Paramedic Disaster Health Management Competencies: A Scoping Review

Peter Horrocks, MHlthSci; ⦿ Lisa Hobbs, Grad Dip HlthMan; Vivienne Tippett, PhD; Peter Aitken, PhD

Queensland University of Technology, Kelvin Grove, Queensland, Australia

Correspondence:
 Peter Horrocks, MHlthSci
 Queensland University of Technology
 Victoria Park Road
 Kelvin Grove, 4056, Queensland, Australia
 E-mail: p.horrocks@qut.edu.au

Abstract

Introduction: Paramedics are tasked with providing 24/7 prehospital emergency care to the community. As part of this role, they are also responsible for providing emergency care in the event of a major incident or disaster. They play a major role in the response stage of such events, both domestic and international. Despite this, specific standardized training in disaster management appears to be variable and inconsistent throughout the profession. A suggested method of building disaster response capacities is through competency-based education (CBE). Core competencies can provide the fundamental basis of collective learning and help ensure consistent application and translation of knowledge into practice. These competencies are often organized into domains, or categories of learning outcomes, as defined by Blooms taxonomy of learning domains. It is these domains of competency, as they relate to paramedic disaster response, that are the subject of this review.

Methods: The methodology for this paper to identify existing paramedic disaster response competency domains was adapted from the guidance for the development of systematic scoping reviews, using a methodology developed by members of the Joanna Briggs Institute (JBI; Adelaide, South Australia) and members of five Joanna Briggs Collaborating Centres.

Results: The literature search identified six articles for review that reported on paramedic disaster response competency domains. The results were divided into two groups: (1) General Core Competency Domains, which are suitable for all paramedics (both Advanced Life Support [ALS] and Basic Life Support [BLS]) who respond to any disaster or major incident; and (2) Specialist Core Competencies, which are deemed necessary competencies to enable a response to certain types of disaster. Further review then showed that three separate and discrete types of competency domains exits in the literature: (1) Core Competencies, (2) Technical/Clinical Competencies, and (3) Specialist Technical/Clinical Competencies.

Conclusions: The most common domains of core competencies for paramedic first responders to manage major incidents and disasters described in the literature were identified. If it's accepted that training paramedics in disaster response is an essential part of preparedness within the disaster management cycle, then by including these competency domains into the curriculum development of localized disaster training programs, it will better prepare the paramedic workforce's competence and ability to effectively respond to disasters and major incidents.

Horrocks P, Hobbs L, Tippett V, Aitken P. Paramedic disaster health management competencies: a scoping review. *Prehosp Disaster Med.* 2019;34(3):322–329.

Introduction

The definition of disaster varies both within the literature and amongst various government organizations. As there appears to be no one definitive definition, the authors of this paper have chosen the definition put forward by the Centre for Research on the Epidemiology of Disasters (CRED; Brussels, Belgium): "A situation or event that overwhelms local capacity necessitating a request at the national or international level for external assistance; and unforeseen and often sudden event that causes great damage and destruction and human suffering."[1] Also, CRED distinguishes between two generic categories for disaster, which are "natural" and "technological" disasters. To be included in CRED's database, at least one of the following criteria must be fulfilled:

- Ten or more people killed;
- One hundred or more people reported affected;

- Declaration of a state emergency; or
- Call for international assistance.

In addition to the term disaster, this research is also concerned with the related (sometimes interchangeable) topic of "major incident." In health service terms, a major incident can be defined as any incident where the location, number, severity, or type of live casualties requires extraordinary resources.[2] As the number of casualties alone does not determine a major incident, what is classified as a "disaster" may or may not, in fact, be classed as a major incident; for example, where there are large numbers of dead and few or no survivors, there is often no major incident for health services.[2]

Within Australia, paramedics are tasked with providing 24/7 prehospital emergency care to the community. As part of this role, they are also responsible for providing emergency care in the event of a major incident or disaster. They play a major role in the response stage of such events, both domestic and international. It is postulated that when disaster of any nature strikes, it will provide paramedics with a serious challenge that will need extensive planning and training outside the norms of everyday response.

Disaster Health Management is an "interdisciplinary body of knowledge with over-lapping domains of expertise, which include emergency medicine, public health, and disaster management."[3] It is, however, important to differentiate "Disaster Health Management" from the discipline of "Disaster Management." The latter encompasses a larger picture requiring activity across the public and private sectors and multiple other professional groupings, and is actually a function across society rather than being more narrowly focused solely on the health aspects of the disaster. Disaster Health Management, rather, is the study and collaborative application of various health disciplines (including paramedics) to the prevention of, preparedness for, response to, and recovery from the health problems arising from a disaster. It is a field of health care practice that is truly multi-disciplinary with a wide-range of skill sets required to comprehensively approach disasters from a health perspective.[4] The "Comprehensive Approach" to managing disasters is a framework and fundamental concept of emergency management promoted in Australia, encompassing emergency prevention/mitigation, preparedness, response, and recovery. The Comprehensive Approach is one of four key principles espoused by Emergency Management Australia (Canberra, Australia) as being the core policies to be pursued by emergency and related agencies.[5] To educate and prepare Australian paramedics and other health personnel for a health disaster response within the Comprehensive Approach framework, a number of differing educational courses exist. These courses range from university-level awards, occupational in-service programs, and private-provider disaster management courses.[6] Such training and education has long been accepted by researchers in disaster response as being an essential part of preparedness. The literature, however, shows that the education and training being taught to Australian emergency responders for disaster response is highly variable.[7] Fitzgerald, et al[6] in 2010 used an expert modified Delphi technique to develop a national framework for disaster health education in Australia that suggested that first responders likely to be involved in disaster response should have specific knowledge comparative to Australian Qualifications Framework-level of certificate or diploma at a minimum, up to a university post-graduate certificate for those taking leading roles in the event

of disaster. Despite this, it appears that many paramedics have little or no formal qualifications specific to disaster response.

An emerging strategy for the improvement of education across the health professions has been the emphasis on competency-based education (CBE) as a methodology for gaining stakeholder consensus, establishing a common lexicon for continued profession-wide dialogue, and facilitating educational transformation.[8] Despite this, CBE has in the past been criticized as being "reductionist," that is, focusing on atomistic skills and failing to capture the essence of professional practice as manifested in the application of complex, integrated capabilities.[9] Given the complex nature of Health Disaster Management, the question could be asked: "Is CBE a suitable strategy for preparing health professionals for disaster response?" Complex skills, however, are constructed from fundamental component skills. Proficient performance of the former is achieved as components are refined and integrated during repeated performance of the skill in a realistic context and as feedback on performance is provided.[9]

The identified lack of standardization in the curricula is particularly concerning for educators tasked with delivering such training programs. In order to address this concern, and to assure that health professionals can perform effectively in a disaster or public health emergency, it is postulated that curricula need to be standardized and based upon a consensus set of core competencies with learning objectives related to those competencies.[10] This process of building disaster response capacities through CBE has also been endorsed by the World Health Organization (WHO; Geneva, Switzerland) and the International Council of Nurses (ICN; Geneva, Switzerland).[11]

Core competencies can provide the fundamental basis of collective learning and can help ensure consistent application and translation of knowledge into practice. Competencies are developers' performance measures or indicators for the workplace akin to knowledge, skills, and abilities in many job classifications.[12] Practitioners should focus on how competency-based training is different from other offerings. Competency-based training should emphasize concepts, not just skills (eg, triage). Simple application of skills may therefore be inadequate for optimizing outcomes; competent practitioners must learn to perform or apply requisite skills in a variety of circumstances. Learning over-arching principles or concepts related to specific skills will enable practitioners to adapt to differing challenges and to perform with a variety of expected and unexpected situations.[13] They require contextual measurement and are generally demonstrated over long periods of time. Educational goals to achieve desired competencies require breaking each competency into sub-competencies with corresponding learning objectives, presentation content, and learning evaluations. Competencies can also be organized into domains, or categories of learning outcomes, as defined by Blooms taxonomy of learning domains.[14] It is these domains of competency that are the subject of this review.

Report
Methods
Scoping reviews are used to map the concepts underpinning a research area and the main sources and types of evidence available.[15] Unlike systematic reviews, the aim of the scoping reviews is a way of mapping the key concepts that underpin a research area (Table 1).[16] The disciplines of paramedicine and disaster management are both relatively new fields, and the depth of research into these areas, while developing, is still in its infancy compared to many fields of endeavor. Scoping reviews, therefore, can be particularly useful for bringing together literature in

	Scoping Review	Systematic Review
Study Question	Often Broad	Focused
Search Strategy	Systematic & Transparent	Systematic & Transparent
Inclusion/Exclusion Criteria	Flexible	Defined A Priori
Study Appraisal	None/Minor	Yes
Synthesis	Typically Qualitative	Often Quantitative

Horrocks © 2019 Prehospital and Disaster Medicine

Table 1. Comparison Between Scoping and Systematic Reviews (Adapted from Armstrong, et al[16])

disciplines with emerging evidence, as they are suited to addressing questions beyond those related to the effectiveness or experience of an intervention. Scoping reviews can be conducted to map a body of literature with relevance to: time; location (eg, country or context); source (eg, peer-reviewed or grey literature); and origin (eg, health care discipline or academic field).[17]

The methodology for this paper was adapted from the guidance for the development of systematic scoping reviews using a methodology developed by members of the Joanna Briggs Institute (JBI; Adelaide, South Australia) and members of five Joanna Briggs Collaborating Centres.[18] It includes the following: identifying the research objective(s) and question(s); outlining the inclusion and exclusion criteria; identifying search strategies; extracting the results; discussing the results; and drawing conclusions, including the implications for future research and practice.

Objective and Research Question
The objective of this scoping review was to identify the most common core competency domains for responding paramedics in disaster management.

A preliminary search for existing research of the topic was conducted, and it was clear that competencies for paramedics had been developed by a number of writers internationally. No study specifically designed to better prepare Australian paramedics for a more effective response was found. A scoping review of this nature will therefore allow Australian practitioners and educators to look at what is happening in different contexts internationally and to assist in the development of specific competency domains for Australian paramedics.

The research question was as follows: What are the most common domains of the core competencies for paramedic response in disaster management?

Inclusion and Exclusion Criteria
This review has considered all studies that include prehospital competencies developed to aid Disaster Health Management by paramedics or international equivalent practitioners, such as emergency medical technicians (EMTs).

Concept/Phenomena of Interest
The core concept that this review explored and evaluated was any existing developed paramedic disaster health competencies or training programs specifically designed to prepare paramedics for responding to disaster situations.

Context
This scoping review considered studies that had been conducted world-wide which had developed or described competencies for paramedics involved in responding to disasters. Competencies for all health care professionals that provide care in disasters outside of hospital were also considered if they were seen as relevant to paramedic practice.

Types of Sources/Studies
This review considered information of any kind, including quantitative and qualitative research studies, grey literature, and policy documents or position statements from professional bodies, governments, or nongovernmental organizations responsible for disaster response.

Data Collection/Extraction of Results/Search Strategy
The search strategy aimed to find both published and unpublished studies. A three-step search strategy was utilized in this review. An initial limited search of PubMed (National Center for Biotechnology Information, National Institutes of Health; Bethesda, Maryland USA) and MEDLINE (US National Library of Medicine, National Institutes of Health; Bethesda, Maryland USA) was undertaken, followed by an analysis of the text words contained in the title and abstract, and of the index terms used to describe the article. A second search using all identified keywords and index terms was then undertaken across all included databases. Thirdly, the reference list of all identified reports and articles was searched for additional studies. Only literature published in English language were considered for inclusion in this review. Literature published between the years 2000-2017 were considered for inclusion in this review.

The databases searched included: PubMed; MEDLINE; Science Direct (Elsevier; Amsterdam, Netherlands); Scopus (Elsevier; Amsterdam, Netherlands); Embase (Elsevier; Amsterdam, Netherlands); and ERIC (Education Resources Information Center, Institute of Education Sciences; Washington, DC USA). The search for unpublished studies included: Google (Google Inc.; Mountain View, California USA); Google Scholar (Google Inc.; Mountain View, California USA); ProQuest Open Access Dissertations and Theses (PQDT, ProQuest; Ann Arbor, Michigan USA); and DART-E (LIBER; The Hague, Netherlands). Initial keywords used, but not limited to, were: paramedic disaster competency, disaster management competency, EMT disaster competency, and/or out-of-hospital disaster management competency.

Two reviewers completed the data extraction process. Any disagreements were resolved through discussion or with involvement of a third reviewer. A charting table was developed to record the key information of the source, such as author, reference, and domains of competencies relevant to the review question. The only reason found for exclusion was those articles that didn't refer specifically to paramedic or EMT competencies (this included those that were designed as generic competencies for health care professionals).

Figure 1 depicts the flow of information through the different phases of this scoping review.[18]
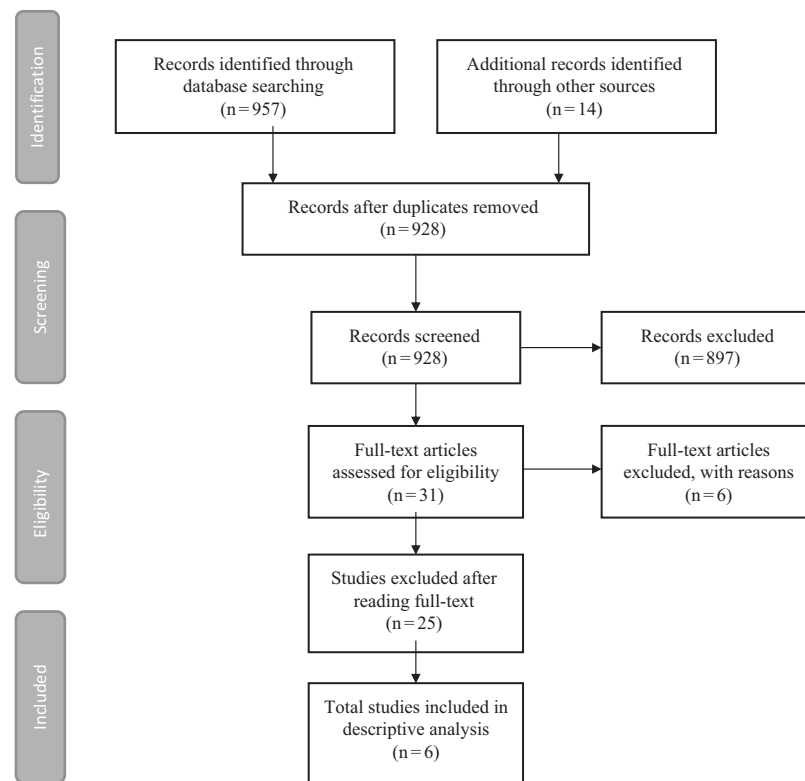
Figure 1. Prisma 2009 Flow Diagram.

Data Mapping/Presentation of Results
The literature demonstrated that many authors have worked to outline sets of core competencies for disaster responders in order to standardize teaching in the area of Disaster Health Management. Due to the descriptive nature and the heterogeneity of much of the research findings, identified core competencies have been sorted and presented in narrative form and shown in tables of common domains such as communication, operations, planning, logistics, incident command systems, and ethics.

It is very common for Western ambulance services to run two-tiered systems that generally consist of a base clinical skill level that is applied to the majority of paramedic responders and then complemented by specialist groups with a higher clinical skill level (ie, critical care paramedics or flight paramedics). The same division of roles can also be applied to disaster or major incident response, whereby all paramedics need a base or core set of competencies. Then, smaller groups of specialist paramedics exist with additional specific core competencies that need to be acquired and maintained for certain types of disaster or major incident (ie, hazardous material [Hazmat] response or mass shootings). The humanitarian space is another area in which paramedics have the potential to provide emergency care in a disaster. The demand for better coordination, accountability, and training in this space has led to a need for standardized humanitarian training programs for providers. Training should be based on comprehensive core competencies that providers must demonstrate in addition to their skill-specific competencies.[19]

The data from the six included papers considered relevant to the objectives of this scoping review are charted in Table 2 [13] and Table 3 [13,20–22] according to their authors, year of publication, and stated core competency domains.

The results have been further divided into two groups: (1) General Core Competency Domains, which are suitable for all paramedics (both Advanced Life Support [ALS] and Basic Life Support [BLS]) who respond to any disaster or major incident; and (2) Specialist Core Competencies, which are deemed necessary competencies to enable a response to certain types of disaster or major incident, such as chemical, biological, or radiological (CBR) incidents; Hazmat incidents; humanitarian response; or those incidents that require a tactical medicine response.

Discussion
This review has focused on determining the most common domains of disaster and major incident core competencies from within the literature and will assist educators and agencies to develop programs that are responsive to the learning needs of today's paramedics. This notion is supported by the World Association for Disaster and Emergency Medicine (WADEM; Madison, Wisconsin USA), an organization whose mission is the global improvement of prehospital and emergency health care, public health, and disaster health and preparedness.[23] Two white papers were released by WADEM, which outline the twin needs for: (1) refining and consolidating disaster health competencies, and (2) developing training curricula that teach to these competencies, which they believe are intertwined and compelling, which will help overcome the demonstrated deficits in competence among health care and other professionals when responding to recent major disaster events.[11,24]

As previously stated, this review found two groups of disaster competency domains specific to paramedics: (1) General Core Competency Domains, which are suitable for all paramedics (both ALS and BLS); and (2) Specialist Core Competencies, which are deemed necessary competencies to enable a response to certain

Author/Year	Core Competency Domains	Methods
Schultz, et al[13] (2012)	1. Define all terminologies and vocabularies related to disasters. 2. Understand mass-incident systems. 3. Recognize disasters and initiate a disaster plan. 4. Communicate effectively. 5. Monitor and distribute supplies. 6. Manage volunteers. 7. Understand the purposes of all teams in a disaster response. 8. Maintain public health and safety. 9. Triage patients. 10. Participate in surge capacity procedures. 11. Identify and track patients. 12. Facilitate and transport patients. 13. Understand decontamination procedures. 14. Provide clinical care for patients. 15. Manage people with special needs. 16. Perform evacuations. 17. Execute critical thinking. 18. Adhere to medical ethics. 19. Maintain psychological support for patients and their families.	Instructional Systems Design Process and Modified Delphi Approach
Subbarao, et al[25] (2008)	1. Preparation and planning. 2. Detection and communication. 3. Incident management and support systems. 4. Safety and security. 5. Clinical and public health assessments. 6. Recovery. 7. Law and ethics.	Three-Stage Delphi Process

Horrocks © 2019 Prehospital and Disaster Medicine

Table 2. Domains of Core Competencies

types of disaster or major incident, such as CBR incidents, Hazmat incidents, humanitarian response, or those incidents that require a tactical medicine response. Reviews of the papers themselves, however, show that in fact three separate and discrete types of competency domains exist in the literature: (1) Core Competencies; (2) Technical/Clinical Competencies; and (3) Specialist Technical/Clinical Competencies. These are shown in Table 4.

With regard to the General Core Competency Domains for disaster, two papers were found. The first paper developed in 2008 is by Subbarao, et al This paper identified seven core learning domains, 19 core competencies, and 73 specific competencies.[25] Then in 2012, a large US stakeholder task force of individuals from multiple professional health organizations came together to develop national standards for the all-hazard disaster core competencies for acute care physicians, nurses, and Emergency Medical Services professionals. This resulted in a framework of 19 content categories, 19 core competencies, and more than 90 performance objectives to address the requirements of an effective all-hazard disaster response.[13] On review of the domains developed in each of the two papers, however, it is clear that the seven developed by Subbarao, et al[25] roughly align with the similar descriptions of

competencies developed by Schultz, et al[13] who have further expanded this out to 19 discrete competency domains. The following domains by Subbarao, et al[25] in Table 5 therefore, by consensus, make up the most-cited core competencies in the literature.

In their paper, Schultz, et al[13] used an instructional systems design process to guide the development of audience-appropriate competencies and performance objectives. Participants, representing multiple academic and provider organizations, used a modified Delphi approach to achieve expert consensus on recommendations. According to the authors, disaster curricula and training developed based on the core competencies and performance objectives would ensure that acute medical care personnel, including paramedics, were prepared to treat patients and address associated ramifications and consequences during any catastrophic event.[13]

The general core competencies, however, were developed as a baseline set of competencies that all health care responders to disaster and major incident should achieve. The very nature of some incidents, however, requires specialist training and competencies within a single profession. The literature showed several authors who had developed "specialist core competencies" for paramedics

Author/Year	Core Competency Domains	Methods
Peller, et al[20] (2013)	1. Austere environment. 2. Flexibility. 3. Adaptability. 4. Improvisation. 5. Self-care, physical. 6. Self-care, psychological. 7. Innovation. 8. Interpersonal relationships. 9. Communication. 10. Teamwork. 11. Sense of humor. 12. Conflict resolution. 13. Cultural competency. 14. Cognitive. 15. Big picture thinking. 16. Situational awareness. 17. Critical thinking. 18. Problem solving. 19. Creativity.	In-depth interviews were conducted with 10 Canadian DMAT members. Data were examined using thematic analysis.
Schwartz, et al[21] (2011)	1. Tactical Combat Casualty Care Methodology. 2. Remote Assessment and Rescue/Extraction. 3. Hemostasis. 4. Airway. 5. Breathing. 6. Circulation. 7. Vascular Access. 8. Medication Administration. 9. Casualty Immobilization. 10. Medical Planning. 11. Human Performance Factors/Health Surveillance. 12. Environmental Factors. 13. Explosions and Blast Injuries. 14. Injury Patterns and Evidence Preservation. 15. Hazardous Materials Management. 16. Remote/Surrogate Treatment. 17. Less Lethal Injuries. 18. Special Populations.	Modified Delphi Review.
Waeckerle, et al[22] (2001)	1. Terrorism: definition, terminology, current threat potential, current level of preparedness. 2. Event Types. 3. Index of Suspicion and Event Recognition. 4. Response Systems and Communications. 5. Key Elements of a WMD Response. 6. Personal Protection and Safety.	Iterated Instructional Design Analysis.

Table 3. Domains of Specialist Core Competencies *(continued)*

Author/Year	Core Competency Domains	Methods
Johnson, Schnepp[13] (2014)	1. (BLS) Analysis of a Hazmat/WMD incident to determine potential health hazards; 2. (BLS) Development of a plan to deliver BLS to any exposed patient within the scope of practice; 3. (BLS) Implementation of the prehospital treatment plan within the scope of practice by determining the nature of the Hazmat/WMD incident. 4. (ALS) A more detailed analysis of a Hazmat/WMD incident to determine the potential health hazards, including an assessment of health risks and identification of patients who may be candidates for advanced clinical care; 5. (ALS) The development of a plan to deliver ALS to any exposed patient within the responder's scope of practice, including identification of supplemental regional and national resources; 6. (ALS) Implementation of an enhanced prehospital treatment plan within the responder's scope of practice by determining the nature of the Hazmat/WMD incident, including an assessment of available equipment and evaluation of the need for advanced clinical care.	Developed in USA by the National Fire Protection Association Technical Committee on Hazardous Material Response Personnel.

Horrocks © 2019 Prehospital and Disaster Medicine

Table 3. *(continued).* Domains of Specialist Core Competencies
Abbreviations: ALS, Advanced Life Support; BLS, Basic Life Support; DMAT, Disaster Medical Assistance Team; Hazmat, hazardous material; WMD, weapons of mass-destruction.

Core Competencies Domains	Technical/Clinical Competencies Domains	Specialist Technical/Clinical Competencies Domains
All hazard in nature and apply across inter-professional health care groups responding to disaster. These competencies are, in general, non-technical except as they relate to the broader Public Health Disaster Management discipline.	Specific competencies that individual professional groups will need to apply as part of their discipline-specific practice when responding to disaster or major incident (ie, nursing practice or paramedic practice).	Specific competencies that individual professional groups will need to apply as part of their discipline-specific practice when responding to **certain types** of disaster or major incident (ie, tactical medicine, Hazmat, or CBR incidents). These only apply to those few trained from within the specific disciplines.

Horrocks © 2019 Prehospital and Disaster Medicine

Table 4. Discrete Types of Competency Domains
Abbreviations: CBR, chemical, biological, or radiological; Hazmat, hazardous material.

1	Austere Environment
2	Flexibility
3	Adaptability
4	Improvisation
5	Self-Care, Physical
6	Self-Care, Psychological
7	Innovation
8	Interpersonal Relationships

Horrocks © 2019 Prehospital and Disaster Medicine

Table 5. Most-Cited Competencies in the Literature

in areas such as Hazmat response, CBR, tactical medical response, and Disaster Medical Assistance Teams (DMATs).

The qualitative study by Peller, Schwartz, and Kitto[20] in 2013 was undertaken with Canadian DMAT members and looked at "non-technical" core competencies, also known as "non-clinical core competencies."[20] These are said to refer to: "A combination of cognitive and social skills, which complement knowledge and technical skills and contribute to safe performance." As part of the study, non-technical core competencies were categorized under austere skills, interpersonal skills, and cognitive skills. These skills,

according the authors, are essential to successful Disaster Medicine and Public Health Preparedness. The findings of this study established a connection between non-technical core competencies and inter-professional collaboration in DMAT activities. It also provided preliminary insights into the importance of context in developing an evidence-base for competency training in disaster response and management.[20]

The delineation between technical and non-technical competencies is an important component of this area of research. It was clear from the literature that much work has been done in other professions, such as nursing for instance, that is specific to their unique area of technical expertise. The work done, however, by Shultz, et al and Peller, Schwartz, and Kitto reflect universal core competencies that appear to cross professional boundaries by being relevant to all health responders to disasters and major incident events.

Limitations
This paper only considered papers in English language. The major studies found were largely from the United States, so therefore their relevance to paramedics and the disaster management systems of other countries is unclear. As this was a scoping review that considered both the white and grey literature, the methodologies and rigor that led to the development of some of the competency

domains is not always clear. Therefore, it was not possible to assess the quality of some of the evidence-base.

Conclusion

This scoping review has outlined the most common domains of core competencies for paramedic first responders to manage major incidents and disasters described in the literature. As the majority of research published was developed in the US, paramedics in other countries now need to engage in their own research to develop or test the relevance of these competencies in the disaster space locally. This future research needs to explore, develop, and describe the

fundamental competencies in each domain and category of competency described in this paper (core, technical, and specialist competencies).

If it is accepted that training paramedics in disaster response is an essential part of preparedness within the disaster management cycle, then by including these localized competency domains into the curriculum development of localized disaster training programs, it will better prepare the paramedic workforce's competence and ability to effectively respond to disasters and major incidents.

References

1. Sundnes, KO, Birnbaum, ML. Health disaster management guidelines for evaluation and research in the Utstein Style. *Prehosp Disaster Med*. 2012;14(S1):S84–S85.
2. Mackway-Jones, K. *Major Incident Medical Management and Support: The Practical Approach at the Scene*. Hoboken, NJ: John Wiley & Sons; 2012.
3. Bradt, DA, Abraham, K, Franks, R. A strategic plan for disaster medicine in Australasia. *Emerg Med*. 2003;15(3):271–282.
4. Australian Disaster Resilience Handbook 1: Disaster Health. Australian Institute for Disaster Resilience. Melbourne, Victoria, Australia. CC BY-NC, 2011.
5. Cronstedt, M. Prevention, preparedness, response, recovery-an outdated concept? *Australian J Emerg Management*. 2002;17(2):10.
6. FitzGerald, GJ, Aitken, P, Arbon, P, et al. A national framework for disaster health education in Australia. *Prehosp Disaster Med*. 2010;25(1):4–11.
7. Horrocks, P, Tippett, V, Aitken, P. Emergency prehospital disaster response training: what's the state of play? *Prehosp Disaster Med*. 2015;30(S1):S37.
8. Calhoun, JG, McElligott, JE, Weist, EM, Raczynski, JM. Core competencies for doctoral education in public health. *Am J Public Health*. 2012;102(1):22–29.
9. Swing, SR. Perspectives on competency-based medical education from the learning sciences. *Medical Teacher*. 2010;32(8):663–668.
10. Burkle, FM Jr, Lyznicki, JM, James, JJ. *Cross-Disciplinary Competency and Professionalization in Disaster Medicine and Public Health. Handbook for Pandemic and Mass-Casualty Planning and Response*. Amsterdam, Netherlands: IOS Press; 2012.
11. Daily, E, Williams, J. *White Paper on Identifying and Assessing Competencies in Disaster Health*. Education and Standards Committee, World Association for Disaster and Emergency Medicine (WADEM), Madison, Wisconsin, USA. 2013.
12. Harris, P, Snell, L, Talbot, M, Harden, RM. Competency-based medical education: implications for undergraduate programs. *Medical Teacher*. 2010;32(8):646–650.
13. Schultz, CH, Koenig, KL, Whiteside, M, Murray, R. Development of national standardized all-hazard disaster core competencies for acute care physicians, nurses, and EMS professionals. *Ann Emerg Med*. 2012;59(3):196–208.e191.
14. Walsh, L, Subbarao, I, Gebbie, K, et al. Core competencies for disaster medicine and public health. *Disaster Med Public Health Prep*. 2012;6(1):44–52.
15. Arksey, H, O'Malley, L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*. 2005;8(1):19–32.
16. Armstrong, R, Hall, BJ, Doyle, J, Waters, E. 'Scoping the scope' of a Cochrane review. *J Public Health*. 2011;33(1):147–150.
17. Anderson, S, Allen, P, Peckham, S, Goodwin, N. Asking the right questions: scoping studies in the commissioning of research on the organization and delivery of health services. *Health Res Policy Syst*. 2008;6:7.
18. Peters, M, Godfrey, C, Khalil, H, McInerney, P, Parker, D, Soares, C. Guidance for conducting systematic scoping reviews. *Int J Evid Based Healthc*. 2015; 13(3):141–146.
19. Johnson, K, Idzerda, L, Baras, R, et al. Competency-based standardized training for humanitarian providers: making humanitarian assistance a professional discipline. *Disaster Med Public Health Prep*. 2013;7(4):369–372.
20. Peller, J, Schwartz, B, Kitto, S. Nonclinical core competencies and effects of interprofessional teamwork in disaster and emergency response training and practice: a pilot study. *Disaster Med Public Health Prep*. 2013;7(4):395–402.
21. Schwartz, RB, McManus, JG Jr, Croushorn, J, et al. Tactical medicine—competency-based guidelines. *Prehosp Emerg Care*. 2011;15(1):67–82.
22. Waeckerle, JF, Seamans, S, Whiteside, M, et al. Executive summary: developing objectives, content, and competencies for the training of emergency medical technicians, emergency physicians, and emergency nurses to care for casualties resulting from nuclear, biological, or chemical incidents. *Ann Emerg Med*. 2001; 37(6):587–601.
23. World Association for Disaster and Emergency Medicine. *Mission & Vision*. https://wademorg/about/association-overview/. Accessed March 8, 2017.
24. Shultz, JM, Loretti, A. *White Paper on Setting Standards for Selecting a Curriculum in Disaster Health*. Education and Standards Committee, World Association for Disaster and Emergency Medicine (WADEM), Madison, Wisconsin, USA. 2013.
25. Subbarao, I, Lyznicki, JM, Hsu, EB, et al. A consensus-based educational framework and competency set for the discipline of disaster medicine and public health preparedness. *Disaster Med Public Health Prep*. 2008;2(1):57–68.