

# Exploring the Demands on Nurses Working in Health Care Facilities During a Large-Scale Natural Disaster: Often an Invisible Role Within a Highly Visible Event

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## Abstract

Nurses are pivotal to an effective societal response to a range of critical events, including disasters. This presents nurses with many significant and complex challenges that require them to function effectively under highly challenging and stressful circumstances and often for prolonged periods of time. The exponential growth in the number of disasters means that knowledge of disaster preparedness and how this knowledge can be implemented to facilitate the development of resilient and adaptive nurses and health care organizations represents an important adjunct to nurse education, policy development, and research considerations. Although this topic has and continues to attract attention in the literature, a lack of systematic understanding of the contingencies makes it difficult to clearly differentiate what is known and what gaps remain in this literature. Providing a sound footing for future research can be facilitated by first systematically reviewing the relevant literature. Focused themes were identified and analyzed using an ecological and interactive systems framework. Ten of the 12 retained studies included evacuation, revealing that evacuation is more likely to occur in an aged care facility than a hospital. The unpredictability of an event also highlighted organizational, functional, and competency issues in regard to the complexity of decision making and overall preparedness. The integrative review also identified that the unique roles, competencies, and demands on nurses working in hospitals and residential health care facilities during a natural disaster appear invisible within the highly visible event.

## Keywords

nursing, resilience, natural disaster, adaptive demands, ecological models, evacuation, health care facilities

## Background

No country is truly exempt from a disaster. History has already provided examples of what can happen to a community in the event of a large-scale natural disaster. Factors such as population growth and urban development are increasing the risk faced by populations worldwide. Climate change will increase the incidence, duration, and severity of hazards of meteorological origin. The risk of disaster and thus the human consequences is increasing. When disaster strikes, health care organizations, and particularly their nursing and medical staff, are a critical element in any disaster response. They provide an essential service to any community, and hospitals and emergency departments (EDs) are often the first place of call for people affected by any type of emergency. The nursing workforce makes up a large part of any health care facility and organization, and is expected to be able to adapt and function competently. In addition, nurses may have to adapt at a moment's notice to events that occur with little or no warning,

and they may be called upon to function effectively in challenging circumstances for periods of weeks or months and in contexts where their own community has been affected. The nature, extent, and speed of recovery in areas impacted by adverse events such as natural disasters is thus influenced by the adaptive capacity and resilience of nurses and the health care organizations they represent.

The aim of the integrative review was to provide an evidence-based approach and re-conceptualization of ideas and recommendations for natural disaster preparation, preparedness, and competencies for nurses using an ecological

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lens. Specifically, the review focused on primary research that reported on large-scale natural disasters that involved nurses working within residential health care facilities such as hospitals and nursing homes. It examined lessons learned in relation to roles, interrelationships, and activities; knowledge, skills, and competencies; and processes and procedures that may increase the potential for preparedness, adaptation, and resilience. By integrating and synthesizing the empirical literature of past natural disasters, it further clarifies what is already known, identifies gaps, and provides direction for future research in disaster management processes and preparedness for nurses.

Hazard events can be natural (e.g., the result of an ecological disruption such as cyclones, floods, pandemics, wildfires, earthquakes, and tornadoes) or man-made (e.g., acts of terrorism). The capacity to respond determines whether an adverse hazard event will be an emergency or develop into a disaster (Pan American Health Organization, 2008). One characteristic people, organizations, and societies have that influences whether a hazard event becomes a disaster is their intrinsic resilience (Paton & Johnston, 2006).

Resilience can be defined as an ability to be prepared and have the capacity to “spring back from” (United Nations International Strategy for Disaster Reduction [UNISDR], 2009) an adverse event, a disaster—natural or man-made. It is also defined as the ability to withstand, recover from, and thrive after a disaster (Smith, 2012). This concept has also been linked to the adaptive capacity of individuals (Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum, 2008). Adaptive capacity is described as the individual’s or the community’s ability to cope with, adapt to, and develop from the demands, challenges, and changes encountered during and after disaster (Paton & Johnston, 2006; Paton & Violanti, 2011; Smith, 2012). Paton and Johnston discuss how the complex nature of the disaster response context makes being able to adapt to dynamic, emergent issues over time as particularly important in disaster recovery context (Paton & Johnston, 2006).

Most health care facilities and staff are educated and prepared to deal with any type and size of emergency event or small-scale disaster, and although it may stretch resources, procedures and processes are generally in place to respond and address the situation (L. M. Brown, Hickling, & Frahm, 2010). A large-scale natural disaster, however, is a catastrophic event that is greater than any extraordinary emergency (L. M. Brown, Hickling, & Frahm, 2010; P. R. Brown et al., 2010), is often unforeseen, and will be affected by serious disruption to essential services such as electricity, water, and sanitation (Quarantelli, 1997). The facility itself may have to function in complete isolation or may have incurred structural damage, and staff and patients within may have been injured or killed (Priest & Bahl, 2008).

Consideration needs to be given to whether or not the same planning that has gone into emergency preparedness exists for what could be seen as an extraordinarily unlikely

event. How will nursing and health care personnel continue to deliver a health care service at an optimal level during and immediately after a large-scale natural disaster, especially if access to services and technology is compromised, and they have to deal with evolving demands over prolonged periods of time?

## Integrative Review

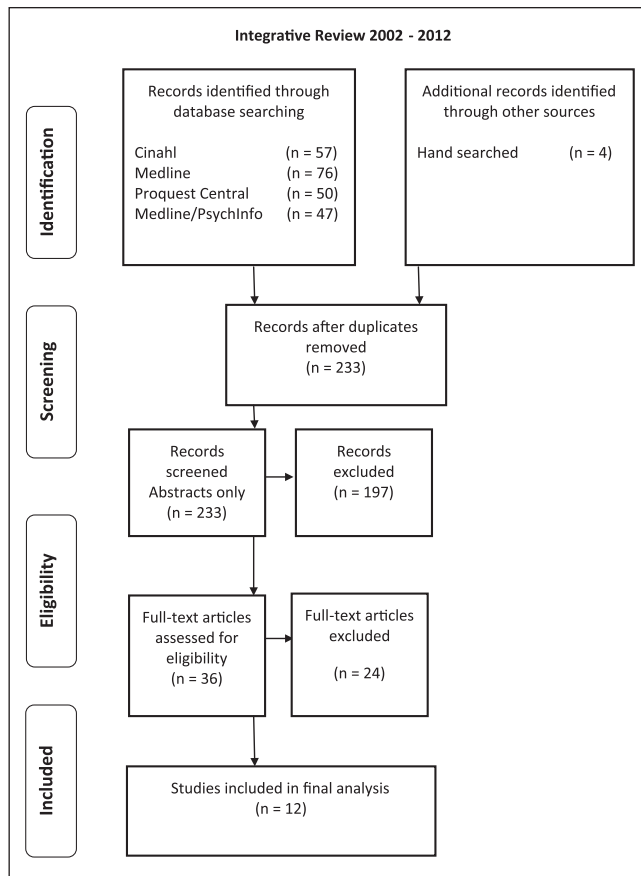
Integrative reviews may address either a mature or a new and emerging issue (Torraco, 2005). A mature, well-developed subject produces a plethora of literature with diverse opinion and research methodologies. Disaster management is both large and complex and continues to grow and contribute to the body of knowledge on preparedness recommendations and the development of resilient and adaptive organizations. A large proportion of international nursing literature available on this subject, however, is experiential, based on personal opinion and not evidence based. The strength and debatably a weakness of a review of this type is that it allows for the integration and synthesis of a wide range of literature and research methodologies (Torraco, 2005; Whittemore & Knafl, 2005). Rigorous synthesis and critique of information gathered can, however, further contribute to theory, practice, and policy development (Whittemore & Knafl, 2005).

## Search Method

Primary searches focused on electronic databases commonly used for storing medical and nursing-related literature such as Medline & Psych Info, CINAHL, Proquest Central. Secondary hand searching of reference lists of relevantly sourced articles was also undertaken (Figure 1). Key search terms included derivations of Nurs\*.mp, disaster, natural disaster\*.tw, catastroph\*.tw, hospital, hospitalization, aged care facility, preparedness, resilience, lessons learned\* [learn]. Boolean terms of and/or were also used to incorporate further search terms such as knowledge, skills, competencies, roles, decisions, and recommendations.

This search included original primary research data (i.e., information derived from field studies using either quantitative or qualitative research methodology), from peer-reviewed, scholarly journals, English language only, and years searched were 2002 to 2012. Gray literature (i.e., literature gained from secondary sources, such as, policies and organizationally produced documents) and conference proceedings were not included in the search. Also excluded was literature pertaining to pre-hospital or non-residential activities, volunteering outside of the nurses’ own country or health care facility.

When articles were assessed for inclusion, the terms natural disaster or catastrophe, included extreme weather events (such as hurricanes, cyclones, big storms, or tornadoes), seismic events (such as earthquakes and volcanic activity), and general critical events due to a natural disaster that may



**Figure 1.** Prisma diagram.

Source. Adapted from Moher, Liberati, Tetzlaff, Altman, and The PRISMA Group (2009).

cause surge capacity to an institution (such as evacuations). Reference to man-made, biological, epidemic, or terrorist disasters was excluded.

## Theoretical Underpinnings to Data Analysis

Content and thematic analysis was used to collate and interpret the data from the integrative review. An ecological/interacting systems framework was used to guide and help provide fresh interpretation to the data. Researchers have used an interactive systems approach to explore, understand, and analyze the effects of a disaster on individuals, communities, systems, and organizations. Hoffman and Kruczek (2011) used a bioecological model to review the literature on mass traumas caused by large-scale disasters and community-wide catastrophes. They believe that these events can be better understood by using an “ecosystemic model” (Hoffman & Kruczek, 2011, p. 1088) as a tool to analyze the traumatic effects on individuals and communities. Their bioecological model of mass trauma was based on Bronfenbrenner’s bioecological model of human development which was, up until

his death, continually evolving and is defined as “the phenomenon of continuity and change in the biopsychological characteristics of human beings, both as individuals and as groups” (Bronfenbrenner & Morris, 2006, p. 793).

Hoffman and Kruczek (2011) believed that an individual is affected by interactions among systems that provide social context and determines the impacts of events. Paton and Johnston and Norris et al. echoed this and developed multi-level, interdependent models of disaster resilience (Norris et al., 2008; Paton & Johnston, 2006). In Bronfenbrenner’s (1979) original ecological theory, the interdependent structures or nested systems have various levels: microsystem, mesosystem, exosystem, and macrosystem. Hoffman and Kruczek have focused on Bronfenbrenner and Ceci’s expanded model in 1994 that included the addition of a biological element known as chronosystems (Hoffman & Kruczek, 2011). This process refers to life changes that occur over time that are dependent on changes to the environment, which is also viewed as important to accommodate the temporal dimension of disaster response (Paton, Johnston, Mamula-Seadon, & Kenney, 2014). Critical distinctions were also made between the proximal processes of environment and process, and are seen by Bronfenbrenner to be interdependent and bidirectional (Bronfenbrenner & Morris, 2006).

The bioecological theory was also used by Boon, Cottrell, King, Stevenson, and Millar (2012) to develop a tool to model and assess community resilience at an individual and community level to natural disasters. These authors used their framework to hypothetically test an Australian community to the effects of a disaster. Their application was not context specific as it was derived from prior studies on disaster resilience. They used data from actual events that occurred in Beechworth, Victoria, and Innisfail and Ingham, Queensland, as a proxy measure to develop and illustrate their model of possible issues and resilience indicators. The authors believe that Bronfenbrenner’s bioecological theory is useful to help collate, interpret, and triangulate findings from multi-method studies on disaster resilience (Boon et al., 2012).

Paton and Violanti’s theory of ecological resilience and model of adaptive capacity (Paton & Violanti, 2011) have some similarities to Bronfenbrenner’s descriptive model but have been operationalized within a disaster context. Paton and Violanti’s model of adaptive capacity was originally developed from empowerment theory, a construct often used in management and organizational contexts, which includes components of meaningfulness, competence, choice, and perceived control. This theory, according to Paton (personal communication, August 30, 2013) “provides a more coherent starting point” when conceptualizing and analyzing adaptive capacity within an organization because it highlights the need to accommodate the interdependence between empowered people and empowered settings. This makes it a useful conceptual framework for the multi-level analysis of processes that operate under conditions of uncertainty (which is

pertinent with regard to the development of capability prior to events occurring). They also assert that when developing a model of adaptive capacity that facilitates resilience in high risk professions, it is important to consider the interactions and relationships of person, team, and organization, and most importantly family (Paton & Violanti, 2011). These authors believe that these factors are interdependent and the combination of which will affect the likelihood of adaptive capacity and resilience in the individual.

## Results

From the initial screening of 233 records, all 12 studies that met all inclusion criteria for final analysis were undertaken in the United States. The type of disaster that affected their facility were nine involving large-scale hurricanes, two focused on a non-specified natural disaster event and one following an earthquake. Two of the facilities studied were hospitals and 10 were aged care facilities such as nursing homes or assisted living facilities. Only half of the studies directly interviewed nurses as a specific demographic. The rest included nurses as one of the members of the multi-disciplinary team involved. Methodologies included five quantitative surveys, two mixed methods, and five qualitative surveys.

Content within all the studies were initially examined and coded manually into categories and analyzed with four predetermined key outcome messages or main focus of each study in mind. The majority of the studies ( $n = 9$ ) included the key message of preparedness either with another category or on its own. Knowledge and skills, decision making, and resilience were only represented in three instances each, either on its own or with another category.

## Thematic Analysis

The data were further coded initially into broad themes using NVivo9 software. All the 10 studies that involved nursing homes included evacuation or sheltering in place as a key theme. Focused themes were then identified and analyzed using an ecological and interactive systems viewpoint as a broad guide.

### *Distributed Decision Making Is Fundamental*

The majority of articles within this review discussed issues pertaining to the facilities either considering or requiring evacuation or accepting evacuees. Multiple issues such as resourcing and adequate staffing, provision of care and patient safety, adequacy of shelter available, and transportation need to be considered prior to making a decision on whether to evacuate or shelter in place. This cannot be made without meticulous planning and expert decision making across local agencies prior to an event, and should be reflected within the organization's disaster plan (Hyer,

Brown, Christensen, & Thomas, 2009; Laditka et al., 2008; Manley et al., 2006).

A successful outcome depended on developing prior relationships with multiple agencies and organizations, which included well-coordinated and direct lines of communication with emergency management organizations, the local community, and other health care facilities within the region. Integrated emergency management processes were identified as lacking or below par. Many reported the need for improved communication with their emergency management and state regulatory agencies (Castro, Persson, Bergstrom, & Cron, 2008; Laditka, Laditka, Cornman, Davis, & Richter, 2009; Laditka et al., 2008; Saliba, Buchanan, & Kington, 2004), with some administrators feeling the pressure to evacuate, against their better judgment (Blanchard, 2009). Some felt abandoned by the state, alone in decision making, and overall, nursing home residents did not seem to be a priority for decisions on evacuation or ensuring essential supplies such as electricity to a facility if sheltering in place (Dosa, Grossman, Wetle, & Mor, 2007). Community assistance and other nursing facilities, however, were seen as helpful and a great support at critical times (Dosa et al., 2007; Laditka et al., 2009; Saliba et al., 2004).

The success of these decisions also depended on the correct professional being involved at the initial planning phase as it requires specific expertise in choosing appropriate, safe, and fit-for-purpose emergency shelters, appropriate transportation, and predicting for adequate supplies and resources. Nurses, some holding leadership roles, who were involved in the actual care of their patients during the disaster, were often excluded in the initial planning and this was reflected in studies where nurses discussed how their lack of input had a direct effect on staff and patient safety and privacy, and was a barrier to care (Christensen, Brown, & Hyer, 2012; Hyer et al., 2009; Laditka et al., 2009; Saliba et al., 2004). This can be summed up by the following statement by Christensen et al. (2012):

Although disaster nursing is tremendously challenging, regardless of whether staff shelters in place or evacuates, our study suggests that asking these critical questions before evacuating to a non-clinical facility can help reduce hazards to both residents and staff. (p. 382)

### *Personal Exposure and Interconnections of the Individual Influences the Functioning of the Individual as a Professional*

The unpredictability and past experiences of disasters and personal worries of the potential impact of the disaster on patients, staff members, their families, pets, and houses affected the functional capacity and performance of staff within a facility. Facilities were understaffed due to absenteeism (Dosa et al., 2007; Hyer et al., 2009; Saliba et al., 2004). One administrator reported that they had to "mandate



all staff participate in evacuation” (Hyer et al., 2009, p. e11), and employees were threatened with disciplinary action and some were terminated if they did not turn up for work. Whereas, Castro et al. (2008) reported that allowing family members to evacuate with their staff members increased staff coverage. This was also the case for some facilities that sheltered in place, with one respondent claiming that they had more staff than they needed (Hyer et al., 2009). Suggestions were also made to consider increasing the level of supplies stockpiled from the standard guidelines of 3 days to at least a week (Laditka et al., 2008) to cater for staff bringing their family members and pets with them.

Physical and mental exhaustion of staff and putting their patients and facility ahead of their family concerns were also issues raised (Laditka et al., 2009). A small pilot study of ED nurses by Battles (2007) highlighted the potential for post-traumatic stress to affect their ability to adapt and respond both personally and professionally during and after a disaster, and may continue to have lasting effects on them. Directors of nursing (DoNs) focus group participants in a study conducted by L. M. Brown, Hyer, Schinka, Mando, Frazier, & Polivka-West (2010) suggested that all direct care providers should be trained in psychological first aid, which could be provided following a disaster to meet the mental health needs of both patients and their staff member colleagues.

### *Functional Capability and Adaptive Demands on Nurses Often Hidden Within the Multidisciplinary and Inter-Agency Context of a Disaster*

In most articles, nurses were included in the general description of staff respondents. This included facility administrators; direct or non-direct care staff; allied staff such as social workers, physiotherapists, and Occupational Therapists; ancillary such as domestic, kitchen, or maintenance and other professionals identified as physicians and psychologists. Most studies focused on the effect on the facility, patients, and staff as a whole, and administrators were identified as their key respondents. Two identified specific interviews with DoNs (Christensen et al., 2012; Laditka et al., 2009) and two studies interviewed or included data from ED nurses (Battles, 2007; Manley et al., 2006). This made it difficult to clearly identify the unique roles, competencies, and demands of nurses involved in a disaster. Only one study (Laditka et al., 2009) reported evidence of resilience in staff, and recommended this potential in staff warrants further study. Nursing resilience or adaptive capacity was not identified or mentioned.

### **Summary**

Results from the integrative review highlight that evacuation is more likely to occur in an aged care facility/nursing home than a hospital. Ten of the 12 studies examined in the

integrative review included evacuation and decisions about evacuation or shelter in place as a key issue. A successful outcome for patients and staff following an evacuation requires well-prepared employees who have undergone training/education, regular site visits, and spot drills. Facilities that incorporated the lessons learned from previous disasters into their disaster plans found that it improved their overall level of preparedness and strengthened their communication and collaboration with community and emergency management authorities during the next disaster. Successful decisions also depended on the correct professional being involved at the initial planning phase as it requires specific expertise in choosing appropriate, safe, and fit-for-purpose emergency shelters, appropriate transportation, and predicting for adequate supplies and resources.

Staff workload increases during a disaster with lack of sleep and breaks a contributing factor to increasing stress. In some cases, these increased levels of stress in staff caused a desensitization to the distress in patients, and had the potential to mask a mental health problem. Evacuated patients were more likely to experience depression and anxiety. This also contributed to increased staff workload with needing to spend more time providing emotional reassurance as well as providing for their usual care requirements often under trying circumstances due to lack of resources and normal services. A small pilot study of ED nurses highlighted the potential for posttraumatic stress to affect their ability to adapt and respond both personally and professionally during and after a disaster and may continue to have lasting effects on them. Some studies reported, however, that many staff had positive experiences and found that the events helped to build stronger relationships with their patients and other staff members. In most articles, nurses were included in the general description of staff respondents. This made it difficult to clearly identify the unique roles, competencies, and demands of nurses involved in a disaster.

### **Discussion**

The complexity of decision making is highlighted within this review. The level of uncertainty is often exacerbated by the dynamic nature of a large-scale disaster. Decisions are distributed over a range of people, teams, agencies, and organizations. This usually involves multiple decision makers with varying levels of expertise, local knowledge, with varying organizational procedures and processes. This type of decision making is referred to by Schneeweiss (2003b) as distributed decision making where multiple decision makers are united in a mutual problem or issue (Schneeweiss, 2003a). Decision-making strategies and coping with uncertainty and stress have been explored and analyzed extensively by many researchers (Aldunate, Pena-Mora, & Robinson, 2005; Flin, Salas, Strub, & Martin, 1997; Gore, Banks, Millward, & Kyriakidou, 2006; Serfaty & Entin, 1997). Effective and adaptive decision making involves the person, teams, and

organizations to be able to be open, flexible, and have common situational awareness and a shared mental model of the problem. This, in turn, contributes to resilient and adaptive teams and organizations (Serfaty & Entin, 1997).

Ecological and interactive systems models are a useful foundation to view and interpret resilience within the individual, team, organization, and community. Paton and Violanti's (2011) model of adaptive capacity describes resilience and adaptive capacity as "resulting from the interaction among person, team, organizational and family factors with each level of analysis being interdependent" (p. 165). These authors maintain that empowerment of individuals collectively helps to build a resilient workforce and organization. They believe that developing and building on interpretive frameworks from past critical events, through facilitating competencies from lessons learned of past experiences, help to build the adaptive capacity of professionals working in high risk professions (Paton & Violanti, 2011).

## Conclusion

This review highlighted many organizational, functional, and competency issues that affected the preparedness of health care professionals during a natural disaster. Many issues and lessons learned have been raised previously in disaster-related health care literature. One factor that appears to be missing is the focus on the adaptive demands specifically on nurses working in residential health care facilities during and after an event. Their roles and responsibilities were often invisible within the highly visible event. Research exploring the adaptive demands of nurses in a critical event such as a large-scale natural disaster may help to further highlight the important roles nurses play and the effect that it may have on a health care facility.

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## References

- Aldunate, R. G., Pena-Mora, F., & Robinson, G. E. (2005). Collaborative distributed decision making for large scale disaster relief operations: Drawing analogies from robust natural systems. *Complexity*, *11*(2), 28-38. doi:10.1002/cplx.20106
- Battles, E. D. (2007). An exploration of post-traumatic stress disorder in emergency nurses following Hurricane Katrina. *Journal of Emergency Nursing*, *33*, 314-318.
- Blanchard, G. (2009). A comparison of the nursing home evacuation experience between hurricanes Katrina (2005) and Gustav (2008). *Journal of the American Medical Directors Association*, *10*, 639-643. doi:10.1016/j.jamda.2009.06.010
- Boon, H., Cottrell, A., King, D., Stevenson, R., & Millar, J. (2012). Bronfenbrenner's bioecological theory for modelling community resilience to natural disasters. *Natural Hazards*, *60*, 381-408. doi:10.1007/s11069-011-0021-4
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.
- Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In R. M. Lerner & W. Damon (Eds.), *Handbook of Child Psychology: Vol. 1. Theoretical models of human development* (6th ed., pp. 793-828). Hoboken, NJ: John Wiley.
- Brown, L. M., Hickling, E. J., & Frahm, F. (2010). Emergencies, disasters, and catastrophic events: The role of rehabilitation nurses in preparedness, response, and recovery. *Rehabilitation Nursing*, *35*, 236-241.
- Brown, L. M., Hyer, K., Schinka, J. A., Mando, A., Frazier, D., & Polivka-West, L. (2010). Use of mental health services by nursing home residents after hurricanes. *Psychiatric Services*, *61*, 74-77.
- Brown, P. R., Nelson, R., Jacobs, B., Kokic, P., Tracey, J., Ahmed, M., & DeVoil, P. (2010). Enabling natural resource managers to self-assess their adaptive capacity. *Agricultural Systems*, *103*, 562-568.
- Castro, C., Persson, D., Bergstrom, N., & Cron, S. (2008). Surviving the storms: Emergency preparedness in Texas nursing facilities and assisted living facilities. *Journal of Gerontological Nursing*, *34*(8), 9-16.
- Christensen, J. J., Brown, L. M., & Hyer, K. (2012). A haven of last resort: The consequences of evacuating Florida nursing home residents to nonclinical buildings. *Geriatric Nursing*, *33*, 375-383. doi:10.1016/j.gerinurse.2012.03.014
- Dosa, D. M., Grossman, N., Wetle, T., & Mor, V. (2007). To evacuate or not to evacuate: Lessons learned from Louisiana nursing home administrators following Hurricanes Katrina and Rita. *Journal of the American Medical Directors Association*, *8*, 142-149. doi:10.1016/j.jamda.2006.11.004
- Flin, R., Salas, E., Strub, M., & Martin, L. (Eds.). (1997). *Decision making under stress: Emerging themes and applications*. Brookfield, VT: Ashgate.
- Gore, J., Banks, A., Millward, L., & Kyriakidou, O. (2006). Naturalistic decision making and organizations: Reviewing pragmatic science. *Organization Studies*, *27*, 925-942. doi:10.1177/0170840606065701
- Hoffman, M. A., & Kruczek, T. (2011). A bioecological model of mass trauma: Individual, community, and societal effects. *The Counseling Psychologist*, *39*, 1087-1127. doi:10.1177/0011000010397932
- Hyer, K., Brown, L. M., Christensen, J. J., & Thomas, K. S. (2009). Weathering the storm: Challenges to nurses providing care to nursing home residents during hurricanes. *Applied Nursing Research*, *22*(4), e9-e14. doi:10.1016/j.apnr.2008.11.001
- Laditka, S. B., Laditka, J. N., Cornman, C. B., Davis, C. B., & Richter, J. V. E. (2009). Resilience and challenges among staff of gulf coast nursing homes sheltering frail evacuees following hurricane Katrina, 2005: Implications for planning and training. *Prehospital and Disaster Medicine*, *24*, 54-62. doi:10.1017/S1049023X00006543
- Laditka, S. B., Laditka, J. N., Xirasagar, S., Cornman, C. B., Davis, C. B., & Richter, J. V. E. (2008). Providing shelter to nursing home evacuees in disasters: Lessons from Hurricane Katrina. *American Journal of Public Health*, *98*, 1288-1293.

- Manley, W. G., Furbee, P. M., Coben, J. H., Smyth, S. K., Summers, D. E., Althouse, R. C., . . . Helmkamp, J. C. (2006). Realities of disaster preparedness in rural hospitals. *Disaster Management & Response*, 4, 80-87.
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine*, 6(7), e1000097. doi:10.1371/journal.pmed.1000097
- Norris, F. H., Stevens, S. P., Pfefferbaum, B., Wyche, K. F., & Pfefferbaum, R. L. (2008). Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. *American Journal of Community Psychology*, 41, 127-150. doi:10.1007/s10464-007-9156-6
- Pan American Health Organization. (2008). *Hospital safety index guide for evaluators* (Hospitals Safe From Disasters, No. 1). Retrieved from [http://www.preventionweb.net/files/8974\\_SafeHosEvaluatorGuideEng1.pdf](http://www.preventionweb.net/files/8974_SafeHosEvaluatorGuideEng1.pdf)
- Paton, D., & Johnston, D. (Eds.). (2006). *Disaster resilience: An integrated approach* [Electronic resource]. Springfield, IL: Charles C Thomas.
- Paton, D., Johnston, D., Mamula-Seadon, L., & Kenney, C. M. (2014). Recovery and Development: Perspectives from New Zealand and Australia. In Kapucu, N. & Liou, K. T. (Eds.), *Disaster and development: Examining global issues and cases* (pp. 255-272). New York, NY: Springer.
- Paton, D., & Violanti, J. M. (Eds.). (2011). *Working in high risk environments: Developing sustained resilience*. Springfield, IL: Charles C Thomas.
- Priest, C., & Bahl, M. (2008). Nursing during catastrophic disaster: A case study from New Orleans. *Journal of Nursing Law*, 12, 157-164.
- Quarantelli, E. L. (1997). Ten criteria for evaluating the management of community disasters. *Disasters*, 21, 39-56. doi:10.1111/1467-7717.00043
- Saliba, D., Buchanan, J., & Kington, R. S. (2004). Function and response of nursing facilities during community disaster. *American Journal of Public Health*, 94, 1436-1441.
- Schneeweiss, C. (2003a). Distributed decision making—A unified approach. *European Journal of Operational Research*, 150, 237-252.
- Schneeweiss, C. (2003b). Distributed decision making in supply chain management. *International Journal of Production Economics*, 84, 71-83.
- Serfaty, D., & Entin, E. (1997). Decision making under stress: Emerging themes and applications (R. Flin, E. Salas, M. Strub, & L. Martin, Eds.). Brookfield, VT: Ashgate.
- Smith, R. (2012, March). *Introduction to emergency management in New Zealand*. Paper presented at the Emergency Management Summer Institute, Wellington, New Zealand.
- Torraco, R. J. (2005). Writing integrative literature reviews: Guidelines and examples. *Human Resource Development Review*, 4, 356-367.
- United Nations International Strategy for Disaster Reduction. (2009). *UNISDR terminology on disaster risk reduction*. Retrieved from <http://www.unisdr.org/we/inform/terminology>
- Whittemore, R., & Knafl, K. (2005). The integrative review: Updated methodology. *Journal of Advanced Nursing*, 52, 546-553. doi:10.1111/j.1365-2648.2005.03621.x

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