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Improving Disaster Preparedness Among Healthcare Professionals: A Comprehensive Approach

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Abstract

Aim: Effective disaster preparedness among healthcare professionals is crucial for efficient emergency response. This study evaluates the disaster preparedness levels of healthcare professionals and identifies factors influencing their readiness.

Materials and Methods: A cross-sectional survey was conducted among 137 healthcare professionals. The survey assessed demographics, professional experience, and disaster preparedness training. Data were analyzed using descriptive statistics, chi-square test, and Mann-Whitney U test.

Results: 65.6% of participants lacked prior disaster preparedness training. Participants with training reported higher confidence in disaster response capabilities. Key skills such as teamwork, stress management, and decision-making were significantly better among those trained ($p<0.05$).

Conclusion: The findings highlight critical gaps in disaster preparedness and emphasize the need for structured, simulation-based, and interdisciplinary training programs.

Keywords: Disaster preparedness, healthcare professionals, emergency response, interdisciplinary training, simulation drills

Introduction

Disaster preparedness is essential for healthcare systems to respond effectively to emergencies. Recent disasters, including pandemics and natural calamities, have stressed the importance of systematic training. Healthcare professionals play a critical role during crises, ensuring the continuity of care and minimizing casualties. However, gaps in training and preparedness can lead to significant inefficiencies in disaster response (1,2).

Globally, the increasing frequency and severity of disasters, from climate-induced events to pandemics like COVID-19, underscore the urgency of equipping healthcare workers with robust disaster response skills. By understanding current preparedness levels and the barriers faced by healthcare professionals, this study aims to provide actionable insights for enhancing disaster readiness.

Materials and Methods

Study Design and Participants

The study employed a cross-sectional design, surveying 137 healthcare professionals from hospitals and emergency services. Participants included physicians, nurses, and allied health staff. The sample size was calculated to achieve statistical power, with an effect size of 0.2, 80% power, and a 5% significance level, to ensure representativeness of the healthcare workforce (3).

Data Collection and Instruments

A structured questionnaire was utilized to evaluate participants' demographic characteristics, professional experience, and levels of preparedness for disaster response. The assessment focused on several key domains, including confidence in disaster response,

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proficiency in handling emergency equipment, the ability to work effectively in a team under stressful conditions, and decision-making skills in crisis situations.

The survey incorporated validated tools, such as the emergency preparedness information questionnaire (EPIQ), to measure perceived readiness and skill levels. Open-ended questions allowed participants to provide qualitative insights into their training experiences and suggestions for improvement (4).

The EPIQ uses a Likert scale for scoring, where participants rate their confidence in specific preparedness domains on a scale from 1 not confident) to 5 (very confident). The final score is calculated as the sum or average of responses, with higher scores indicating greater perceived preparedness.

The questionnaire assessed multiple aspects of disaster preparedness, including participants' familiarity with disaster response protocols, confidence in handling emergency equipment, perceived ability to function effectively within an interdisciplinary disaster response team, and knowledge of hospital disaster plans. A comprehensive list of the questionnaire items is provided in the Appendix 1.

Statistical Analysis

Data analysis involved descriptive statistics, chi-square test, and Mann-Whitney U test to examine correlations between training and preparedness. Demographic variables were analyzed to identify potential disparities in training and confidence levels. Qualitative responses were thematically analyzed to extract recurring themes and suggestions (5).

Results

Demographic Characteristics

The demographic analysis of the study population revealed that 63.3% of the participants were female, while 36.7% were male. The majority of participants (36.7%) were within the age range of 36 to 45 years. Additionally, 35.6% of the respondents had more than 21 years of professional experience, indicating a workforce with substantial expertise in their respective fields.

Training and Preparedness

The analysis of training and preparedness levels revealed that 65.6% of participants had not received any prior disaster preparedness training, highlighting a significant gap in professional education (Figure 1). Furthermore, participants who had undergone training reported significantly higher confidence in their ability to respond effectively to disasters (χ^2=16.83, p=0.002). This relationship is further illustrated in Figure 2, which presents confidence levels stratified according to training status.

Skills Assessment

The analysis of skills among trained and untrained participants revealed significant differences across three key areas:

Trained participants demonstrated a notable improvement in equipment handling skills, with a strong positive correlation (r=0.423) between training status and proficiency. Similarly, interdisciplinary training contributed to enhanced teamwork capabilities, as indicated by a moderate positive correlation (r=0.312). Lastly, participants with training reported higher stress management ability, with a positive correlation of r=0.297.

These findings underscore the critical role of disaster preparedness training in developing essential skills for effective response.

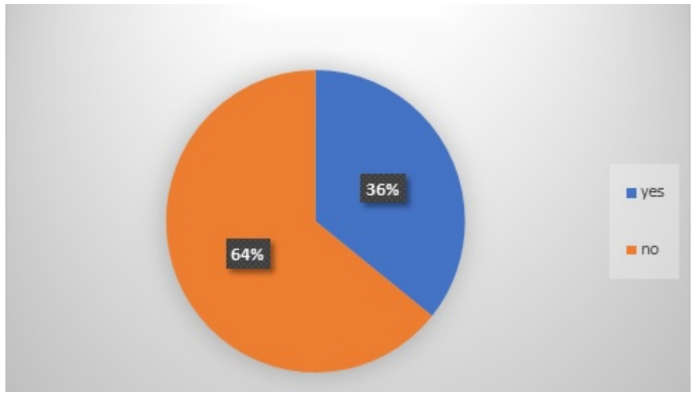

Figure 1. Proportion of participants with and without disaster preparedness raining. A pie chart illustrating the proportion of participants who have received disaster preparedness training versus those who have not. The chart highlights the distribution of trained versus untrained participants in the study, emphasizing the overall preparedness landscape

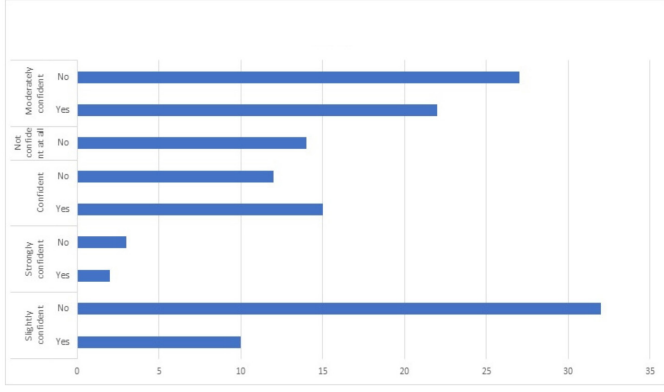

Figure 2. Comparison of confidence levels in disaster response based on training status. A bar chart comparing the confidence levels of participants in responding to disasters, segmented by their training status. Confidence levels are categorized (e.g., low, moderate, high), showing the impact of disaster preparedness training on participants' perceived readiness

Discussion

Addressing Training Deficiencies

The lack of disaster preparedness training among 65.6% of participants highlights a critical gap in healthcare education. This finding is consistent with international studies, which emphasize the need for standardized, comprehensive training programs to ensure readiness across healthcare systems (6,7).

Significance of Confidence Levels

The chi-square analysis demonstrated a statistically significant association between training and confidence levels in disaster response (χ^2=16.83, p=0.002). This reinforces the hypothesis that training enhances both perceived and actual preparedness. Confidence is a pivotal factor influencing decision-making and performance during crises, as highlighted in prior research (8).

Importance of Simulation-Based Training

Simulation-based training emerged as a highly effective method for improving disaster preparedness. Such training not only enhances practical skills but also builds confidence and reduces response times during actual emergencies. For instance, participants in our study who underwent simulation training reported significantly higher preparedness levels than those who only received theoretical instruction (9).

Multidisciplinary Collaboration

Interdisciplinary training fosters improved communication and coordination during emergencies. This is particularly important in disaster scenarios, where seamless collaboration between various healthcare roles is critical for effective response. Previous studies have shown that joint training sessions involving diverse professional groups enhance teamwork and reduce role ambiguity (10).

Role of Psychological Resilience

Stress management is a vital yet often overlooked component of disaster preparedness. Participants who received training in stress management techniques reported better performance under pressure. Incorporating psychological resilience training into disaster preparedness programs can mitigate burnout and improve overall workforce sustainability during prolonged crises (4).

Integration of Technology

The integration of technology, such as virtual reality (VR) and online learning platforms, offers innovative solutions for disaster preparedness training. These tools provide immersive, scalable, and cost-effective training options, making them ideal for large-scale implementation. Recent advancements in VR-based training have demonstrated significant improvements in participants' situational awareness and decision-making skills (8,10). Interprofessional simulation has been shown to enhance collaborative practice and disaster response skills (8).

Recommendations

Structured Training Programs: Develop standardized curricula tailored to the specific needs of different healthcare roles. These programs should include both theoretical knowledge and practical exercises to ensure comprehensive preparedness.

Regular Simulation Drills: Conduct realistic, hands-on training sessions to enhance practical skills and situational awareness. These drills should be tailored to mimic real-world disaster scenarios.

Interdisciplinary Collaboration: Promote teamwork through joint training initiatives that include physicians, nurses, administrative staff, and emergency responders. This approach fosters better communication and role clarity during crises.

Incorporate Psychological Resilience: Include stress management and mental health support in disaster preparedness training modules. This will help healthcare professionals maintain high performance levels during prolonged emergencies (10,11).

Leverage Technology: Utilize VR and e-learning platforms to expand access to disaster preparedness education. These tools can complement traditional training methods and provide flexible, on-demand learning opportunities.

Policy Advocacy: Engage policymakers to make disaster preparedness training a mandatory component of healthcare education and ongoing professional development programs.

Conclusion

This study underscores the critical need for enhanced disaster preparedness among healthcare professionals. By addressing training gaps, fostering collaboration, and leveraging technology, we can build a more resilient healthcare workforce capable of effectively responding to emergencies. Continuous improvement in training programs and policies will ensure better outcomes in future crises. Policymakers, educators, and healthcare institutions must collaborate to implement these recommendations and strengthen the global healthcare system's capacity for disaster response.

Ethics

Ethics Committee Approval: This study is based on a survey conducted among healthcare professionals to evaluate their disaster preparedness levels. As this was an observational survey

study with no intervention and did not involve patient data, it was not subject to ethical committee approval. Additionally, no identifiable personal data were collected during the survey, ensuring compliance with ethical standards for such research.

Informed Consent: The study did not involve any patients or patient-related procedures. Therefore, no patient consent forms are applicable or available for this work. The research exclusively focused on anonymous data collected from healthcare professionals.

Footnotes

Conflict of Interest: The author declare that they have no conflict of interest.

Financial Disclosure: There is no financial conflict of interest to disclose.

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Appendix 1.

Disaster Preparedness Level Assessment Survey

Section 1: Participant Information

In this section, demographic information of the participants will be collected and basic information to be used in the analysis of the data will be provided.

1. Gender: *

○ Woman

○ Male

2. Age: *

○ 18-25

○ 26-35

○ 36-45

○ 46-55

○ 56 and above

3. Professional Experience (Years) *

○ 0-5

○ 6-10

○ 11-15

○ 16-20

○ 21 and over

4. Type of Institution You Work For *

○ Hospital (Except Emergency Departments)

○ Emergency room

○ Ambulance Services

○ Other:

Disaster Preparedness Level Assessment Survey

Chapter 2: Disaster Preparedness Training

In this section, participants will be questioned whether they have received disaster preparedness training and, if so, what type of training they have received.

5. Have you received disaster preparedness training? *

○ Yes

○ No

6. What type of education did you receive? (You can choose more than one) *

○ Basic Disaster Training

○ Advanced Disaster Training

○ Simulation Training

○ I didn't get it

○ Other:

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Disaster Preparedness Level Assessment Survey

Chapter 3: Disaster Preparedness Level Assessment

In this section, questions are asked to evaluate the participants' level of preparedness for disaster situations.

7. How confident are you in your ability to respond in disaster situations? *

○ I don't trust at all

○ I have little confidence

○ I am moderately confident

○ I trust

○ I trust you very much

8. What is your skill level in using the necessary equipment in disaster situations? *

○ Very low

○ Low

○ Middle

○ High

○ Very High

9. What is your ability to work as a team in disaster situations? *

○ Very low

○ Low

○ Middle

○ High

○ Very High

10. What is your ability to cope with stress in disaster situations? *

○ Very low

○ Low

○ Middle

○ High

○ Very High

11. What is your ability to make quick and accurate decisions in disaster situations? *

○ Very low

○ Low

○ Middle

○ High

○ Very High

12. What is your desire to contribute to disaster preparedness plans? *

○ I have no desire

○ I have little desire

○ I have a moderate desire

○ I have a request

○ I have many requests

13. What are your suggestions for improving disaster preparedness training?(Open-ended) (optional)

Your answer