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Observation on the Intervention Effect of Emergency Rescue Capability Among College Students

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Abstract： *Objective:* To explore the application effect of emergency rescue capability intervention among students in a university in Beijing. *Methods:* A total of 900 students from a university in Beijing in 2023 were selected as the research objects. Emergency rescue capability training was conducted from March 2023 to June 2023, once a month. The students' mastery of emergency rescue before and after the intervention was analyzed. Survey questionnaires were distributed to all college students to understand their channels and willingness to acquire emergency rescue knowledge. *Results:* A total of 886 valid questionnaires were collected in this study. The highest proportion of knowledge about China's general emergency telephone number and how to dial the emergency rescue hotline was 100.00%. Among the strategies for dealing with cardiac arrest in CPR, the highest proportion was 336.34%. Among the four major first aid techniques of hemostasis, bandaging, fixation, transportation, the highest proportion of knowledge about the use of rubber band signs was 31.71%. Among the first aid techniques for heatstroke, poisoning, fire, and sharp instrument injuries, the principle of emergency treatment for severe gas poisoning had the highest proportion of 41.42%, showing significant differences. College students mainly acquire knowledge of emergency rescue capability through TV programs, health education lectures, and the internet. Around 61.40% of college students hope to learn more about prevention and control knowledge. *Conclusion:* After the intervention of emergency rescue capability, the emergency rescue capability of college students in this university has been significantly improved, showing a strong training effect, which is worthy of promotion.

Keywords: University; Emergency rescue capability; Emergency rescue capability intervention

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1. Introduction

Globally, twenty percent of trauma patients die each year due to the lack of timely rescue at the scene, and the public's on-site emergency response capability in China is low, with very few people possessing this ability [1]. Article 43 of the "Emergency Response Law of the People's Republic of China" published on June 28, 2024

stipulates that "emergency education should be included in the curriculum, and emergency knowledge training and drills should be implemented for teachers and students to enhance safety awareness and self-rescue and mutual assistance capabilities." [2]. College students are young, highly educated, and generally have strong cognitive and receptive abilities. They are enthusiastic about participating in public welfare activities. Evaluating the status of emergency rescue knowledge and skills among college students, exploring their needs for emergency rescue knowledge and ways to acquire it is crucial for promoting emergency rescue education in urban areas and enhancing students' self-rescue and mutual rescue awareness and abilities [3]. Therefore, this study conducted an emergency rescue capability intervention among college students in Beijing in 2023 and conducted a questionnaire survey on educational needs. This study aims to develop a health education plan to control the harm caused by emergency events to students in the future.

2. Materials and methods

2.1. General information

Beijing Union University was selected as the research object and 900 freshmen were randomly included. Emergency rescue capability training was conducted in March 2023 and ended in June 2023. A questionnaire survey was conducted before the intervention in March 2023. A total of 900 questionnaires were distributed, and 886 valid questionnaires were collected, with an effective recovery rate of 98.44%. After the emergency rescue capability intervention ended in June 2023, a second questionnaire survey was conducted. A total of 886 questionnaires were distributed, and all 886 were validly recovered, with an effective recovery rate of 100%. Among them, there were 450 males and 436 females, aged between 19 and 20 years old, with an average age of (19.76 ± 0.22) years old. The inclusion criteria were: (1) Full-time four-year undergraduate students; (2) Class absenteeism not exceeding 3 times in the previous year; (3) The samples in this study were all voluntary students and medical personnel. The exclusion criteria consists of: (1) Students who are unable to participate in full-time study due to force majeure; (2) Students who did not receive education within the university.

2.2. Methods

2.2.1. Quality control

This study provided unified training to the responsible personnel and effectively answered any potential questions from their teams or individuals in detail. After the training, a test was required, and only those who completed the test were allowed to proceed with the formal training. Before starting this task, relevant precautions were clearly communicated to the group. It was ensured that each university student had received a detailed explanation of the survey items from the investigator before filling out the questionnaire. The questionnaires were entered into the system after being verified by two or more responsible personnel for accuracy.

2.2.2. Emergency rescue capability training

The training should cover basic first aid knowledge and corresponding skills, such as cardiopulmonary resuscitation (CPR), hemostasis and bandaging, and add emergency response strategies in specific situations according to actual needs. The training process is divided into two major parts: theoretical research and practical operations. With the help of case analysis, simulation drills, and other methods, trainees' practical operation skills are improved [4]. Secondly, modern technological means are adopted to enhance the interactivity and fun of the

training. For example, using virtual reality to simulate actual combat drills allows trainees to immerse themselves in emergency rescue scenarios, thereby enhancing their crisis awareness and reaction speed in emergency response. With the help of an online learning platform, learning resources are provided anytime and anywhere, increasing the adaptability and convenience of the training. Teamwork and communication skills are emphasized during the training. By simulating multi-party emergency rescue scenarios, trainees' collaborative combat capabilities in a team are honed, aiming to achieve higher overall efficiency in emergency rescue [5]. Through role-playing and group discussions, communication and coordination among trainees are enhanced, shaping students' team spirit in emergency rescue.

This study adopts field research methods to collect data, referring to the first aid training standards and CPR guidelines of the Red Cross Society of China, and combining relevant research topics to design a questionnaire. The questionnaire incorporates a survey on the actual rescue abilities of vocational college students by Meng *et al.* [6]. The Cronbach's alpha coefficient is 0.772. Additionally, self-designed survey questions are included based on the actual situation, covering basic information of college students (gender, native place, ethnicity, etc.), emergency rescue-related knowledge, channels for acquiring knowledge, willingness to learn new knowledge, and other aspects. The questionnaire was reviewed by experts from the Beijing Center for Disease Control and Prevention, and a pre-test was conducted. After revision and improvement, a formal survey was implemented. All survey personnel underwent unified training. After the survey is completed, a dedicated person will review the questionnaires and enter the data.

Definition of awareness rate: (1) Single knowledge awareness rate = Number of people who correctly answered a certain knowledge item / Number of people who filled out valid questionnaires × 100%; (2) Total awareness rate = Σ Number of correct knowledge items answered by each survey respondent / (Number of people who filled out valid questionnaires × Number of knowledge items) × 100%.

2.2.3 Invalid questionnaires

Questionnaire surveys were conducted before and after the intervention. The following questionnaires were excluded: (1) those with a filling time of greater than or equal to 10 minutes; (2) those with illogical and incoherent content; (3) those with missing or omitted information.

2.3. Statistical methods

The data obtained from this study was used to establish a database using Epidat 3.1 software, and double-entry was implemented. SPSS 18.0 software was used for statistical analysis. Counting data was tested using the chi-square test, and a P-value < 0.05 was considered statistically significant.

3. Results

3.1. Basic information

Through the questionnaire survey, the study obtained a total of 886 valid questionnaires, with an effective recovery rate of 98.44% (886/900). Among them, male and female college students accounted for 50.79% and 49.20%, respectively. The largest number of respondents were aged between 21 and 22 years old. There were more Han Chinese college students, and the proportion of urban residents was the largest. The number of college students living with a partner or being single was the highest. The monthly income of college students was mostly between

5,000 and 8,000 yuan, as shown in **Table 1**.

Table 1. Basic information of college students [n(%)]

Basic information	Number of cases
Gender	
Male	450(50.79)
Female	436(49.20)
Age	
Under 20 years old	179(20.20)
19–20 years old	186(20.99)
21–22 years old	496(55.98)
23–24 years old	25(2.82)
Ethnicity	
Han nationality	791(89.27)
Ethnic minorities	95(10.72)
Place of residence	
City	596(67.28)
Township	198(22.34)
Rural area	92(10.38)
Monthly household income	
5000 yuan	177(19.97)
5000–8000 yuan	298(33.63)
9000–15000 yuan	223(25.17)
Over 15000 yuan	188(21.21)

3.2. Emergency rescue-related knowledge

After conducting two questionnaire surveys, a total of 1,772 valid questionnaires were obtained, with an effective recovery rate of 100.00% (1772/1772). Among the emergency rescue knowledge after intervention, the awareness of China's general emergency phone number and how to dial the emergency rescue hotline accounted for the highest proportion, which was 100.00%. The highest level of knowledge was about cardiac arrest handling strategies in cardiopulmonary resuscitation, with a percentage of 36.34%. Among the four major emergency techniques of hemostasis, bandaging, fixation, and transportation, the use of rubber band markers was the highest, accounting for 31.71%. Among emergency techniques for heatstroke, poisoning, fire, and sharp instrument injuries, the principles of emergency treatment for severe gas poisoning were the most known, accounting for 41.42%, which was statistically significant ($P < 0.05$). There were no significant differences in knowledge about China's general emergency phone number, how to accurately dial the emergency rescue hotline, and the safe transfer steps for patients with neck injuries ($P > 0.05$), as shown in **Table 2**.

Table 2. Emergency rescue-related knowledge [n(%)]

Category	Before Intervention	After Intervention	X^2	*P*
First aid knowledge				
China's general emergency phone number	886(100.00)	886(100.00)		
How to accurately dial the emergency rescue hotline	886(100.00)	886(100.00)		
Proper handling of burns	234(26.41)	698(78.78)	487.310	< 0.001
Rescue measures for drowning	218(24.60)	654(73.81)	429.218	< 0.001
Escape strategy during earthquakes	189(21.33)	476(53.72)	198.271	< 0.001
Cardiopulmonary resuscitation (CPR)				
Cardiac arrest handling strategies	211(23.81)	322(36.34)	33.061	< 0.001
Consciousness assessment methods	187(21.11)	278(31.37)	24.144	< 0.001
Key points of opening the respiratory tract operation	98(11.06)	192(21.67)	36.431	< 0.001
External chest compression positioning	87(9.82)	176(19.86)	35.367	< 0.001
External chest compression frequency	82(9.25)	128(14.44)	11.431	< 0.001
Four major first aid techniques: hemostasis, bandaging, fixation, and transportation				
Standard use of rubber bands	176(19.86)	281(31.71)	32.509	< 0.001
Emergency response measures for major trauma and bleeding	155(17.49)	197(22.23)	6.254	< 0.001
Bandaging techniques	143(16.13)	196(22.12)	10.246	< 0.001
On-site protection techniques for fracture injuries	123(13.88)	179(20.20)	12.517	< 0.001
Safe transfer steps for patients with neck injuries	111(12.53)	121(13.66)	0.496	0.481
First aid techniques for heatstroke, poisoning, fire, and sharp instrument injuries				
Emergency guide for gas poisoning	123(13.88)	367(41.42)	167.942	< 0.001
Emergency treatment principles for sharp instrument wounds	121(13.65)	346(39.05)	147.198	< 0.001
Treatment plan for foreign body blocking the respiratory tract	98(11.06)	265(29.90)	96.623	< 0.001
Emergency rescue steps for fires	97(10.94)	254(28.67)	87.571	< 0.001
Treatment strategies for food poisoning	76(8.57)	128(14.44)	14.979	< 0.001

3.3. Channels for acquiring knowledge

Among the channels for acquiring knowledge, watching TV programs was the most popular, accounting for 98.42%, followed by health education, accounting for 66.25%. Other channels included searching online, graphic promotional materials, audio and video products, and plain text materials, as shown in **Table 3**.

Table 3. Channels for acquiring knowledge [n(%)]

Category	Number of cases
Watching TV programs	872(98.42)
Health education	587(66.25)
Searching online	423(47.74)
Graphic promotional materials	379(42.77)
Audio and video products	294(33.18)
Plain text materials	129(14.55)

3.4. Willingness to learn new knowledge

There were 544 cases (61.40%) who were very willing to continue learning new knowledge, 212 cases (23.93%) who were generally willing, 111 cases (12.53%) who were indifferent, and 19 cases (2.14%) who were not willing to continue learning new knowledge.

4. Discussion

The overall level of emergency rescue is considered as one of the important indicators reflecting social progress and the quality of city life. Multiple research results have shown that the current level of emergency rescue knowledge among college students in responding to emergencies is still inadequate, and their self-rescue and mutual rescue skills are lacking. Colleges and universities are emergency systems and linkage mechanisms prone to various safety accidents. They enhance students' professional literacy and emergency skills, reasonably organize training for students, promote departmental collaboration and social participation, and enhance students' self-rescue and emergency response capabilities. Through professional and systematic emergency rescue knowledge training, students are effectively encouraged to pay more attention to personal safety, actively participate in rescue skill training, and comprehensively improve their comprehensive literacy and emergency response capabilities.

In this study, among the relevant knowledge of emergency rescue after intervention, the awareness of China's general emergency phone number accounted for the highest proportion of 100.00% in first aid general knowledge, and the highest level of knowledge was about cardiac arrest handling strategies in cardiopulmonary resuscitation, with a percentage of 36.34%. To master cardiopulmonary resuscitation, it is necessary to deeply understand its relevant theoretical knowledge and proficiency in specific operation steps. However, for college students, there are limited opportunities for practical practice of cardiopulmonary resuscitation in their daily lives, and it is difficult to effectively improve their operational proficiency in a wide range with only one or two training and promotional activities. Among the four major emergency techniques of hemostasis, bandaging, fixation, and transportation, the use of rubber band markers accounted for the highest proportion of 31.71%. Trauma rescue includes hemostasis, bandaging, fixation, and transportation. These skills are relatively common in daily life, and the operation steps are relatively simple. Through systematic training, continuous practice, and continuous consolidation in daily life, college students can master these skills. Among the emergency techniques for heatstroke, poisoning, fire, and sharp instrument injuries, the principles of emergency treatment for severe gas poisoning accounted for the highest proportion of 41.42%, which was statistically significant ($P < 0.05$). This is similar to the research results of Lu *et al.* [7].

After intervention, the relevant knowledge of emergency rescue among college students has been improved, but some of them have relatively low mastery of professional knowledge, suggesting that students have fewer opportunities to expose to professional rescue knowledge and have not received systematic and standardized emergency training. Among the channels for acquiring knowledge, watching TV programs is the most popular, followed by health education. Other channels include searching online, graphic promotional materials, audio and video products, and plain text materials. From the survey feedback, most students mainly acquire emergency rescue knowledge through television, the internet, and books. This is similar to the research results of Zhu *et al.* targeting college students [8]. The proportion of students who are very willing to continue learning new knowledge accounts for 61.40%, indicating that a large number of college students show a urgent desire to learn emergency rescue knowledge and a positive learning attitude after intervention training, and have a high demand for health

education.

With the growth of the internet, the emergence of various related software and websites has broadened the ways for students to learn about emergency rescue. Therefore, it is necessary to follow the trend of communication integration, deeply integrate emergency rescue with cultural communication, explore innovation, and build a communication matrix for students to acquire knowledge [9]. At the same time, measures such as conducting emergency rescue training activities, introducing self-evaluation and peer evaluation mechanisms, and establishing long-term tracking mechanisms can effectively improve students' learning strategies for emergency rescue [10].

5. Conclusion

In summary, through the intervention of emergency rescue capabilities, colleges and universities have significantly enhanced their awareness of emergency rescue, knowledge acquisition channels, and rescue capabilities. At the same time, this intervention has stimulated students' enthusiasm for emergency knowledge, enhanced the skills and confidence of applied college students in emergency rescue in the face of emergencies, and achieved excellent training results, which is worthy of recommendation and popularization. This study still has the following limitations. The scope of the questionnaire survey used in the study is limited, and it fails to fully investigate the comprehensive aspects of college students. Therefore, further research is needed on the health science popularization needs of people of different age groups.

Disclosure statement

The author declares no conflict of interest.

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