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An overview of the construction of emergency and pre-hospital first aid platform

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ABSTRACT

To further improve the ability of pre-hospital and in-hospital collaborative treatment, strengthen emergency multidisciplinary cooperation and construct a scientific, rational and efficient emergency system, under the support of former chairman Yu Xue-zhong, Dr. Li Chun-sheng and numerous colleagues in the industry, the Emergency Medicine Society of the Chinese Medical Association appeal to us to draft Construction of Emergency and Pre-hospital Platform. Based on this background, the platform of emergency and pre-hospital first aid helps to build a "one horizontal and one Longitudinal" treatment model, using the horizontal and longitudinal patterns to integrate emergency medical resources to satisfy the automatic information integration and intelligent analysis sharing, realizing the emergency management visualization and medical information digitization, simplifying the medical process and establishing a perfect standard for the emergent diseases, thereby ultimately achieving efficient diagnosis and scientific treatment.

1. Introduction

A complete emergency medical service system should consist of three elements: pre-hospital first aid, hospital emergency and emergency intensive care [1]. How to smoothly and tightly connect the three aforementioned elements tends to be the key to guarantee the proper treatment of critical patients. In decades, the emergency medicine model has developed from “triage channel” to “early treatment” then to the first aid before hospital, hospital emergency, intensive care in hospital and current multidisciplinary cooperation of the “one-stop medical service system”. To a great extent, the level of the construction of emergency medical system reflects the level of comprehensive medical service and management ability of a country or a region [2,3].

Emergency medicine has made great achievements in the past 30 years. Meanwhile, there is a series of practical problems that needs to be resolved. Although there are different emergency service models in China, problems still do exist such as insufficient pre-hospital, in-hospital information sharing, weak capability of work transition, unreasonable allocation of emergency resources, lack of unified command and dispatch, poor multidisciplinary collaboration

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and uneven quality of emergency medical services.

The construction of Chest Pain Center, Stroke Center and Trauma Center is still developing, but now they run into the bottleneck [4-8]. In recent years, the incidence of acute chest pain, acute stroke and multiple traumatic diseases presents a roughly increasing trend, and constructing centers could emphasize the development of the regional emergency network and extend the advanced treatment concept and the standardized treatment process to pre-hospital and the community, which has been proven to be an effective treatment model and management system to improve emergency flow interface, patients transshipment and information sharing so as to eventually realize the overall promotion of regional treatment level.

According to the recent research data, the number of acute myocardial infarction in China has quadrupled, but there is no significant decrease in the proportion of patients who does not receive reperfusion therapy. Also, there is no significant improvement in hospital mortality and complications [9]. Research report on National Stroke Registration in China showed that only 2.4% patients with acute ischemic stroke received thrombolytic therapy, which was far below the level of developed countries. Practice showed that construction of chest pain center, stroke center and trauma center seems to always meet the practical bottleneck until these system problems can be well and effectively solved such as professionalization, normalization, informatization and multidisciplinary collaboration efficiency of emergency and pre-hospital emergency system. It can hardly realize the synergy effect of different disciplines to decrease fatality rate [10].

The 'single fight' type of construction has become one of the major factors inhibiting its development in the further development of stroke chest pain and trauma centers. Taking the whole pathophysiological process of the disease into consideration, only by establishing a single major emergency platform on which multidisciplinary cooperation, collaboration and integration can be achieved can we push forward and realize information communication. Under the circumstances, we can effectively shorten the time between onset and treatment of a disease to realize the turning point of decreasing the mortality rate.

To further enhance the ability of pre-hospital and in-hospital collaborative treatment, strengthen emergency multidisciplinary cooperation and construct a scientific, rational and efficient emergency system, under the support of former chairman Yu Xue-zhong, Dr. Li Chun-sheng and numerous colleagues in the industry, both the current chairman of the Emergency Medicine Society of the Chinese Association of Emergency Medicine and the would-be chairman of the State Health and Family Planning Commission appeal to us to draft The Guidance to Further Strengthen the Construction of Emergency and Pre-hospital Emergency Platform to promote the development of emergency medicine in China.

2. Basic design idea

Emergency medicine focuses on the combination of pre-hospital care, hospital emergency and EICU together, making it a standardized, efficient, multidisciplinary one-stop service model. Emergency medicine aims to build a platform for the treatment of critical diseases, and an invisible multidisciplinary collaboration mechanism and process on a visible space and place. Meanwhile, it also aims to provide support, supervision and continuous improvement to this mechanism and process through informational means. The large emergency platform which was built following the specialized, standardized, informational, modern, international standards is not only the inevitable choice in the development of today's emergency medicine, but also the important foundation of the development of treatment model in special centers like apoplexy, pectoralgia and trauma.

Based on this, the construction of this project puts forward the means which relies on the platform of emergency and pre-hospital first aid to build the one horizontal and one longitudinal treatment model, using the horizontal and vertical patterns to integrate emergency medical resources to achieve the automatic integration of the information and intelligent analysis sharing, realizing visualization of emergency management, medical information digitization, the simplest medical process and setting up a perfect standard for emergency related diseases, finally meeting quick diagnosis and scientific treatment.

Construction of emergency and pre-hospital emergency platform is the integrated innovation of science. The construction of large platform has the characteristic of typical integrated innovation. A large platform is just like a modern smart phone. A modern smart phone is an integrator which possesses different kinds of functions like making phone calls, taking pictures, recording, mobile payments. Though these features are not the original features of the phone, but mobile phone as a carrier platform integrates these functions perfectly. Hence, the emergency and pre-hospital platform we are going to build is just like a modern smart phone which integrates the various non-original functions of medicine, building our intelligent medical fusion model. Emergency medicine provides a large platform for those clinical specialty and auxiliary departments, including pre-hospital first aid, cardiovascular medicine, neurosurgery, trauma surgery, neurology, medical imaging and ultrasonic medicine, promoting full integration of medical technology to better serve the critical patients.

Construction of emergency and pre-hospital emergency platform needs to build the concept of 'tai'. The large platform we build will provide a platform for specialized disciplines, essentially achieving integration. We need to change the current consultation system of "Kowloon water control" and change the situation of 'single dancing' and 'singe singing' to 'group dancing' and 'chorus' on this large platform. The emergency platform is a large platform for "group dance" and "chorus", the "timeline" of disease treatment is just the major rhythm of 'group dance 'and 'chorus'.

Construction of emergency and pre-hospital emergency platform needs to build the concept of 'wei'. 'wei' means the extension and expansion of perinatal concept in emergency department. Looking forward we move from different departments to emergency room, to pre-hospital, and then to the emergent scenes. Looking backward, we set up the rapid response team in hospital, which is called 'Blue Garrison 2.0', moving emergency service go to different specialties, and at the same time starting as early lifesaving therapy and early rehabilitative intervention in time. Construction of emergency and pre-hospital emergency platform bases on the concept of emergency and critical care, building the model with 'peri traumatic period', 'peri cerebral apoplexy period ' and 'peri thoracic pain period', building an emergency and critical care chain, including "chain of treatment for trauma", "chain of treatment for chest pain", and "chain of treatment for thoracic pain", integrating and implanting the latest guide of emergency diseases and expert consensuses, information

technology, big data and artificial intelligence into the chain of critical care, creating a integrative scientific diagnosis and treatment system.

3. Main innovative content

The platform of emergency and pre-hospital emergency platform will be remade on the basis of traditional emergency zoning, creating a 'zero channel' (see Fig.1)in the emergency department. 'Zero channel' is a new concept which is relative to 'green channel', which mainly includes 'zero space', 'zero time' and 'zero process'. 'Zero Channel' is an important bridge connecting prehospital with in-hospital; it is the important component of the whole "peri traumatic period" (or 'peri cerebral apoplexy period' and 'peri thoracic pain period'). It is also the key to shorten the time axis, and it is mainly reflected in the following three aspects:

'Zero space'. It is the embodiment of "zero channel" in spatial dimension. Patient who needs emergency operation can reach the field of operation directly, while the patient with cardiac arrest and respiratory arrest who needs emergency recovery can reach the resuscitation unit directly. As the requirement to time axis and time window becomes more and more harsh, "zero channel" will be able to reach more areas or units, minimizing the spacial distance

'Zero process'. With the help of the direct operation area and the resuscitation unit patient information has been inputted at all pre-hospital steps, so the traditional 'referral' process can be eliminated. Additionally, patient examination results will be shared in-hospital, making the traditional 'preoperative preparation' process more perfect. Due to the application of information real-time sharing and remote visual system, corresponding team in the hospital can design a complete therapeutic regimen for the coming patient though the patient is still on the way of transit. On the patient's arriving at the hospital, he or she can receive rescue treatment with 'zero progress' at once. The 'zero process' is not without a process, but the process has been moved forward, improved and simplified. Besides, patients can 'get treated first and then pay' instead of 'paying first and then treating', and this 'simplifies the process and turns zero into integral.'

Establishing the concept of "Dahong area". Ddifferent from the existing red area of emergency department, 'Dahong area' also includes resuscitation unit, emergency ICU, field of operation and standard red area (rescue room). Different areas of 'Dahong area' are connected 'door-to-door' with each other. The surgical area contains an integrated hybrid operating room, a interventional catheter chamber or a general operating room and debridement room, and there is equipment of ECMO in the recovery unit which can help us operate the ECMO+CPR (ECPR), combining with large platform operating room to realize the ECPR+PCI. The "Dahong area" is relatively independent area but it directly connected to other districts. What's more, it has a direct "zero channel".

Establishing the concept of "Dahuang area". In addition to meeting the needs of daily emergency work, the 'Dahuang area' is specially set chest pain unit, stroke unit and trauma unit and other specialist "unit area." For patients with special conditions like trauma, chest pain or stroke, ambulances can arrive at the door of each unit directly, then be taken care of and cured by corresponding group in the hospital. Unit areas are connected with each other in 'Dahong area'. When the patient's condition turns worse or are in need of surgery, he can arrive at every area directly. Except for trauma, chest pain and stroke, setting the poisoning unit (including gastric lavage) *etc*. can also meet the requirements of special treatment for special diseases. Patients in Dahuang area or unit may also be admitted to specialist wards after stabilization.

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Building a mobile red zone means creating a mobile life-saving unit, which is equipped with ECG monitor, defibrillator, rescue vehicle, cardiopulmonary resuscitation machine, ventilator, etc. The mobile equipments for the patient and the patient's condition will be realized through equipping mobile CT, mobile ultrasound, POCT and other devices in the mobile image inspection workstation and sharing equipment resource in emergency area.

Establishing an information network platform 'starting from the first time of call' (Figure 1). Phone operator instructs patients and their families to carry out saving or self-saving by cell phone, telephone, video device or various kinds of app system for pre-hospital emergency treatment to ensure that patients and their families receive rescue guidance is received in the blind area from the first call to the first medical consultation. Pre-hospital emergency workers are the first ones to treat patients, thus, all processes must be recorded in the information platform system at the beginning and all registered information should be shared on the information platform, and medical personnels can find all the information data of pre-hospital on the information network platform carrier such as emergency cell phone or pad, and can import these information data into the patient's in-hospital electronic medical records.The moment the patient is admitted to the hospital, the whole diagnosis and treatment process will be recorded in the information platform system, and all records will be filled in with menu options, making it convenient for doctors to record quickly. Treatment standards for different diseases are set in the course of in-hospital treatment. There is a drop-down menu in the electronic information system therapy bar from which treatment packages for various diseases can be accessed. There are simple disease treatment packages and also treatment packages with other diseases, and the standard of treatment can be designed and improved according to the latest domestic and foreign guidelines. The information management platform can objectively, truly, accurately, timely, completely record the whole process of first aid at pre-hospital and in-hospital, thus the recording function, medical resource information sharing function, medical information database function, medical quality warning function, direct reporting and medical quality control functions can be realized.

Relying on informational network platform which starts from 'the first moment from calling', we can put forward 'the time from calling to the exact treatment'for the first time, such as 'call bolt time' , 'call ball time'and so on. On the one hand, compared with 'bolt

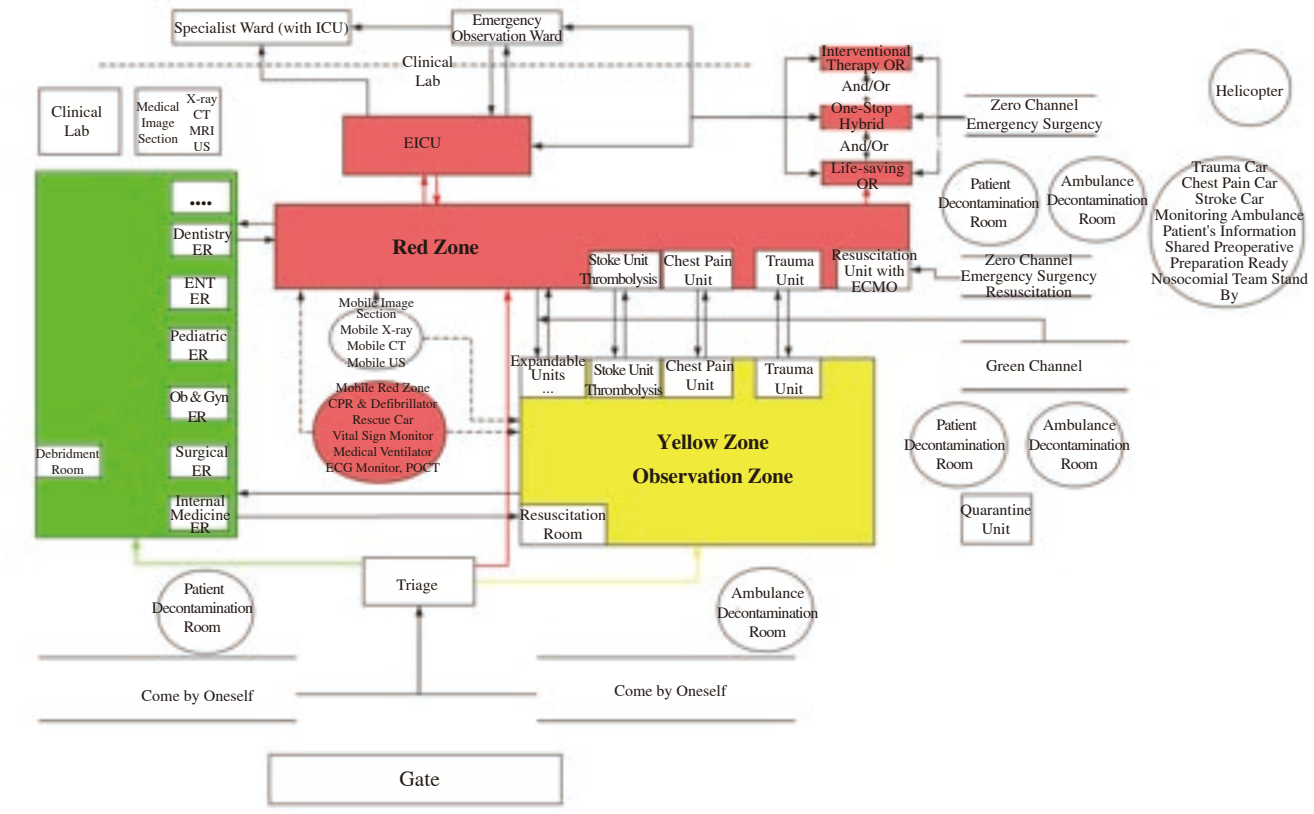


Figure 1. the horizontal platform of emergency and pre-hospital.

time' and 'gate ball time', 'call bolt time' and 'call ball time' reflect the integrative treatment concept and they fit better the pathological and physiological process. On the other hand, emergency treatment battlefront is going forward so that the time from outpatient service to definitive treatment can be shortened evidently. Take acute ischemic stroke as an example, the time for outpatient clinic can even be reduced to zero.

The construction of emergency and pre-hospital first aid major platform has achieved the fusion of space and time, and the fusion of chemical equations through 'Wei', 'Tai' and 'Integrated Innovation'. The major platform construction has achieved the unified management of regional emergency medical resources-seamless connection between pre-hospital first aid and the rescue in hospital, multidisciplinary efficient collaboration and efficient operation, early identification intervention and ultra-early rehabilitation around critical stage patients, standardized treatment path and continuous improvement of key critical diseases, distant education in emergency first aid and popularization of public first aid knowledge. Finally the 'turning point' of the fatality rate of emergency and critical cares will arrive to minimize morbidity and mortality and improve the prognosis of patients.

Conflict of interest statement

The authors report no conflict of interest.

References

[1]Qian S. Current situation of pediatric emergency in tertiary and teaching hospitals in 15 provinces, municipalities and autonomous regions in China Mainland. *Zhonghua Er Ke Za Zhi* 2014;**52**(12):913-917.

[2]Yu W, Lv Y, Hu C, et al. Research of an emergency medical system for mass casualty incidents in Shanghai, China: a system dynamics model. *Patient Prefer Adherence* 2018;**12**:207-222.

[3]Roudsari BS, Nathens AB, Arreola-Risa C, Cameron P, Civil I, Grigoriou G, et al. Emergency Medical Service (EMS) systems in developed and developing countries. *Injury* 2007;**38**(9):1001-1013.

[4]Davis A1, Chiu J, Lau SK, Kok YJ, Wu JYH. Efficacy of implementation of a chest pain center at a community hospital. *Crit Pathw Cardiol* 2017;**16**(4):135-141.

[5]Man S1, Schold JD1, Uchino K.Impact of stroke center certification on mortality after ischemic stroke: the medicare cohort from 2009 to 2013. *Stroke* 2017;**48**(9):2527-2533.

[6]Miller EC, Blum C, Rostanski SK. Developing a stroke center. *Stroke* 2017; **48**(7):e155-e156.

[7]Fedor PJ, Burns B, Lauria M, et al. Major trauma outside a trauma center: prehospital, emergency department, and retrieval considerations. *Emerg Med Clin North Am* 2018;**36**(1):203-218.

[8]Keefe J1, Cern K, Wiita S,et al. Community-based academic level I trauma center prepares for the 2016 republican national convention. *J Trauma Nurs* 2018;**25**(2):98-103.

[9]Li J, Li X, Wang Q, Hu S, Wang YF, Masoudi FA, et al. ST-segment elevation myocardial infarction in China from 2001 to 2011 (the China PEACE-Retrospective acute myocardial infarction study): a retrospective analysis of hospital data. *Lancet* 2015;**385**(9966):441-451.

[10]XIANG Ding-cheng. Chest pain center and the construction of emergency medical service system: comparison on accreditation criteria from the United States of America, Germany and China. *Chin J Frontiers of Med Sci* (Electronic Version) 2017;**9**(1):6-10.