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A survey on the epidemiology of trauma and China trauma care training in subtropical regions of Hainan Province

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ABSTRACT

Objective: To investigate the epidemiology of trauma patients in subtropical areas of Hainan Province and the improvement of the level of trauma treatment in China trauma care training (CTCT). **Methods:** From 01-01-2015 to 01-01-2016, the epidemiological data of 2 476 patients with trauma were collected. From 01-01-2016 to 01-01-2017, 105 professional doctors and nurses in emergency surgery took part in CTCT, and their knowledge were compared before and after training. **Results:** There were 1 656 male and 820 female trauma patients with 1 614 cases in the middle and young age and 478 cases were the elderly. In terms of occupational distribution, 736 peasants, 574 workers and 458 retirees were involved. In May, the number of patients was the highest 332. October to January was the high-incidence season of trauma. In 24 hours a day: 11:00-13:00, 18:00-19:00, 23:00-03:00 were the high incidence periods. Referred to trauma sites, 904 cases of trauma happened on roads, 540 cases in family and 370 cases in restaurants or entertainment facilities. Through CTCT, the scores of the theoretical examination, the assessment of the trauma treatment skills and the field test scores of the emergency surgery practitioners were better than before ($P<0.05$). The misdiagnosis rate of severe trauma patients decreased from 26.21% to 15.36% ($P<0.05$). The mortality rate of severe trauma patients decreased from 18.67% to 13.94% ($P<0.05$). **Conclusions:** Trauma epidemiology in Hainan is closely related to its special geographical environment, which provides a reference for the prevention and treatment of trauma in Hainan, and some information for the government to formulate corresponding laws and regulations, as well as emergency plans and other relevant strategies. CTCT training improves the level of theoretical knowledge and first aid skills of medical personnel involved in trauma treatment. Health departments and medical education departments may consider extending CTCT training and continuing education programs to Hainan and other parts of China.

1. Introduction

Trauma, one of the major health problems worldwide, causes about 10% of deaths, and induces 5.1 million deaths per year. In addition,

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trauma is the main reason for disability, loss of labor ability and the decrease of life quality. There are more than 100 million people living with some forms of disability. The age distribution of trauma is mainly in the young adults, causing serious economic burden to

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the society and family, with billions of dollars of the annual social cost, and 90% of trauma deaths occurs in low- and middle-income countries[1,2]. Through the improvement of trauma treatment ability, nearly 2 million lives can be saved each year in low- and middle-income countries, which reminds us that we must appeal to the whole society, especially the medical staff, to pay more attention to the improvement of trauma treatment ability[3]. Due to the unique geographical characteristics of Hainan Island, there are only two transportations able to leave the island by sea and air. However, in the event of strong earthquakes, tsunamis and typhoons, these two modes of transportation are both useless. Therefore, only by improving the local trauma treatment ability can save more trauma patients[4]. Consequently, it is of great social significance to investigate the epidemiological characteristics of trauma patients in the subtropical region of Hainan Province and primary trauma care (PTC) training in China for the improvement the level of medical staff on trauma care.

The study of trauma epidemiology not only can provide references for the prevention and treatment of trauma, but also can afford some information for the government to formulate corresponding laws and regulations, as well as emergency plans and so on. And PTC training is an internationally recognized trauma training. It aims at improving the ability of doctors and nurses to cure trauma quickly and systematically[5]. From January 5th 2017 to January 8th 2017, the Chinese Trauma Surgeon Association conjunction with the Hainan Provincial Trauma Medical Center and the Sanya People's Hospital, carried out China trauma care training (CTCT) for relevant medical staffs in Hainan Province. By comparing the difference in the skill level of trauma first aid among trauma treatment related medical personnel before and after CTCT training in Hainan Province, this study explored the effect of CTCT on improving medical staffs' trauma treatment skill level and provided theoretical basis and references for the application and popularization of CTCT training in Hainan Province and other places.

2. Materials and methods

2.1. Respondents

From January 1st 2015 to January 1st 2016, the data of 2 476 trauma patients in The First Affiliated Hospital of Hainan Medical College, Hainan people's Hospital, Haikou people's Hospital, The Second Affiliated Hospital of Hainan Medical College and Sanya People's Hospital were collected retrospectively. The repeat hospitalization of same trauma and incomplete information were excluded. At the same time, 105 medical personnel from emergency departments of five hospitals participated in CTCT from 01-01-2016 (Before training) to 12-31-2017 (After training), including 40 doctors and 65 nurses.

2.2. Data sources

Using Delphi method relevant trauma experts and epidemiologists were consulted to generate trauma epidemiology registration form [6]. From January 1st 2015 to January 1st 2016, we retrospectively collected the epidemiological data of trauma patients in The First Affiliated Hospital of Hainan Medical College, Hainan people's Hospital, Haikou people's Hospital, The Second Affiliated Hospital of Hainan Medical College and Sanya People's Hospital. From 01-01-2016 (Before training) to 12-31-2017 (After training), the differences in the ability to grasp the treatment of trauma were compared. Selection criteria: The ISS score of patients with severe trauma was ≥ 16 . Exclusion criteria: Patients who gave up treatment and lacked clinical data. During the study, a team of specially trained trauma surgeons and emergency surgeons recorded daily information on the gender, age, occupation, time of injury, location, cause of injury and other relevant information required for registration of patients admitted to trauma centres. Each project was evaluated by the training teacher before and after the training, and recorded the theoretical level, operation of trauma first aid skills, assessment results of field drills in different CTCT stages (before training and after training) were recorded. The operation time of tracheal intubation during the treatment of severe trauma, the time of general examination, the time of rescue, the time of emergency stay and the time of preparation before operation in the course of treatment of patients with severe trauma; the rate of misdiagnosis and mortality of patients with severe trauma were recorded as well.

2.3. Statistical methods

Conversion of Excel form into GraphPad Prism 6 format software to analyze, measurement data were expressed by mean standard deviation ($\bar{x} \pm \text{SEM}$). The independent samples of measurement data were tested by *t*-test, and the count data were tested by χ^2 . ($P < 0.05$) showed a statistical difference, and $P < 0.01$ showed the difference was statistically significant.

3. Results

3.1. Epidemiological profile

3.1.1. Gender and age distribution of trauma patients

A total of 2 476 trauma patients were collected, including 1 656 males and 820 females, and the male: female ratio was 2:1; The gender gap between men and women was not significant between the ages of 0-9 years; There were more women than men in the age group of people older than 60, and more men than women between the ages of 10 and 60. The patients ranged from 0-100 years old with an average age of 39.63 years old. The proportion of patients who were 30-29 years old was 22.94%; 30-39 was 14.46%; 40-49

was 16.40% (Table 1).

Table 1
Gender and age distribution.

Age (year)	Males (n)	Females (n)	Total (n)
0-9	92	98	190 (7.67%)
10-19	150	44	194 (7.84%)
20-29	444	124	568 (22.94%)
30-39	258	100	358 (14.46%)
40-49	292	114	406 (16.40%)
50-59	194	88	282 (11.39%)
≥60	226	252	478 (19.31%)
Total	1 656 (66.86%)	820 (33.12%)	2 476 (100.00%)

3.1.2. Time of injury, occupations and locations distribution of trauma patients

The number of injuries was the highest in May, and the months with high incidence of trauma was from October to January next year (Figure 1A); Within 24 h a day, the number of trauma patients increased in three time periods: 11:00 to 13:00, 18:00 to 19:00, and 23:00 to 03:00 (Figure 1B). In term of occupational distribution, farmer were the highest, followed by workers, retirees, students and intellectuals (Figure 1C). Referred to locations of injury, most injuries occurred on roads, followed by in family, in restaurants or entertainment facilities, and factories or construction sites (Figure 1D).

3.1.3. Cause of injury, location distribution and trauma score of patients

In sequence, 685 cases of injury caused by traffic accident (27.67%)(189 cases of electric bicycles), followed by falling down, falling high, mechanical injury, and beating injuries (Figure 2A). The locations of injury was 1 026 cases of limb injury (41.44%), followed by head and face, chest, abdomen, neck, and pelvis (Figure 2B). Minor injuries with ISS score no more than 16 accounted for 1 893 cases (76.45%); followed by 16<ISS score<25, and ISS≥25 (Figure 2C); 924 patients with craniocerebral injury GCS score 13-15 (51.84%), followed by 9-12 points (40.26%) (Figure 2D).

3.2. Effect of CTCT on improving the level of trauma treatment

3.2.1. Effect of CTCT on improving the level of trauma first aid skills

After CTCT, the average score and rate of qualification were increased. The rate of qualification increased from 59.05% to 88.57%, and the difference was statistically significant before and after the training ($P<0.05$) (Table 2); The success rate of the axis turning-over training was 59.05% higher than that before the training (55.24%), but there was no significant difference before and after the training, and there was no statistical significance ($P>0.05$). The success rate of other skills was improved

significantly ($P<0.05$) (Table 3); And all the skills in the field examination were improved obviously ($P<0.05$) (Table 4). It showed that after CTCT, the theory knowledge, skill operation and field practise level of medical personnel occupied in trauma care were improved obviously.

Table 2
Comparison of CTCT Theory Test scores training ($n=105$).

Item	Before	After	t	χ^2	P
Test scores	57.64±0.85	71.42±0.84	11.50	190(7.67%)	<0.01
Qualified rate	59.05%(62/105)	88.57%(93/105)	23.67	194(7.84%)	<0.01

Table 3
Comparison of success rate skill training ($n=105$).

Item	Before	After	χ^2	P
Cervical fixation	60.95%(64/105)	81.90%(86/105)	11.29	<0.01
Open airway	64.76%(68/105)	85.71%(90/105)	12.37	<0.01
Ring puncture	43.81%(46/105)	64.76%(68/105)	9.29	<0.01
Simple ventilator	68.51%(72/105)	95.24%(100/105)	25.19	<0.01
Intubation	60.95%(64/105)	91.43%(96/105)	26.88	<0.01
Thoracentesis	50.48%(53/105)	72.38%(76/105)	10.63	<0.01
Limb fracture fixation	60.00%(63/105)	84.76%(89/105)	16.10	<0.01
Hemostasis	68.57%(72/105)	89.52%(94/105)	13.92	<0.01
Axial rollover	55.24%(58/105)	59.05%(62/105)	0.31	0.58

Table 4
The comparison of qualification rate in field drills ($n=105$).

Item	Before	After	χ^2	P
Airway and cervical protection	59.05%(62/105)	80.00%(84/105)	10.88	<0.01
Breathing and ventilation	67.62%(71/105)	89.52%(94/105)	14.96	<0.01
Circulation and bleeding control	55.24%(45/105)	72.38%(76/105)	6.68	<0.01
Neurological assessment	51.43%(54/105)	75.24%(79/105)	12.82	<0.01
Whole body examination	64.76%(68/105)	86.67%(91/105)	13.70	<0.01

3.2.2. Effect of CTCT training on emergency trauma skills in treatment of severe trauma patients

Gender, age, and ISS scores of severe trauma patients were compared, but there was no statistical difference before and after training (Table 5). There was no statistical difference in baseline consistency of clinical data ($P>0.05$). It illustrated the comparability of the data between the two groups.

Table 5
Gender, age, and ISS scores of severe trauma patients.

Groups	Cases	Male	Age(years)	ISS(point)
Before	381	301	36.0±21.0	21.7±5.77
After	436	323	39.1±20.3	22.2±5.43
P		0.55	0.79	0.84

After CTCT, the time of tracheal intubation and thoracic puncture closed drainage in the process of first aid of trauma was shortened obviously, and the success rate was significantly improved ($P<0.05$). It showed that CTCT could improve the level of trauma first aid skills of medical personnel concerned with trauma treatment. (Table 6, Table 7).

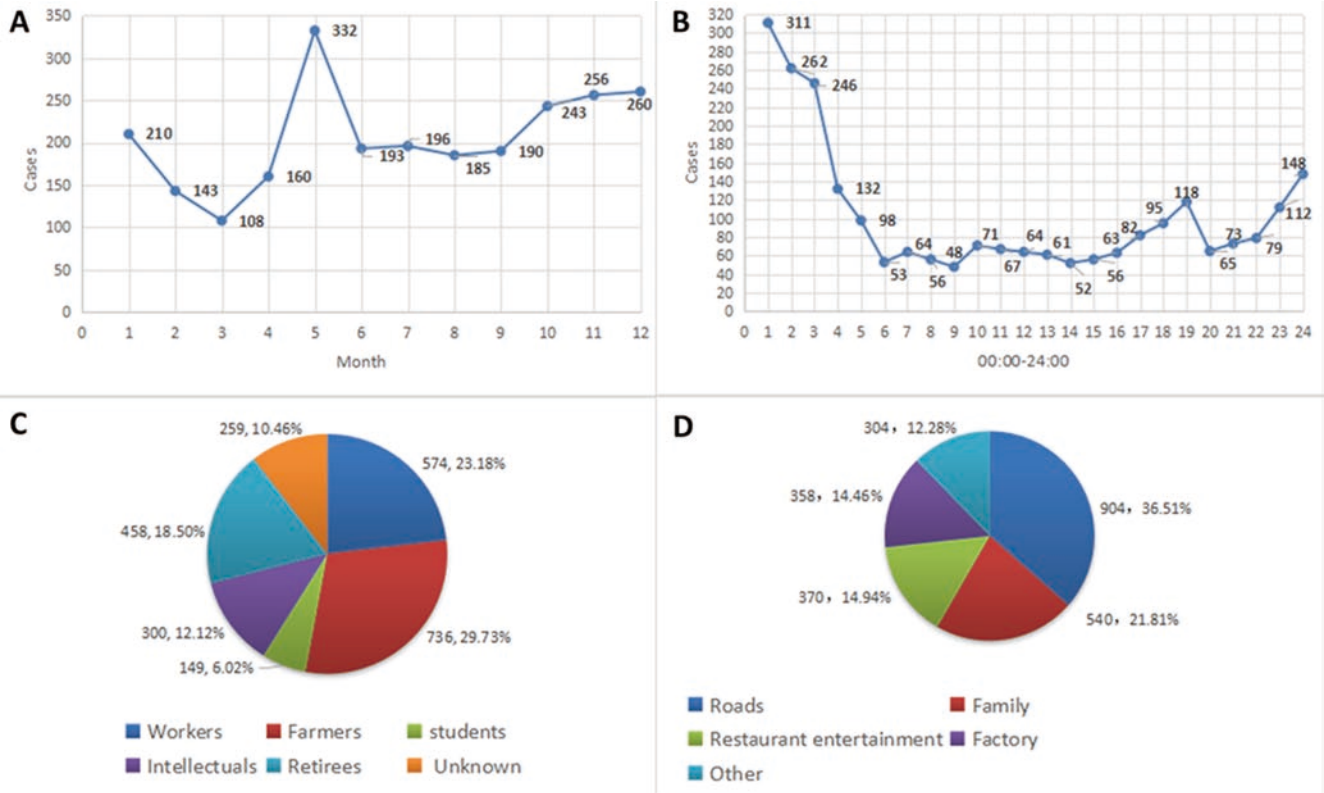


Figure 1. Time of injury(A&B), Occupations of injury(C), Location of injury(D).

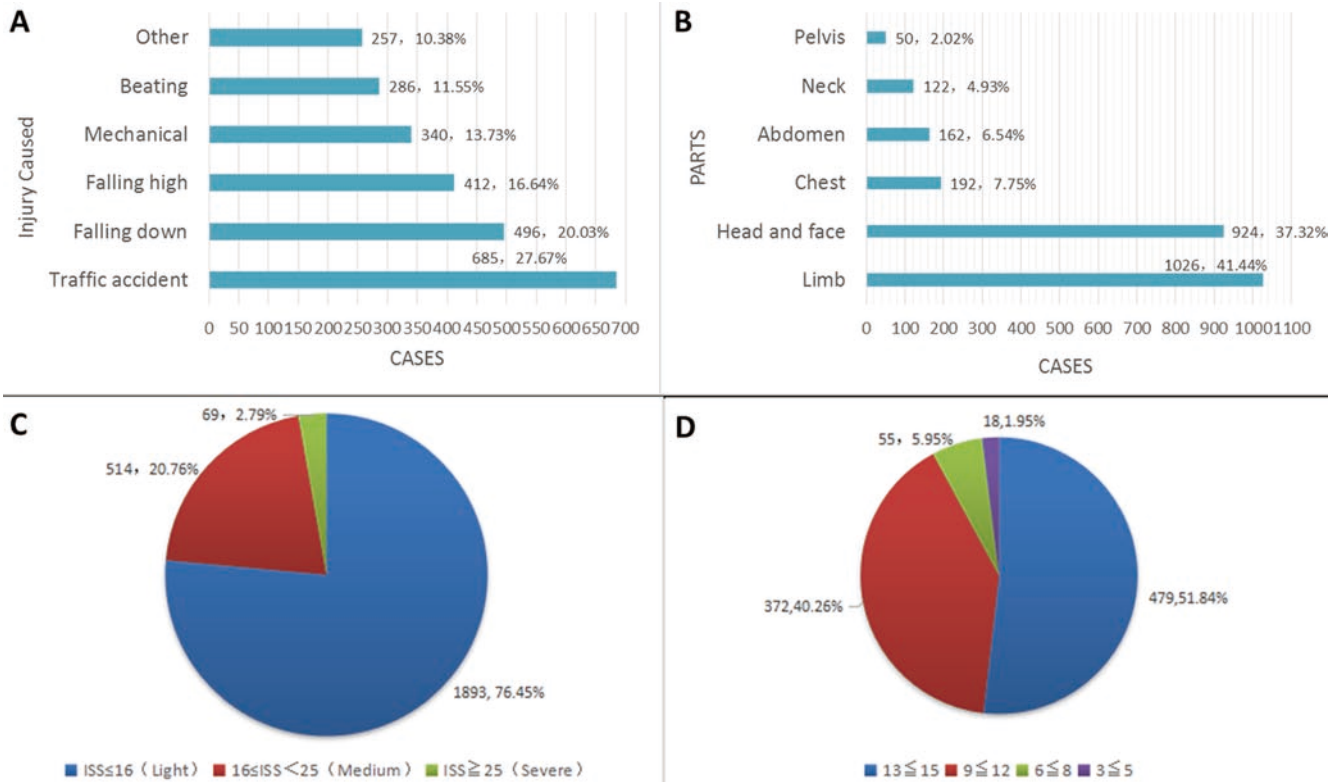


Figure 2. Cause of injury(A), Part of injury(B), Degree of injury(C), GCS score of injury(D).

Table 6

Comparison of the one-time success rate.

Item	Before	After	χ^2	P
Intubation	(39.25%)42/107	(52.82%)75/142	4.51	0.034
Thoracentesis	(42.86%)24/56	(77.89%)74/95	18.99	<0.01

Table 7

Comparison of the operation time of trauma first aid skill.

Item	Before	After	t	P
Intubation	63.70±11.06(n=107)	34.50±6.15(n=142)	7.29	<0.01
Thoracentesis	16.70±2.16(n=56)	12.50±2.08(n=95)	4.43	<0.01

There were significant differences in general body examination, rescue, imaging examination, emergency stay and preoperative preparation time of patients with severe trauma between post-training and pre-training ($P<0.05$), and after training, all of them were significantly shortened. It showed the medical personnel concerned with trauma treatment improved the therapeutic effect of severe trauma patients after CTCT training (Table 8).

Table 8

Comparison of the treatment efficiency of severe trauma patients

Item	Before	After	t	P
Systemic examination(m)	14.53±0.333(n=404)	10.90±0.225(n=436)	9.03	<0.01
Rescue time(m)	60.83±1.386(n=202)	27.95±0.360(n=276)	22.95	<0.01
maging examination(h)	1.03±0.020(n=404)	0.55±0.011(n=436)	21.51	<0.01
Emergency detention(h)	1.19±0.017(n=404)	0.58±0.011(n=436)	29.46	<0.01
Emergency preoperative(h)	1.80±0.050(n=257)	1.34±0.033(n=281)	7.52	<0.01

The rate of misdiagnosis of severe trauma patients was decreased from 26.24% to 15.60%, the level of trauma diagnosis of the medical personnel concerned with trauma treatment was improved. The mortality rate decreased from 18.81% to 15.37%. But the mortality rate was not statistically significant ($P>0.05$). It showed that after CTCT, the level of treatment on severe trauma of the medical personnel concerned with trauma treatment was improved (Table 9).

Table 9

Comparison of the misdiagnosis and mortality of severe trauma patients.

Item	Before	After	χ^2	P
Misdiagnosis	26.24% (106/404)	15.60%(68/436)	14.4	<0.01
Mortality	18.81% (76/404)	15.37%(67/436)	1.762	0.18

4. Discussion

The risk factors of trauma patients are distinct in different periods, so are patients' sex and age. There is no significant difference of gender between males and females aged 0-9 years. Female patients over the age of 60 are more than male, probably because females have longer life expectancy than males and most postmenopausal females over 60 years old own an increas risk of fracture; The ratio of males and females aged from 10 to 60 years old is 2.84:1, owing to males' occupation, physical labor and other

relevant reasons; Patients with trauma mainly concentrate in the age of 20-59, accounting for 65.19%, suggesting that the trauma mainly occurs in young adults, which is similar to other regions of the world[7]. In the occupation distribution, farmers accounted for 29.73%, followed by the workers, and the retirees are ranked at the third position. Understanding the time and location of trauma is of great significance in preventing the occurrence of trauma. The high incidence of trauma between 11:00-13:00 and 18:00-19:00 is mainly due to the increase number of traffic accidents resulted from traffic jams in the afternoon rush hours. The number of trauma patients increase during the period of 23:00 to 03:00. On May, in a monthly view of the largest number of trauma patients is associated with the subtropical climate in Hainan Province, where the weather becomes gradually hot after May, and the abundant nightlife, leading the increase of risk factors , such as fighting and drunk driving. From October to January, the number of patients begins to rise, for Hainan province is the most popular resort for travelers and olds to hibernate, which leads to a significant increase in the number of people in Hainan in winter, and the corresponding increase of trauma patients. Maturing the law of time can help trauma centers allocate medical resources, developing trauma treatment plans, and ensure the timeliness and effectiveness of trauma treatment. A total of 685 cases of traffic accident with the percentage of 27.67, occupies the first place of total accidents, among which there are 189 cases of electric bicycle accidents. According to the data of Hainan police, there are approximately over three million electromobiles on the island. These high speeding electromobiles which is illegal, rided without helmet result in frequent traffic accidents. Therefore, traffic police departments and transport management should resolutely restrict the number of electromobiles and establish local networks of electromobiles. In addition, the regulation of driving with helmets and other preventive measures are needed. A total of 370 cases happen in restaurants or entertainment facilities, and occupies the third place of trauma incidence. Hainan is a big tourist province, the service industry is highly developed with amounts of dining and entertainment places. Consumer groups are mainly consisted of young people; Alcoholism, gambling, entertainment and other reasons cause a lot of fighting events, indicating that the management departments and public security organizations should jointly strengthen the regulations and management of dining and entertainment places. The age distribution of over 60 is 478 cases, of which 458 cases are retired, suggesting that the elderly should not be ignored. At present, the aging population in China is about 1 200 million people, with a trauma rate of 16%-20%. About 2 million elderly people are injured due to a variety of reasons. Because of the unique geographical location of Hainan Province, the average life expectancy is the longest in China, and the number of elderly migrants to Hainan is increasing year by year[8]. Therefore, families,

hospitals, society and government departments need to pay more attention to the prevention and treatment of trauma in the elderly[9].

The PTC training began in 2004 with the International Committee For Primary Trauma Care. The teaching material, Handbook on PTC, which is edited and written by the World Health Organization, focuses on practical and standard trauma training for emergency surgeons and anesthetists, and has been implemented in 56 countries, becoming one of the most influential continuing medical education programs in the world[10]. Primary trauma treatment training is a total of three-day courses, including one-day theoretical course, one-day field exercise and one-day teacher's taught course, to develop and standardize the trauma treatment ability of the medical staffs involved in trauma treatment[11]. CTCT was launched in Wuhan in September 2010, and then carried out in four national training centers. It is of great significance to improve the students' ability in trauma treating, including theoretical level, trauma first aid skills and field exercise results[12]. The requirement of timely and effective treatment for severe trauma patients is much higher than that of other non-emergency patients. Trauma treatment should strive to integrate effective treatment resources. If timely and effective treatment can be achieved, the mortality rate and disability rate of patients are able to be significantly reduced[13]. After CTCT, the whole body examination, rescue, imaging examination, emergency stay time and preparation time before operation are shortened significantly in the course of treatment of severe trauma patients in five hospitals in Hainan Province. For the patients with severe trauma, prolonging the emergency stay time can significantly increase the mortality rate, and the limited ability of emergency surgery personnel, the excessive emergency room consultations, the unreasonable imaging examination time, the congested emergency room, and so on can cause the retention of patients in the emergency room[14]. While the CTCT pays attention to the basic clinical skills training, and does not rely on other specialties, so it shorten the emergency stay time. CTCT training stress the requirement for a rapid and effective initial assessment of trauma within 2 min, which can save more time for treatment of patients with severe trauma, and patients with severe trauma, can be transferred to ICU for monitoring or damage control surgery as soon as possible. Surgery is the only way to control the patient's condition[15]. The treatment of severe trauma patients after CTCT can shorten the time of emergency preparation before operation and improve the prognosis[16]. Severe trauma often involves multiple parts and organs at the same time, and there are multiple types of open and closed trauma[17]. Most patients suffered disturbance of consciousness, such as restlessness, apathy, coma, etc., they can't describe their condition accurately, but the trauma of some substantive organs is not obvious in the early stage[18]. The emergency surgeons, especially the young surgeons, who have limited expertise and experience, are prone to misdiagnosis of important sites[19,20]. CTCT emphasizes the overall concept of

trauma treatment. First of all, it is necessary to make a preliminary assessment of A: trachea; B: respiration and C: circulation. Under the premise of stable respiration and circulation, a general examination is needed to avoid missed diagnosis as far as possible[21]. After CTCT, the rate of misdiagnosis has decreased from 26.24% to 15.60%, suggesting that CTCT can improve the diagnostic level of medical personnel concerned with trauma treatment. The mortality rate for severely traumatized patients has decreased from 18.81% to 15.37%, which shows to some extent that training can reduce the mortality of severely traumatized patients.

The collection of samples in this study is pretty limited, the number of trauma patients for a year of statistics in only five hospitals in Hainan Province has some certain limitations. The CTCT was carried out for one year, so the training time was too short, and the medical staffs was not proficient in CTCT; The patients with severe trauma were investigated in only five hospitals in Hainan province every year, leading to few severe trauma cases and limited data.

Trauma epidemiology in Hainan is closely related to its special geographical environment. The gender ratio of male and female patients with trauma is distinct at different age. Hainan is also one of the places of longevity in China, the trauma of the elderly should not be ignored. The floating population increases significantly in winter for the travelers and "migratory birds" from the mainland of China to the island, resulting in an increase of traumatic population. The climate in four seasons of Hainan is suitable, the abundant nightlife on the island which is an international tourist island and the a high amount of dining and entertainment places causes the trauma patient at wee hours to be more than other time. On the other hand, the volume of electromobiles in Hainan are extremely large, and electromobile accidents are more than other regions of the country, which is also an issue need to be paid attention. These special epidemiological features provide a reference for the prevention and treatment of trauma in Hainan International Tourism Island, and can also provide some information for the government to formulate corresponding laws and regulations, as well as emergency plans and other relevant strategies. In this study, it also finds that CTCT improves the level of theoretical knowledge and first aid skills of medical personnel involved in trauma treatment, reduces the rate of misdiagnosis of severe trauma, and improves the success rate of treatment for severe trauma patients. Therefore, it is suggested that all medical personnel involved in trauma treatment should regularly attend CTCT. Health departments and medical education departments may consider extending CTCT and continuing education programs to Hainan and other parts of China.

Conflict of interest statement

The authors report no conflict of interest.

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References

- [1] Lozano R, Naghavi M, Foreman K, Lim S, Shibuya K, Aboyans V, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012; **380**(9859): 2095-2128.
- [2] Haagsma JA, Graetz N, Bolliger I, Naghavi M, Higashi H, Mullany EC, et al. The global burden of injury: incidence, mortality, disability-adjusted life years and time trends from the Global Burden of Disease study 2013. *Inj Prev* 2016; **22**(1): 3-18.
- [3] Ley Greaves RA, Wilkinson LF, Wilkinson DA. Primary trauma care: a 20-year review. *Trop Doct* 2017; **47**(4):291-294.
- [4] Chuanzhu L, Jiahe L, Liping W, et al. Proposal for building a disastermedicine rescue system in Hainan Province. *Chin J Hosp Admin* 2008; **24**(11): 728-731.
- [5] Wilkinson D, Mcdougall R. Primary Trauma Care. *Anaesthesia* 2007; **62**(Supplement s1): 61-64.
- [6] Van Beeck E. The Delphi method: A tool to support injury control and trauma care policy. *Injury* 2017; **48**(1): 3-4.
- [7] Dimaggio CJ, Avraham JB, Lee DC, Frangos SG, Wall SP, et al. The epidemiology of emergency department trauma discharges in the United States. *Acad Emerg Med* 2017; **24**(10): 1244-1256.
- [8] Wang W, Zhou Y, Zeng J, Shi M, Chen B. Epidemiology and clinical characteristics of patients hospitalized for ocular trauma in South-Central China. *Acta Ophthalmol* 2017; **95**(6): e503-e510.
- [9] Holleran RS. Elderly trauma. *Crit Care Nurs Q* 2015; **38**(3): 298-311.
- [10] Jawaid M, Memon AA, Masood Z, Nadeem Alam S. Effectiveness of the primary trauma care course: Is the outcome satisfactory?. *Pak J Med Sci* 2013; **29**(5): 1265-1268.
- [11] Nogaró MC, Pandit H, Peter N, Le G, Oloruntoba D, Muguti G, et al. How useful are primary trauma care courses in sub-Saharan Africa?. *Injury* 2015; **46**(7): 1293-1298.
- [12] Zhang LY, Zhang XZ, Bai XJ, Zhang M, Zhao XG, Xu YA, et al. Current trauma care system and trauma care training in China. *Chin J Traumatol* 2018; **21**(2): 73-76.
- [13] Nafissi N, Saghafinia M, Balochi K. Improving trauma care in rural Iran by training existing treatment chains. *Rural Remote Health* 2008; **8**(4): 881.
- [14] Dickason RM, Cioè-Peña E, Chisolm-Straker M. Primary trauma care curriculum: A qualitative analysis of impediments to improvement. *Trauma* 2016; **19**(2).
- [15] Machtinger EL, Cuca YP, Khanna N, Rose CD, Kimberg LS. From treatment to healing: the promise of trauma-informed primary care. *Womens Health Issues* 2015; **25**(3): 193-197.
- [16] Goldstein E, Athale N, Sciolla AF, Catz SL. Patient preferences for discussing childhood trauma in primary care. *Perm J* 2017; **21**: doi: 10.7812/TPP/16-055.
- [17] Hiratsuka VY, Moore L, Dillard DA, Avey JP, Dirks LG, Beach B, et al. Development of a screening and brief Intervention process for symptoms of psychological trauma among primary care patients of two American Indian and Alaska Native Health Systems. *J Behav Health Serv Res* 2017; **44**(2): 224-241.
- [18] Figueroa RA, Cortés PF, Accatino L, Sorensen R. Management of psychological trauma in primary care. *Rev Med Chil* 2016; **144**(5): 643-655.
- [19] Canady VA. Learning collaborative created to inform trauma practices in primary care. *Mental Health Weekly* 2017; **27**(42): 1-7.
- [20] Wagner J. Assessing refugee trauma in the primary care setting. *Ann Global Health* 2016; **82**(3): 568-568.
- [21] Calderwood S, Rowlands A, Harley T. Prevalence of trauma symptoms in primary care service users referred to psychological services[J]. *Clin Psychol Forum* 2017; **2017**(294): 14-22.