

# Construction and Grouping of a Chinese People's Armed Police Forces Provincial-Level Mobile Rescue Hospital System

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### ABSTRACT

In recent years, with the increasingly frequent variety of large-scale disasters that have happened in China, the Chinese People's Armed Police Forces (PAP) has undertaken increasingly frequent and diversified tasks, which has led to greater requirements for the construction of emergency medical rescue equipment. Therefore, as determined by the characteristics of the PAP's tasks and based on the construction of special boxes and frame tent equipment, a new PAP mobile rescue hospital system was successfully developed, and all PAP provincial-level medical rescue teams have been equipped with this system. In the present article, we describe this mobile rescue hospital system, which is mainly composed of professional emergency vehicles, frame-type tents, and advanced medical equipment. The system has the following characteristics: significant integration, a fast response, flexibility, and practicability. The mobile rescue system is generally used as the army's own health service support system and to provide certain emergency medical rescue services to disaster-stricken people. The successful construction and further application of this system have significance in terms of accelerating the response of rescue teams and the emergency treatment ability of the PAP's provincial-level emergency medical rescue teams. (*Disaster Med Public Health Preparedness*. 2018;12:502-506)

**Key Words:** disasters, mobile hospital, health service support, emergency medical rescue

China is subject to several of the world's most serious disasters and accidents. Especially in recent years, with the occurrence of many severe disasters, such as the Wenchuan earthquake, the Yushu earthquake, and the influenza A (H1N1) outbreak, Chinese state and local governments have been paying more attention to the creation of emergency medical rescue forces and corresponding equipment systems. In 2012, 22 state-level health emergency response teams were formed in China. Their responsibilities can be divided into emergency medical rescue, acute infectious disease control and prevention, emergency poisoning accident treatment, and emergency treatment for nuclear and radiation accidents. Additionally, corresponding rescue vehicles and equipment, such as operation vehicles, outpatient service vehicles, medical technical support vehicles, and equipment loader vehicles, have been assigned to every rescue team.<sup>1</sup> The equipment and treatment capacity is equivalent to a second-class hospital in China.

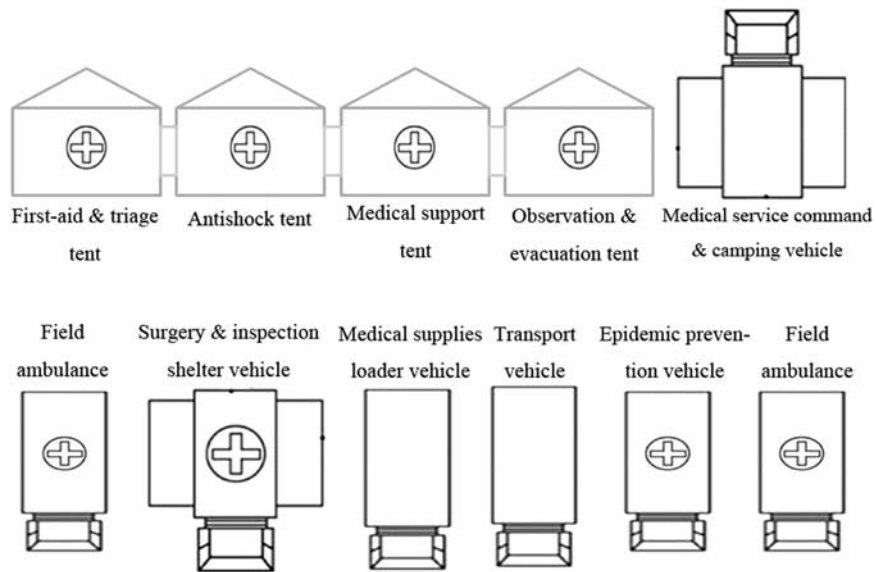
In 2009, China enacted the Law of the People's Armed Police Forces (PAP), which clearly stipulates that emergency rescue and disaster relief should be one of the main tasks of the PAP. To strengthen the

construction of the whole country's emergency rescue capabilities, the State Health Ministry and the PAP published a joint-mandated document in 2011, which officially brought the PAP's emergency medical rescue team into the national disaster medical rescue system.<sup>2</sup>

With the variety of large-scale disasters that occur frequently in China, the PAP will undertake increasingly frequent and diversified rescue tasks. The existing medical emergency equipment has certain shortcomings with respect to degree of integration, flexibility, and systemic use and has been unable to effectively meet the requirements of onerous medical service support.<sup>3</sup> Therefore, the relevant departments of the PAP have attached great importance to the construction of professional medical rescue and support equipment in recent years. In light of changes in society and disaster awareness, the mobile rescue hospital system described in this article was successfully developed to provide more appropriate medical rescue equipment, to realize the integrated transport of rescue personnel and equipment, to form a treatment system composed of rescue vehicles combined with tents, and to further promote the development of the PAP's emergency medical equipment system.

FIGURE 1

## Deployment Diagram of the Mobile Rescue Hospital System.



### GENERAL OVERVIEW

This mobile rescue hospital system is primarily composed of 8 to 10 professional emergency medical and support vehicles, 3 to 4 frame-type health tents (approximately 30 m<sup>2</sup>), and a series of advanced medical equipment. The system is characterized by significant integration, rapid response, flexibility, and practicability. The vehicles primarily include field ambulances, surgery and inspection shelter vehicles, medical supply loader vehicles, medical service command and camping vehicles, epidemic prevention vehicles, self-propelled kitchen trucks, water transport and purification vehicles, and transport vehicles (Figure 1). Among these vehicles, the plans for the medical service command and camping vehicle, the surgery and inspection shelter vehicle, and the medical supply loader vehicle were approved in 2010, and the vehicles were successfully developed by 2012 by the Affiliated Hospital of the Logistics University of the PAP. The vehicles are mass produced and equipped for all of the PAP's provincial-level emergency medical rescue teams. These vehicles have effectively improved the rescue capability of each rescue team.

### FUNCTIONAL LOCALIZATION

As a new emergency medical support platform for the PAP's provincial-level emergency medical rescue teams and the corresponding emergency medical rescue teams, the system can be used to perform 3 types of tasks. First, the system can provide the army's own health service support when the PAP is in the process of handling emergencies, maintaining social stability, and performing defensive combat missions. Second, the system

can offer emergency medical rescue service for disaster-stricken areas after large-scale domestic disasters or accidents. Third, the system can provide medical inspection and diagnosis to the people of remote or poor areas in China.

The system can be assembled as a temporary medical aid station that can provide 20 beds and treat 100 wounded patients every day within an area of approximately 1200 m<sup>2</sup>. In principle, the system should not be employed for more than 1 month. However, according to the actual needs of a specific medical rescue task, any vehicles, tents, and medical equipment within this system can be rapidly drafted to realize the system's rapid mobility and modular combination.

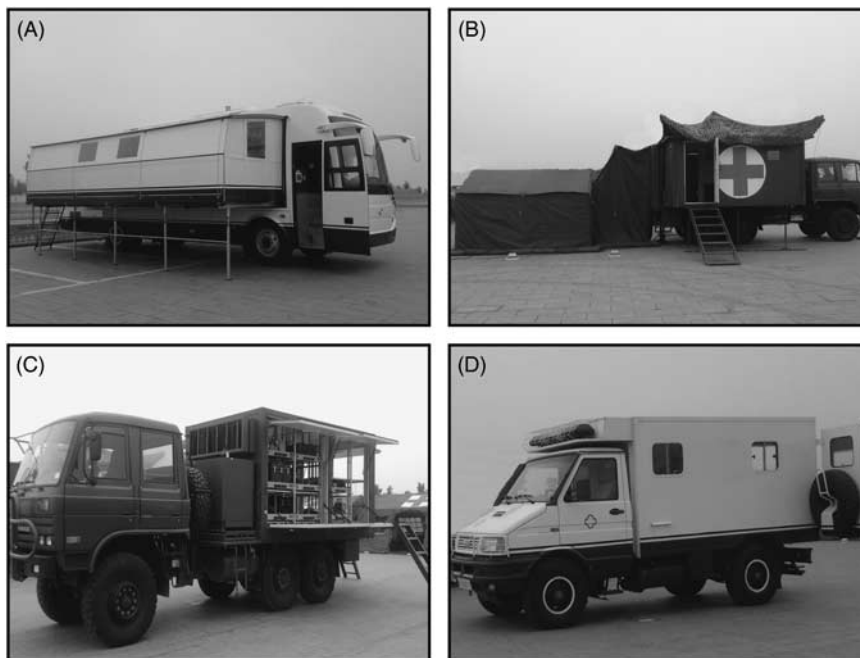
### MAIN RESCUE VEHICLES

#### Medical Service Command and Camping Vehicle

The medical service command and camping vehicle is equivalent to a mobile camp and command post, and its design was based on the People's Liberation Army camp bus. The vehicle adopts the body of a half-loaded bus and is primarily equipped with many foldable seats, a maritime satellite phone, a vehicular short-wave radio system, a single pawn knapsack communication terminal, handheld radio equipment, and other communications equipment, which allow the vehicle to perform its functions of communication and command, transportation of rescuers and emergency materials, and temporary camping (Figure 2A). The vehicle can transport 29 rescuers (including 1 driver) and their personal rucksacks and inflatable mattresses at one time. The vehicle adopts a double-expansion-type cabin body, and the unfolded

## FIGURE 2

**Appearance of the Main Rescue Vehicles. (A) Medical Service Command and Camping Vehicle. (B) Surgery and Inspection Shelter Vehicle. (C) Medical Supplies Loader Vehicle. (D) Field Ambulance.**



cabin area is approximately 45 m<sup>2</sup>, which can meet the camping needs of 33 people and can greatly improve the rescue team's camping conditions.<sup>4</sup>

### Surgery and Inspection Shelter Vehicle

The vehicle consists of a 4.5-m double-expansion cabin and a military off-road vehicle chassis, which is primarily used for fixing and carrying related equipment and facilities, such as operation and inspection equipment and heating and sterilization devices (Figure 2B). When the cabin of the vehicle unfolds, it can form an operation shelter and an inspection shelter (approximately 26 m<sup>2</sup> area). In addition, an affiliated preoperative tent can be unfolded (approximately 23 m<sup>2</sup> area) and is connected to the back door of the cabin. Therefore, the vehicle effectively realizes the integration of surgery and inspection functions, and it can simultaneously support 1 surgical operation and biochemical, blood, and urine testing.<sup>5</sup> The surgery vehicle can support many emergency surgeries, such as tracheotomy, decompression craniotomy, debridement, surgical hemostasis, and reduction of fracture.

### Medical Supply Loader Vehicle

The medical supply loader vehicle is equivalent to a mobile equipment storeroom and is formed by a 4.5-m large-sheet square cabin body and a military off-road vehicle chassis of a Dongfeng EQ2102, which is mainly used for the storage and

transportation of medical equipment, epidemic prevention equipment, and sanitary tents (Figure 2C). Under non-emergency conditions, the vehicle can be used instead of a warehouse; in a war or disaster rescue, the vehicle can leave quickly with other vehicles, accelerating the rapid response of the emergency medical rescue team. To meet the electricity demands of the mobile rescue hospital system, the anterior of the square cabin is integrated with a set of 13-kW super-silent diesel generator sets. The interior of the square cabin is outfitted with 15 groups of bearing drawers and 4 shelved areas to meet the needs of storing box-grouped medical equipment and sanitary tents. When the square cabin is unfolded, the cabin body can form extract pedals on both sides and the back of the square cabin, which makes the removal and placement of equipment more convenient.<sup>6</sup>

### Field Ambulance

This vehicle is formed by a military off-road vehicle chassis of the Nanjing Iveco NJ2045 and a large-board insulated van cabin body (Figure 2D). The vehicle is mainly installed and equipped with a defibrillation monitor, portable ventilators, a cardiopulmonary resuscitation machine, and other emergency equipment, which facilitate the functions of bandaging, fixation, stemming of traumatic bleeding, ventilation, infusion, providing oxygen supply, monitoring, and other emergency functions. This vehicle is primarily used for first aid and evacuating the wounded. It can transport 6 patients

TABLE 1

The Mobile Rescue Hospital System Groups and Primary Assignments

Grouping	Number of Personnel	Main Vehicles or Tents	Main Assignment
Command	3-4	1. Field command vehicle 2. Medical service command and camping vehicle	Organize and manage rescue action; coordinate contact with relevant departments; publicize and report
First aid and triage	5-8	1. Field ambulance 2. First aid and triage tent	Rescue and sort the wounded; basic first aid on the scene; early psychological intervention
Antishock	5-10	Antishock tent	Implement anti-shock measures; observe the seriously wounded
Surgery	5-10	Surgery and inspection shelter vehicle	Implement acute surgery; implement necessary debridement and special fracture fixation
Observation and evacuation	4-6	1. Field ambulance 2. Observation and evacuation tent	Set up the disposal area of the minor wounded; observe and evacuate the wounded; implement psychological support
Medical and technical support	3-4	1. Surgery and inspection shelter vehicle 2. Medical support tent	Supply drug and medical equipment; implement auxiliary examination and diagnosis
Epidemic prevention	3-4	Epidemic prevention vehicle	Health education; sanitation control; epidemic prevention and control; sterilize the poison-infected area
Logistics support	2-3	1. Medical supplies loader vehicle 2. Transport vehicle	Implement vehicle, life, and communication support; test and maintain devices; camping area alert

at one time. This vehicle has played an important role in previous stability maintenance in conflict, emergency rescue, and disaster relief medical support tasks.

### GROUPING SITUATION

In addition to the new mobile rescue hospital system, a PAP provincial-level emergency medical rescue team is equipped with 30 to 50 professional rescue workers. The team is typically divided into 8 groups (more details are given in Table 1). Team members are usually distributed across every division of the hospital, and once an order is given, the members immediately gather along with the corresponding equipment to go into action.<sup>7</sup> When performing a task, the team can adjust the composition of each group in a timely and reasonable way.

### CONCLUSIONS

In recent years, many types of emergencies, such as natural disasters and national security incidents, have occurred with increasing frequency and intensity throughout the world and have seriously affected human life and social development. To respond effectively to emergencies and to reduce damage, countries around the world have made significant efforts on research and operation of emergency medical rescue, which has greatly improved the construction and development of emergency medical rescue equipment systems.<sup>8</sup> Professional medical rescue equipment is the material foundation for a rescue team to implement an emergency medical rescue mission. The construction level of the equipment will partly determine the success or failure of the entire rescue project.

At present, many countries (eg, America, Germany, France, Japan, and China) have developed various types of health emergency vehicles. Certain vehicles have been mass produced and have equipped armed forces and civilian organizations. Generally, emergency medical vehicles are developed with the operation vehicle as the core and involve certain auxiliary support vehicles, such as the X-ray diagnostics vehicle, the disinfection car, or the water tender.<sup>9</sup> Through effective combinations, more perfect equipment systems can be formed, which will further promote the overall national emergency rescue level.

China has experienced several serious disasters and accidents. Especially in recent years, with an increasingly frequent variety of large-scale disasters and accidents in China, the PAP has undertaken increasingly frequent and diversified tasks, which has placed greater requirements on the integrated, large-scale, and systematic construction of health emergency rescue equipment. Based on the construction of box and tent equipment, a PAP provincial-level mobile rescue hospital system has been successfully developed, which is significant for the rapid response and emergency treatment quality of all of the PAP's provincial-level emergency medical rescue teams. This system improves the abilities and levels of medical rescue teams, such as their rapid response ability, rapid mobility, efficient expansion and roll-up, and comprehensive medical treatment level. This statement is supported by several data: for example, the time for emergency response and deployment has been shortened from the original 2 hours to 20 minutes, and the number of wounded patients who can be treated every day has increased from 40 to 100. However, we did not perform a detailed analysis of the data in this article.

Equipped for more than 1 year, the system has played an important role in several critical missions, such as earthquake medical rescue in Sichuan Ya'an and Yunnan Ludian, adenovirus epidemic disposal, and medical services for the Tibetan garrison. Without a doubt, with further construction and application, the system will become a very important rescue force in China and will provide more powerful medical support and health services to both the PAP and disaster areas.

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