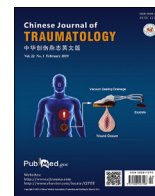


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# Chinese Journal of Traumatology

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## Editorial

### Review of Chinese Journal of Traumatology in the year 2018

#### A B S T R A C T

Trauma is one of the leading causes of death worldwide. It is an urgent task to strengthen the trauma care and prevent related complications. In 2018, Chinese Journal of Traumatology reported a series of trauma-related articles which cover the contents of pre-hospital care, in-hospital care, complication prevention, etc. The journal aims to improve the treatment levels, decrease the trauma incidence, and reduce the trauma mortality and disability.

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#### Introduction

Frequent natural disasters, constant regional conflicts, and widespread use of vehicles have made trauma the fourth leading cause of death for human beings, which is the first killer among the youth aged 1–45 years. In 2016, trauma-induced mortality ranked the third in city and the fourth in the countryside in China. It means that no matter in developed or developing countries, the process and technique of trauma rescue/care should be improved unceasingly. In June 2018, National Health Commission of the People's Republic of China promulgated a policy focusing on the establishment/construction of trauma care centers at secondary hospital and tertiary hospital. Trauma care faces three challenges: pre-hospital urgent medical rescue or aid, in-hospital emergency care, and traumatic complication prevention & treatment as well as intensive care of trauma victims. Chinese Journal of Traumatology (CJTEE) presented a series of in-depth reports concerning these three aspects in the year 2018.

The introduction and establishment of trauma care system is one of CJTEE watching topics. The similarities and differences of trauma care systems among countries and regions have been reported in the past year. Pre-hospital treatment greatly reduces the mortality of severe trauma patients while in-hospital treatment is equally nonnegligible. More importantly, it needs to pay more attention to restore organ function and improve quality of life of trauma patient in future. Sepsis is one of the objective complications after severe trauma, which can easily induce multiple organs dysfunction, and result to death of patient. Unfortunately, what we can know about sepsis is still limitation. Another serious complication of in-hospital trauma care is secondary brain injury. About 40% of patients will continue to deteriorate after hospitalization and even die. Secondary injury following brain trauma is a worldwide challenge, which may be due to the fact that we know few about the

mechanism of secondary inflammatory injury after brain trauma. Open extremity fractures are the common presented injury in trauma care, however some professional consensus is needing to be re-discussed. Therefore, CJTEE invited experience experts to summarize the update currents on trauma emergency system, intensive critical care on sepsis. It is worth noting that, two innovative researchers from America were invited to summarize the recent achievements in basic medicine. Prof. Zheng-Guo Wang, an academician of the Chinese academy of engineering and prof. Li-Jun Hou, the director of neurosurgery department in Shanghai Changzheng Hospital provide some enlightenment and understanding of the brain injury. Professor Raymond Malcolm Smith from Harvard Medical School, Massachusetts General Hospital also delivered his study on open fracture care.

#### Trauma care system (Issue 2, 5)

Trauma involves multiple systems and anatomic sites, and trauma care requires multi-disciplinary cooperation for injury assessment, emergency surgery and further staging operation. Some misunderstandings and disputes about the establishment of trauma care system include: (1) which one – multidisciplinary team or trauma center team – is able to provide more efficient trauma care; (2) what qualification should the leader of trauma care team hold; (3) what kind of trauma center model is optimal. However, due to the varied geography, resources, population and economic development in different countries and regions, a trauma system should adapt to local conditions. CJTEE has made a detailed introduction of trauma care models in Germany, United States, Chongqing (China), Wuhan (China), Zhejiang (China) aiming to continuously improve Chinese trauma care system, and provide guidance and reference for its future development.

The pre-hospital emergency care system in Germany consists of emergency and disaster management, which is different from

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China. Prof. Norman Hecker introduced three-level trauma centers of emergency management system, which is nation-wide to provide the appropriate treatment for the trauma patients of different levels. Germany has a decentralized disaster management system, meaning that the state delegates emergency management system authority to its provinces and the provinces delegate emergency management system authority to their regions, cities and communes – the system not only gives full play to disaster relief, but also provides powerful assistance to emergency rescue. Prof. Dong-Xia Feng gave an overview of the American trauma care system. In American system, the trauma centers are divided into four levels in accordance with the personnel composition, facilities equipment, and service coverage. Each trauma center gives the patients trauma care at different levels. The trauma patients can accept comprehensive treatment and a total care in Level-I trauma center, and initiate definitive care in level-II trauma centers. In level-III trauma center, after a prompt assessment of the patient, resuscitation, surgery, intensive care, postoperative stabilization and emergency surgery could be performed if needed. Meanwhile, the center frequently treats patient who may require transfer to a higher level of care. Level-IV trauma center, often located in remote areas, can provide the advanced trauma life support (ATLS) prior to transfer of patients to a higher level trauma center.

In the past three years, China has attached such great importance to building trauma care system. Trauma centers have been established gradually in large, medium and small cities, and systematic trauma care training have been produced regularly. CJTEE invited Prof. Lian-Yang Zhang and Prof. Xiang-Jun Bai to make the systems in Chongqing and Wuhan as examples to take a brief introduction of the current trauma care system in China. In the articles, two advices of building trauma center, three models of trauma care systems, existing problems, and the train courses are reported. With a vast territory of geographic features and sophisticated county-level administration, China is believed to be difficult to establish a regional trauma care system. In issue 5, a series of articles report how to conduct trauma care in county-level hospitals; how to establish three-level trauma centers under local conditions; how to build a rescue chain through self-rescue and team rescue; how to make a guideline of trauma care in county-level medical units.

Because of the high mortality of traumat injury, it is urgent to establish and improve the trauma care system in China. In the southwest and northwest China, many towns and counties are in mountainous and plateaus areas. Thus the establishment of trauma center system needs to adapt to the domestic conditions and get the indispensable support from the government, which could increase the cure rate of trauma, set scientific guideline and train professional surgeons and paramedics.

We believe that trauma care system can provide more efficient trauma care than a multidisciplinary team. The candidate for clinic lead of trauma center should be trauma surgeons with special training in ICU or ICU doctors who served as surgeons before. The standardized trauma care system could not be used anywhere, because the system needs to be built in the local conditions, such as geographic features, personnel configuration, especially the current economic and social development. The gold standard of a good trauma care system is to transfer trauma patients to the right place in the shortest time.

#### Open fracture (Issue 4)

At present, both pre- and in-hospital first aid agree that pre-hospital care is a provisional emergent measure and after simple management, the patient will be transferred to hospital for further treatment. Taking the most common open fracture of the extremities as example, Prof. Raymond Malcolm Smith, a well-known

expert in Harvard Medical School, pointed out the key points for its handling. Moreover the example of external fixation is shown.

The open fractures have the characteristics of easy contamination, frequent high-energy injury, heavy tissue damage, and hard to manage. Prof. Smith proposed three principles of surgery for open fracture: debridement and lavage, fracture stabilization and soft tissue closure. He believed that early treatment is important to greatly reduce the risk of infection. Comprehensive evaluation of the wound, accurate and thorough debridement and lavage, and prevention of postoperative complications such as infection are indispensable for the treatment. Although someone believes that postoperative fixation should be avoided for better healing, clinical and experimental evidences have shown that postoperative fixation plays a positive role in wound healing. In this review, Prof. Smith and this team also introduced different fixation methods for different wound patterns to speed up the healing process.

Whether to treat combined triangular ligament injury in ankle fractures is controversial. Professor Lei Liu from West China Hospital reported that besides open reduction and internal fixation, transarticular external fixation is more effective than triangular ligament repair for rotation type IV equivalent ankle fractures. Meanwhile, wound management is more convenient.

The treatment of open fractures has been always controversial. We believe the review by Professor Smith, which summarizes the recent advanced clinical techniques, suggests appropriate surgical methods based on author's years of clinical experience, and moreover proposed three principles of open fracture care, will provide valuable clinical advice for the majority of clinicians.

#### Sepsis (Issue 6)

Sepsis is a common complication of severe trauma, burn injury, shock and major operation, which may cause septic shock and multiple organ dysfunction syndromes. With the high morbidity and mortality, sepsis strikes more than 18 million people every year in the world. And about 14,000 people die of sepsis and its complications. Based on the foreign epidemiological investigations, sepsis is the main cause of death of non-cardiac patients in ICU, and its mortality has exceeded that of myocardial infarction. In recent years, anti-infective therapy and organ support technology have made great progress, but the mortality rate of sepsis is still as high as 30%–70%. The economic burden, the medical resource consumption, and the high fatality rate make sepsis a significant threat of human health.

Prof Peng-Lin Ma discussed a positive effect of early fluid loading for septic patients. They believed that the plasma volume depletion is fundamental for aggressive fluid loading, and the hemodynamic stability is prior to the organ function stability for sepsis patients. It is known that fluid resuscitation is fundamental in the management of critically ill patients. However, there is no standard procedure of fluid resuscitation. Prof Peng-Lin Ma proposed five protocols: (1) Evaluate the fluid and electrolyte status of critically ill patients; (2) Make a “normal saline” (NS) infusion management plan; (3) Measure the rate and volume of NS and mark the 4 Rs; (4) Record other sources of fluid and electrolyte intake; and (5) Write the information for patients and their family members.

The mechanism of sepsis is still unknown. Although updating Surviving Sepsis Campaign, formulating the guidelines, adopting the Goal-directed therapy, the mortality rate of sepsis has been still high. The mechanism of sepsis is quite complicated, which is closely related to the pathological and physiological changes in multiple systems and organs, including systemic Inflammation, gene polymorphism, immune dysfunction, coagulopathy, tissue injury and responses to infection, pathogenic microorganism and

toxin, etc. To decrease the mortality rate and find an effective therapy, the mechanism of sepsis should be further studied.

### Secondary inflammatory damage (Issue 3)

Brain injury is the leading cause of death worldwide, and spinal cord injury causes a large number of deaths. Both of them highly result in the secondary injury, which reduce the survival rate, increase the complication rate, affect the quality of life, and cause heavy social burdens. Many prospective studies have reported brain injury and traumatic spinal cord injury in recent years. To prevent secondary injury, improve the quality of life, and reduce the economic burden for society, CJTEE reports a series special reports.

Wen-Hui, Hu a famous professor in Lewis Katz School of Medicine, Temple University, introduced the paradigm shifts of CNS immunity. Through the good efficacy of innate immune, inflammatory corpuscles, microglia/macrophages and astrocytes combined with drug therapy, secondary injuries, caused by cranio-cerebral injury and spinal injury could be treated effectively. Several immunomodulatory strategies are likely to see translation to patients within the next few decades, and several challenging questions need be addressed or investigated for future studies. By reviewing and summarizing the understanding of neuroinflammation after traumatic brain injury and cell-based therapeutic opportunities in recent years, Prof Ye Xiong aims to treat neuroinflammation and promote functional recovery. Neuroinflammatory responses after TBI have dual roles: chronically, they mainly contribute to worsening outcomes of the progressive TBI pathology, and acutely, they may promote functional recovery. It is significant to strengthen the neuroimage on gender and age. The neurorestorative approaches, like cell therapy, exosomes as mediating cell-based therapy, induced pluripotent stem cells (iPSCs) for treatment are all effective treatments. Brain science is an interdisciplinary subject. Military Brain Science is a cutting-edge innovative science that uses potential military application as the guidance. Prof. Zheng-Guo Wang and Prof. Li-Jun Hou preliminarily provide nine aspects, including understanding the brain, protecting the brain, monitoring the brain, injuring the brain,

interfering with the brain, repairing the brain, enhancing the brain, simulating the brain and arming the brain.

At present, the limited research and the vague conclusion of secondary injury lead to the high disability and mortality. The in-depth mechanism studies will be helpful to develop novel therapies, reduce the fatality rate, and improve the long-term prognosis of patients.

We are all in a fusion and communion modern world. The booming city and transportation establishment brings about a high traumatic morbidity, thus trauma is called a disease in a developed society. Trauma is the leading cause of death in children and young adults, and the fourth leading cause of death in whole population. Trauma emergency care is a major branch of clinical medicine. In fact, the establishment of the trauma treatment system should include pre-hospital emergency care, in-hospital treatment, traumatic intensive care, prevention of traumatic complications, post-traumatic rehabilitation, especially post-traumatic psychological rehabilitation. CJTEE always aims to report traumatic contents to popularize the prevention knowledge, enhance the therapy cognition, optimize the treatment regulations, improve the treatment levels, decrease the trauma incidence, and reduce the trauma mortality and disability. In 2019, CJTEE will publish more articles on the establishment of trauma care system and the prevention of traumatic complications. The topics such as vascular surgery in trauma treatment and innovation on wound repair will be covered in the following issues.

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