

A Review of Compassion Fatigue of Nurses During and After the Canterbury Earthquakes

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Abstract

The significance of compassion fatigue in health professionals was highlighted during and after the Canterbury earthquakes, in New Zealand. A lack of consistent definition of and comprehension about compassion fatigue, particularly in relation to understanding disaster response processes, may impact upon nurses both emotionally and physically when caring for traumatised survivors. In light of this, the current article focuses on an exploration of national and international literature. Findings from this review include definitions and theories of compassion fatigue, exposure, impacts, and interventions. The international literature has demonstrated the significance of compassion fatigue for nurses as well as other health professionals; however, very little New Zealand literature specifically refers to compassion fatigue. Researchers in New Zealand tend to view the symptoms associated with compassion fatigue and burnout as a combined condition rather than two distinct syndromes, which could impact upon clinical awareness in New Zealand. Limitations of international and New Zealand literature are discussed and gaps within the research are identified, along with recommendations for future research in this area, especially from a New Zealand perspective.

Keywords: compassion fatigue, earthquake, emotional exhaustion, disaster, nursing

Disasters related to natural hazards are a part of human history with a significant impact on life, physically, psychologically, and psycho-socially. In the last 50 years, the number of disasters has increased and more than 10,000 natural disasters have occurred (Arbon, 2010; World Health Organisation, 2013). Over 270 million people have been affected, including 12 million deaths, and over \$4 trillion (USD) of financial loss has been reported (Arbon, 2010; World Health Organisation, 2013). New Zealand is no exception with reports of 185 deaths, 150,000 homes damaged, and \$20 billion (NZD) rebuild costs after the Canterbury earthquakes (Parker & Steenkamp, 2012).

With an increase in severe disasters globally, the significance of health professionals, including nurses, and their ability to respond has been acknowledged (World Health Organisation, 2013). A fundamental role of acute nursing, caring for the injured can be emotionally and physically arduous work. Potentially, health professionals are at high risk of experiencing indirect suffering, such as feelings of fear and pain, while articulating empathy and compassion (Chung, 2016; Davies, 2009; Gauthier, Meyer, Grefe & Gold, 2015; Günüşen & Üstün, 2009; Hinderer et al., 2014; Itzhaki et al., 2015; Stewart, 2015). It is concerning that a workforce such as nursing that expounds these qualities on a daily basis may well lack awareness of the impact of compassion fatigue in terms of nurses' well-being and the quality of patient care.

The risk of earthquakes is clearly identified as New Zealand is situated amongst the Pacific Ring of Fire, an area in the Pacific Ocean more prone to earthquake activity due to plate tectonics. Following the Canterbury earthquakes, disasters related to natural hazards have become a current, priority concern in New Zealand. Raising awareness of compassion fatigue during times of disasters has become essential as the risk for future earthquake activity, resulting in human casualties, is high. A lack of understanding of compassion fatigue in nursing may potentially threaten nurses' wellbeing along with patients' safety. The purpose of this article is to explore New Zealand literature and compare it to international literature on compassion fatigue in order to answer these review questions: what is compassion

fatigue, what situations expose nurses to compassion fatigue, what is the impact of compassion fatigue, and what possible interventions exist for managing or even preventing symptoms of compassion fatigue in nurses in New Zealand.

Methodology

Strategies were adopted from Bettany-Saltikov (2012) and the PRISMA protocol from Huggard and Unit (2013)

and Moher, Liberati, Tetzlaff, and Altman (2009) in order to locate, appraise, and extract quantitative and qualitative data of national and international articles related to compassion fatigue. Preliminary searches related to compassion fatigue guided the selection of appropriate databases to create inclusion and exclusion criteria which were then applied to literature (Huggard & Unit, 2013). Figure 1 presents this process.

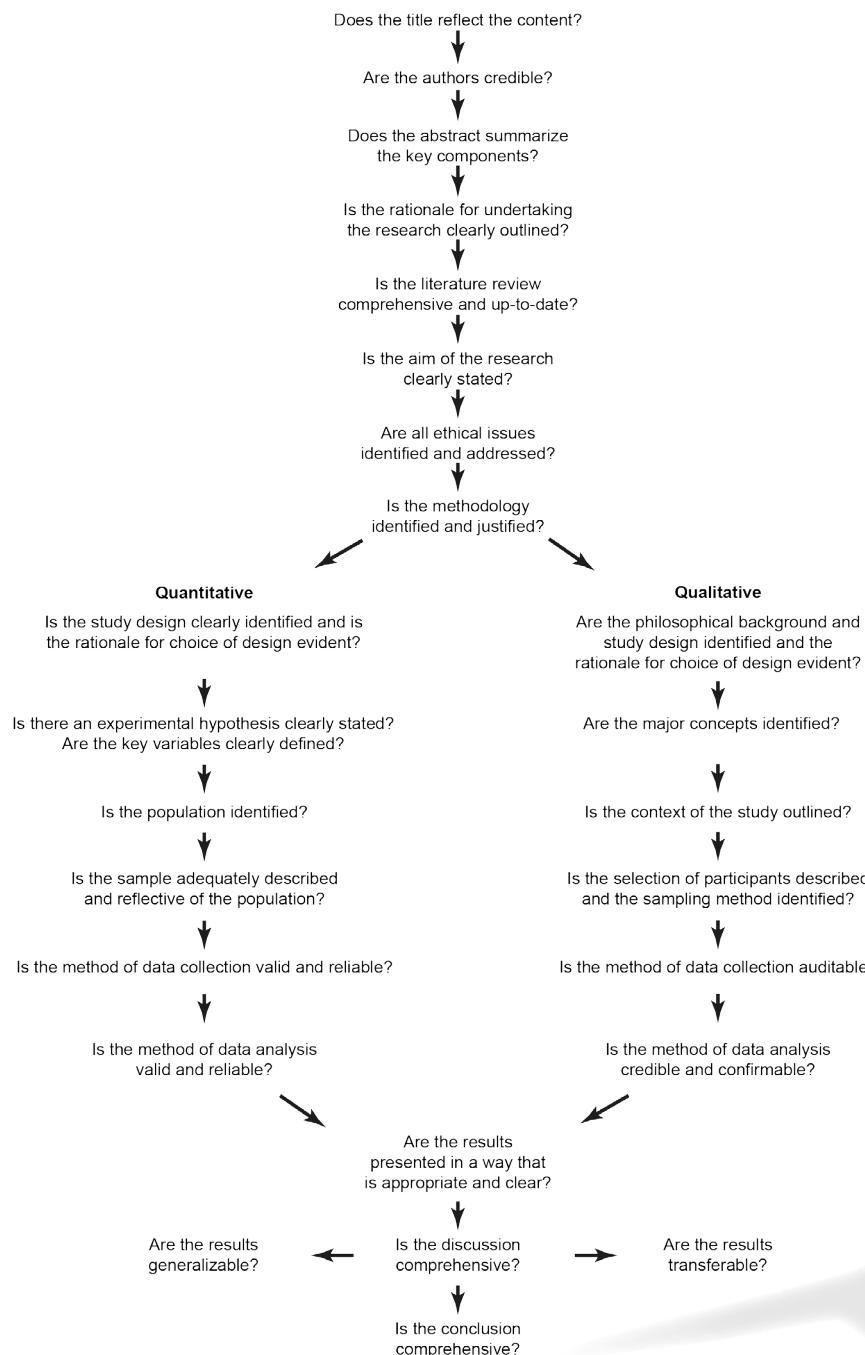


Figure 1. Literature review framework. From "Developing a framework for critiquing health research: An early evaluation" by K. Caldwell, L. Henshaw, and G. Taylor, 2011, *Nurse Education Today*, Volume 31, pp. e1-7. Copyright 2011 by Elsevier. Adapted with permission.

It was evident in the initial stages of this process that New Zealand literature directly related to compassion fatigue in nursing was limited and only a few articles matched the protocol. In response to the result, the New Zealand literature search was expanded to include dissertations/theses. The expanded search was conducted through nzresearch.org.nz, canterbury.ac.nz (University of Canterbury) and researcharchive.vuw.ac.nz (Victoria University of Wellington). These webpages were used due to the open access availability of published and unpublished nursing theses in New Zealand, whereas the remaining New Zealand universities restricted or limited access to nursing theses. The international literature search remained focused on peer-reviewed literature rather than dissertation/theses on account of sufficient and adequate quantity of research available. A decision was made to rule out a meta-analysis as the majority of studies from New Zealand were qualitative, descriptive studies, or literature reviews. Consequently, there was not sufficient statistical commonality between the studies to warrant a meta-analysis. The appraised studies were categorised alphabetically. Also included was information about; country of origin, research aims, and results. Results from the studies were summarised into topics and then grouped into themes (see Appendix 1). This process adopted deductive reasoning.

Search strategy

Key terms and search criteria located appropriate studies for this review, from CINAL, PsycINFO, ProQuest, PubMed, Scopus, Google Scholar, nzresearch.org.nz, canterbury.ac.nz (University of Canterbury) and researcharchive.vuw.ac.nz (Victoria University of Wellington). Four study categories were identified: health professionals (nurses), natural disasters, compassion fatigue (or stress), and crisis interventions. Key words for these categories were as follows: compassion, stress or fatigue, post-traumatic stress disorder, vicarious trauma, nurs*, crisis intervention, program or evaluate* and stress management, natural disasters, earthquake*, tsunami*, hurricane*, cyclone*, flood* or bush fire*. Research related to compassion fatigue, published between 2000 and 2015, was selected for the review. Database results were then screened based on inclusion and exclusion criteria. Eligible articles for the review had to meet one of the criteria:

- i. nurses' views, understanding or experiences during or after natural disasters;
- ii. nurses' exposure to compassion fatigue;

- iii. impacts by natural disasters;
- iv. interventions in order to suggest possible solutions for compassion fatigue.

Exclusion criteria were as follows:

- i. not written in English language;
- ii. international dissertations/theses on compassion fatigue.

Quality appraisal

Appraising research quality is an essential process to maintain rigour and transparency and to avoid methodological biases (Adriaenssens, De Gucht & Maes, 2015; Bettany-Saltikov, 2012). Quantitative and qualitative articles may require differently focused criteria: authenticity and trustworthiness for qualitative research, and validity or reliability for quantitative research (Bettany-Saltikov, 2012). Initially, each quantitative and qualitative article was read thoroughly. The articles were appraised for quality by selecting yes or no against each of the review criterion in the framework in figure 1. No quality scores were applied, however, only articles that met all appraisal criteria were included in this review.

Results

The initial search identified 465 articles and 22 New Zealand dissertations/theses.

Following further examination based upon the inclusion and exclusion criteria, duplication, and quality appraisal, 32 references remained: 5 from New Zealand research and 27 international studies. Figure 2 summarises the overall research selection process.

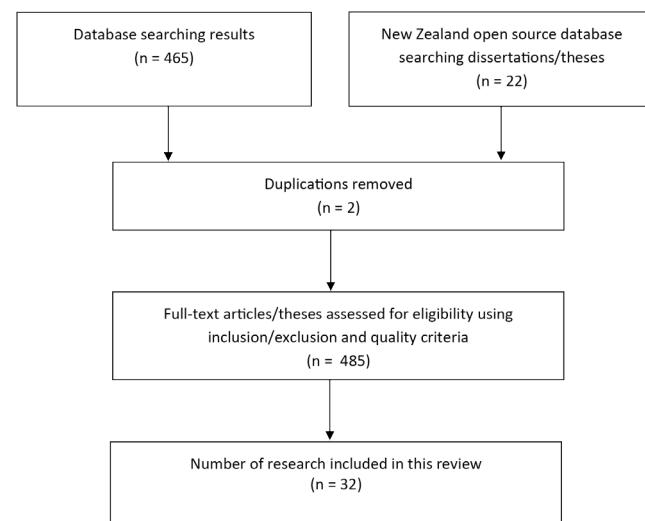


Figure 2. Adapted PRISMA flow diagram used to select studies.

Appendix 1 provides a summary of results and themes from the parsed set of literature. The majority of the 32 research studies on compassion fatigue were conducted in the USA, followed by China, Taiwan, Japan and Turkey. International studies were largely quantitative and utilised different tools to measure degrees of compassion fatigue. These include Professional Quality of Life and Post or Secondary Traumatic Stress scales for compassion fatigue (Armagan, Engindeniz, Devay, Erdur & Ozcakir, 2006; Zhen et al., 2010). Of the five New Zealand studies included in the review, the majority were qualitative, descriptive studies or literature reviews. Four themes were identified relating to compassion fatigue and nursing: definitions and theories, exposure, impact, and interventions.

Definitions

The theme of definition or lack of it was noted across the New Zealand literature. Compassion fatigue in nursing can be the result of experiences of indirect trauma while caring for distressed patients, in stressful circumstances, for a short period of time. The indirect stressful emotions can evoke secondary traumatic stress in nurses, which may lead to feelings of vulnerability, hopelessness, helplessness, and insecurity (Figley, 1995). Further definitions of hopelessness in particular are provided in Appendix 1. Alternatively, burnout is caused by chronic emotional exhaustion due to stressful professional relationships at the organisational level for a prolonged period of time (Figley, 2002). By extension, short-term emotional secondary stress or compassion fatigue can potentially develop into long-term emotional exhaustion, also known as burnout.

Despite the way that compassion fatigue and burnout share similarities (Figley, 1995, 2002; Maslach & Jackson, 1981; Maslach, Schaufeli & Leiter, 2001), the lack of separation and identification as two distinct concepts only leads to further misunderstanding. There is, therefore, a need for clear definitions for both conditions if health professionals are to fully understand exposure, impacts, and interventions, and the way these relate to professional practice.

Throughout the literature review process, it was apparent that international researchers adopted two key theories which underpinned the majority of research: compassion fatigue by Figley (1995, 2002) and burnout by Maslach (Maslach & Jackson, 1981; Maslach et al., 2001). Consequently, the majority of international research clearly distinguished between compassion

fatigue and burnout and adopted clear definitions to decrease confusion between the two terms. Conversely, researchers in New Zealand tended to use various theoretical backgrounds and symptoms associated with compassion fatigue and burnout interchangeably (Davies, 2009; Hall, 2001; Hall & Powell, 2011; Itzhaki et al., 2015).

Upon closer inquiry, the status of research in New Zealand appears to fail to address the issue of compassion fatigue as a direct focus. Indeed, only one of the New Zealand articles (Hughes, Grigg, Fritsch, & Calder, 2007) and one dissertation (Gillespie, 2013) use the term compassion fatigue briefly, citing Figley (1995, 2002) as the underpinning theoretical source. While it may be implied that the concept of compassion fatigue can be inferred from some elements reported in the remaining set of New Zealand articles, none of the authors appear to have done so. It therefore seems counter-productive to critique these authors' application of the concept.

Exposure

Balancing clinical judgement, ethical responsibilities, and the personal distress and emotions associated with the aftermath of a natural disaster is extremely challenging for many health professionals. Early recognition of the potential sources of compassion fatigue may contribute to understanding the development of this condition in nurses.

Findings shown in appendix 1 indicate that patient burden ratios, unexpected aftershocks (Dolan et al., 2011), high patient ratio (Richardson et al., 2013), threatened safety (Dolan et al., 2011; Lyneham & Byrne, 2011), and limited communication and access to caring resources (Dolan et al., 2011; Richardson et al., 2013), may cause compassion fatigue within a New Zealand context. In this context, patient burden ratio refers to "safe staffing for nursing...monitoring and taking action if there are not enough nursing staff available to meet the nursing needs of patients on the ward" (National Institute for Health and Clinical Excellence, 2014 para 2). International literature highlights these additional causes: ethical dilemmas (Arbon, 2010), weakness of health infrastructures (Arbon, 2010), nurses' adverse feelings of powerlessness and helplessness (Armagan, 2006; Boyle, 2011; Shih, Liao, Chan & Gau, 2002; Yang, Xiao, Cheng, Zhu & Arbon, 2010), repeated indirect trauma (Armagan et al., 2006; Ben-Ezra, Palgi, Hamama-ratz, Soffer & Shrira, 2013; Boyle, 2011; Zhen et al., 2010),

a lack of professional training for disasters (Yang et al., 2010), psychological vulnerability (Ben-Ezra et al., 2013), and unpredictability and uncontrollability (Zhen et al., 2010) as potential sources of compassion fatigue.

Impacts

Exposure to compassion fatigue can cause severe emotional distress which may impact upon professional role, and psychological and physical health (Armagan et al., 2006; Boyle, 2011; Yang et al., 2010; Zhen et al., 2010). However, the literature summarised in appendix 1 revealed that New Zealand research into compassion fatigue was limited and focused solely on the psychological impact following natural disasters: the fear of unpredictable future earthquakes, and negative effects of overall mental health (Hughes et al., 2007; Lyneham & Byrne, 2011).

In contrast, international literature covered a wider range of effects which included the impact upon three perspectives: professional role – avoidance (Armagan et al., 2006; Boyle, 2011; Dominguez-Gomez & Rutledge, 2009; Guo et al., 2004; Palm, Polusny & Follette, 2004; Zhen et al., 2010), hypersensitivity (Guo et al., 2004), decreased focus and concentration (Dominguez-Gomez & Rutledge, 2009), and increased vigilance (Armagan et al., 2006; Dominguez-Gomez & Rutledge, 2009); physical loss of energy (Boyle, 2011; Yang et al., 2010), feelings of inadequacy (Armagan et al., 2006), insomnia (Yang et al., 2010), and somatic symptoms (Armagan et al., 2006; Ben-Ezra et al., 2013; Boyle, 2011); and psychological health concerns and fears (Ben-Ezra et al., 2013; Hammad, Arbon, Gebbie & Hutton, 2012; Shih et al., 2002), anxiety/depressed mood (Armagan et al., 2006; Zhen et al., 2010), and being easily startled (Armagan et al., 2006; Dominguez-Gomez & Rutledge, 2009; Zhen et al., 2010). It appears that there are major differences in global awareness relating to the impact of compassion fatigue.

Interventions

Two key intervention theories may help to address compassion fatigue: personal control and stress and coping processes by Folkman (1984), and psychological empowerment in the workplace by Spreitzer (1995). These theories and other comparable literature are outside of the 2000 to 2015 timeframe as the search criteria for appendix 1. However, they are considered seminal works and inform the discussion presented within the review articles.

Folkman's theory relates to personal and organisational coping mechanisms: emotional and problem focused coping respectively. Greater awareness of these coping strategies could contribute to improved stress management within the nursing profession. Additionally, Spreitzer's theory provides psychological empowerment components including meaning, competence, self-determination, and impact. Spreitzer places emphasis on autonomy, initiation, and continuity throughout the caring process, which may assist nurses to identify potential risk factors, search for solutions, and cope with highly stressful working environments. Both Folkman's and Spreitzer's theories incorporate education, self-empowerment, and mindfulness.

Education programmes focus on dealing with distressing circumstances as external problems and promote problem-focused interventions based upon effective communication, positive co-worker relationships, efficient leadership by management teams, debriefing sessions based on cultural recognition, and mentoring programs at an organisational level (Hunsaker, Chen, Maughan & Heaston, 2015; Mealer, Burnham, Goode, Rothbaum & Moss, 2009; Sacco, Ciurzynski, Harvey & Ingersoll, 2015). Mentoring programmes can be particularly useful for new graduate nurses who can learn from experienced nurses regarding stress management (Günüşen & Üstün, 2010; Hinderer et al., 2014; Hooper, Craig, Janvin, Wetsel & Reimels, 2010; Ishihara, Ishibashi, Takahashi & Nakashima, 2014).

Self-empowerment is an intervention that has a problem and emotional focus which includes meaning, competence, self-determination, and impact. These four elements can contribute to improved professional competency based on self-management through the construction of positive networks, journaling, spending time with family, regular exercise, seeking advice from other health professionals, and in some instances, medical or pharmacological intervention (Hinderer et al., 2014; Hochwälter, 2007; Sacco et al., 2015). Self-empowerment as an intervention for managing compassion fatigues concentrates on managing personally distressing emotions and then taking actions to tackle challenges. External and internal problems tend to be managed simultaneously.

Finally, Mindfulness-Based Stress Reduction (MBSR), developed by Samuelson, Carmody, Kabat-Zinn and Bratt (2007), consists of emotional coping, self-awareness, and improvement in self-resilience (Moll,

Frolic & Key, 2015). It has an important emotional focus as this technique relies upon the acknowledgement of the present moment in order to perform current tasks, and manage traumatic flashbacks and stressors. Concentrating on present time can help nurses to engage calmness without self-judgement and to deliver effective care. This process may also augment nurses' ability to think critically and objectively about emotionally stressful events and to search for constructive coping strategies in order to improve self-resilience (Flarity, Gentry & Mesnikoff, 2013; Hinderer et al., 2014). Resilience is an essential factor for decision-making processes and effective self-management during caring processes.

Discussion

The current exploration of literature concerning compassion fatigue provides an overview of existing national and international literature. The results of this review have revealed a lack of consistent definition of and comprehension about compassion fatigue in New Zealand. Nationally, this inconsistency has resulted in further misunderstanding when the terms compassion fatigue and burnout have been used interchangeably, despite being two different conditions –according to Chung (2016). This interchangeable use of definitions may impact upon the early recognition and understanding of symptoms related to these similar but separate conditions.

Possible reasons for the misuse of definitions of compassion fatigue and burnout may be related to the inappropriate application of compassion fatigue theories to research. The majority of New Zealand research in this domain is qualitative and explores individual nurses' in-depth emotions and experiences of compassion fatigue (Davies, 2009) with limited application of compassion fatigue theories. In contrast, international literature appears to adopt mainly quantitative research methods to investigate compassion fatigue based on compassion fatigue theories (Günüşen & Üstün, 2010; Hinderer et al., 2014).

A consistent and succinct definition of compassion fatigue can be constructed when the research is underpinned by a recognised theorist such as Figley (1995, 2002). This kind of clear definition of compassion fatigue, based on a globally acknowledged theory, may help to develop research in New Zealand that will assist nurses recognise or even prevent symptoms of compassion fatigue following a natural disaster. A clear

definition may also help to prepare for effective disaster response.

Research concerning nurses' exposure to compassion fatigue is still comparable between New Zealand and international literature. Nationally and internationally, the work pressure in disasters appears to cause intense emotional distress and increase the risk of emotional exhaustion. This potential emotional exhaustion is closely related to unexpected, emotionally demanding circumstances and potentially life threatening environments (Chung, 2016). In distressing circumstances, compassion fatigue can be caused by challenging and stressful circumstances of patients' care, as noted in appendix 1. Nurses may experience indirect or secondary distress and trauma leading to compassion fatigue. This may have been the case during and after the Canterbury earthquakes in the South Island of New Zealand in 2011.

The impact of compassion fatigue is highly significant due to the direct influence on quality of care and the ability of the nurse to meet patients' needs (Hunsaker et al., 2015). If compassion fatigue is not recognised promptly, it may contribute to a vicious cycle: high stress levels may lead to errors, decreased safety, and dissatisfaction of patients and families. Poor work performance may lead to increased work pressure resulting in extensive emotional exhaustion and avoidance. Improving and maintaining nurses' wellbeing may help to improve patient safety and standards of care while preventing a potential vicious cycle leading back to compassion fatigue.

As outlined in the introduction to this article, disasters related to natural hazards have a significant impact on people's lives, physically, psychologically, and psycho-socially. These impacts were highlighted during and after the Canterbury earthquakes in New Zealand. Despite this, research to develop interventions to address or prevent compassion fatigue is limited. The current authors could not locate research that considered New Zealand specific interventions for compassion fatigue. International literature, however, may act as a guide for New Zealand researchers as they begin the search for appropriate concepts for nurses.

Possible strategies include education, self-empowerment, and mindfulness (Folkman, 1984; Gauthier et al., 2015; Itzhaki et al., 2015; Spreitzer, 1995). Education offers a problem focused coping strategy which may improve communication, positive

social networking, co-worker relationships, debriefing time, and mentoring programmes (Hinderer et al., 2014; Hunsaker et al., 2015; Sacco et al., 2015). Self-empowerment may aid the prevention of, or recognition and acceptance of, compassion fatigue as a legitimate condition. Recently, mindfulness as an emotional coping strategy has become a trend to promote nurses' wellbeing in order to deal with compassion fatigue (Günüşen & Üstün, 2009, 2010). Mindfulness practice can help nurses to clear and expand their mind to face challenges and difficulties in their daily nursing practice. Self-empowering processes and self-determination can prepare nurses to embrace stress, concerns, trauma, challenges, and risks to manage distressing situations in order to improve their resilience and minimise the risk of developing compassion fatigue.

Conclusion

International literature has demonstrated the significance of compassion fatigue for nurses as well as other health professionals. However, very little New Zealand literature specifically refers to compassion fatigue. Researchers in New Zealand have tended to use definitions of compassion fatigue and burnout interchangeably, which could impact upon clinical awareness in New Zealand. Furthermore, limited research and the dissemination of findings based on various theoretical backgrounds of compassion fatigue may lead to nurses not recognising their symptoms, or the impact that this condition can have personally or professionally (Chung, 2016); Davies, 2009; Hall, 2001; Hall & Powell, 2011; Itzhaki et al., 2015).

In New Zealand, the focus on nurse/clinician wellbeing has increased after the Canterbury earthquakes, particularly in the media. After five years, the impact of earthquakes on nurses may have triggered the public's interest due to recognition of the direct relationships between nurses' wellbeing and public safety in health systems (Chung, 2016; Stewart, 2015). Nurses' wellbeing is closely related to nurses' satisfaction, meaning that the close relationship between patients' satisfaction and nurses' satisfaction may contribute to preventing compassion fatigue. Compassion can be a key to augment nurses' resilience when dealing with distressing working environments such as those encountered following the Canterbury earthquakes. Ultimately, compassionate nurses may be better equipped to embrace challenges and to maintain professional quality of care.

In this context, New Zealand has a great opportunity to clearly define compassion fatigue and burnout with a view to promoting better understanding (Chung, 2016). Despite the limited availability of appropriate interventions for nurses in New Zealand, international research can act as a guide for future New Zealand research and practice. Clearly there is a pressing need to prepare nurses for natural disasters, including how to maintain personal well-being, professionalism, and quality of care during these times. From a health perspective the promotion and maintenance of nurses' wellbeing and patients' safety are key components of delivering high quality of care.

Understanding compassion fatigue is complicated. Public interest following events such as the Canterbury earthquakes has prompted health professionals to consider the concept of compassion fatigue and its impacts on personal and professional roles. Nurses' ability to recognise the symptoms and impacts of compassion fatigue needs further investigation, particularly from a New Zealand perspective. Working towards understanding, increasing awareness, prevention, and how to overcome compassion fatigue will help to form compelling and holistic processes to enhance nursing resilience in New Zealand.

Limitations

This article has some limitations, including that the majority of international studies included in the review are quantitative research and were from one country, the United States of America. Sample sizes were small due to restricted study regions. In addition, there were no longitudinal studies and only one study, by Itzhaki et al. (2015), was conducted comparatively, among five countries. New Zealand had a limited number of studies of compassion fatigue which makes it even more challenging to investigate potential interventions from within an appropriate context. Further summaries of literature concerning compassion fatigue can avoid these limitations by broadening search strategies to include more studies with different methodologies.

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Appendix 1: International Literature and New Zealand Literature and Dissertations/Theses Included in the Review

Country	Reference	Research aims and measures used	Themes
NZ	Al-Shaqsi, Gauld, McBride, Al-Kashmiri & Al-Harthy (2015) [1]	To investigate health professionals' responses to emergency circumstances prior to the Canterbury earthquakes Quantitative research/ Cross-sectional national survey	Preparedness for natural disasters
NZ	Dolan, Esson, Grainger, Richardson & Ardagh (2011) [2]	To describe nurses' responses to the Canterbury earthquakes Descriptive study	Preparedness for natural disasters, threatened safety, unexpected aftershocks, limited communication, and access to caring
NZ	Lyneham & Byrne (2011) [3]	To study factors that assisted or delayed the nurses when delivering nursing care in the three days after the Canterbury earthquakes Qualitative (phenomenological) research/Narrative method	Fluctuating demands of patient care routines, threatened safety, the fear of unpredictable future earthquakes, negative effects of overall mental health
NZ	Richardson, Ardagh, Grainger & Robinson (2013) [4]	To review initial responses and lessons from the Canterbury earthquakes Qualitative research/interview	High patient ratio, limited communication, and access to caring resources
Australia	Arbon (2010) [5]	Learned lessons applied to the Haiti Earthquake response aid Descriptive study	Ethical dilemmas, weakness of health infrastructures
Turkey	Armagan, Engindeniz, Devay, Erdur & Ozcakir (2006) [6]	To assess the occurrence of post-traumatic stress disorder among the members of the Turkish Red Cross Disaster Relief Team after the Tsunami in Asia Quantitative research/CAPS – 1 (Clinician-Administered Post Traumatic Stress Disorder Scale)	Nurses' adverse feelings of hopelessness, powerlessness and helplessness, re-experiencing indirect trauma, avoidance, increased vigilance, feelings of inadequacy, somatic symptoms, anxiety, easily startled
USA	Boyle (2011) [7]	To explore compassion fatigue Literature review	Nurses' adverse feelings of hopelessness, powerlessness and helplessness, re-experiencing indirect trauma, avoidance, loss of energy, somatic symptoms
Japan	Ben-Ezra, Palgi, Hamama-Raz, Soffer & Shrira (2013) [10]	To study the potential difference between hospital professionals and residents' reactions to the 2011 Tohoku earthquake and tsunami Quantitative research/Survey (questionnaire)/The 22-item Impact of Event Scale-Revised (IES-R)	Re-experiencing indirect trauma, psychological vulnerability, fear, somatic symptoms
USA	Boley (2011)	To explore compassion fatigue Literature review	Exposure: nurses' adverse feelings of hopelessness, powerlessness and helplessness, re-experiencing indirect trauma Impacts; avoidance, loss of energy, somatic symptoms

USA	Dominguez-Gomez & Rutledge (2009)	To investigate Secondary Traumatic Stress (STS) in emergency nurses Quantitative research/ Secondary Traumatic Stress Scale (STSS)	Impacts; avoidance, decreased focus and concentration, increased vigilance, easily started
USA	Figley (1995)	To investigate and examine compassion fatigue Theory	Definition
USA	Figley (2002)	To comprehend compassion fatigue Theory	Definition
USA	Flarity et al. (2013)	To investigate the effectiveness of an educational program to prevent compassion fatigue and increase resilience in emergency nurses Quantitative research/Professional Quality of Life	Interventions; self-resilience
USA	Folkman (1984)	To examine stress and coping processes Theory	Interventions; theory
Taiwan	Guo et al. (2004)	To investigate different stress responses between professional and non-professional rescue workers Quantitative research/Questionnaire including Davidson Trauma Scale (DTS-C) in Chinese	Impacts; avoidance, hypersensitive
Turkey	Günüşen & Üstün (2010)	To assess the efficacy of coping and supporting group interventions to decrease burnout in nurses Quantitative research (Randomised controlled trial)/Maslach Burnout Inventory	Interventions; education programmes
Australia	Hammad, Arbon, Gebbie, & Hutton (2012)	To review nursing knowledge while working during a disaster Literature review	Implication; fear
USA	Hinderer et al. (2014)	To investigate burnout, compassion fatigue and compassion satisfaction Quantitative research (surveys)/Professional Quality of Life (Pro-QOL)	Interventions; education programmes, self-empowerment, self-resilience
Sweden	Hochwälder (2007)	To study the effectiveness of empowerment on burnout Quantitative research/questionnaire/Maslach Burnout Inventory	Interventions; self-empowerment
USA	Hooper et al. (2010)	To investigate the prevalence of compassion satisfaction, burnout and compassion fatigue among frontline nurses in an ED (emergency department) setting and other selected specialty areas Quantitative research/Professional Quality of Life (Pro-QOL)	Interventions; education programmes
USA	Hunsaker et al. (2015)	To examine compassion satisfaction, compassion fatigue and burnout Quantitative research/Professional Quality of Life (Pro-QOL)	Interventions; education programmes
Japan	Ishihara et al. (2014)	To examine newly graduated nurses' intention to leave related to organisational matters and working environments Quantitative research/questionnaire	Interventions; education programmes
USA	Maslach & Jackson (1981)	To study specific patterns of burnout and to formulate an instrument Quantitative research/Maslach Burnout Inventory (MBI)	Definition
USA	Maslach et al. (2001)	To analyse job burnout based on the past 25 years research Review	Definition

USA	Mealer et al. (2014)	To examine psychological disorders and the effectiveness of a 12 week intervention Quantitative research/questionnaire/Connor Davidson Resilience Scale (CDRISC)/Posttraumatic Diagnostic Scale (PDS)/Hospital Anxiety and Depression Scale/Maslach Burnout Inventory (MBI)	Interventions; education programmes
Canada	Moll et al. (2015)	To investigate the impact of mindfulness-based interventions on interactions of nurses with their co-workers, patients and families Mixed methods (qualitative and quantitative research)/ questionnaire/ Maslach Burnout Inventory	Interventions; self-resilience
USA	Palm, Polusny, & Follette (2004)	To study vicarious trauma reactions across different professionals Literature review	Impacts; avoidance
USA	Sacco et al. (2015)	To understand compassion satisfaction and compassion fatigue in adult, paediatric and neonatal critical care nurses Quantitative research/survey/Professional Quality of Life	Intervention; education programmes, self-empowerment
Taiwan	Shih, Liao, Chan & Gau (2002)	To examine nurses experiences at the central site of the 9-21 Taiwan earthquake Qualitative research/interview	Exposure; nurses' adverse feelings of hopefulness, powerlessness and helplessness Impacts; fear
USA	Spreitzer (1995)	To investigate and validate measurements of psychological empowerment at work Quantitative research/Confirmatory Factor Analysis	Interventions : theory
China	Yang, Xiao, Cheng, Zhu & Arbon (2010)	To investigate Chinese nurses responses to the 2008 Wenchuan earthquake Qualitative research/Gadamer's Philosophical Hermeneutics	Exposure: Nurses' adverse feelings of hopefulness, powerlessness and helplessness, a lack of professional training for disasters Impacts: loss of energy, insomnia
China	Zhen et al. (2010)	To study the occurrence of Post-Traumatic Stress Disorder (PTSD) after the 2008 Wenchuan China earthquake Quantitative research (Survey)/PTSD Scale (CAPS)/Major Depressive Episode (MDE) module of the Structured Interview for DSM-IV (SCID) for comparison	Exposure: re-experiencing indirect trauma, unpredictability and uncontrollability as potential sources of compassion fatigue Impacts; avoidance, somatic symptoms, anxiety, easily started