ORIGINAL RESEARCH

Current Situation and Factors Influencing the Disaster Response Capability of Undergraduate Nursing Students

Xin-Juan Wang, MD; Cui-Ping Li, MD; Fang Huang, MD

ABSTRACT

Context • China is a country in which frequent natural disasters occur, but there is a lack of disaster education in Chinese institutions of higher education. Nursing students should receive disaster and emergency training in addition to their professional medical training.

Objective • Our study aimed to investigate the current situation and disaster knowledge and training needs of nursing students and to increase the disaster first aid knowledge of college nursing students.

Design • This was a cross-sectional study.

Setting • The study took place at Taizhou University in Taizhou, Zhejiang, China.

Participants • Participants were 443 full-time undergraduate nursing students at Taizhou University in China.

Outcome Measures • This cross-sectional survey included a general questionnaire and an undergraduate nursing student disaster nursing ability questionnaire.

Results • The survey results were from the first to the third year of study. Students were age 20 to 23 years, with an average age of 20.57±1.85 years. The largest group (35.44%) was made up of juniors. The scores of 3 dimensions of this survey were: dimension of physical and mental quality dimension (3.76 ± 0.71), theoretical system dimension (3.00 ± 0.57) and practical competencies dimension (2.89 ± 0.68). The ability to adapt to rescue needs at the disaster site and whether or not the student had heard of the term "disaster nursing" is the dominant factor affecting the disaster nursing skills of undergraduate nursing students.

Conclusions • The disaster relief of male undergraduate nursing student seniors is more positive and their physical and mental quality is better than female nursing students, but knowledge of disaster prevention and practical capability in disaster relief remain weak and there is a lack of a corresponding theoretical system and competence in practical knowledge and skills. It is recommended that systematic disaster nursing education at universities be improved. Knowledge of disaster rescue should be taught systematically to improve awareness of disaster procedures and response and improve the level of practical skills in disaster rescue. We should learn from the educational approach and models of disaster nursing training in developed countries in order to establish a disaster nursing education model in China. (*Altern Ther Health Med.* 2023;29(1):210-215).

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INTRODUCTION

China is one of the few countries where severe natural disasters are common, due to China's vast territory, as well as its complex geographical and climatic conditions. There are many types of natural disasters; drought and earthquakes are the most common and frequent. China is located at the intersection of 3 major tectonic plates in Eurasia and the Pacific and Indian Ocean and seismic activity is frequent. China is also affected by a very strong monsoon climate, so meteorological disasters are common. Significant local or regional droughts occur almost every year. Between 1990 and 2008, the average annual damage caused by various

natural disasters affected approximately 300 million people and more than 3 million houses were destroyed. As a result, more than 9 million people had to be urgently relocated and resettled, and the direct economic loss was >200 billion Chinese Yuan. China has long been prone to disasters, but disaster nursing education and training in China is still in its infancy.[1]

In disaster situations, the loss of life and the financial burden are often significant. So, there is an urgent need to improve disaster relief competency and disaster first aid training. Although great strides have been made in disaster care research in China, the uncontrollability of disasters, limited theoretical knowledge of disaster rescue procedures and the lack of disaster nursing knowledge and skilled rescue personnel have greatly restricted rescue activities. Evidence suggests that China is underprepared for disaster response. The role of disaster medicine in rescue and medical care highlights the importance of nursing, reflecting the importance of nursing staff in first aid.[2]

Following a disaster, nurses are on the front line as the backbone of the emergency medical system. Therefore, in order to improve the disaster care competency of future nursing staff, training should start in nursing school. Nursing education must prepare graduates for disasters.[3] As future healthcare professionals, nursing students should be provided with the right knowledge, skills and a positive attitude in order to successfully respond to public health emergencies or disasters worldwide.

This study aims to obtain information about the current status and factors affecting the disaster care competencies of undergraduate university nursing students, and to build a systematic rationalization for disaster education in colleges and universities and the creation of vocational disaster nursing, with references and suggested actions.

Participants

In April 2021, a total of 443 undergraduate nursing students at Taizhou University in Taizhou City, China, 410 female and 33 male, age 20 to 23 years (average age 20.57 ± 1.85 years) were randomly selected to participate in this study.

Inclusion criteria. Participants (1) were positive, and had clear thinking, emotional stability and excellent communication skills; (2) were university professional nursing and midwifery students.

Exclusion criteria. Individuals with (1) incomplete questionnaires; (2) unwillingness to cooperate, irregular responses, or deliberately missing more than 3 items on the questionnaire.

METHODS

General Questionnaire

General information was obtained via questionnaire, including gender, year and place of birth, whether or not they were an only child, whether they had experienced a disaster, whether they had participated in disaster training or an emergency drill, whether they had participated in a disaster rescue; whether or not they could adapt to the needs of on-site rescue and whether they had ever heard the term "disaster care."

Nursing Ability Questionnaire

The survey used is an adapted version of the Disaster Nursing Ability Questionnaire of Undergraduate Nursing Students,[4] which includes 3 dimensions: physical and mental quality, practical skills and theoretical systems, with a total of 47 items. Each item is rated on a Likert 5-level scale with a total possible score of 235 points. Scores go from "very good" to "very poor," with a range of 5 to 1 points for each item. The score is proportionate to disaster nursing ability: <3 points = low ability; 3-4 points = moderate ability; >4 points = high ability. Cronbach's alpha coefficient of this questionnaire was 0.965.

Research Method

After the researcher explained the purpose and role of the investigation to the participants, informed consent was obtained. Participants completed the questionnaires without external interference and returned them in a timely manner. The questionnaires were numbered and double checked, and when the same option is selected in the same questionnaire or several questions are lost or several are selected. That is, some nursing students did not answer the complete questionnaire.A total of 450 questionnaires were distributed and 443 valid questionnaires were returned; an effective recovery rate of 98.4%.

Statistical Analysis

IBM® SPSS 21.0 software was used for statistical analysis. Data verification and analysis was performed by 2 researchers. The difference in disaster response competency between the 2 groups was compared using the one-way ANOVA test and the student *t* test. The results were expressed as ($\bar{x} \pm s$) and the level of proof α value of 0.01.

RESULTS

Table 1 summarizes the comparison of scores in the various dimensions of disaster care competency of undergraduate nursing students with different characteristics.

Table 2 summarizes the disaster care capacity score of undergraduate nursing students.

DISCUSSION

Analysis of Disaster Nursing Competency of Undergraduate Nursing Students

According to our results, the average score of male nursing students on various disaster-dimension tests was significantly higher than that of female nursing students, indicating that male nursing students had greater disaster care skills than female nursing students. This has a lot to do

Table 1. Comparison of Different Characteristics of Disaster Response Capacity of Undergraduate Nursing Students ($\bar{x} \pm s$)

Item	Theoretical System	Practical Skills	Physical and Mental Fitness
Gender			
Male (n = 33)	63.79 ± 12.24	74.82 ± 14.88	19.12 ± 3.66
Female (n = 410)	56.49 ± 10.44	65.8 ± 15.50	18.79 ± 3.52
t value	14.52	10.25	0.27
P value	.000	.001	.602
College level			
Freshman (n = 139)	53.74 ± 10.96	58.07 ± 14.76	18.68 ± 3.47
Sophomore (n = 147)	56.21 ± 10.51	64.65 ± 13.82	18.54 ± 3.66
Junior (n = 157)	60.73 ± 9.66	75.79 ± 12.88	19.19 ± 3.45
F value	17.44	62.80	1.46
P value	.000	.000	.234
Home			
Rural (n = 353)	57.09 ± 10.78	66.65 ± 15.72	19.00 ± 3.53
Urban (n = 90)	56.82 ± 10.67	66.09 ± 15.25	18.09 ± 3.48
t value	0.045	0.092	4.787
P value	.833	.762	.029
Are you an only child?			
Yes (n = 129)	56.47 ± 11.54	66.74 ± 16.12	18.36 ± 3.50
No (n = 314)	57.27 ± 10.41	66.45 ± 15.42	19.00 ± 3.53
t value	0.514	0.030	2.947
P value	.474	.862	.087
Have you ever experienced a disaster?			
Yes (n = 114)	56.80 ± 12.03	66.61 ± 16.76	19.22 ± 3.38
No (n = 329)	57.12 ± 10.28	66.51 ± 15.22	18.67 ± 3.58
t value	0.075	0.004	2.041
P value	.784	.950	.154
Have you participated in disaster nursing courses?			
Yes (n = 195)	58.12 ± 10.98	66.69 ± 15.87	18.84 ± 3.63
No (n = 248)	56.18 ± 10.50	66.42 ± 15.44	18.79 ± 3.45
t value	3.587	0.033	0.022
P value	.059	.856	.881
Have you participated in emergency drills?			
Yes (n = 394)	57.17 ± 10.93	66.59 ± 15.69	18.83 ± 3.51
No (n = 49)	55.98 ± 9.13	66.10 ± 15.08	18.67 ± 3.73
t value	0.532	0.042	0.085
P value	.466	.837	.770
Have you participated in disaster relief?			
Yes (n = 33)	61.81 ± 2.14	71.51 ± 6.83	18.18 ± 3.26
No (n = 410)	56.65 ± 10.54	66.13 ± 15.46	18.86 ± 3.26
t value	7.257	3.695	1.139
P value	.007	.055	.287
Does your existing first aid knowledge meet on-site rescue needs?			
Yes (n = 119)	62.46 ± 10.38	72.47 ± 15.61	19.43 ± 3.44
No (n = 324)	55.04 ± 10.18	64.35 ± 15.06	18.59 ± 3.54
t value	45.710	24.784	4.997
P value	.000	.000	.026
Have you heard about "disaster care"?			
Yes (n = 155)	60.14 ± 11.34	70.01 ± 14.85	18.97 ± 3.23
No (n = 288)	55.35 ± 10.05	64.69 ± 15.75	18.72 ± 3.69
t value	10.594	5.973	0.454
P value	.000	.003	.636

Table 2. Undergraduate Disaster Response C Dimension Score (N = 443)

Item	Score (points $\bar{x} \pm s$)
Physical and mental fitness	3.76 ± 0.71
Theoretical system	3.00 ± 0.57
Practical skills	2.89 ± 0.68
Average entry score	3.03 ± 0.56

with the fact that male nursing students are more likely to accept new concepts and new ideas in clinical work. [5] and have more flexible thinking compared with female nursing students. The advantages of physical strength, strong practical ability and strong interest are interrelated, and therefore the advantages of male nursing students can be fully utilized. Male nursing students can be encouraged to participate in teaching and scientific research on disaster care that is less involved. The average score of female nursing students in various disaster dimension tests was lower than that of male nursing students.

Our study results show that there are significant differences in the level of disaster attention and life care capability, which are not the same. Life care is one of the disaster response ability in disaster nursing knowledge.Comparing the scores of the 3 dimensions, the scores of nursing students in the higher grades were slightly higher than nursing students in the lower grades. This is inseparable from the fact that senior nursing students learn more professional theoretical knowledge, have richer clinical practice experience and have a strong ability to withstand stress.

A disaster response curriculum is needed that incorporates disaster training into the higher education curriculum of basic professional nursing training[6] and organically combines China's special disaster situations, the advantages of the education system, and opens different courses for nursing students at all levels. Plans and measures related to disaster nursing courses need to be established.

According to the results, disaster nursing, with its special requirements, gives students who have directly experienced the impact of disasters a great advantage and a deeper understanding of disaster nursing,[7] and the shock and emotions involved in real scenes in the disaster rescue process. Studies have shown that relevant disaster care education and simulation training are important ways for nursing students to gain disaster rescue knowledge and skills in addition to experiencing disaster relief sites. Therefore, it is urgent to conduct high-simulation disaster first aid training. Nursing education should prepare students for the inevitability of disasters and emergencies.[8]

Our study found that the scores of the degree of coincidence of the perception of existing first aid knowledge and the adaptation to on-site rescue differ significantly in the 3 dimensions. Individuals with a high level of knowledge and the ability to self-rescue have a significantly higher level of disaster response capability than individuals who do not

identify with self-sufficiency. Therefore, colleges and universities need to adequately increase the percentage of theoretical and practical courses to accelerate students' adaptation to on-site rescue and increase their sense of self-identity.

We found that there are significant differences in the theoretical system and practical skills dimensions of disaster nursing. Driven and encouraged by interest, awareness and perception of information and consultation on aspects related to disaster nursing can effectively increase understanding, care and exploration of undergraduate nursing students' disaster nursing knowledge and practical skills.

Undergraduate Nursing Students Have Intermediate Disaster Response Skills

The results of this study show that the average score of undergraduate nursing students' disaster response competency is 3.03 ± 0.56. Thus, their ability to deal with disasters is insufficient. and needs to be further improved. We found that the scores in the 3 dimensions were, high to low: physical and mental quality, theoretical system and practical skills. This shows that our undergraduate nursing students have certain physical and psychological qualities to deal with disasters that result in a good ability to work in teams. The practical skill scores are lower than the theoretical system scores, which may have a lot to do with the lack of relevant operational training and the fact that the percentage of theoretical systems has increased. Nursing professional courses lack disaster response ability operation training, while the percentage of disaster response ability theoretical system is relatively high.This may be related to the relevant media and disaster courses and training in schools. The development of the general education system and training in disaster response skills in our schools remains relatively weak and still has a long way to go.

Physical and Mental Quality Dimension

The physical and mental quality dimension scores were the highest. Therefore, we believe that undergraduate nursing students have excellent physical and psychological qualities that correspond to their disaster rescue capability, and have a good awareness and ability to communicate and cooperate in groups. This may be related to the fact that nursing students are generally younger. Physical fitness and exercise classes during school improve resistance to psychological stress. Studies have shown that disaster relief personnel not only take on the mission of rescuing disaster victims, but also the task of psychological counseling and intervention for disaster victims. Therefore, disasters have a severe physical and psychological impact even on disaster relief personnel due to the increased pressure involved.

Disasters result in death. trauma and psychological distress. As the largest number of healthcare workers, nurses play a crucial role in reducing the impact of a disaster.[9] Only by removing the strangeness and fear of the actual disaster scene can we establish a strong line of psychological defense and resilience. Through psychological skills training measures—such as watching numerous professional disaster relief videos and facing bloody disaster scenes—an effective psychological intervention mechanism can be established that can strengthen the psychological quality of nursing students.[10] Undergraduate nursing students can perform extracurricular activities during school, physical education courses and other forms of physical fitness, undergo psychological counseling, take psychological courses and pursue psychological skills training. Obviously, cultivating the ability of undergraduate nursing students to resist stress is a great help so that they can show a good psychological quality in the face of high stress.

Theoretical System Dimension

The theoretical system dimension scores were second after the physical and mental quality dimension. This may be closely related to the shortcomings of the education system and training in disaster response in colleges and universities. According to relevant survey statistics, a considerable number of colleges and universities have not yet established an independent discipline of disaster nursing. and there is no professional teacher of related courses. Some colleges and universities only achieve the goal of cultivating students' disaster nursing skills by combining the 2 disciplines of acute critical care nursing and emergency nursing. We believe in the combination of situational exercises — the problem-based teaching learning method (PBL) — can be an effective and feasible method for training in practical disaster response skills. Nursing staff need to participate in training in order to acquire knowledge related to disaster nursing, and the demand for training in emergency nursing, rehabilitation and psychological nursing in victims of disasters is high. Most want to receive training through skills training and lectures, and, as reported, the use of scenario simulations, video playback, PBL teaching and training methods is not only conducive to timely review of students' knowledge points but also saves class hours. It guides students in creative thinking, and combines clinical cases with their own professional knowledge. It examines their own knowledge and understanding of actual clinical cases, so that nursing students can be methodical when they encounter how to deal with family emergencies in their texts.

Developing a Multimodal Simulation Program to Improve Disaster Competencies in Undergraduate Nursing Students[11]

Screen-based, immersive and game-based simulations are all used in disaster training.[12-13] Disaster education for nursing students can be successfully created through cooperation with the Red Cross Society.[14] Emergency and disaster preparedness should be incorporated into the curricula of medical schools and the continuing medical education programs of health institutions.[15] Major colleges and universities can try to increase the number of hours of theoretical learning, and teachers in the professional training group should be

responsible for providing students with relevant training. This should include disaster nursing first aid principles, nursing duties, trauma-related theoretical knowledge, etc. to improve knowledge of the theoretical system and literacy of undergraduate nursing students in a quality manner.

Practical Skills Dimension

The practical skill dimension scores were the lowest scores, indicating that nursing students have a large margin for improvement in their ability to practice skilled disaster procedures. The truth is that in recent years education level in undergraduate nursing schools has not placed much importance on operational skills, and the percentage of practical training courses is lower than that of theoretical study hours. and the usual practical training is free. In China, many disaster response capacity training is charged.The quality of the exercises cannot be guaranteed, and there are other related factors. Due to the need to strengthen the popularization of disaster nursing education and training in China, the level of knowledge and skills of disaster relief nurses is generally low. To effectively improve the practical skills level, schools could conduct a series of seminars, such as the Huaxia Higher Nursing Education Alliance at the Disaster Nursing Seminars using on-site visits, role playing and other teaching methods to allow students to feel and interpret the disaster and rescue relationship.[15]

According to Yang Bingxiang, et al[16] and others, the multi-station simulation exercise method is also an effective combination of theory and practice, presenting the core content of disaster rescue in a simulation situation. This provides a more realistic immersive practical environment and encourages students to switch from passive acceptance to active learning. It greatly improves students' teamwork skills, as well as their operational and clinical thinking skills. In the United States, virtual reality simulation (VRS) is increasingly being used in disaster education for healthcare workers.[17] Kilmon, et al.[18] found vrSV-based VRS in primary disaster education useful by developing VRS scenarios to study the speed and accuracy of cardiopulmonary resuscitation (CPR) response in emergency situations. The app improves the first aid skills of nursing students by allowing them to immerse themselves in disaster scenes, adapt to similar disaster environments and better master first aid techniques and have a good emotional experience in stressful situations.

Thus, we can improve the interest and operational competency of nursing students by immersing them in scenario simulation exercises created in developed countries and inviting experts in disaster management skills to conduct skills training sessions and professional lectures. Teaching methods such as virtual simulation training and simulation of PBL scenarios for disaster relief can be carried out. In nursing colleges and universities. the simulation of cross profession mass casualty events enables nursing students to learn how to cope with disasters.[19] Compared with scenario simulation, theme game-based teaching is more effective in improving the disaster nursing competence of nursing students.[20]

CONCLUSIONS

There is a relative shortage of professional disaster nursing personnel in China, and nursing students barely receive systematic disaster nursing education. This lack of training has become the biggest obstacle to the development of disaster nursing. Undergraduate nursing students have insufficient understanding of disaster nursing, and disaster care competence needs to be further strengthened. Nursing students should clearly understand their role in emergency and disaster preparedness and be able to identify environmental factors that may be unfavorable to themselves and patients. Combined with qualitative and quantitative analysis, actively building a system of disaster nursing capacity and further evaluating and confirming the disaster nursing competency of nurses will be a long-term challenge for disaster care research in China. Therefore, it is imperative to build a rapid first aid training system. The disaster nursing competency of undergraduate students should be cultivated by relevant professional nursing courses, and it is imperative to conduct training. Therefore. through systematic training in disaster rescue knowledge, improve the awareness of the response to nursing life. That is, to improve disaster response capacity.And improve the level of disaster rescue so that nursing students can respond quickly to various unexpected minor and major disasters and play a more important role in future disaster rescue work. They would also make a small contribution to the establishment of future disaster first aid echelons in China and improve the international emergency response. The United States has included disaster drills and training in the mandatory curriculum for American medical students. In contrast, the low frequency of training leads to a lack of knowledge on how to plan and execute disaster response and to the inability of medical professionals and trainees to prepare for the burden of disasters.[23]

Disaster response competency and risk management education are important and require human resource development for health workers involved in disaster response. Japan has also not yet established a practical educational model for risk management and disaster response, although. a model of disaster medical education for practical risk management and disaster nursing has been proposed.[24] Nurses can be useful in saving disaster victims by preparing and implementing effective care at different stages of a crisis.[25] More disaster nursing research is necessary to enhance the knowledge, skills and readiness of nursing professionals in disaster management in meeting global disaster challenges.[26] Continued evaluation of simulation training and making identified changes to interdisciplinary disaster drills will improve student learning and help prepare future nurses for disasters.[27] Integrating interdisciplinary abilities into disaster preparedness education is imperative.[28]

We must learn from the educational channels and models of developed countries about disaster response competencies in order to establish a disaster response education model in China. This must be applied as soon as possible to meet the needs of diverse populations, especially

nursing students. The importance of training of disaster nursing scientists[29] and disaster nursing education and training programs have expanded globally.[30]

FUNDING

This research was supported by the General Research Project of the Education Department of Zhejiang Province, No. Y202146955; the second batch of research projects on teaching reform in Zhejiang Province's 13th five-year plan, No. Jg20190460; the 2020 National Innovation and Entrepreneurship Project and the Taizhou University Nursing Discipline Development Special Fund Project

CONFLICT INTEREST

None.

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