A Disaster Response and Management Competency Mapping of Community Nurses in China

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Abstract

Background: It is widely accepted in many parts of the world that community nurses are of vital importance in various phases of disaster response and management. In China, however, it is not clear whether the Chinese community nurses are able to assume disaster-related duties due to the lack of a systematic assessment.

Methods: A pre-designed and well-tested questionnaire was employed to evaluate the competency in disaster response and management among 205 valid registered Chinese community nurses between September and October 2009. Statistical analyses were performed with SPSS Version 13.0 using one way ANOVA, Least Significant Difference (LSD) and multiple stepwise regression analysis.

Results: This group of Chinese community nurses scored at an intermediate level of competency (a score of 3.68 (SD 0.48) out of a perfect score of 5) in disaster response and management, suggesting that they have the basic ability to participate in disaster-related nursing. Four factors, namely, Experiences in Disaster Relief, Participation in Disaster Training, the Age and Duration in Job, were identified to be the predominant factors contributing significantly to the integrated competency in disaster response and management of an individual.

Conclusion: Most of the Chinese community nurses have basic qualifications and competencies to undertake the responsibilities of disaster response and management. However, more targeted disaster training including virtual-reality based drills should be provided in order to improve their competency.

Keywords: Community nurse, Public health nurse, Disaster

Introduction

Our modern world is constantly facing with the challenges of the outbreak of infectious diseases, traffic accidents, food poisoning, war, terrorist attacks and many other natural or non-natural disasters such as earthquake, landslide and flood, etc. To minimize the damage and the suffering the disasters might cause, it is important to maximally mobilize all human resources and natural resources to cope with difficult situations effectively.

Traditionally, professional emergency response departments and medical relieving organizations and hospitals, are responsible for most of the disaster related response and management efforts in the most countries worldwide. The doctors and nurses working in the health care sectors are serving as the major medical forces to shoulder the tasks of disaster relieving. Recently, however, the importance of disaster response and management

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at the community levels is attracting a lot of attention (1-2). In particular, it has been proposed that the community nurses can contribute significantly not only to disaster medical relief, but also to disaster management (pre-disaster preparedness and dissemination of disaster knowledge; immediate responses to disasters; and post-disaster hygienic tasks, peace keeping, mitigation and recovery etc.) (2). A number of studies have been undertaken to delineate the exact roles and the competency status of the public health nurses and to determine the training they might need in order to be better prepared for the responsibilities they might have to take (2-10). In comparison with the nurses from the hospitals or other relieving agencies, the community nurses might have their own advantages. These include that they are more familiar with the vicinity of the environment; they have easy access the local residents and they can perform comprehensive drills and training for disaster preparedness and responses; they can also provide more personalized guidance and effective help to local residents at different levels when needed (11-13).

In China, previous attention in disaster nursing was largely paid to enhancing the competency of hospital nurses at specialized sectors, especially first-aid stations, ICU, as well as the surgery departments, focusing on the emergency rescue medical efforts immediately after the disasters (10, 14). In contrast, little attention has been given to the more comprehensive roles that Chinese community nurses may be able to play for a variety of disasters-related tasks, such as medical management, disaster information dissemination, transmittable disease and contamination control, psychological relief and peace making (15). To the best of our knowledge, very few studies have been carried out to assess the competency status of Chinese community nurses in disaster response and management and previous results were not sufficiently comprehensive and clear. The lack of a clear assessment is hindering the recognition of the roles of community nurses might be able to play in disaster response and management. It is also hindering the design of better curriculums and training programs aimed at increasing the preparedness of community nurses for disaster response and management.

In the present study, we conducted a survey of community nurses in Chongqing, the largest southwestern Chinese city that is prone to various disasters. The status quo of the competency of Chinese community nurses in disaster response and management and the predominant factors affecting the competency were statistically determined.

Materials and Methods

Recruitment of the participants
The survey was carried out between September and October 2009. A total of 205 registered nurses were recruited from eight community health care units in Chongqing, who had been working in community settings for more than 5 years by the time they were surveyed. The participants were all females and aged between 25 to 60 years old. About 14% of the recruited nurses possessed the Bachelor's Degree, which was also the highest level of formal education among these nurses. Around 50% of the 205 participants had experience in disaster medical relief and 63% of the 205 participants had experience in disaster training (Table 1).

Questionnaire
A pre-designed questionnaire was employed to evaluate disaster response and management competency among the recruited community nurses. In general, the "competency" here is defined as a nurse's ability to properly respond or handle situations of various disasters, based totally on her own assessments. The questionnaire was divided into three parts. The first part was to collect the personal information regarding the respondents. The second part contained two questions querying about the experiences in disaster relief and disaster training. The third part of the questionnaire was composed of one hundred and five questions, with five questions of which deliberately-included to serve as truthfulness detectors (Appendix I). These five questions were such designed that each of them normally had a straight and simple answer and that as long as the participants were not giving answers randomly or carelessly, correct answers were expected.

Table 1: General information of the participants of the survey (n = 205)

Category		n	6
Age (yr)	< 30	67	32.68
	≥ 30 but < 40	72	35.12
	≥ 40 but < 50	46	22.44
	≥ 50	20	9.76
Formal Education	Technical Secondary School	57	27.80
	Junior College	119	58.05
	Bachelor Degree	29	14.15
Professional Rank	Nurse	84	40.98
	Senior Nurse	62	30.24
	Nurse-in-charge and Above	59	28.78
Duration in Job	≥ 5 but < 10	64	31.22
	≥ 10 but < 20	60	29.27
	≥ 20 but < 30	61	29.76
	≥ 30	20	9.76
Past Department Affiliation	Internal Medicine	76	37.07
	Surgery	84	40.98
	Management	28	13.66
	Others	17	8.29
Experience in Disaster Relief	Yes	102	49.76
	No	103	50.24
Disaster-related Training	Yes	130	63.41
	No	75	36.59

The remaining 100 questions were designed to assess the competency in disaster response and management of the respondents. These questions encompassed six primary itemized competencies, namely, Disaster Knowledge, Ability in Risk Assessment, Ability in Emergency Responses, Ability in Coping with Psychological Stress, Ability in Transmittable Disease Control and Other Personal Qualifications that were further divided into 35 secondary itemized competencies (Appendix II). For each of the 105 questions in the third part of the questionnaire, the responders were asked to choose one of the five scores, namely 5, 4, 3, 2 and 1, with the score 5 reflecting the best ability and the score 1 being the worst. The comprehensive score and the score of every itemized competency were calculated by using the weight sets that had been previously formulated and tested (Appendix II). The questionnaire has been tested in our preliminary studies. We found that the

Cronbach's Alpha coefficient for in*ternal consistency* of this questionnaire were from 0.828 to 0.945 and the concordance correlation coefficients of repeated measures were 0.826 to 0.983 (16).

Data collection and analyses

All nurses were verbally informed of the purposes, the confidentiality and the nature of voluntary participation at the beginning of the survey. The questionnaire was dispatched and explained to the participants by trained surveyor, finished by the participants anonymously and returned to the surveyors on the spot. A total of 235 copies of questionnaire were sent out and 225 copies were returned, with the questionnaire response rate being 95.74%. 20 returned questionnaires were deemed to be invalid as wrong answers were given to the truthfulness detector questions and thus excluded from subsequent analyses. The effective response rate therefore was 91.11% (205 out of 225 copies of

questionnaire). The self-completed scores regarding competency in disaster response and management of the community nurses were logged in an Excel form. Subsequently the data were grouped according to Age (less than 30; ≥ 30 but < 40; ≥ 40 but < 50; ≥ 50 years), Formal Education (Technical Secondary School, Junior College and Bachelor Degree), Professional Rank (Nurse, Senior Nurse, Nurse-in-charge and Above), Duration in Job (≥ 5 but < 10; ≥ 10 but < 20; ≥ 20 but < 30; ≥ 30 years), Past Department Affiliation (Internal Medicine, Surgery, Management Sectors and Others) etc. The grouped data were subsequently analyzed statistically by the SPSS version 13.0, together with one way ANOVA, LSD and the Multiple Stepwise Regression Analysis to determine the comprehensive score and the scores of primary itemized compe-tencies, and to identify the predominant factors affecting these comp-etencies.

Results

Chongqing community nurses scored at an intermediate level of the comprehensive competency in disaster response and management
Self-assessment of competency in disaster response and management among Chongqing community nurses showed that, on average these Chinese nurses scored 3.68 (SD 0.48) out of a full score of 5 (Table 2), indicating that these nurses are reasonably competent in disaster response and management. Among the six primary itemized competencies surveyed, this group of nurses scored best for the Personal Qualifications at 3.97 (SD 0.49) whereas they scored worst for the Ability in Risk Assessment at 3.28 (SD 0.58).

The influence of Age and Duration in job on the competency of disaster response and management
The relative influence of factors affecting the competency in disaster response and management of community nurses was estimated by the one way ANOVA and LSD. It was found that the higher the ages, the higher the scores.

Table 2: The comprehensive score and the average scores of itemized competencies in disaster response and management of Chongqing community nurses (n = 205)

Itemized Competency	Mean(SD)
Disaster Knowledge	3.45(0.59)
Ability in Risk Assessment	3.28(0.58)
Ability in Emergency Responses	3.75(0.53)
Ability in Coping with Psychological Stress	3.75(0.51)
Ability in Communicable Disease Control	3.84(0.63)
Personal Qualifications	3.97(0.49)
Comprehensive	3.68(0.48)

Scores for the nurses aged less than 30 had a lowest score at 3.42 (SD 0.33) that is significantly lower than that of all other age groups ($P < 0.05$). By contrast, those aged 50 or more scored a highest at 3.85 (SD 0.55) that was significantly higher than that of those aged less than 30 or those aged between 30-39 but not significantly different from the score for those aged between 40-49. Collectively, these data indicated that those aged over 30 are largely competent. With the Duration in Job, those nurses had worked for more than 5 years but less than 10 years scored the lowest at 3.43 (SD 0.36) in disaster response and management, and this score is statistically different from that of all other Duration in Job groups ($P < 0.05$), whereas the scores for those with more than 10 years of Duration in Job are not statistically different. Together these data suggested that with the increase of Duration in Job, competency of disaster response appeared to be strengthened significantly.

The influence of Formal Education, Professional Rank and past experience on the competency of disaster response and management
It was expected that the higher the education degree the community nurses received, the stronger competency responding and management to disaster they should have. Indeed, those had completed only with Technical Secondary School scored the lowest degree at 3.43 (SD 0.42) that is significantly different from that of the other two groups ($P < 0.05$). The results also demonstrated

that the community nurses with higher professional ranks scored higher in their disaster response and management. For the contribution of previous department association, surprisingly those who worked at the management sectors previously scored the highest and those who worked in departments other than the management sector, the internal medicine and surgery, scored lower, indicating previous management experience is very beneficial. Most importantly, however, this study shows that previous Experiences in Disaster Relief or Participation in Disaster-related Training are of vital importance to the enhancement in the competency of disaster response and management among these community nurses (Table 3).

Table 3: Averaged scores of different groups of community nurse in Chongqing in the competency of disaster response and management

Category	Group	n	Mean(SD)	*f*-value	*P*-value
Age	< 30	67	3.42(0.33)*	8.792	< 0.001
	≥ 30 but < 40	72	3.60(0.47)*		
	≥ 40 but < 50	46	3.79(0.48)#		
	≥ 50	20	3.85(0.55)#		
Formal Education	Technical Secondary School	57	3.43(0.42)*	6.147	0.003
	Junior College	119	3.68(0.47)		
	Bachelor Degree	29	3.69(0.46)		
Professional Rank	Nurse	84	3.44(0.38)*	9.537	< 0.001
	Senior Nurse	62	3.64(0.48)*		
	Nurse-in-charge and Above	59	3.83(0.47)*		
Duration in Job	≥ 5 but < 10	64	3.43(0.36)*	5.212	0.002
	≥ 10 but < 20	60	3.64(0.45)		
	≥ 20 but < 30	61	3.72(0.54)		
	≥ 30	20	3.75(0.47)		
Past Department Affil-	Internal Medicine	76	3.51(0.43)	7.189	< 0.001
	Surgery	84	3.69(0.43)* #		
	Management Sectors	28	3.84(0.53)* #		
	Others	17	3.31(0.45)		
Experience in Disaster	Yes	102	3.86(0.46)*	80.302	< 0.001
	No	103	3.36(0.32)		
Disaster-related Train-	Yes	130	3.74(0.45)*	35.348	< 0.001
	No	75	3.38(0.41)		

* Compared with any other groups in the same category, *P* < 0.05 /# Not significant between the two groups in the same category.

Identification of factors affecting the competency of disaster response and management most significantly

We performed multiple stepwise regression analysis to determine the relative contribution to the Comprehensive Score of competency in disaster response and management of community nurses by the categories within the personal information and disaster experience sectors. Among all categories in these sectors, we identified four, namely, the Experience in Disaster Relief, Participation in Disaster-related Training, Age and Duration in Job to be the most predominant factors affecting the competency in disaster response and management for the nurses we surveyed (Table 4).

Table 4: Coefficients of four categories affecting the comprehensive competency in disaster response and management most significantly as analyzed by multiple stepwise regression analysis

Category	PRC	SE	SRC	*t*-value	*P*-value	95% confidence interval	
						Lower Bound	Upper Bound
Constant	2.638	0.138		24.426	<0.001	2.425	2.851
Experience in Disaster relief	0.366	0.061	0.394	6.011	<0.001	0.246	0.487
Disaster-related Training	0.192	0.061	0.199	3.148	0.002	0.072	0.312
Age	0.213	0.068	0.443	3.135	0.026	0.079	0.348
Duration in Job	-0.154	0.066	-0.325	-2.335	0.021	-0.284	-0.024

Abbreviations:

PRC– partial regression coefficient; SE– standard error; SRC– standard regression coefficient

We further analyzed the relative contribution to the six itemized competencies within the personal information and disaster experience sectors, respectively. Interestingly, the Experience in Disaster Relief, Participation in Disaster-related Training, Age and Past Department Affiliation were once again identified to be important factors affecting these itemized competencies among this group of Chinese community nurses. The results further indicated that the Experience in Disaster Relief alone is positively correlated with increased Ability in Risk Assessment and increased Ability in Coping with Psychological Stress. In addition, the Professional Rank is also positively correlated with increased itemized competencies among all of the participants. In this survey, the Experience in Disaster Relief appeared to be the most predominant factor affecting all the six itemized competencies (Table 5).

Table 5: Coefficients of categories influencing itemized competency in disaster response and management of Chongqing community nurses as analyzed by multiple stepwise regression

Itemized competency	Category	PRC	SE	SRC	*t*-value	*P*-value	95% confidence interval	
							Lower Bound	Upper Bound
Disaster knowledge	Experience in Disaster Relief	0.052	0.008	0.410	6.406	<0.001	0.036	0.067
	Disaster-related Training	0.032	0.008	0.246	3.848	<0.001	0.016	0.049
Ability in Risk Assessment	Experience in Disaster Relief	0.074	0.012	0.396	6.139	<0.001	0.050	0.098
Ability in Emergency Responses	Experience in Disaster Relief	0.168	0.024	0.432	7.001	<0.001	0.120	0.215
	Professional Rank	0.054	0.014	0.238	3.856	<0.001	0.026	0.082
Ability in Coping with Psychological Stress	Experience in Disaster Relief	0.062	0.009	0.442	7.021	<0.001	0.045	0.080
Ability in Transmittable Disease Control	Experience in Disaster Relief	0.036	0.011	0.230	3.346	0.001	0.015	0.057
	Disaster-related Training	0.044	0.011	0.273	4.125	<0.001	0.023	0.065
	Age	0.018	0.005	0.228	3.424	0.001	0.008	0.029
	Past Department Affiliation	-0.013	0.005	-0.159	-2.531	0.012	-0.024	-0.003
Personal Qualifications	Experience in Disaster Relief	0.028	0.005	0.351	5.185	<0.001	0.018	0.039
	Disaster-related Training	0.018	0.006	-0.215	3.183	0.002	0.007	0.029

Abbreviations: PRC– partial regression coefficient; SE– standard error; SRC– standard regression coefficient

It was also noted that theoretical knowledge of disasters and the Ability in Risk Assessment of the Chinese community nurses appeared to be inadequate.

Discussion

In a previous study that surveyed on the nurses in the hospital emergency departments to determine their competency in disaster response and management in China (10) and another previous study that investigated the disaster-related knowledge of medical students in the medical colleges of China (17), it was revealed that the disaster related knowledge reservation of these nurses or students might not be sufficient. Consistent with these results, in this current study we also found that the disaster related knowledge reservation among our group of Chinese community nurses might also be inadequate. The reasons for the general inadequacy of disaster related knowledge reservation among the Chinese nurses might in part reflect the fact that very few medical schools or nurse training agencies had provided courses and curriculums related to disaster prevention, disaster response and management. While professional medical first-aid theories and skills were indeed emphasized, specific educational needs such as assessment of disaster risks, comprehensive disaster response planning, and effective drills were often neglected. It is timely to make the effort needed to begin to offer these courses.

Age, Formal Education, Duration in job and Participation in Disaster-related Training were all previously identified as the major factors affecting the development of competency in disaster response and management. For instance, it was suggested that with the increase in age and duration in job, nurses will gradually accumulate the professional knowledge and skills (18,19). Furthermore, their knowledge will be shifted from procedural knowledge to reflective, strategic and emotional knowledge that is deep-rooted and invisible. And as a consequence, the nurses will gradually develop and improve their holistic reasoning and judgment. Consistent with this, Qi et al. also suggested that duration in job affected the first-aid competency significantly. They reported that community nurses with 3 or more years in a position scored significantly higher than those with less than 3 years in the competency in disaster response and management (20).

With Formal Education and Professional Rank, some scholars believed that people with higher formal education background possessed more knowledge and better professional skills and trainings, thus might be more qualified with higher competency in disaster response and management. Li suggested that, in China, medical staff with higher professional rank often had more specialized knowledge and skills and were better at performing their jobs under more sophisticated surroundings (21). Similarly, the longer they have served, the better they might become. Noteworthy, however, is that past department associations with surgery departments appeared to be very helpful. A little bit surprising is that experience from the management sectors also appeared to be helpful, which might be due to the fact that the nurses from these sectors were often senior nurses with rich experiences and comprehensive management capacities that were helpful in improving their disaster management capability. Consistent with previous findings, our current study confirmed that Age, Formal Education, Participation in Disaster-related Training all contributed significantly to the development of competency in disaster response and management.

Nurses' Experiences in Disaster Relief had been suggested to be the most predominant factor affecting the competency in disaster response and management. Many nurses who had taken part in disaster relieving efforts held strongly that the Past Experiences in Disaster Relief could help them identify their disadvantages clearly, such that they can take initiatives to strengthen the relevant training to allow them to be better prepared (16). Nonetheless, in reality not all nurses will have the opportunities to participate in disaster relief (22). Recently it was proposed that the use of certain virtual reality approaches might be helpful in circumventing the reality limitation. However, it

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needs to be further evaluated before this type of approaches can become practical.

Although the system of the Chinese community nurses has not been established for a long time, the ordinary services provided by the community nursing services have been well recognized. The communities are the major places for disaster relief. As mentioned earlier, however, whether the Chinese community nurses might be able assume duties in various phases of disaster response and management and assume various duties were not clear. By evaluating systemically the competency in disaster response and management, our current study suggests that in general the Chinese community nurses are largely qualified and able to assume duties in various phases of disaster response and management. The recognition of the competency of the Chinese community nurses in disaster response and management is of vital importance to future disaster response and management because the administrative and other disaster-relevant agencies might consider leveraging on this important task force to maximize our ability in combating various kinds of disasters. In addition, this study also identified a few predominant factors affecting the competency in disaster response and management of an individual, which is essential for the development of better curriculums, better disaster-related training programs for nurses in the medical and health care sectors and the community service sectors.

Conclusion

Based on current study, we concluded that most Chinese community nurses are able to perform duties in disaster response and management. More systematic training will be helpful in improving the competency in undertaking their responsibilities.

Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission,

redundancy, etc) have been completely observed by the authors.

Acknowledgments

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