Measures for Emergency Medical Technicians in Helping Victims at Scenes Guided by the Pattern of Injuries and Bombing Attacks in the Three Most Southern Provinces of Thailand

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Bombing attacks by terrorists in the three most southern provinces of Thailand increased both in frequency and intensity from the year 2004 until now. Patterns of bombing were not only destroying buildings or killing targets victims by dropping bombs under roads and in public places but also harming scene investigators by dropping second bombs nearby. Emergency medical personnel working there also had some risks from these second bombs while helping victims at the scene. The purposes of the present study aimed to describe patterns and risks of bombing attacks, analyze locations of wounds of bombing casualties and propose a standing operation procedure for emergency medical technicians (EMTs) in helping victims at scenes to reduce harm from second bombs. The authors gathered some information about patterns of bombing from the Forward 4th Army Area Explosive Ordnance Disposal (EOD) team and reviewed insurgency related casualty reports from Yala, Pattani and Narathivasrajanakarin Hospital from January 2004 to December 2006. From these reports, data of deep wounds or wounds that caused serious injuries or deaths of 144 improvised explosive devices (IED) victims was collected and separated into fatal (45 casualties) and non-fatal groups (99 casualties). In each group, casualties' demographic data and number of casualties separated by locations of wounds and occupations are shown and compared by percentage of the total number of each group and was found that most of fatal casualties had wounds on head (42.22%), chest (33.33%) and abdomen (33.33%) that should be protected by wearing helmets and body armors. But there was a higher proportion of extremity injuries in non-fatal casualties (63.64%). Thus, the authors proposed measures for EMTs in helping victims at scenes to reduce their risks by wearing helmets and body armors and quickly removal of the injured with minimal medical intervention.

Keywords: *Emergency medical technicians, Injuries, bombing attacks improvised explosive devices, Thailand*

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The number and extent of worldwide terrorist attacks has risen sharply in recent years. Jerusalem, Israel, was the target of 17 bombing attacks from August 2001 to August 2004 resulted in 430 casualties that entered hospitals and 10 in hospital deaths[1]. On 17th October 2004, three suicide bombings occurred in Tabba and Ras-el-Satan, Egypt, resulted in 185 injured and 40 deaths[2]. In Istanbul, Turkey, the two truck bombing attacks took place on 15th and 20th November 2003 resulted in 248 and 418 injures respectively and 30 and 33 deaths respectively[3]. All these examples of attacks created mass-casualty incidents and problems in on-site triage and first aid, evacuation, planning of emergency departments, mechanisms of injuries and treatment. As to the three most southern provinces of Thailand, the provinces of Pattani, Yala and Narathiwas there have been an outbreak of insurgents' bombing attacks by terrorists since January 2004; the violence has markedly increased, both in frequency and intensity, since then. In year 2006 alone, there were over 300 bombing attacks compared with 76 attacks in 2004, which resulted in 450 injures and 36 deaths. This

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gleaned from unpublished reports of improvised explosive devices attacks in the three most southern provinces of Thailand of the Forward 4th Army Area Explosive Ordnance Disposal team).

The purposes of insurgents' bombing attack were first to destroy people's credence in the government's mastery, second to assassinate government personnel especially policemen, soldiers and teachers, third to terrify Buddhist people as well as Muslims whondid not cooperate with the insurgents, and fourth to destroy the economy of this region to force Buddhists to evacuate the area (Taken from police major general Umporn Jarujinda's unpublished report of bombing incidences in the three most southern provinces of Thailand).

These bombing attacks were also serious threats to Thai emergency medical personnel, helping casualties at the scene. The purposes of the present study were to describe patterns and risks of bombing attacks, analyze wounds of bombing casualties and propose a standing operational procedures for emergency medical technicians (EMTs) helping victims on the scene, in order to reduce risks to them.

Material and Method

Information about patterns of bombing was collected by interviewing the deputy commander of the Forward 4th Army Area Explosive Ordnance Disposal (EOD) team and reviewing incidence report, advise and guildlines of explosive ordnance disposal (EOD) team from January 2004 to December 2006.

To collect information about wounds of bombing casualties, insurgency related casualty reports from Yala, Pattani and Narathivasrajanakarin Hospital sent to Administrative Center for Southern Border Provinces from January 2004 to December 2006, were reviewed. Data of 144 IED victims who had deep wounds or wounds that caused serious injuries or deaths were collected and separated into fatal and non-fatal groups. In each group, the number of casualties was separated by location of wounds compared with percentage of the total number of each group. Criteria of deep wounds of the head included injuries to the skull and its structures inside the skull, including the brain, facial bones, eye, and structures inside oral and nasal cavity. Deep wounds of the neck included injuries of structure inside the neck and cervical spine. Deep wounds of the chest included injuries of ribs, thoracic spines and structure inside the chest wall. Deep wounds of abdomen included structure inside abdominal cavities, pelvic bones, and lumbar spines; finally, deep wounds of the extremities (arms, forearms, hands, thighs, legs and feet) including injuries of bones, blood vessels and nerves.

Results

Patterns of bombing

All bombs the insurgents used were improvised explosive devices or IEDs, which had two patterns of attack. One was to destroy buildings or kill target victims by one single bomb. The target victims were mostly police or military squads that patrolled the usual area at predictable times using the same routes. IEDs were usually dropped in holes under roads at points that vehicles had to slow down, such as junctions, turns, curves and at the foot of bridges and also resting points of squads, such as road side huts, shops and big trees. Other target places were public places that officials usually frequented such as restaurants, hotels, banks and post offices. The other pattern was to attack scene investigators by perpetrating different kinds of violence including murder, arson, dropping IEDs both real or false and then dropping the second IEDs nearby to kill officers who entered the scene to investigate those incidents. In 2006 there were 11 incidences of second IED attack and 1 incidence had 2 second IEDs. (From unpublished reports on improvised explosive devices attacks in the three most southern provinces of Thailand of the Forward 4th Army Area Explosive Ordnance Disposal team).

Wounds of bombing casualties

Casualties' demographic data, number of casualties separated by locations of wounds and occupations, which compared with the percentage of the total number of each group are shown on Table 1. Eighteen victims (12.5% of total casualties) had more than one part of injury. Most of the casualties in the fatal group had deep wounds on the head, neck, chest and abdomen. There was a higher proportion of injuries to the extremities among non-fatal casualties than with fatal ones. It also revealed that there were a nearly equal proportion of civilians and government security officers (soldiers and policemen) in the fatal group; meanwhile there were a higher proportion of security officers in the non-fatal group.

Discussion

Patterns of terrorist IED attacks in Thailand were quite different from other parts of the world, such as in Israel, Iraq, Afghanistan, Pakistan or Indonesia, for there has been so far no suicide bombings in

Table 1. Patients' demographic data

	Type of injury	
	Fatal (n = 45)	Non fatal (n = 99)
Age (range)	37.19 (13-71)	30.06 (2-63)
Gender (male : female)	8:1	5.2:1
Locations of wounds		
Head and neck	19 (42.22%)	25 (25.25%)
Chest	15 (33.33%)	10 (10.10%)
Abdomen	15 (33.33%)	6 (6.06%)
Extremities	9 (20%)	63 (63.64%)
Occupations		
Government security officers (soldiers and policemen)	23 (51%)	53 (53.54%)
Civilians	22 (49%)	46 (46.46%)

Thailand[4]. Patterns of undercover, hidden IEDs should make the terrorists use smaller and less intense bomb; attacking with a second IEDs are still threats to our emergency medical personnel who are helping IED victims on the scenes. Thus, in order to decrease their risks, some important factors need to be considered, especially when they cannot wait for 20 to 30 minutes for the EOD team to clear the scene and had to enter to help the casualties before establishing the presence or absence of a second IED. This problem was similar to helping victims of the terrorist bombing attacks on the Underground (subway) in London in July 2005[5]. At present, protecting themselves should be the best way for EMTs.

All EMTs should receive basic knowledge about IEDs and training to inspect IED suspected objects. Before entering the scene to help victims, EMTs have to survey the scene carefully to look for IED, suspected objects and alive victims to be evacuated. They should evacuate victims from the scene as fast as possible, with the realization that they are working in a dangerous zone. Regarding the present study, help for victims in this situation should follow basic tactical combat casualty care management plan ning for care "under fire" phase that EMTs should do only minimal life saving intervention; it is recommended to perform only controlling exsanguinations from limb injuries by tourniquet[6]. This principle is comparable to that recommended after the July 2005 London bombings that rapid removal of the seriously injured, with minimal medical intervention, is a priority[5] and is also comparable to "scoop and run" method of Israeli EMS team[7]. A difference is that Israeli protocol recommends performing needle thoracostomy and tracheal intubation in the field in seriously needed cases but almost all of The 1st First responders in the presented situation in the three most southern provinces of Thailand are bystanders or basic EMT that have not received training on how to perform those procedures.

Data for wounds of fatal casualties was similar to a previous report by Fryberg et al, which was a review of 14 published studies of terrorist bombing incidents[8]. The most common causes of deaths from terrorist bombing were injuries to the head, chest and abdomen. This provided us which parts of the body should have priority to be protected and guided us a way to prevent fatal injuries of IEDs by wearing protective suits or body armor, helmets and goggles or face shields. In addition, because of not very high velocity shrapnel IEDs can throw, body armors of level type II A, according to the United States National Institute of Justice (NIJ) standard (Table 2)[9], can be used depending on the EOD team commander's opinion. Limb injuries were also serious problems; they could even cause amputation but there is no proper protective suit that can cover limbs that EMTs can use in helping casualties. Thus, creating a proper armor suit for this purpose is still a challenge.

Another protective measure for medical personnel that may help is wearing EMT uniforms or Red Cross emblems. It was found that no medical personnel were directly harmed by insurgents. So, at present, it is believed that the insurgents have no intent to attack medical personnel.

From all this information, the author proposes a standing operations procedure for EMTs in helping victims at scenes. When receiving notification, EMTs have to ask for the exact location of the scene. To

Table 2. NIJ standard 0101.04 armor level

Armor level	Protects against
Type I (.22 LR; .380 ACP)	This armor protects against .22 caliber Long Rifle Lead Round Nose (LR LRN) bullets, with nominal masses of 2.6 g (40 gr) at a reference velocity of 329 m/s (1080 ft/s ± 30 ft/s) and .380 ACP Full Metal Jacketed Round Nose (FMJ RN) bullets, with nominal masses of 6.2 g (95 gr) at a reference velocity of 322 m/s (1055 ft/s ± 30 ft/s).
Type IIA (9 mm; .40 S&W)	This armor protects against 9 mm Full Metal Jacketed Round Nose (FMJ RN) bullets, with nominal masses of 8.0 g (124 gr) at a reference velocity of 341 m/s (1120 ft/s ± 30 ft/s) and .40 S&W caliber Full Metal Jacketed (FMJ) bullets, with nominal masses of 11.7 g (180 gr) at a reference velocity of 322 m/s (1055 ft/s ± 30 ft/s). It also provides protection against the threats mentioned in (Type I).
Type II (9 mm; .357 Magnum)	This armor protects against 9 mm Full Metal Jacketed Round Nose (FMJ RN) bullets, with nominal masses of 8.0 g (124 gr) at a reference velocity of 367 m/s (1205 ft/s ± 30 ft/s) and 357 Magnum Jacketed Soft Point (JSP) bullets, with nominal masses of 10.2 g (158 gr) at a reference velocity of 436 m/s (1430 ft/s ± 30 ft/s). It also provides protection against the threats mentioned in (Types I and IIA).
Type IIIA (High Velocity 9 mm; 0.44 Magnum)	This armor protects against 9 mm Full Metal Jacketed Round Nose (FMJ RN) bullets, with nominal masses of 8.0 g (124 gr) at a reference velocity of 436 m/s (1430 ft/s ± 30 ft/s) and .44 Magnum Semi Jacketed Hollow Point (SJHP) bullets, with nominal masses of 15.6 g (240 gr) at a reference velocity of 436 m/s (1430 ft/s ± 30 ft/s). It also provides protection against most handgun threats, as well as the threats mentioned in (Types I, IIA, and II).
Type III (Rifles)	This armor protects against 7.62 mm Full Metal Jacketed (FMJ) bullets (U.S. Military designation M80), with nominal masses of 9.6 g (148 gr) at a reference velocity of 847 m/s (2780 ft/s ± 30 ft/s) or less. It also provides protection against the threats mentioned in (Types I, IIA, II, and IIIA).
Type IV (Armor Piercing Rifle)	This armor protects against .30 caliber armor piercing (AP) bullets (U.S. Military designation M2 AP), with nominal masses of 10.8 g (166 gr) at a reference velocity of 878 m/s (2880 ft/s ± 30 ft/s). It also provides at least single hit protection against the threats mentioned in (Types I, IIA, II, IIIA, and III).

protect themselves, they should show themselves to be medical personnel by wearing EMT uniforms for civilians and red cross emblems for the military, using vehicles with red cross signs and should wear helmets, polycarbonate goggles or face shields and body armors (level IIA at least). After reaching the scene and before entering to help victims, they have to inspect the scene quickly but thoroughly to find IED suspected objects, alive victims and set up a plan to evacuate these victims as fast as possible by doing minimal life saving intervention, only controlling exsanguinations for limb injuries by tourniquet is recommended, and using the fastest and safest route to exit the scene and send these victims to the nearest hospital. All deaths must be left at the scene without moving or turning over. For unconscious victims, signs of being alive should be checked by observing respiration and palpating the carotid pulse. EMTs have to avoid touching or moving any object at the scene. After finishing a task, incident, operation, obstacles and problems should be recorded and reported for further improvement.

Conclusion

The violence from insurgent bombing attacks in the three most southern provinces of Thailand has markedly increased. Emergency medical personnel working in these three areas also experienced risks from second bombs while helping victims at the scene. The author gathered some information on the pattern of bombing from the Forward 4th Army Area Explosive Ordnance Disposal (EOD) team and reviewed data from insurgency related casualty reports from Yala, Pattani and Narathivasrajanakarin Hospital to collect and compare casualties' demographic data and number of casualties separated by the location of deep wounds from information about the most fatal casualties. It was found that the most fatal injuries were to the head,

chest and abdomen. Thus, the authors proposed measures for emergency medical technicians (EMTs) in helping victims on the scene to reduce their risks by wearing helmets and body armor and the removal of the injured with minimal medical intervention as fast as possible.

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มาตราการสำหรับพนักงานแพทย์ฉุกเฉิน ในการช่วยเหลือผู้บาดเจ็บในที่เกิดเหตุระเบิดแสวงเครื่อง ซึ่งชี้นำโดยรูปแบบของการบาดเจ็บ และการลอบวางระเบิด ในจังหวัดภาคใต้ของประเทศไทย

ปิยพันธุ์ ชีรานนท์

การลอบวางระเบิดของกลุ่มผู้ก่อความไม่สงบใน 3 จังหวัดภาคใต้ของประเทศไทยได้เพิ่มมากขึ้นทั้งความถี่และความรุนแรงตั้งแต่ พ.ศ. 2547 เป็นต้นมา รูปแบบการลอบวางระเบิดนั้นนอกจากเพื่อทำลายอาคารสถานที่และสังหารบุคคลที่เป็นเป้าหมายโดยการวางระเบิดในท้องถนนและในบริเวณสถานที่สาธารณะแล้วยังจงใจทำร้ายเจ้าหน้าที่ ที่เข้าไปสอบสวนสถานที่เกิดเหตุนั้นโดยการลอบวางระเบิดลูกที่สองไว้ในบริเวณใกล้ที่เกิดเหตุ พนักงานแพทย์ฉุกเฉินที่ปฏิบัติงานช่วยเหลือผู้บาดเจ็บในที่เกิดเหตุนั้นย่อมมีความเสี่ยงที่จะได้รับอันตรายจากระเบิดลูกที่สองนี้ด้วย บทความนี้มีวัตถุประสงค์เพื่ออธิบายรูปแบบของการลอบวางระเบิด และความเสี่ยงต่ออันตรายจากระเบิด ศึกษาตำแหน่งของบาดแผลของผู้รับอันตรายจากระเบิด และเสนอระเบียบปฏิบัติสำหรับพนักงานแพทย์ฉุกเฉินในการเข้าช่วยเหลือ ผู้บาดเจ็บในที่เกิดเหตุระเบิดเพื่อลดอันตรายจากระเบิดลูกที่สอง การศึกษานี้ได้รวบรวมข้อมูลเกี่ยวกับรูปแบบของการ วางระเบิดจากหน่วยทำลายล้างวัตถุระเบิด กองทัพภาคที่ 4 ส่วนหน้า และทบทวนรายงานผู้บาดเจ็บและเสียชีวิตจาก สถานการณ์การก่อความไม่สงบของโรงพยาบาลยะลา โรงพยาบาลปัตตานี และโรงพยาบาลนราธิวาสราชนครินทร์ ตั้งแต่เดือนมกราคม พ.ศ. 2547 ถึง เดือนธันวาคม พ.ศ. 2549 ซึ่งรายงานนี้ได้รวบรวมข้อมูลตำแหน่งของบาดแผลลึก หรือ บาดแผลที่ทำให้เกิดการบาดเจ็บที่รุนแรง หรือการเสียชีวิตของผู้รับเคราะห์จากเหตุระเบิด 144 ราย และแยกเป็นกลุ่มที่เสียชีวิต (45 ราย) และกลุ่มที่บาดเจ็บ (99 ราย) ในแต่ละกลุ่มจะแสดงข้อมูลด้านประชากรศาสตร์ จำนวนผู้รับเคราะห์ที่แยกตามตำแหน่งบาดแผลและอาชีพของผู้รับเคราะห์ ผลการศึกษาพบว่าผู้ที่เสียชีวิตส่วนใหญ่ จะมีบาดแผลที่ศีรษะ (ร้อยละ 42.22) อก (ร้อยละ 33.33) และท้อง (ร้อยละ 33.33) ซึ่งน่าจะป้องกันได้โดยใส่หมวก เหล็ก และเสื้อเกราะป้องกันกระสุน แต่ผู้ที่บาดเจ็บจะมีสัดส่วนของการบาดเจ็บของแขนและขาที่สูงกว่า (ร้อยละ 63.64) ดังนั้นจึงควรมีมาตรการสำหรับพนักงานแพทย์ฉุกเฉินเพื่อลดความเสี่ยงขณะช่วยเหลือผู้บาดเจ็บในที่เกิดเหตุโดยให้นำผู้บาดเจ็บออกจากที่เกิดเหตุโดยเร็วที่สุดโดยทำการปฐมพยาบาลหรือหัตถการเพื่อช่วยชีวิตให้น้อยที่สุด รวมทั้งการสวมหมวกเหล็กและเสื้อเกราะป้องกัน