่นตัวและรับทราบบทบาทของตนเองในสถานการณ์เหล่านี้ร่วมด้วย*

ผู้ป่วยและวิธีการ: *งานวิจัยนี้ได้รวบรวมข้อมูลพื้นฐานและรายละเอียดเกี่ยวกับการบาดเจ็บจากสถานการณ์หายนะภัย และสาธารณภัยจากข้อมูลระหว่าง พ.ศ. 2549-2553 รวมทั้งระบบการเตรียมรับสถานการณ์ต่างๆ การคัดกรองผู้บาดเจ็บ การบริหารจัดการนำส่งโรงพยาบาล และมาตรฐานของหน่วยบริการรวมทั้งบุคลากรที่เกี่ยวข้อง โดยศึกษาจากฐานข้อมูลของศูนย์บริการการแพทย์ฉุกเฉินกรุงเทพมหานคร (ศูนย์เอราวัณ) สำนักการแพทย์กรุงเทพมหานคร, ศูนย์กู้ชีพ "นเรนทร" โรงพยาบาลราชวิถี, สถาบันการแพทย์ฉุกเฉินแห่งชาติ (สพฉ.), สำนักงานตำรวจแห่งชาติ, กรมป้องกันและบรรเทาสาธารณภัย (ปภ.), กระทรวงมหาดไทย*

ผลการศึกษา: *ระบบทางการแพทย์ของประเทศไทยในการเตรียมรับสถานการณ์หายนะภัยและสาธารณภัยโดยรวมอยู่ในระดับที่ทำงานได้อย่างมีประสิทธิภาพสอดคล้องกับพระราชบัญญัติการแพทย์ฉุกเฉิน พ.ศ. 2551 อย่างไรก็ตาม เนื่องจากเป็นการพัฒนาในช่วงเริ่มต้นจึงอาจยังไม่สมบูรณ์แบบร่วมกับยังไม่มีระบบการรวบรวมข้อมูลและขึ้นทะเบียนของผู้ป่วยที่เป็นระบบมาตรฐานเดียวกันทั้งประเทศ ศูนย์บริการการแพทย์ฉุกเฉินกรุงเทพมหานคร (ศูนย์เอราวัณ) ดูแลรับผิดชอบรับแจ้งเหตุและสั่งการในพื้นที่กรุงเทพมหานคร ในขณะที่ศูนย์การแพทย์ฉุกเฉินของสำนักงานสาธารณสุขจังหวัดต่างๆ นอกเหนือจากกรุงเทพมหานครรับผิดชอบพื้นที่ของตนเองในแต่ละจังหวัดนั้นๆ โดยมูลนิธิต่างๆที่เป็นองค์กรอิสระและอาสาสมัครมีส่วนร่วมอย่างมากในการช่วยเหลือประชาชนในสถานการณ์ต่างๆด้วย นอกจากนี้ ผลการศึกษาจากหายนะภัยและสาธารณภัยระหว่าง พ.ศ. 2549-2553 พบว่ามีการเสียชีวิตทั้งหมด 60,999 ราย การบาดเจ็บ 346,763 ราย การสูญหาย 73 ราย ความสูญเสียทั้งหมดเป็นมูลค่า 47,453.69 ล้านบาท (1,581.79 ล้านดอลล่าร์สหรัฐ)*

สรุป: *การเตรียมรับสถานการณ์หายนะภัยและสาธารณภัยโดยรวมของประเทศไทย ได้มีการจัดตั้งขึ้นอย่างเป็นระบบและทำงานได้อย่างมีประสิทธิภาพพอสมควรแม้ว่ามีส่วนการทำงานที่ทับซ้อนกันอยู่บ้างเนื่องจากยังอยู่ในช่วงเริ่มต้นได้ไม่นาน อย่างไรก็ตาม ความเข้าใจของเหล่าผู้ประกอบวิชาชีพทางการแพทย์ทั่วประเทศถึงความสำคัญ ในเรื่องของการรวบรวมข้อมูลและขึ้นทะเบียนของผู้ป่วยอย่างเป็นระบบ การให้ความรู้แก่ประชาชนเพื่อทราบถึงระบบการแพทย์ฉุกเฉินที่มีอยู่รวมทั้งการประสานงานและเตรียมรับสถานการณ์ต่างๆ ที่เป็นระบบนั้น จะช่วยให้มาตรฐานการดูแลรักษาผู้ป่วยโดยรวมดีขึ้นและอาจเป็นประโยชน์ต่อสภาพเศรษฐกิจโดยรวมของประเทศด้วย*