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Research on Emergency Medical Service System under the Background of Smart Internet: Take the Pre-hospital First Aid System as an Example

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Abstract

Objective to explore a new emergency medical system, to achieve a complete pre-hospital emergency plan and to improve the emergency medical service system (EMSS). Methods by giving full play to the role of "the first witness", setting up emergency medical service stations and 5G telemedicine guidance, a three-level plan network was formed, and a closed-loop pre-hospital first aid system was constructed. Results the intelligent closed-loop pre-hospital first-aid system can ensure the efficient operation of the whole first aid procedure, and ensure the life safety and prognosis of patients. Conclusion All-round development of EMSS is the main trend of emergency medical development in the future. Closed-loop pre-hospital first aid will effectively improve the success rate of first aid and reduce accidental mortality.

Keywords

Emergency Medical Service System; Pre-hospital Emergency Treatment; A Closed-loop Type.

1. Introduction

In recent years, the disability rate and mortality rate caused by emergencies and accidental injuries have remained high. The life safety of the public has been seriously threatened. According to statistics, about 3.5 million people in the world die from accidental injuries every year because they miss the golden treatment time. Perfecting the emergency medical service system and high-quality emergency medical services will effectively reduce the mortality rate and disability rate of accidental injuries, reduce complications, improve the prognosis of diseases and improve the quality of life after illness.

Emergency Medical Service System (EMSS) is a kind of emergency medical model which is composed of pre-hospital emergency, hospital emergency and ICU[1]. Among them, pre-hospital first aid is important and urgent, which is an important part of emergency medical system and an important link to reduce the risk of patients' lives and can directly affect the rescue effect of severe patients. Pre-hospital first aid means that the first witness carries out first aid treatment on the sick and wounded at the scene. Whether the first witness can correctly use first aid technology to carry out timely and effective on-site first aid is related to the life safety and prognosis of the sick and wounded [2]. Rapid and effective pre-hospital first aid can minimize the casualty rate and play an important role in protecting patients' life and health. With the rapid development of society and economy, health awareness has been widely popularized. Constructing a new pre-hospital emergency medical service system with the help of information technology will become the development direction of emergency medical service. By constructing a closed-loop pre-hospital first aid system: playing the role of "the first witness", setting up an emergency medical service station, forming a three-level plan network, and combining with 5G telemedicine guidance, we hope to provide reference for improving the pre-hospital emergency medical service system.

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2. Present Development Status of Pre-hospital First Aid

2.1 First Witness Lack of First Aid Knowledge and Skills

Studies have shown that people of different ages have uneven mastery of first aid knowledge and skills, and the penetration rate of pre-hospital first aid knowledge and skills is low, which cannot meet the needs of ordinary people to carry out emergency treatment anytime and anywhere [3]. First-aid skills are characterized by strong professionalism and high skill requirements. When patients are in acute and critical illness, the first witness often lacks practical experience due to the general mastery of first-aid knowledge and skills and the inability to make accurate judgments according to patients' conditions. The active first-aid behavior is weak and misses the golden rescue time, which makes the rescue work more difficult.

2.2 First Aid Resources are Not Fully Integrated

The traditional pre-hospital first aid system relies on the personnel and materials of medical institutions, that is, 120 ambulances, first-aid personnel, medical equipment and other single ways, which do not make full use of social forces and resources. In the face of accidental injuries, it is often impossible to complete the first aid task in time only by relying on medical institutions, and miss the golden time of pre-hospital first aid. Therefore, it is extremely urgent to innovate the pre-hospital first aid system, give full play to the basic strength of public health, integrate resources from all sides, such as young volunteers and social love materials, equip first aid facilities for areas lacking first aid resources, and introduce professionals to solve problems such as insufficient human resources.

2.3 The Means of Medical Assistance are Relatively Simple

At present, the medical first aid means are still traditional and have certain limitations. Call the emergency center for help by calling the emergency number, although it plays a certain role in ensuring the safety of emergencies. However, due to the inability to accurately assess the injury, the long distance from point to point, the complicated road conditions, the difficulty in avoiding emergencies, the lack of first-aid related knowledge of the first witness, and the relative shortage of ambulance resources, many "urgent diseases" failed to master the gold for 6 minutes, delaying the best treatment opportunity. Relevant data show that in the process of emergency vehicles leaving, mild patients account for 30% [4]. At this time, the ambulances that are already lacking will not reach the critically ill patients and patients in remote areas at the first time, and it is difficult to ensure that patients receive timely and effective treatment. At present, there is a lack of perfect emergency medical service system and complete pre-hospital emergency plan in China, so it is imperative to establish a professional emergency medical service system.

3. Function, Operation Carrier and Design Analysis of New Emergency Medical Service System

3.1 Functional Design of Emergency Medical Service System

In view of the scarcity and unbalanced distribution of medical resources, The team set up a three-dimensional emergency medical system, gave full play to the subjective and active role of medical colleges, integrated social resources, made full use of first-aid talent resources, formed an emergency service network with communities, voluntary groups and regular designated hospitals, and entered the vast rural areas, urban communities and government departments to preach and popularize first-aid knowledge. At the same time, make use of the advantages of the Internet to promote online and offline "amplify the role of the first witness". Set up a love station, deliver emergency medical supplies and equipment free of charge, position between stations, connect stations with team members, medical volunteers and designated hospitals, and form a new pre-hospital emergency medical material carrier to provide public welfare material guarantee for life escort. Combining 5G communication technology with traditional medical foundation, Site, designated hospital and online medical platform are connected into a network to set up a telemedicine first aid guidance system, Real-time assessment and monitoring of patients, wireless remote consultation, command of

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emergency rescue operations, etc., that is, using their own resources, integrating the spiritual carrier and material carrier of pre-hospital first aid, make the "first aid concept" enter the community, enter the town, enter the vast rural areas, enter one household, improve the success rate of first aid, and effectively reduce the mortality rate.

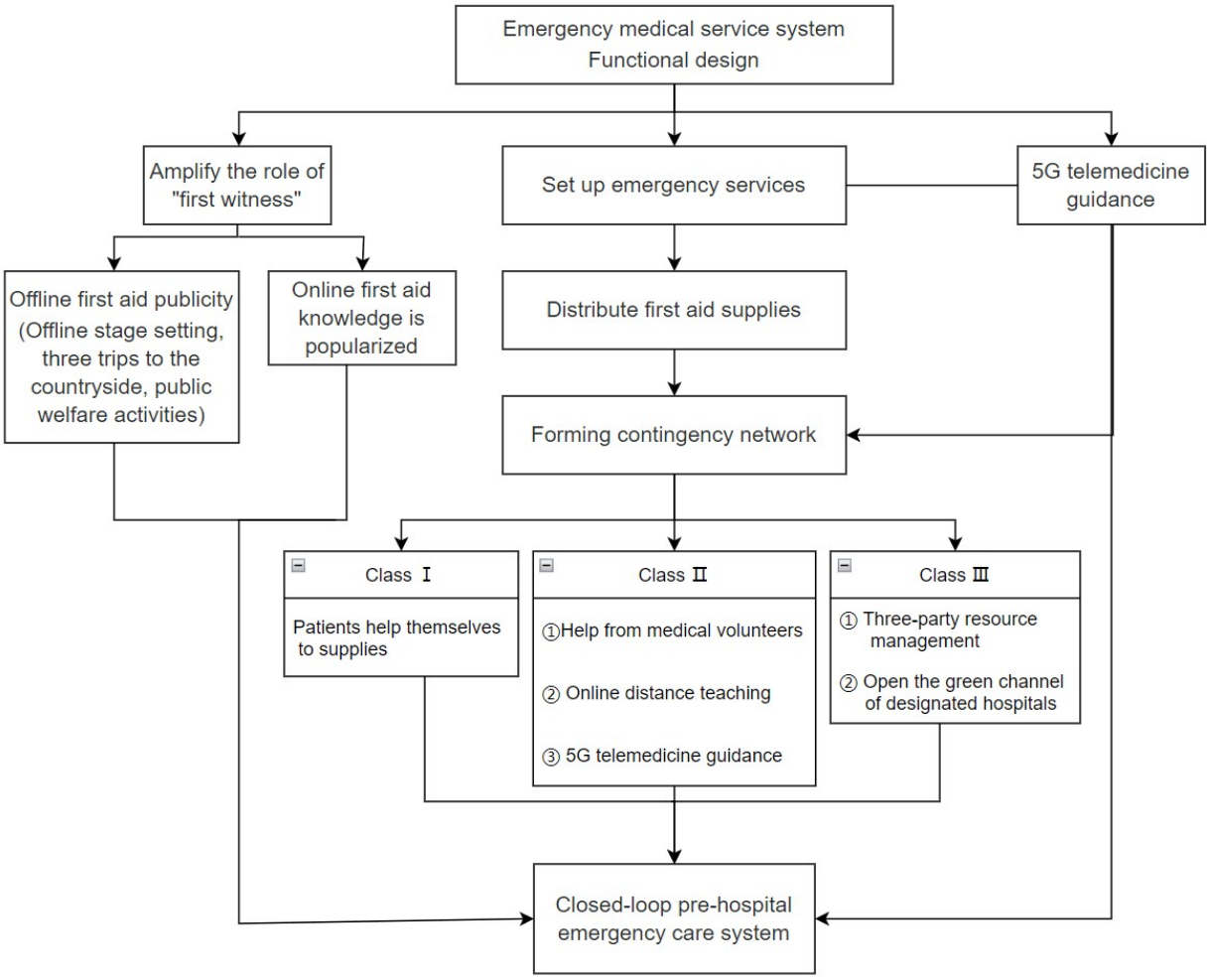

Fig. 1 Schematic diagram of closed-loop pre-hospital first aid three-level plan network

3.2 Functional Operation Carrier

3.2.1 Set up a Unique Emergency Medical Service System

Regional hierarchical management, with the first-level management foundation of the system and the physical medical station as the second-level material foundation, sets up 5G communication technology telemedicine fixed points in the emergency departments of various hospitals, keeps contact among all levels, and establishes a closed-loop information exchange emergency medical service system. Integrate the resources of all parties (such as personnel, materials, etc.) to popularize and popularize first aid knowledge in an orderly manner. At the same time, use the resources of medical colleges and universities to set up a golden first aid team to carry out knowledge education and emergency rescue at the same time. Once an emergency occurs, the three parties give early warning, providing a safe and strict first aid emergency network.

3.2.2 Give Full Play to the Role of "First Witness"

Organize experienced clinicians to disseminate pre-hospital first aid knowledge to the public through publicity, communication, lectures, demonstrations, training and other activities, improve the ability of the masses to save themselves and each other, and master the necessary first aid knowledge and

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skills; Taking advantage of the mobile Internet, official accounts are set up through major platforms to disseminate first aid knowledge to the public, such as first aid medical regulations and first aid health services. First, set up personalized education methods, increase vivid and interesting teaching areas according to the cognitive level and acceptance level of different groups, and use pictures, animations, cartoons, short videos and other forms to entertain first aid knowledge and weaken the theoretical complexity of medical science popularization; Second, grasp the potential users of the Internet, effectively achieve large-scale promotion and large-scale network coverage, and break the limitation of offline science popularization area and time. Finally, the 5G communication telemedicine network technology is used to guide remote rescue, give full play to the role of "first witness", and provide basic life support and basic rescue services to prolong the waiting time for rescue.

3.2.3 Set up a Love Site

Taking the emergency medical station as the material carrier, the three-level pre-hospital emergency network plan is brought into play. The physical station covers an area of 6-7 square meters and is divided into three parts: main cabinet, auxiliary cabinet and emergency telephone booth. The main cabinet is equipped with temperature and humidity, access and other control systems, and is equipped with common disinfection products, simple treatment devices for traumatic sprain fractures, foreign body cleaning, asthma drugs, insulin, normal saline, glucose oral agents, antihypertensive drugs and other first aid necessities. An intelligent screen is set on the side of the main cabinet, which mainly realizes the carrier function of 5G remote online consultation, plays teaching videos and teaching steps on the use of relevant first-aid tools, evaluates the level of emergency plans, locates between networks, and connects with small programs and WeChat official account (first-aid knowledge push, user communication carrier, etc.).

The auxiliary cabinet is roughly divided into three sections: medical garbage bin, first aid supplies and disinfection temperature box. It is equipped with automatic external defibrillator, wheelchair, stretcher, surgical hemostatic bag and other common first aid tools. The emergency medical cabinet greatly facilitates the daily purchase of medicines, reduces the deepening of injuries caused by accidents, and effectively improves the first aid rate in accidents.

Fig. 2 Overall map of the station

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Fig. 3 Schematic diagram of local function setting of small station

3.2.4 First Aid Replenishment Cloud Store Applet

Provide a registration platform for medical volunteers. Willing medical volunteers can register through the registration platform, and after passing the qualification certification, they can become rescuers for accidental injuries. At the same time, it is connected with the emergency departments and intensive care units of major hospitals in the region to ensure the normal operation of the life channel in an emergency. The specific operation process is as follows:

If the user buys masks, cotton swabs, Band-Aids, glucose oral agents and other drugs that the user can use independently, the Class I plan will be enabled, that is, the supplementary drug service will be adopted to fill the drug vacancy generated by the user after purchase. Meet the user's use needs in time;

If users buy disinfection products, foreign body cleaning products, normal saline, simple treatment devices for traumatic sprains and fractures, etc., they need the help of people with relevant use knowledge. To complete the use of medical articles, The Level II plan is enabled, That is, the positioning function in the small program is adopted, Locate the nearest medical volunteer or designated hospital to the user, And transmit the user's drug purchase records and rescue analysis to the mobile phones of the corresponding medical volunteers or hospital-related personnel, and notify the medical volunteers and hospital-related personnel to be ready for rescue at any time, contact the user through small programs, and ask if they need the help of medical volunteers or medical staff;

If the user buys asthma drugs, antihypertensive drugs, surgical hemostatic products and other drugs used in emergencies, Or press the first aid bell in the site to enable the Class III plan, that is, according to the location obtained by data processing, immediately locate the nearest medical volunteers and hospital related personnel to the user's location, and notify the nearby hospitals to make first aid preparations related to the disease according to the diseases involved in the related drugs obtained by processing. Through the fixed-point assistance of medical volunteers and hospital-related personnel and the advance preparation of hospitals, it not only reduces the probability of life-threatening for users due to sudden asthma, hypertension, massive hemorrhage and other accidents, but also provides professional guidance and observation for users' later recovery.

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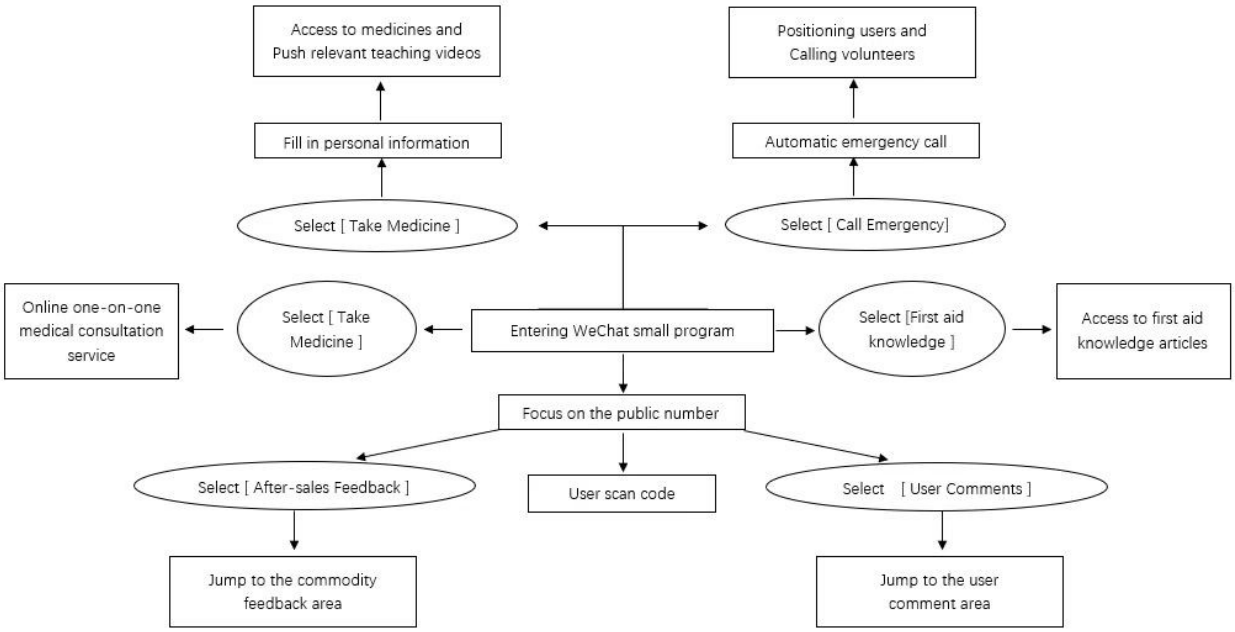

Fig. 4 Operation flow of applet

3.3 5G Telecommunications Medical Guidance

Combine 5G communication technology with traditional medical foundation, connect sites, designated hospitals and online medical platforms into a network to set up a telemedicine first aid guidance system to conduct real-time evaluation and monitoring of patients, wireless remote consultation, and command emergency rescue operations; When the patient is in a remote area in a critical moment or the resources are scarce, medical ambulances and ambulance personnel cannot arrive at the rescue site in a short time, The guidance system can be used to ask for help from online first aid experts from a platform end or an intelligent end of an offline entity cabinet, When the online expert receives the distress signal, he will open the system, and use the characteristics of 5G remote communication, such as fast, stable, multi-image and real-time, to evaluate the picture in real time. When an expert can't handle it alone, he will open the multi-party consultation function for remote rescue and guide rescue. Treat the patients briefly, increase the rescue time for the rescue team, and grasp the golden period of emergency rescue.

4. Conclusion and Research Prospect

Our country wants to perfect the first aid universal training system and set up a complete pre-hospital first aid plan. It needs the attention and support of relevant government departments, social medical organizations, hospitals and related industries. At the national level, relevant departments should formulate national standards and policies and incorporate first aid science into the responsibility bill; Define relevant responsible parties, give corresponding support (such as policies, funds, materials, etc.), and increase the popularization of first aid knowledge system; Give legal protection to the first witness and help volunteers, give full play to the role of the first witness, and effectively use the golden six minutes of emergencies; At the social level, hospitals in townships, towns, counties and cities should be networked and communicated with each other to explore a new emergency medical model; Medical developed areas use 5G telecommunication medical care to help medical underdeveloped areas, forming a new emergency medical system with large network and high level. At the personal level, individuals should actively participate in first aid knowledge training. If their own conditions permit, they can obtain relevant first aid qualification certificates to ensure the safety of themselves and their families; You can also volunteer to join the emergency medical volunteer service to inject first aid into the society and play the role of the first witness.

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Integrate the resources of all parties and establish an all-round and large-scale first aid knowledge training system (combining online and offline); And individualized and differentiated pre-hospital first aid evaluation plan network; At the same time, combined with the current hot 5G telecommunication medical service and its integration into the emergency medical system, it adds modern technology to the traditional emergency medical service and integrates the characteristics of intelligence in the new era. The all-round development of emergency medical service system will be the main trend of emergency medical development in the future, so that pre-hospital first aid is no longer just a single way, and the intelligent closed-loop system will also ensure the efficient management of first-aid procedures and make the rescue process efficient, convenient and safe.

Acknowledgments

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