

Evidence of Disaster Planning by Home Care Providers

Subjects: **Health Care Sciences & Services**

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The increasing risk of disasters worldwide poses challenges both to health care infrastructures and to home care providers, who must maintain decentralised services for those in need of long-term care for as long as possible, even under adverse circumstances. However, both the kind of organisational precautions that home care providers consider in preparation for disasters and the available evidence on the effectiveness of these precautions remain largely unclear.

home care providers

disaster preparedness

disaster planning

1. Introduction

Both the risk of various kinds of disasters and the multifaceted consequences of these events are expected to increase around the world in the coming years ^[1]. Despite having long been spared from such developments, Europe—and especially Germany—is now also increasingly affected by these risks due, for example, to progressing climate change, the unsustainable use of natural resources, degrading ecosystems, pandemics, and epidemics ^[2]. In 2015, the United Nations addressed this global challenge by adopting the Sendai Framework for Disaster Risk Reduction 2015–2030, which is an international agreement aimed at significantly reducing both damage to critical infrastructure and the disruption of essential services ^[3]. The framework aims to reach this goal via improved disaster management both in and between all sectors as well as via activities that are targeted at disaster preparedness at the national, local, and organisational levels. In order to implement the Sendai Framework, a German strategy for strengthening resilience to disasters was developed and published in 2022 ^[4].

One essential component of this German resilience strategy is to better prepare critical health care infrastructures. Although attention in this context is often directed towards acute and emergency care and hospitals, home care should not be forgotten. In 2016, 20% of households in the European Union with individuals who required assistance used some sort of professional home care service ^[5]. Demand for home care can be assumed to further increase in the future in connection with demographic, epidemiological, and societal developments, as well as via the encouragement of health and social policy initiatives ^[6]. The ongoing shift of patient groups and forms of treatment (e.g., mechanical ventilation, haemodialysis, palliative care) from the inpatient sector to patients' homes is also contributing to the growing importance of home care ^{[7][8][9]}. Independent of the vast differences in provision structures as well as the role of skilled professionals and regulatory mechanisms ^[10], home care is an indispensable part of the health and social care systems in many countries. It is therefore critical to better prepare this vital infrastructure for future disasters.

As members of community-based organisations, home care providers play a central role in identifying hazards, developing preparedness plans, responding to disasters, disseminating information, and identifying vulnerable individuals [11]. People in need of home care—and especially those who are immobile, disoriented, severely ill, or technology-dependent—are exposed to special risks during disasters that include large-scale power outages, floods, storms, and epidemics. The vulnerability of this population has been demonstrated in previous disasters and studies. For example, deficits in preparedness, disruption of services in the event of a disaster, or reduced ability and preparedness to evacuate from their homes can lead to serious negative health impacts for people who rely on home care [7][8][12]. In order to ensure the safety of these vulnerable individuals and to maintain their decentralised care for as long as possible, even under adverse circumstances, home care providers and their staff need to be organisationally prepared and ready for action at all times [9][13]. Indeed, they must be able to work closely with other health care providers as well as with emergency services and disaster response teams in the event of an incident, and they must be prepared to initiate any necessary evacuation. In the United States (henceforth, USA), a regulation was established in 2016 that includes national disaster requirements for Medicare- and Medicaid-participating providers in order to ensure adequate planning for disasters and to coordinate with emergency preparedness agencies [14]. However, it remains largely unclear what organisational arrangements home care providers have made or will make to prepare for disasters.

2. Thematic Analysis

The thematic analysis inductively identified three overarching areas of organisational disaster planning by home care providers: (1) internal operational arrangements, (2) information and networking activities, and (3) measures for safeguarding patient care. These three areas are presented here in condensed form.

2.1. Internal Operational Arrangements

Based on the studies considered here, home care providers' internal operational arrangements for disaster planning were assigned to three subcategories, as shown in **Table 1**.

Table 1. Internal operational arrangements.

Study	Organisational Disaster Plans	Staff Disaster Arrangements	In-house Disaster Training
ASPR TRACIE (2019) [15]	✓		✓
Balinsky (2003) [16]; Balinsky & Sturman (2006) [17]; Balinsky & Sturman (2006) [18]	✓	✓	✓
Daugherty et al. (2012) [19]	✓		✓
Kirkpatrick & Bryan (2007) [20]	✓		✓

Study	Organisational Disaster Plans	Staff Disaster Arrangements	In-house Disaster Training
Laditka et al. (2008) [21]	✓	✓	
Wyte-Lake et al. (2017) [22]	✓		✓
Wyte-Lake et al. (2019) [23]			
Wyte-Lake et al. (2020) [24] ; Wyte-Lake et al. (2020) [25]	✓		
Zane & Biddinger (2011) [26]			

Disaster plans were mentioned relatively often as an organisational measure that home care providers use to prepare for disasters [\[15\]\[16\]\[17\]\[18\]\[19\]\[20\]\[21\]\[22\]\[24\]\[25\]\[26\]](#). These plans covered, for example, an incident command system as well as other communication plans, a hazard vulnerability analysis, employee protection, an integrated business continuity plan, processes for safeguarding client records, material resources, agreements with partners, and other procedures for patient tracking. Information on whether these plans were regularly reviewed, tested in exercises, or even adapted after specific disasters was rare. The plans presented differed between the included articles and the agencies interviewed in them. For example, some of the agencies reported that their plans essentially consisted of maintaining a list of all patients and their caregivers with emergency contact information [\[20\]](#). Another article presented a toolkit for creating a plan that takes an all-hazards approach and addresses the factors that home care providers need to be prepared for [\[22\]](#).

- *Staff disaster arrangements*

Less frequently, home care providers mentioned measures for supporting the willingness and readiness of employees to work even under adverse circumstances and in times of disaster [\[16\]\[17\]\[18\]\[21\]](#). Such measures included, for example, the provision of individual disaster plans for staff members, securing child or adult care arrangements, keeping emergency supplies or emergency “go-kits” in employees’ homes, and having a pre-arranged meeting point for employees in the event of an emergency (e.g., a blackout or communication failure). In one study, a respondent reported that personal back up emergency plans are in place for staff relatives to ensure continuity of services for all patients [\[16\]\[17\]\[18\]](#).

- *In-house disaster training*

Internal disaster training for the staff of home care providers ranged from no or minimal training to routine and comprehensive training that was offered either as initial training upon hire, as annual refresher courses, or as targeted training for different staff depending on their role in the agency or in the disaster plan [\[15\]\[16\]\[17\]\[18\]\[19\]\[20\]\[22\]](#). Themes and didactic approaches were diverse and comprised, for example, online systems or platforms for delivering learning modules, staff meetings, “lunch and learns”, local disaster planning meetings for discussing certain topics, simulations, tabletop drills, and annual mock drills with home care staff for testing policy protocols.

One agency surveyed found that conducting mock drills regularly each year resulted in a more orderly response (e.g., staff were more prepared, patients were better able to adapt) [\[20\]](#).

2.2. Information and Networking Activities

This category included any activities that the home care providers in the included studies mentioned for communicating disaster-related information in preparation for—as well as for communication during and after—a disaster affecting their staff (internal), the users of their home care services, and other providers (external), as well as for networking with other organisations or providers in their region (see **Table 2**).

Table 2. Information and networking activities.

Study	Information Procedures			Networking
	Internal	For Home Care Users	External	
ASPR TRACIE (2019) [15]	✓	✓	✓	✓
Balinsky (2003) [16] ; Balinsky & Sturman (2006) [17] ; Balinsky & Sturman (2006) [18]	✓	✓	✓	✓
Daugherty et al. (2012) [19]		✓		✓
Kirkpatrick & Bryan (2007) [20]	✓	✓	✓	✓
Laditka et al. (2008) [21]	✓	✓		✓
Wyte-Lake et al. (2017) [22]				✓
Wyte-Lake et al. (2019) [23]		✓	✓	
Wyte-Lake et al. (2020) [24] ; Wyte-Lake et al. (2020) [25]	✓	✓		✓
Zane & Biddinger (2011) [26]		✓	✓	

- *Disseminating information to staff (internally)*

Electronic communication tools such as the telephone, text messaging, and email were often mentioned as a means of spreading disaster-related information. Some providers used secure text messaging systems, software, or mobile apps, while others relied on manual telephone chains or call trees. Sometimes, backup strategies for employee accessibility during communication outages were mentioned, such as an 800-Hz-radio battery-operated walkie-talkie system, web-based scheduling, two-way digital radio communication devices, or a contract with local ham radio operators [\[15\]\[16\]\[17\]\[18\]\[20\]\[21\]\[24\]\[25\]](#).

- *Disseminating information to home care users*

Identifying emergency contact information and informing patients and caregivers about disaster preparedness can be part of the patient admission process and may be reviewed regularly. Some providers communicated with patients via telephone after an incident in order to ensure the patients' safety, to see if the patients needed anything, or to check whether a family member was available to help them [15][16][17][18][19][20][21][23][24][25][26]. An alternative mode of communication was "knocking on doors" to assess patients' status in case of a communication disruption [16][17][18].

- Disseminating information to others (externally)

Emergency notifications from a local or state emergency management or public safety agency, as well as health alerts from a local or state health department, were mentioned by some home care providers as important sources of external information. Other providers faxed or forwarded patient lists containing information such as medical risk, supply reserves, transportation needs, contact information, and special needs to local emergency responder agencies [15][16][17][18][20][23][26]. A study reports on the New York State Health Provider Network (HPN), a web-based system for exchanging information quickly and efficiently. It includes a communications directory with contact information and a health alert network. The HPN coordinator is an individual who has a designated role in each agency and serves as the primary point of contact [16][17][18].

- Networking

Networking initiatives by home care providers can be directed to the local government, law enforcement, public health departments, emergency management agencies, the Red Cross, the EMS, the local fire department, the transportation industry, nursing homes, or hospitals. Informal agreements that specify roles or provide support with emergency responders, supply companies, or other home care providers were also mentioned, as was informal advice from local authorities, for example, on disseminating literature on preparedness, setting up a website, or organising awareness-raising events [15][16][17][18][19][20][21][22][24][25]. One article noted that agency cooperation and collaboration with local, regional, or state preparedness partners varied (from active participation to the inability to find partners). However, many agencies interviewed indicated that this collaboration is challenging [15].

2.3. Measures for Safeguarding Patient Care

This category summarises the organisational disaster planning measures of home care providers that were designed to ensure patient care in the event of a disaster (see **Table 3**).

Table 3. Measures for safeguarding patient care.

Study	Personal Patient Disaster Plan	Disaster Education	Triage/Patient Classification	Evacuation
ASPR TRACIE (2019) [15]	✓	✓	✓	✓
Balinsky (2003) [16]; Balinsky & Sturman (2006) [17]; Balinsky &			✓	

Study	Personal Disaster Plan	Patient Disaster Plan	Disaster Education	Triage/Patient Classification	Evacuation
Sturman (2006) [18]					
Daugherty et al. (2012) [19]			✓	✓	✓
Kirkpatrick & Bryan (2007) [20]			✓		✓
Laditka et al. (2008) [21]	✓		✓	✓	✓
Wyte-Lake et al. (2017) [22]					
Wyte-Lake et al. (2019) [23]	✓		✓	✓	✓
Wyte-Lake et al. (2020) [24] ; Wyte-Lake et al. (2020) [25]	✓		✓	✓	✓
Zane & Biddinger (2011) [26]				✓	✓

In order to develop individual disaster plans [\[15\]\[21\]\[23\]\[24\]\[25\]](#) with which patients could ensure their own care, one measure that was mentioned in some of the studies considered here involved reviewing these plans regularly and adjusting them after a disaster [\[15\]\[24\]\[25\]](#).

- *Disaster education*

Disaster education for patients and relatives was also mentioned as a preparatory measure that was mostly conducted during patient admission. However, wide variation was found in terms of the scope of the training and the covered topics (e.g., discussions of the emergency plan, emergency contact information, emergency shelter information, evacuation procedures, patient responsibilities, emergency kits, medical equipment, and patient safety) [\[15\]\[19\]\[20\]\[21\]\[23\]\[24\]\[25\]](#). Occasionally, leaflets and written instructions were simply handed out [\[20\]\[21\]](#). A study presented and evaluated a checklist-like assessment tool to help providers assess and train their patients' disaster preparedness [\[22\]](#).

- *Triage/patient classification*

Classifying patients into risk-category groups in order to prioritise care during disasters was another way that home care providers prepared for an incident. Two-, three-, four-, or five-level categorisation systems were applied based on selected characteristics, which included the time frame in which each patient needed to be seen, the patient's medical needs, and the support available to the patient [\[15\]\[16\]\[17\]\[18\]\[19\]\[21\]\[23\]\[24\]\[25\]\[26\]](#). In some cases, providers reported continually updating their rankings, especially in preparation for predicted events [\[15\]\[26\]](#). Based on the experiences of the interviewed agencies with their systems, the authors of one selected article developed a standardised classification system [\[26\]](#).

- *Evacuation preparedness*

Some home care providers prepared an evacuation plan upon patient admission, assisted their patients in registering for emergency transport and shelter, and educated them about the evacuation procedure [15][19][20][21][23][24][25][26]. Other providers relied on Emergency Medical Service (EMS) for patient evacuation but were willing to provide medical and nursing care at the evacuation site or in special-needs shelters [19]. In some cases, home care providers tracked their patients after evacuation [15][24][25]. In one study, agencies had different degrees of involvement with special-need shelters (e.g., some were actively involved, others hardly at all) [20].

3. Quality Appraisal

The studies included referred to various measures related to disaster preparedness and the response of home care providers. All studies had a descriptive, exploratory character, and most (i.e., five studies) used qualitative methods. Moreover, the only quantitative study [22], as well as the studies with a quantitative research component (mixed methods), remained on a descriptive level. **Table 4** presents the methods and samples used in each study, along with the quality appraisal.

Table 4. Overview of the methods, samples, and quality appraisal of the included articles.

Authors (Year); Origin	Methods/Sample	Quality Appraisal (MMAT)
ASPR TRACIE (2019) [15]; USA	Mixed-methods design; quantitative: online survey of leaders of Medicare-certified home health and hospice agencies from 43 states (n = 245); qualitative: semi-structured in-depth telephone interviews (n = 25)	5/5 criteria met; self-selection bias
Balinsky (2003) [16]; Balinsky & Sturman (2006) [17]; Balinsky & Sturman (2006) [18]; USA	Follow-up survey with qualitative interviews; roundtable discussion; home care agencies (n = 8) in Lower Manhattan that were impacted by the 11 September attacks (follow-up: n = 6); roundtable discussion: the 8 home care agencies as well as representatives from government, academia, and other home care agencies (n = unknown)	0/5 criteria met; insufficient indication of data sampling, data collection detail, data analysis, and data consistence
Daugherty et al. (2012) [19]; USA	Qualitative; semi-structured interviews; administrators (n = 21) of home health and personal care agencies in Georgia and Southern California	5/5 criteria met; self-selection bias
Kirkpatrick & Bryan (2007) [20]; USA	Qualitative; case study approach; retrospective; in-depth interviews; the two top administrative staff of 5 selected home health agency facilities that operate in Orleans Parish (n = 10?)	2/5 criteria met; insufficient indication of study sampling, data collection detail, and analysis
Laditka et al. (2008) [21];	Qualitative; semi-structured interviews; state-level preparedness experts (n = 9), administrators of home health (n = 5), and in-	2/5 criteria met; insufficient indication of

Authors (Year); Origin	Methods/Sample	Quality Appraisal (MMAT)
USA	home personal care agencies (n = 16) in South Carolina	study sampling, data collection detail, and analysis
Wyte-Lake et al. (2017) ^[22] ; USA	Quantitative online survey; programme managers of Veterans Health Administration Home-Based Primary Care (VHA HBPC) programmes across the country (n = 77)	4/5 criteria met; insufficient indication of non-response analysis
Wyte-Lake et al. (2019) ^[23] ; USA	Mixed-methods design; quantitative: online survey of practitioners (n = 64) at 10 sites of (VHA HBPC) programmes in 8 states as a natural cohort from an existing study that used the tool and completed patient questionnaires (n = 754); follow-up survey with practitioners (n = 33) of 2 sites; qualitative: follow-up feedback interviews with programme manager (n = unknown)	5/5 criteria met; self-selection bias
Wyte-Lake et al. (2020) ^[24] ; (Wyte-Lake et al. (2020) ^[25] ; USA	Qualitative (1); mixed-methods design (2); qualitative: semi-structured interviews; clinical staff (n = 34) with key functions of the 9 Veterinary Affairs (VA) HBPC from Texas, Florida, and Puerto Rico (1,2); quantitative: secondary data analysis; timeline of activities of the same 9 sites that use the VA's Corporate Data Warehouse (CDW) (2)	2/5 criteria met; insufficient indication of data collection detail, data analysis, and data consistency
Zane & Biddinger (2011) ^[26] ; USA	Qualitative; unstructured interviews; home health and hospice agencies (n = 21) and other community service providers (n = 4) from 6 states	2/5 criteria met; insufficient indication of data collection detail and data analysis

designs used by these studies appeared to be appropriate to answer the research questions; however, the methodological procedures—such as the measurements and statistical analyses—were not easily comprehensible due to a lack of transparency, and the internal and external validity were thus difficult to assess. Furthermore, in studies with a mixed-method design, any inconsistencies or correlations between the methodological approaches that may have occurred were hardly mentioned. In one study, quality could not be assessed. Even though the three articles appeared to have scientific merit and may have pointed to guiding recommendations for home care providers to promote their disaster preparedness, there was a lack of information about the methodological approaches.

None of the examined studies investigated the effectiveness of the described disaster preparedness activities. Three studies evaluated tools (e.g., a disaster preparedness toolkit, a patient assessment tool, and a patient classification tool), albeit in terms of utility rather than effectiveness ^{[22][23][26]}. Almost all studies considered here took a primarily explorative and descriptive approach, which has inherently methodological limitations when it comes to measuring effectiveness. The included studies displayed strong heterogeneity with respect to different characteristics (which affects external validity) and indicated multiple initiatives on multiple levels. For example, some studies focused on the overall disaster preparedness of home care agencies (e.g., Ref. ^[15]), while other studies concentrated on a specific topic, such as patient classification (e.g., Ref. ^[26]). In addition to the fact that all of the studies included here were conducted in the USA, with a few exceptions, their data collection was regionally limited ^{[15][22]}.

Individuals who reported information about the measures differed across studies in terms of their positions and affiliations with the surveyed home care providers (e.g., administrative staff, programme managers, practitioners, clinical staff, state-level preparedness experts). Similarly, differences existed between the health care settings and the types of providers included in the studies. For instance, while the respondents in some studies worked in home health and hospice agencies (e.g., Refs. [15][26], in other studies they worked in home-based primary care programmes [22][23]. Moreover, in some cases, personal care and home health care agencies were distinguished [19][20]. In addition to the lack of effectiveness evaluations, this high degree of heterogeneity impeded a comparison of measures across studies.

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