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Health Care Workers' Perceptions of Hospital Disaster Planning and Preparedness for Building Resilient Healthcare Systems

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Original Research

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Abstract

Objective: This study aimed to examine health care workers' (HCWs) perceptions of hospital disaster planning and preparedness within the context of building resilient health care systems. It also evaluated HCWs' involvement in the planning process.

Methods: Thirteen HCWs from 2 Queensland hospitals participated in in-depth, semi-structured interviews. These interviews were audio-recorded with participant consent and transcribed verbatim. Transcripts, recordings, and participant details were coded for confidentiality. Thematic analysis was used to identify essential patterns in the data and make sense of them.

Results: HCWs' perspectives on disaster planning underscored the importance of comprehensive planning, business continuity, proactive approaches emphasizing anticipation and risk mitigation, and implementation of established plans through training, resource management, and operational readiness. HCWs' participation in planning ranged from high engagement through collaboration and continuous improvement to moderate or lower levels focusing on regulatory compliance and resource allocation.

Conclusions: This study highlights HCWs' views regarding disaster planning and preparedness for building resilient health care systems. HCWs emphasised comprehensive planning and proactive preparedness, aligning with global priorities for disaster risk reduction. They stress the importance of education, training, operational readiness, and continuous improvement. This study underlines the vital role of HCWs' participation in disaster planning and the need for comprehensive training initiatives.

Emergencies, including small-scale incidents and large-scale disasters, impact health care systems.[1] Managing disasters involves complex responsibilities, including planning, organising, synchronising, implementing, controlling, installing, operating, disseminating information, alerting, and supervising.[2] Managing disasters from a health services perspective aims to ensure that health services can operate at a nearly average capacity while absorbing the surge in patient presentations.[3,4] Health facilities and hospitals need comprehensive emergency management plans, including protocols for managing large numbers of victims and coordinating relief efforts with stakeholders.[5]

Ensuring that organizations are prepared and capable of handling any disaster is essential. Because hospitals are considered safe havens for the sick or injured, the significance of being adequately prepared cannot be overstated.[6] Health care workers (HCWs) often find themselves undertaking unfamiliar tasks in stressful environments during emergencies, necessitating a deeper understanding of disaster response protocols.[7,8] Hospitals may have established preparedness measures, but HCWs may require additional training and confidence to respond effectively to disasters.[9]

There is consensus about the need to enhance HCWs' awareness, education, and training regarding disaster-related plans.[8,10,11] Several emergency planning and training programs exist to equip HCWs with the necessary skills to distinguish between routine and emergency responsibilities and adhere to hospital emergency response plans.[12] A comprehensive and collaborative approach to hospital disaster planning is essential.[13,14] Such an approach would require the systematic involvement of HCWs from various disciplines to assess potential risks and establish robust, integrated disaster preparedness plans.[15,16] Moreover, there is a need to reinforce HCWs' familiarity with accessing critical resources during disaster situations.[17]

Understanding HCWs' perceptions of disaster preparedness is essential for devising effective operational strategies, such as tailored training and exercises, to enhance response capabilities. In

addition, the extent of HCWs' preparedness and engagement during unprecedented disasters needs to be evaluated.[7,9] This study aimed to address these knowledge gaps through the following research questions:

1) How do HCWs define disaster planning and preparedness within the context of hospital disaster resilience?
2) What are the levels of engagement among HCWs in the hospital disaster planning process?

Methods

Design

This study employed an exploratory qualitative approach, incorporating in-depth, semi-structured interviews. The interviews were structured to facilitate participants' reflections on their experiences concerning climate change impacts and disasters.[18,19] Participants' perspectives on factors influencing their involvement in disaster planning and preparedness were solicited.

Settings

Two hospitals were chosen for this study, one situated in the City of Gold Coast and the other in Brisbane, both densely populated cities of Southeast Queensland, Australia. This selection aimed to ensure exposure to similar challenges, opportunities, hierarchical structures, political management regimes, and adherence to identical policies. Both hospitals offer public health care services, research, surgical and trauma care, general and specialist medicine, maternity and emergency services, intensive care, outpatient care, and health education, among other things. Each hospital has over 50 000 patients annually and employs over 8000 staff members. For confidentiality purposes throughout this study, the hospitals are referred to as (H1) and (H2).

Population and sample

The research team collaborated with hospital advisors from (H1) and (H2) to discuss participant recruitment and ensure the study's questions and logistics were appropriate for HCWs. The advisor of (H2) served as the disaster and emergency management coordinator, while the advisor of (H1) was a nursing executive. Their roles included acting as the primary liaison between the research team and their respective hospitals. Participants from H1 and H2 are designated as H1.1 to H1.6 and H2.1 to H2.7, respectively.

The sampling focused on services and departments approved by hospital management that had relevant exposure to answer the research question. Individual participants were selected in consultation with hospital advisors. The inclusion criteria were (i) hospital staff, (ii) over 18 years of age, (iii) with experience in disaster and climate change. Key health care worker profiles included managers, doctors, nurses, and auxiliary staff from relevant departments.

A pool of 20 potential candidates were identified by the hospital advisors, and this sample size was chosen to ensure meaningful data collection, with interviews conducted until data saturation was reached.[20]

Data collection

Two researchers conducted each of the confidential interviews (June 2021 and April 2022), with the first author leading and a co-author observing. Each interview lasted between 45 and 60 minutes and was audio-recorded with participants' consent. The first author transcribed the recordings verbatim using Microsoft Word and saved them in a format compatible with NVivo software for analysis. Participant details, transcripts, and recordings were coded with participant numbers to maintain confidentiality and were accessible only to researchers named in the approved ethics application.

Data analysis

Braun and Clarke's framework[21] guided the thematic analysis of interview transcripts, which used NVivo (Version 12) software.[21] This approach facilitated a thorough and nuanced examination of the data and transparency and consistency in the coding process. The audit trail produced by NVivo, which tracked code creation, renaming, and theme identification, strengthened the validity and trustworthiness of the analysis.[22] Discussions within the research team minimised biased reporting and identified information gaps. Recruitment of participants ceased when no new themes emerged, and identified themes were organized into content domains using a matrix to identify patterns and connections. The final analysis was reviewed by researchers who were not involved in the initial coding process to enhance reliability.

Several methodological strategies were employed to ensure the credibility and trustworthiness of data analysis. Team discussions and iterative coding were utilised to refine codes and themes collaboratively, reducing bias and identifying information gaps.[22] Transparency was maintained by creating an audit trail that documented code development, enhanced consistency, and mitigated personal bias.[23]

Data saturation was reached when no new themes emerged, and themes were organized into content domains to identify patterns.[20] Multiple coders participated to improve inter-rater reliability, while diverse perspectives within the research team and reflexivity helped minimize information processing errors.[24,25]

Ethical consideration

The study was designed and undertaken following the principles of the Declaration of Helsinki. It was granted Ethics approval to conduct interviews with HCWs from (H1) and (H2) in Southeast Queensland by Griffith University Human Research Ethics Committee (Ref No: 2020/542- 09/09/2020), as well as from the hospital sector's Human Research Ethics Committee (Ref. No.: HREC/2020/QGC/66944- 10/07/2020, SSA reference number: SSA/2020/QGC/66944- 06/01/2021). Informed consent was obtained from all participants involved in the study.

Results

Thirteen of the 21 invited HCWs were available and consented to be interviewed. All participants were adults aged 18 or older, comprised of 10 females and 3 males.

Disaster Types, Participants' Roles, and Responsibilities

Participants shared diverse experiences related to various types of disasters with the interviewers. Table 1 shows participants' diverse experiences related to various types of disasters during the interviews. Some interviewees mentioned multiple disasters, so we asked them to focus on 1 or 2 for the rest of the interview. This helped clarify the focus of each interview, which was usually centered on 1 or 2 specific disasters they had encountered.

Additionally, the table provides insights into the roles and duties of the participants. A generic role-based identification method was

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Table 1. Participants' roles and responsibilities and types of disasters*

Consideration	H1.1	H1.2	H1.3	H1.4	H1.5	H1.6	H2.1	H2.2	H2.3	H2.4	H2.5	H2.6	H2.7
Disaster /incident type													
COVID–19		X	X	X	X			X	X		X		X
Fires/bushfires							X			X			
Floods	X	X	X		X	X							
An incident												X	
Roles													
Management	X			X	X	X	X	X	X		X	X	X
Consultancy/advisory		X								X			
Practitioners	X	X	X		X	X			X				
Responsibilities													
Clinical services: (medical, nursing, surgical perioperative, infection management)	X	X	X		X				X				
Executive & organizational capability				X							X		
Human resources								X					
Incident management						X							
Operational support services:							X			X		X	
Work health and safety								X					X

*H1 Hospital 1; H2 Hospital 2. Participants from H1 and H2 were designated as H1.1 to H1.6 and H2.1 to H2.7, respectively.

employed to categorize participants into Management, Consultancy/Advisory, and Practitioner roles based on how they described their roles and in line with ethical research standards and ensuring participant confidentiality. This approach acknowledged the possibility of individuals holding multiple roles concurrently, such as both nurse and manager. Emphasis was placed on delineating their responsibilities within Clinical Services (Medical, Nursing, Surgical Perioperative, and Infection Management), Executive and organizational Capability, Human Resources, Incident Management, Operational Support Services, and Work Health and Safety.

Thematic analysis

An inductive thematic analysis was conducted on the interview transcripts to explore health care workers' (HCWs) perspectives on "Disaster Planning" and "Disaster Preparedness." A systematic coding process identified themes directly from the data without a pre-existing framework. As patterns emerged, disaster planning was characterised by comprehensive, multi-level planning, emphasising business continuity, risk assessment, and a proactive approach to risk mitigation. Similarly, the theme of disaster preparedness arose, focusing on implementing plans, training, resource management, operational readiness, and risk assessments. Additionally, the theme of HCWs' Engagement in Disaster Planning emerged, capturing varying degrees of involvement, ranging from high to low, with different focuses on collaboration, compliance, and resource coordination. These themes were derived iteratively, with the continuous refinement of codes to ensure they accurately represented the data analysis.

Defining "Disaster Planning" and "Disaster Preparedness"

The interview transcripts were analysed to explore responses to the question regarding the terms "Disaster Planning" and "Disaster Preparedness," as presented in Table 2. This analysis provided nuanced perspectives of HCWs regarding this significant aspect of hospital planning.

Participants described disaster planning as producing comprehensive, multi-level, detailed plans based on risk assessment. Participants also described it in the context of "business continuity" and as a proactive approach, emphasising anticipation and risk mitigation. Through the steps of thematic analysis, researchers delved into the intricate perspectives of HCWs, revealing comprehensive disaster planning as a pivotal foundation of hospital preparedness. In line with this, participants described disaster preparedness as "executing plans and procedures established beforehand." Moreover, participants highlighted the importance of "education," "training," and "resource management" in disaster preparedness efforts. Participants focused on operational readiness and the ability to enact plans in response to emergencies. Additional recurring points of emphasis included the importance of conducting "risk assessments," "running mock incidents," and having oversight committees to prepare for potential disasters. Interestingly, 1 participant felt it was important to distinguish between disaster planning and preparedness. Refer to Table 2 for further details.

HCWs' Engagement in disaster planning

The interview transcripts were analysed to explore the significance of HCWs' active involvement in the planning process. A thematic category labelled "HCWs' Disaster Planning Engagement" emerged through this. Captured within this theme were expressions of participants being highly engaged in disaster planning, characterised by collaborative efforts, a sense of ownership, continuous improvement, and consultation with various stakeholders at different levels. Participants described a moderate level of engagement, which incorporated risk assessment methodologies and national guidelines, with varying degrees of direct staff participation.

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Table 2. Participants' definitions for hospital disaster planning and preparedness*

Term	Theme	Description	Examples of Quotes
Disaster planning	Comprehensive plans	Emphasis on multi-level, detailed planning.	H1.1, H1.5, H2.4, H2.5 • *"Is done at multiple different levels. So we've got statewide we've got district wide we've got hospital. We even have unit-wide disaster management plans. And that can be anything from fires in the hospital to floods."* (H1.1) • *"Most of our planning goes into having all of our protocols in place and Staff training and this is what we're going to do if something happens and it's at a strategic level as well as a hospital level".* (H1.5) • *"Is basically preparing for an incident that can cause major damage to infrastructure services or just making sure you get different things set together."* (H2.4) • *"Setting down a set of steps we would take."* (H2.5)
	Business continuity	Emphasising risk assessment	H2.1, H2.7 • *"Is making sure we have all those business continuity plans those backup plans in, in the event of multiple disasters, different scenario types of disasters as well… planning is making sure we have the documents available so a clear documented well-engaged stakeholder plan about what would happen in the event of a particular disaster or scenario." (H2.1)* • *"Is Business Continuity Management, and whether there's a strong business continuity plan in place, …, I automatically think about what risk assessments have been undertaken, which is part of the business continuity process obviously around… having things in place for when disasters, should arise."* (H2.7)
	Proactive approach	Highlighting anticipation and risk mitigation.	H1.2, H1.4, H1.6, H2.2, H2.3, • "*Just getting prepared for anything that could be coming in a disaster.*"(H1.2) • "*In the hospital context, is …describing what the arrangements are for the response.*" (H1.4) • *"Is about potentially scanning the environment, to look for any potential issues or hazards and what would be the worst case scenario, and what you do in disaster planning is you actually plan for how to … soften the blow and you know your alternatives to respond."* (H2.2) • *"Is scanning the environment, and looking for the disasters that may happen, and then to put plans in place to be able to mitigate any risks that we have in those disasters, and to operationalise any issue as that we find in a disaster."* (H2.3) • *"A hospital environment disaster planning is about … resource evaluation and education and determining the capabilities that you have for your resources, both human and infrastructure, and other supplies and materials that you would use for an emergency response.*" (H1.6)
Disaster Preparedness	Preparedness as implementation	Viewed as executing pre-established plans and procedures.	H1.1, H1.3, H1.4, H1.5 • "*It's what constitutes the preparedness is what have we put in place."*(H1.1). • "*I think it's just responding to the overarching planning and tying it into an actionable …outcome.*"(H 1.3). • *"Making sure that we have clear information, actions, and standards for operating procedures all in place prior to any disasters that we are prepared for.*" (H1.4) • *"Our response to that planning documentation."*(H1.5).
	Training and resource management	Importance of education, training, and resource management.	H1.2, H1.6, H2.1, H2.4 • "*It's just looking at our capabilities anticipating and responding to this, looking at how we should at least having a look at what we need to do to plan for preparedness, looking at this thing we're looking at as our staff preparedness, so how they are prepared for a disaster."* (H1.2). • *"Taking specific steps to educate, train, and or manage the resources that you have available in order to respond to very specific types of disasters.*" (H1.6). • *"Is more making sure you're in a position to implement those plans."* (H2.1) • *"It's pretty self-explanatory. It's making sure you've got business continuity plans in place, you've got your training in place for your staff so that they know what they've got to do depending on the different types of emergencies they've gone through."*(H2.4)

(*Continued*)

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Table 2. (*Continued*)

Term	Theme	Description	Examples of Quotes
	Operational readiness	Focus on operational readiness and ability to enact plans.	H2.2, H2.3 • *"Is about having all your doctrine, all your systems."* (H2.2) • *"The difference to me is that planning is much more than strategic view and looking at… disaster preparedness is much more having the operational planning in place to be ready to enact disaster plans."* (H2.3)
	Risk assessment and mock incidents	Emphasis on conducting risk assessments and running mock incidents.	H2.5, H2.7 • *"Running mock incidents or mock crisis or making sure that we have a committee that has oversight of what the steps would be once we… had a disaster which happened…being prepared for it for when the disaster happened and we'd have to enact the plan."*(H2.5) • *"You would look at all of the relevant disasters that are likely to occur at the hospital, health service … I would assume that we look at the relevant area that the sights are placed on and looked at what disasters potentially could occur in those areas."* (H2.7)
Both	Planning as preparedness	Emphasis on interacting through urgency, rapidness, and loss	• *"Disaster Preparedness or disaster planning is any interactions that we have to scale up or fine-tune or pivot out normal business as usual functions and activities, either through volume or sense of urgency, a sense of rapidness, or more specifically where we have a loss of service or a loss of function or loss of activity."* (H2.6)

*H1 Hospital 1; H2 Hospital 2. Participants from H1 and H2 were designated as H1.1 to H1.6 and H2.1 to H2.7, respectively.

Furthermore, other participants showed a lower level of engagement, emphasizing regulatory compliance, coordination among teams, and resource allocation, with less emphasis on direct staff involvement in the planning phase. Please refer to Table 3 for further details.

Discussion

This discussion addresses the research queries regarding HCWs' perspectives on disaster planning and preparedness within hospital disaster resilience. Specifically, it delves into how HCWs define these concepts and examines the levels of engagement among them in the hospital disaster planning process.

Appreciation of Terminology

Eleven of 13 participants characterized disaster planning in a way that closely aligns with the literature's definition of planning. For instance, "comprehensive plans" emphasize multi-level, detailed planning and align with how the literature defines it. Planning involves a series of tasks to achieve specific objectives, including goal setting, determining how to achieve them, designing an optimal future state, and identifying the methods and means to reach it.[26]

The comprehensive planning approach advocated by HCW participants aligns with the need for detailed, multi-level strategies to prepare hospitals for diverse disaster scenarios.[13] HCWs' proactive stance resonates with Priority 1 of the Sendai Framework for Disaster Risk Reduction (SFDDR), emphasizing the importance of understanding various dimensions of disaster risk, including vulnerability, capacity, exposure, hazard characteristics, and the environment. Utilizing this understanding is crucial for effective pre-disaster risk assessment, prevention, mitigation, and the development of appropriate preparedness measures and response strategies.[27]

The comprehensive planning aligned with the Queensland Emergency Risk Management Framework Risk Assessment Process Handbook, covering Local, District, and State Disaster Management Plans; Business Continuity Planning; Functional Plans; and Hazard-Specific Plans.[28] These plans address hazard actions across all phases of disaster management, while business and operational continuity planning within the health system ensures readiness for potential disruptions.[29]

Business continuity is a holistic management process that offers a comprehensive framework for effective response. Business continuity plans aim to mitigate events' impact on a firm's capacity to fulfil customer requirements.[30] Both "comprehensive plan" and "business continuity" align with planning in Queensland that occurs at various levels, guided by the Disaster Management Act 2003, the Standard for Disaster Management, and the Queensland Prevention, Preparedness, Response, and Recovery (PPRR) Disaster Management Guideline.[31,32]

The results regarding HCWs' perspectives on disaster preparedness reveal various facets that align with established literature. HCWs perceive preparedness as implementing pre-established plans and procedures. This resonates with the World Health Organization's (WHO) definition of preparedness as actions taken in advance to anticipate, respond to, and recover from hazardous events.[33] This underscores the importance of comprehensive preparedness plans for effective responses to potentially hazardous events.[34] Preparedness is "the knowledge and capacities developed by governments, response and recovery organisations, communities, and individuals to effectively anticipate, respond to, and recover from the impacts of likely, imminent, or current disasters."[34] The proactive approach highlights anticipation and risk mitigation. Mitigation involves reducing or limiting the adverse impacts of hazards and related disasters.[35]

HCWs' engagement and participation in disaster planning

The current study emphasises the vital role of active participation and sufficiency in disaster planning engagement, aligning with the

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Table 3. Participants' engagement in disaster planning*

Engagement	Theme	Description	Examples of Quotes
Active involvement in the planning process, varying degrees of engagement.	High level of engagement	High: collaborative efforts, sense of ownership, continuous improvement	• *"Each plan within our broader Disaster Management Plan has an accountability or an owner…owned by myself."* (H2.6). • "*We stood up a committee…continually tweaked throughout the period.*" (H2.5). • "*I always tell the guys at the end of the day, it's everybody's responsibility. We can put all the plans in place, but unless you guys are happy to run with them or you think of a better way to do it. Come on, let us know and keep the communication happening, and it's the way that we improve our plans*" (H2.4). • "*Those plans are usually developed and it's a collaborative approach… there's a lot of collaboration and planning that goes into making those types of plans*" (H1.6). • "*Hospital says this is how we're going to respond to it…involves consultation across all areas*" (H1.5). • "*They are developed usually by the disaster and emergency manager…Key stakeholders within that would be at the sort of strategic and operational level.*" (H1.4). • "*The plans are really developing multidisciplinary like multi-day sort of working groups.*" (H2.3).
	Moderate level of engagement	risk assessment methodologies, national guidelines	• "*The plans are developed as a result of the risk assessment… controls are then transferred onto a plan*" (H 2.7). • "*Basically using national guidelines recommendation…felt comfortable that we had a decent process in place*" (H1.3). • "*They would have been there because the plans always get developed every couple of years…always updated*" (H 1.2).
	Lower level of engagement	regulatory compliance, coordination, resource allocation	• "*So to put things in perspective, from a work health and safety side of the business, the regulator actually put out what they had an expectation*" (H 2.2). • "*We've got a dedicated disaster management coordination team… They benchmark…the content experts in that field in that area*"(H 2.1). • "*There are disaster guidelines…knowing what we can provide*" (H 1.1).

*H1 Hospital 1; H2 Hospital 2. Participants from H1 and H2 were designated as H1.1 to H1.6 and H2.1 to H2.7, respectively.

authors' previous research on challenges in disaster preparedness awareness.[7,8,10,11] This approach involves assessing the effectiveness of existing and alternative coping capacities in probable risk scenarios, fostering a culture of continuous learning and improvement.[34] The moderate and low engagement observed among 6 of 13 participants underscores the critical need for education, training, and resource management in disaster preparedness efforts. This aligns with the World Health Organization's (WHO) emphasis on knowledge and capacity development for effective disaster response.[33] Furthermore, participants' focus on operational readiness and the ability to enact plans in response to emergencies highlights the paramount importance of planning and capability integration, as articulated in Queensland's disaster management framework. The emphasis placed by HCWs on risk assessment, conducting mock incidents, and establishing oversight committees mirrors the WHO's recommendation that hazard monitoring and early warning systems are essential components of preparedness.[31,33] Disaster risk assessment is "a qualitative or quantitative approach to determine the nature and extent of disaster risk by analysing potential hazards and evaluating existing conditions of exposure and vulnerability that could harm people, property, services, livelihoods, and the environment on which they depend," further underscoring the comprehensive approach necessary for effective disaster preparedness.[34]

These findings highlight the significance of continuous learning and improvement, as supported by global health organizations advocating for Interprofessional Education (IPE) to enhance health care systems. This echoes earlier calls for innovative training methods, such as visualizations and simulations.[36,37] Furthermore, the findings align with Queensland's proactive regulatory and training initiatives, as evidenced by the QLD Disaster Management Training Framework, which covers various aspects of disaster management. This framework, supported by Queensland's Disaster Management Act 2003, underscores the necessity for comprehensive training.[32,38]

Limitations of the Study

Given the focus on disaster resilience, there was a concern that the researchers might encounter political or institutional sensitivities related to classified information, public awareness campaigns, and past events. To mitigate this risk, the researchers addressed political and institutional sensitivities in discussions with project advisors before each round of interviews. Additionally, limitations included the non-generalizability of in-depth interviews, their time-consuming nature, the need for a prolonged verification process, and challenges in providing contextual information.

Conclusion

The study found that health care workers (HCWs) emphasized their need for pre-established plans, education, training, resource management, operational readiness, and risk assessment for

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disaster preparedness. Their focus on comprehensive, multi-level planning aligns with global priorities on disaster risk reduction. HCWs also stressed the importance of continuous learning, which supports global health organizations' calls for Interprofessional Education (IPE) to strengthen health care systems.

The findings highlight the importance of active engagement and training in disaster planning, aligning with proactive initiatives such as those in Queensland. Recommendations include improving training methods and developing detailed preparedness strategies for hospitals.

Supplementary material. The supplementary material for this article can be found at http://doi.org/10.1017/dmp.2025.3.

Data availability statement. The data supporting the results are interview transcripts, which can be made available upon written request of the corresponding author.

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