Practical 'modular design' research of emergency drug supplies in hospitals

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ABSTRACT

Objectives To determine an effective framework for supplying emergency drugs under various scenarios using 'modular design' and information technology. Additionally, medicinal safety was improved by combining pharmacy monitoring with a safety alert system for medication.

Methods Data from various emergency events and details of the disease related to the incident were analysed using Cluster, Delphi and Decision analyses. The optimal drug combination was determined and then divided into the different modules. We established the 'drug supply expedited system in emergencies' based on the above modules, and we organised emergency drills to verify the system's effectiveness and to improve efficiency. Pharmaceutical care services were performed by rehearsing the unexpected emergency incident and associated pharmaceutical care.

Results We developed a drug supply framework for 'traffic accidents, poisoning first aid, natural disasters, epidemics and mass disturbances' and established an 'emergency drug supply expedited system'. We quickly equipped the drugs that were needed for the special emergency events, and we developed a 'green channel' between the emergency and drug supply centres. Medication safety was also important for the emergencies, and clinical pharmacists played a role in medicating the safety service personnel. The utility of our findings was demonstrated through several emergency drills.

Conclusions In this study, we explored the optimal drug supply and pharmacy assistance models for emergency medicine. The clinical innovation of this study was that we provided a modular supply of medical supplies for traffic accidents. We also established a drug supply information system. This study provided effective reference values for emergency drug therapy.

pharmacists should take advantage of their professional expert knowledge and participate in emergency medical care, with the aim of preventing irrational drug use and reducing the occurrence of adverse drug reactions.¹

METHODS

Part 1: Hospital drug supply emergency module Data

Data were obtained through literature searches and from the clinical emergency medicine practices at our hospital. We concluded that the primary types of diseases and conditions occurred during the following catastrophes and emergency events: (1) earthquakes disasters (ie, the 1976 Tangshan earthquake, the 1994 Los Angeles earthquake, the 2008 Wenchuan earthquake,² and the 2013 Ya'an earthquake³); (2) floods (ie, the 1996 North China floods, the 1998 Yangtze river and Songhua river basin floods in China, and the 1998 flood rescue operations in China^{4,5}); (3) snowstorms (according to the American health research data on populations in snow disasters⁶); (4) fire (ie, data from the burns research projects from the US National Research Council,⁷ the 2010 Shanghai Jiaozhou Road apartment fire, and the treatment of massive burn casualties in conflagration cases⁸); (5) traffic accidents (ie, the 2008 Jiaozhou railway accident in China and the traffic accidents emergency medication statistics (2000–2012) from our hospital); (6) epidemic diseases (ie, the SARS (severe acute respiratory syndrome) treatment⁹ and the treatment and control of H1N1 and H1N9 influenza outbreaks); (7) poisoning first aid (ie, severe acute occupational poisoning accidents that occurred in China between 1989 and 2003¹⁰ and the analysis of occupational poisoning events that occurred in Jinan City from 2002 to 2012); (8) mass disturbances (ie, the Hanyuan riots); and (9) statistical data from various injuries and medications at our hospital and drug usage in the emergency department at our hospital between 2011 and 2012.

Module division

Based on the 'modular design' idea and data analysis, the emergency drugs were classified as 'Universal Module' and 'Specific Modules'. The 'Universal Module' was also subdivided into the 'General Module' and 'First Aid Module'. The 'General Module' drugs could be used in all emergency incidents, and the 'First Aid Module' mainly included analgesics, haemostatics, anaesthesia agents, and anti-shock drugs, etc. 'Specific Modules' contained the specific drugs used for particular disaster or injuries, such as vaccinations and medications used during floods. In different

INTRODUCTION

When emergencies occur, general hospitals must provide effective medical care to rescue the sick and wounded. Access to adequate drugs are the material basis for effective medical treatment. A key factor in reducing casualties is determining how to ensure the supply of essential medicines in a timely manner. Hospitals should adopt a scientific approach to preparing drugs in the event of an emergency. The selection of a particular drug variety and the quantity of that drug should evolve from the 'original, experienced, hand-generated' mode to a 'timely, flexible and scientific' mode. Simultaneously, with the development of clinical pharmacies and increased attention paid to drug safety in emergency medicine settings, clinical

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emergency situations, we could choose different modules to determine the drug supply frame. For example, when a serious traffic accident occurred, we could equip emergency drugs from the 'Universal Module' and the 'Traffic Accidents Module' ('Specific Modules').

Statistical analyses

The Cluster, Delphi and Decision methods were used to analyse the proportions of diseases, use of drugs and number of different varieties and types of emergency incident medications used during various emergency situational events. The Cluster Analysis method could analyse the type of diseases that occur during various events, with the nearest or most closely related diseases clustered together. Based on the cluster analysis, the Delphi method was used to analyse the modules that lacked data to determine the composition ratio of the diseases. In situations where more data were available, more integrated modules (eg, the earthquakes module) were employed, and we could use the Decision Analysis method to determine the composition ratio of the diseases and conditions.

Determination of drug varieties and quantity in the module

The drugs in all modules were preferred as the first-line treatment drugs in the 'Chinese Essential Medicines List', 'Chinese National Formulary', 'WHO Emergency Health Kits List', and other essential WHO medicines.¹¹ We also made appropriate adjustments based on the actual hospital pharmaceutical varieties and specifications.

The drug quantities were estimated using the drug daily dose (DDD), the medication time, and the number of patients.

Thus, the drug quantity = $[(DDD) \times (\text{medication days}) \times (\text{number of patients})] / \text{drug specification}$.

To reduce drug waste, we must also consider that the incidences of various diseases differ in different situations. Therefore, we used statistical methods to determine the proportion of various diseases. Thus, the proportion of drugs primarily used to treat certain category diseases could be determined.

Using 50 daily patient doses as an example, the total amount of drugs = the amount of drugs for 50 patients in Category 1 $\times$ this class of drug indications disease incidence ratio (%) + the amount of drugs for 50 patients in Category 2 $\times$ this class of drug indications disease incidence ratio (%) +.

Part 2: Emergency drug supply information construction

Information design

To supply drugs more conveniently in emergency situations, we developed a software programme named 'Drug Supply Expedited System in Emergency' by programming in the emergency centre and pharmacy. The emergency system included all emergency modules and data from part 1 (above). After the system started, we could quickly determine the drug list and drug, and automatically generate a list of emergency medicine preparations. Then, the drug list was reviewed by the clinical emergency specialists and transmitted to the pharmacy departments.

Part 3: Emphasis on drug safety and drug use in special populations

The medication safety services were performed by focusing on the high-alert drugs and medications for special populations (eg, elderly patients, pregnant women and children). We arranged the high-alert drugs and prohibited drugs for the special populations for all modules described above, and then we set up a warning function in the emergency system. For example, when

one selected a drug that should be prohibited or cautiously taken by pregnant women, a warning alert would pop up as a warning display on the computer screen and that drug would not be allowed. Clinical pharmacists always participated in reviewing the drug directory.

Part 4: Emergency drug supply plans and emergency drill

Develop the emergency event drug supply plan

We developed emergency drug supply plans for all types of emergencies, including 'the serious traffic accident rescue plan', 'the epidemic diseases treatment plan', 'the earthquake rescue plan', 'the floods rescue plan', etc. Drills were conducted for all emergency drug supply plans to prove the rationality of our data analyses and the effectiveness of the emergency system.

Pharmacists involved in emergency and improved rational drug use

As early as 2003, the American Society of Health-System Pharmacists (ASHP) emphasised the role of pharmacists in emergencies.¹² Pharmacists should be encouraged to participate in the emergency medication process, particularly in the emergency treatment, drug storage and review of the patient's medication process, to avoid harmful medication errors and serious drug interactions.

RESULTS

Part 1: The establishment of emergency drug modules

According to the types of main disaster events and medication groups, we established the 'Universal Module' (General Module and First-aid Module) and 'Specific Modules' (traffic accidents, poisoning, natural disasters, epidemic disease, and other general emergencies) (figure 1).

Drug configuration in the 'Universal Module'

We analysed the disease incidence in the various events described in part 1 above, and an emergency disease frequency table was established (table 1).

Using the cluster analysis method, we established the 'Universal Module', in which most drugs could be used in all emergencies. Firstly, the composition ratio of diseases in the 'Universal Module' was determined, and the following ratios were found: upper respiratory disease (40%), gastrointestinal

Figure 1 A classification diagram of the main emergency events. The common (universal) module contained the drug that could be used in all emergency incidents; the specific (special) modules contained the specific drugs that are only used in a particular disaster.

Table 1 Disease frequencies in disasters

Types of diseases	Types of emergencies												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Cardiovascular diseases	0	511	591	14	71	49	14	25	15	17	22	12	321
Gastrointestinal diseases	33	1237	781	462	432	288	2	9	6	41	31	10	563
Respiratory system diseases	45	4404	623	2318	5636	429	5	83	23	112	65	17	815
Skin diseases	83	4765	364	2559	0	197	48	23	3	54	57	2	1063
Heatstroke	0	114	0	418	0	0	23	0	0	0	0	0	36
Eye diseases	22	235	156	22	0	20	31	45	45	6	38	5	156
Mental disorders	32	302	231	328	575	15	18	89	43	32	71	11	85
Facial disorders	1	40	25	0	891	0	0	23	22	3	6	0	382
Trauma (fractures, etc.)	192	4967	1969	32	44	96	16	51	86	0	4	23	2532
Others	23	1100	38	26	12	83	30	120	29	21	57	15	23

Diseases 1–13 were the Tangshan earthquake, Los Angeles earthquake, Wenchuan earthquake, North China flood, Yangtze River and Songhua River floods, snowstorms, a forest fire, a major Shanghai apartment fire, emergency hospital accident data, the SARS epidemic, Jinan occupational poisoning distribution, mass incidents, and medication data from the hospital emergency department.

SARS, severe acute respiratory syndrome.

disease, (30%), cardiovascular disease (20%), ear, nose and throat (ENT) disease, (30%), bone diseases (10%), mental illness (20%), skin diseases (20%), and other diseases (10%). In serious events, the use of anti-infective and analgesic drugs was generally greater than 90%, and the rate of shock and other critical illnesses was approximately 20%. In addition, to adequately prepare anti-shock rescue medication and other drugs for emergency treatment of the critically ill patients, the 'Universal Module' was divided into the 'General Module' and the 'First aid Module'. Duplicate drugs (such as anti-allergic drugs) could be combined. According to the disease constitution, we determined the proportion of drug types and quantities in the modules (table 2).

Drug configuration in the 'Special Module'

The traffic accidents module

We analysed the 2008 Jiaozhou railway accident, as well as various transportation emergency event statistical data derived from our hospital over recent years (eg, 358 cases of highway accidents and 131 cases of serious traffic accidents) and the traffic accident injuries characteristics in emergency.¹³ With bodily injury as the primary treatment goal, we determined the composition ratio of injury types using the Decision Analysis method, and the following injuries were found: skin and other soft tissue contusions (100%), fractures (50%), traumatic brain injury (40%), chest injuries (11%), abdominal injuries (10%), spine, pelvis, and extremities injuries (18%), and multiple injuries (22%). Meanwhile, for medications associated with a major traffic accident, we found the following rates: a pain rate of 100%, an infusion rate of 50%, an infection rate of 90%, and an operation rate of 40%. Combined with our experience in hospital emergency transportation for many years, we determined the specific modules for the traffic accident module (the drug list can be obtained in online supplementary table S3).

The poisoning first-aid module

The poisoning first-aid module was subdivided into the occupational poisoning module and the organophosphorus pesticide poisoning module. According to the relevant statistics (210 occupational poisoning cases were diagnosed in Jinan between 2002 and 2011), occupational poisoning was caused by more than 20 types of chemicals, including benzene and manganese, followed by organic fluorine, solvents, gasoline, carbon

monoxide, and other irritating gases. The bulk of the occupational poisonings presented themselves in 2006 and 2009, including organic fluorine monomer and polymer pyrolysis poisoning, hydrofluoric acid burns, and sand occupational ENT diseases.¹⁴ In addition, the increased occurrence of mass poisoning was due to hydrogen sulfide poisoning, benzene poisoning and nitric oxide poisoning, and organophosphorus pesticide poisoning.¹⁵ Using the Delphi method, we determined six classes of poisoning events by the amount of drug supplies, which antidotes to use, and which treatments should be selected to prevent complications, which were proportionately and tentatively scheduled (see online supplementary table S4).

The epidemic diseases module

According to the drug information from our emergency rescue work, which was obtained during the SARS pandemic influenza prevention and control, and so forth, and by combining this information with the state health department clinical programmes for major outbreaks of epidemic, we tentatively developed three specific modules: SARS, H1N1, H1N9 (see online supplementary table S5).

The natural disasters module

In recent years, earthquakes and other disasters have frequently occurred worldwide. The Tangshan earthquake and Sichuan earthquake in China resulted in many casualties. Our hospital participated in a number of disaster medical treatments, sent emergency medical teams, and treated some of the Sichuan patients wounded during the earthquake.

The earthquake aid specific module

To analyse the four types of earthquake disaster-related diseases and drugs we used the Decision Analysis method, referencing the literature to identify the main injury components, for example: (1) injuries (60% fractures, 80% soft tissue contusion, 40% traumatic brain injury); (2) respiratory infection (20%); (3) gastrointestinal reactions (30%); and (4) skin inflammation (40%). The epidemic diseases often occurred after the earthquake; therefore, the drugs that prevented and controlled epidemics can be reserved in advance.^{16 17} After comprehensive consideration, based on the common module types and the major diseases, the earthquake emergency-specific module was determined (see online supplementary table S6).

Table 2 General modular list and first-aid modular list of medical supplies (the dosage for 50 patients)

Class	Drug	Specification	Unit	DDD	Proportion (%)	Quantity	Class	Drug	Specification	Unit	DDD	Proportion (%)	Quantity
<i>General modular</i>													
Anti-infective drugs	Penicillin G sodium	80 wu	amp.	600 wu	90	338	Respiratory drugs	Dyphylline	0.25 g	amp.	0.5 g	40	40
	Cefazolin sodium	0.5 g	amp.	3 g	90	270		Salbutamol	2.4 mg	tab.	12 mg	40	100
	Oxacillin sodium	0.5 g	amp.	2 g	90	180		Ambroxol	15 mg	amp.	30 mg	40	40
	Azithromycin	0.125 g	amp.	0.5 g	90	180	Gastrointestinal drugs	Cimetidine	0.2 g	amp.	0.2 g	30	15
	Levofloxacin	0.5 g	amp.	0.5 g	90	45		Metoclopramide	10 mg	amp.	20 mg	30	30
	Cephalexin	0.125 g	cap.	2 g	90	720		Raceanisodamine	10 mg	amp.	10 mg	30	30
	Ribavirin	0.1 g	amp.	0.75 g	90	338		Oral rehydration salts	13.95 g	packet	6 g	30	6
NSAIDs	Antodine Injection	0.1 g	amp.	1 g	90	450		Montmorillonite	3 g	packet	9 g	30	45
	Acetaminophen	0.5 g	tab.	2 g	90	180	Cardiovascular drugs	Berberine	0.1 g	tab.	0.9 g	30	135
	Ibuprofen	0.3 g	cap.	0.6 g	90	90		Aspirin	0.1 g	tab.	0.1 g	20	10
Anti-allergy drugs	Chlorpheniramine	4 mg	tab.	12 mg	90	135		Insulin	400 iu	amp.	20 iu	20	1
	Calcium gluconate	10 mL	amp.	10 mL	90	45		Nitroglycerine	5 mg	amp.	10 mg	20	20
	Vitamin C	1 g	amp.	3 g	90	135		Nitroglycerine	0.5 mg	tab.	1.5 mg	20	30
	Vitamin B6	0.1 g	amp.	0.1 g	90	45		Atropine	1 mg	amp.	3 mg	20	30
	Dexamethasone	5 mg	amp.	20 mg	90	180		Amiodarone	0.15 g	amp.	0.8 g	20	53
	Prednisone	5 mg	tab.	60 mg	90	540		Inosine	0.1 g	amp.	0.6 g	20	60
ENT drugs	Chloramphenicol eye drops	5 mL	tube	5 mL	30	15	Sedative-hypnotics	Magnesium sulfate	10 ml	amp.	60 ml	20	60
	Ofloxacin ear drops	5 mL	tube	5 mL	30	15		Diazepam	10 mg	amp.	30 mg	20	30
	Iodine glycerine	10 mL	tube	10 mL	30	15		Diazepam	2.5 mg	tab.	2.5 mg	20	10
Anaesthetic	Lidocaine	0.1 g	amp.	0.1 g	10	5		Phenobarbital	0.1 g	amp.	0.1 g	20	10
<i>First-aid modular</i>													
Anti-shock drugs	Dopamine	20 mg	amp.	0.2 g	20	100	Anticoagulants	Heparin sodium	1.25 wu	amp.	1.25 wu	20	10
	Metaraminol	19 mg	amp.	76 mg	20	40	Haemostatic drugs	Vitamin K1	10 mg	amp.	20 mg	20	20
	Epinephrine	1 mg	amp.	5 mg	20	50		Aminomethylbenzoic acid	0.1 g	amp.	0.3 g	20	30
	Norepinephrine	2 mg	amp.	10 mg	20	50		Thrombin	500 u	amp.	1000 µ	20	20
	Deslanoside	0.4 mg	amp.	0.4 mg	20	10	Glucocorticoid	Methylprednisolone	0.5 g	amp.	1.8 g	20	36
	Nikethamide	0.375 g	amp.	1.125 g	20	30		Furosemide	20 mg	amp.	40 mg	20	20
	Lobeline	3 mg	amp.	6 mg	20	20	Others	Dextran	500 mL	bag	500 mL	20	10
Antiarrhythmic drugs	Propafenone	70 mg	amp.	70 mg	20	10		Mannitol	250 mL	bag	250 mL	20	10
	Amiodarone	0.15 g	amp.	0.45 g	20	30		Diatrizoic acid	20 mL	amp.	20 mL	20	10
Vasodilator drugs	Nitroprusside	50 mg	amp.	100 mg	20	20		Tetanus antitoxin	1500 u	amp.	1500 µ	20	10
	Papaverine	30 mg	amp.	150 mg	20	50							

amp., ampule; cap., capsule; DDD, drug daily dose; ENT, ear nose and throat; NSAID, non-steroidal anti-inflammatory drugs; tab., tablet.

The flood emergency specific module

Floods often result in the outbreak of basic diseases, respiratory diseases and infectious diseases, and infectious and allergic skin diseases were the most common types of diseases, according to data from the 1996 floods in north China, the 1998 China Yangtze river and the Songhua river basin flood, and floods in Pakistan.¹⁸ Using H-5G*7 and the decision analysis method, we first determined the composition of various diseases, as follows: cardiovascular diseases (10%), respiratory diseases (30%), gastrointestinal disorders (30%), skin inflammation (30%), ENT diseases (10%), bone diseases (10%), and other conditions (10%). Based on the general module and a comprehensive consideration of the above types of major diseases, we determined the flood-specific modules (see online supplementary table S7).

The fire emergency specific module

In a variety of disasters, fire was a universal threat to public safety and social development. Although the ability to prevent fire and control its incidence has improved in the 21st century, urbanisation has led to sustained increases in population density in some areas, while human production and lifestyle changes have exposed populations to a greater risk of burns, which are diverse in form, according to the literature,^{19–21} combined with first-aid knowledge to determine the proportion of injuries using the decision analysis method. All patients were burned to some degree when a major fire occurred, therefore, the drug proportion for burn medication was determined to be 100%, including external use. We provided reliable protection for fire emergency first-aid medicines based on the injuries (see online supplementary table S8).

The mass disturbance specific module

According to the hospital emergency department admissions statistics of mass injuries,²² trauma is the most common type of event, accounting for more than 70% of injuries. We determined the proportion of traumatic injuries of mass incidents in accordance with a decision analysis method based on a fracture rate of 30%, a burn rate of 10%, a pain rate of 100%, an infection rate of 90%, an infusion rate of 50%, and a surgery rate of 40%. We

also determined the amount of pharmaceutical product-specific modules drugs (see online supplementary table S9).

Part 2: The application of the 'drug supply expedited system in an emergency'

The design plans

The design was divided into two parts: the internal data and the operation interface design. First, the drug data in the modules above were input by category, and then the procedures were related to the hospital drug management system. The drugs were assembled according to the event type, and the drug quantity was calculated by the DDD, the composition ratio of diseases in the event, the medication time, and the number of patients. The operation interface was set up in the emergency department and the pharmacy. After the emergency department entered the emergency event type, the patients' numbers and other information, then the pharmacy could immediately receive the information and assemble the necessary drugs (figure 2).

Examples of the 'drug supply expedited procedure in emergencies'

Based on our hospital's specialty, we used 50 traffic accident patients to demonstrate the operation of the system. First-aid emergency personnel entered the basic information into the system, including the total number of people (50, including critically ill patients,¹⁰ people and children⁵) and the days of hospitalisation (3 days). A list with the number of drugs was immediately generated, where special populations such as drug use and high-risk drugs precautions instantly alert. The pharmacy also receives a list of drugs that should be equipped for the timely deployment in case of medicine shortages (figure 3).

Part 3: Establish emergency plans and drills to verify the validity of the system

Set up a catastrophe model and scheme

Referring to Rosenthal's 'catastrophe models' as the National Disaster Medical System Design in 2005,²³ we designed a catastrophe model to validate the rationality and effectiveness of the drug supply framework in an emergency. According to the

Figure 2 Design of the 'drug supply expedited system in emergency'. The left panel shows the operation of the programme interface diagram, and the right panel shows the data for internal medicine combination.

Front Page

Emergency Center

Pharmacy Department

Module Settings

Date Time	Event Type	Number of Patients	Number of Critically ill	Medication Days
2014-2-5	Traffic Accident	50	10	3

The Drug Supply List of Traffic Accidents

2014-2-5 14:28:36

No	Drug Name	Dosage form	Specifications	DDD	Dosage	Safety Attentions	Storage Amount
1	Azithromycin	Injection	0.125g	0.5g	540	FDA pregnancy risk category B	733
2	Aspirin	Tablet	0.1g	0.1g	30	Contraindicated in children	3610
3	Ambroxol	Injection	0.03g	0.12g	480	3 months of pregnancy with caution	2000
4	Antondine	Injection	2ml	2ml	135	Elderly patients with reduced	200
5	Amiodarone	Injection	0.15g	0.8g	150	Contraindicated in pregnancy and children below 3	130
6	Ribavirin	Injection	0.1g	0.75g	1012	Contraindicated in pregnancy	2000

Notes: Dosage is the unit package

A total of 10 pages   The 1 page

Export File As Excel

Low Stock

Figure 3 Schematic diagram of the final drug supply and generating, including the special groups medication safety alert and the drug stock situation caution.

catastrophe model, we set up drill programmes and a variety of exercises in which doctors, nurses and pharmacists participated. The drills confirmed that our emergency drug supply system was reasonable, adequate and timely.

DISCUSSION

Because the hospital's pharmacy is charged with the drug supply and security of dispensing pharmaceuticals in emergencies, a scientific method should be adopted to develop drug emergency security plans, to strengthen exercises, and to improve the plans in a continuously developing strategy. In this study, we focused on how hospitals used the 'modular management' and 'catastrophe models' to determine an emergency medicine framework in the emergency department and to establish the best mode of pharmacy service through drills of the emergency planning and medication safety services of the pharmacy and pharmacists. The novel idea shown in this study was the application of a drug modular management method to determine the different types of emergency drug model. At the same time, we provided road traffic emergency treatment, with a particular focus on the supply of drugs and pharmaceutical assistance when a serious accident occurred for the first time. We also tried to construct an information technology platform in pharmacy emergency care and to set up the 'drug supply expedited procedure in emergency', which greatly improved the efficiency of our drug supply in emergency care. This study has also provided a reference value for effective emergency treatment after a major life-threatening event.

However, due to the urgency and uncertainty of emergency events, the current selection of medicines in emergency care lacks the preparation of a scientific catalogue and effective communication of information, which primarily come from experienced judgment. We have developed and distributed different modules, according to the proportion of major diseases associated with various events, and we established information technology software to improve efficiency and save time. The design was an effective model of a hospital's emergency medicine supply. However, our statistical analyses did not fully cover the number of events. To ensure the maximum amount (for key

therapeutic drugs in certain types of events, we tend to remove the largest component ratio), there were still insufficient quantities to streamline the number and types of scientific problems. These issues must be explored and improved upon in future work. The information platform's application, which was developed in a short time period, must also be validated and improved upon in practice by the pharmacists and programmers.

Key messages

What is already known on this subject

- In recent years, hospital emergency rescue systems have been a key project in the construction of worldwide emergency response systems.
- US hospitals use the hospital emergency incident command system IV (HEICS IV), which is more mature, but it lacks unconventional emergency medical rescue details, for example, the specific content of the drug emergency support system is less intricate.

What this study adds

- In this study, we used statistical methods to analyse the scientific event features, combined with the innovative technical resources, to explore a scientific and convenient pharmacy rescue mode.
- This drug supply information system could prove to be convenient for emergency work and provide effective reference values for emergency first-aid.

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Contributors CS was responsible for the programme design. JY was responsible for the data analysis. X-LZ was responsible for clinical pharmacy services. L-Z was

responsible for the computer information technology. C-YY was responsible for the emergency drills.

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