

Disaster Medicine Competencies: A Review of Paramedic Students' Curriculum

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Abstract: Disaster medicine training plays a crucial role in how paramedics act in their roles as the first line responders. Curriculum designing for paramedic training needs to take into consideration the development of the knowledge, skills, as well as critical decision making capabilities. However, a disproportionate emphasis is placed on imparting technical skills and knowledge alone, while the development of competencies may not be focused upon. This is a serious gap, as repeatedly, empirical evidence suggests that first responders are pressured into situations where they have to make crucial decisions and take life-and-death decisions. This paper, therefore, aimed to develop a holistic understanding of disaster medicine competencies needed by paramedics during disaster management. It also intended to develop a comprehensive review of curriculum for paramedic students, more specifically in the context of Australia. The research is based on a systematic review of literature and for which databases like PubMed, MedLine, Cochrane, ScienceDirect, Emerald Insight, CINAHL and Google Scholar were used. A total of 21 papers were reviewed, dating between 2005 and 2019, and analyzed using manual qualitative review. The findings indicated that there was scope for enriching curriculums by expanding core competencies and contextualizing them in the local and cultural settings, as well as enabling curriculums that support continuous learning and development.

Keywords: Disaster Medicine Competencies, Paramedic Students' Curriculum, PubMed, MedLine, Cochrane, ScienceDirect, imparting technical skills.

1. INTRODUCTION

Research Background

Paramedics play a crucial role in disaster management as first line of response. Disasters can be man made or natural, and while they may not be preventable, it is possible to reduce their impact through disaster management. Disaster management is the process that enables the coordination of diverse resources and agencies with the aim of reducing the impact of disasters by rendering emergency services like evacuation as well as medicines and healthcare. Owing to the typical nature of the disaster location, special skills and training might be needed by the emergency service providers, including the disaster medicine management personnel. Curriculum designing for such training, therefore, needs to focus on development of the knowledge, skills, as well as critical decision making capabilities.

Research Aims and Objectives

- To develop a holistic understanding of disaster medicine competencies needed by paramedics during disaster management
- To develop a comprehensive review of curriculum for paramedic students, more specifically in the context of Australia.

The following research questions will be used to guide the research:

Research Questions

1. What are the core competencies that are needed for disaster medicine management?
2. Do the existing Australian curriculums impart the core competencies to paramedic students in a sustainable and contextual manner?

Research Significance

This research endeavours to develop an exhaustive list of core competencies that may be needed for disaster medicine management, and as such to provide insights for curriculum development. The research is, therefore, significant as it expects to contribute to create disaster medicine curriculums that are more contextually relevant and suited to develop core competencies for disaster medicine management students.

2. RESEARCH METHODOLOGY

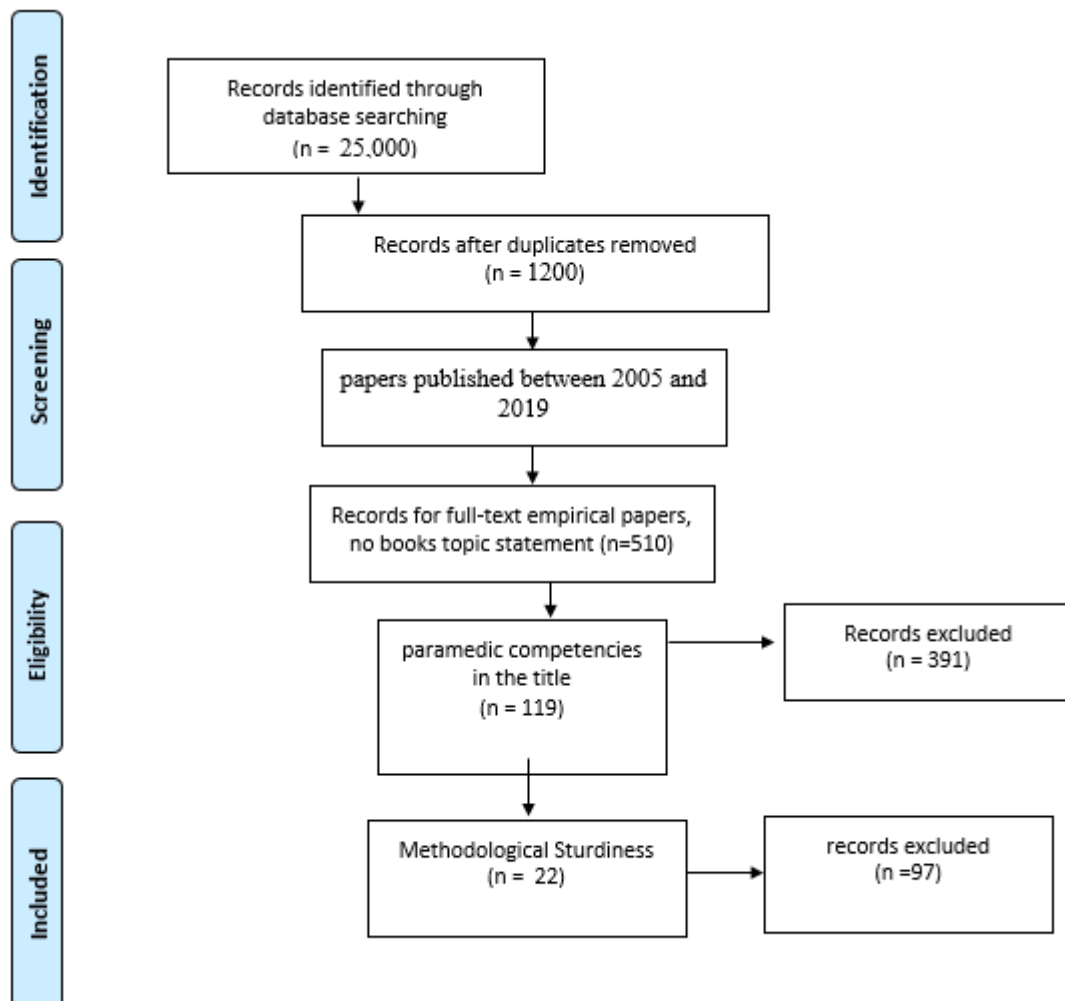
Research Methods

The research is conducted in the form of a literature survey and review, and as such, it is classified as secondary research. Secondary research enables the researcher to explore the perspective of diverse scholars on the topic and to pool information and knowledge from a variety of studies across the globe – thus yielding a rich contextual database for analysis. However, secondary research is based on historical data; it is difficult to ascertain the credibility or validity of secondary research (Creswell and Poth, 2017).

Data Collection Approach

The review of literature was conducted using the PRISMA model by first developing a set of studies that could be included in the analysis or review (Creswell and Pot, 2017). For this, initially, relevant keywords were developed to conduct a search in Google Scholar and other databases like PubMed, MedLine, Cochrane, ScienceDirect, Emerald Insight, and CINAHL.

Figure 1: PRISMA for Data Collection and Screening



International Journal of Novel Research in Healthcare and Nursing

Vol. 12, Issue 1, pp: (73-82), Month: January - April 2025, Available at: www.noveltyjournals.com

The research yielded more than 25,000 results in all, out of which 15,000 were from diverse databases and 10,000 from Google Scholar. After removing the duplicates, only 1200 papers were found.

The search results were further narrowed to the papers published between 2005 and 2019. This led to the reduction of papers to 900 in all. However, as the number of papers was still very large, the studies were further narrowed to those that contained empirical research focus only. This led to a total of 510 papers, which were further screened for paramedic competencies in the title and reduced to 119. These papers were reviewed for abstracts and methodological sturdiness and quality of discussion, and led to a final 22 number of papers to be included in the review.

Data Analysis

The studies included in the survey were read repeatedly by the researcher to extract their main findings as well as critique their methodologies. The analysis was, therefore, conducted in the form of manual qualitative review, where the summarized critiques of the studies was collated and categorized under themes which was further segregated and presented systematically and finally reviewed for similarities or differences (Creswell and Clark, 2017).

3. RESULTS FROM THE SYSTEMATIC LITERATURE REVIEW

Introduction

The review of literature starts with a discussion of the available research on core competencies required for emergency medicine management curriculum, followed by the studies that have evaluated the same from across the globe. The review's aim is to develop themes that can be used to enhance disaster medicine management course curriculums.

Core Competencies

A considerable number of studies are available that have explored core competencies using empirical evidence from paramedics and emergency assistance personnel, who are directly involved in disaster medicine management. For example, Alanazi (2012) conducted study in the context of Saudi Arabia found that there were 10 core competencies required for a paramedic. These included skills like communication, clinical, and instructional skills and ability to do critical thinking for dexterously handle the situation by conducting objective and credible assessment with complete safety knowledge. Additionally, paramedics are expected to work in teams, and accordingly, ability to perform as a team player was important while maintaining professionalism and ethical behaviour.

Boyle et al (2008) researched the performance of paramedic students who were placed with ambulance services after completing their disaster medicine management courses. The researchers found that when the students were placed to face the real situation they suffered self-doubt and couldn't perform at their optimum. And this was anticipated as a result of the lack of linkage of their courses' academic activities with real-life situations.

Another research, by Johnston, MacQuarrie, and Rae (2014), based on a quantitative survey methodology, found that the core competencies for disaster medicine management included having clinical skills, communication skills, intellectual skills, and clinical decision making skills along with the ability to make assessments based on case history and management of the scene, professionalism, personal qualities, ability to follow policies and guidelines, being self-aware, and having a learning and professional development attitude. The emergency medical management personnel are also required to know driving and have an educational background that can support their paramedic training and development. This research based its findings on close-ended survey questionnaires that were obtained from a sample of 215 respondents comprising paramedic and nursing students, paramedic tutors, academics, and technical support staff. As the research took into consideration inputs from a diverse range of respondents involved in the emergency medicine management – either as teachers or curriculum developers or students, the findings capture the concept of core competencies in an expansive manner. The opinions of both students as well as those who are involved in the curriculum development can be considered as relevant inputs. However, the research suffered from the limitation that it did not include paramedics who have experience working in the field and may have greater and practical insights about core competencies that are needed to operate as a paramedic. Also, the quantitative nature of the research means that the respondents were confined to short or multiple choice answers, that means the respondents were restricted from contributing any contextual or subjective information – which

International Journal of Novel Research in Healthcare and Nursing

Vol. 12, Issue 1, pp: (73-82), Month: January - April 2025, Available at: www.noveltyjournals.com

can be presumed as a limitation for a study that aimed at obtaining information from participants who were knowledgeable about the subject at hand.

Review of Curriculum for Disaster Medicine Management

Using an expert panel group, Alanazi (2012) developed an exhaustive review of the adaptations that may be required for adoption of the PBL curriculum in the context of the Kingdom of Saudi Arabia. Thus, the resulting findings were able to guide the development of a curriculum that was specific to Saudi Arabia, and also enabled further research into the scope of adapting curriculums from different universities to local contexts.

Among other scholars, Kuo et al (2012) have assessed the continuous professional development (CPD) needs of Emergency Medical Personnel in New Taipei City, and compared them with the provisions covered in the paramedic curriculum taught in programs. The researchers found that the curriculum that was taught was fixed and rigid and could not be adapted to provide for the varying developmental needs of paramedics who worked in different areas, like basic life support and advance life support.

Brice et al (2014) investigated the EMS (Emergency Medicine Services) curriculum in the USA and found that in order to develop a functional curriculum for emergency disaster medicine program, it is important to take into consideration the holistic body of knowledge that is needed for practice by paramedics in the field.

Cooper (2005) reviewed the curriculum for the UK paramedic training and found several inconsistencies between the theory and practice of paramedic education. O'Meara et al (2014) based their research on 40 expert participants who were involved in disaster medicine management curriculum development, teaching, or were part of the disaster medicine management services organizations and they jointly assessed the scope for expanding existing curriculums to make them more applicable to the local communities.

Another scholar, Hryciw (2009) studied the utility of using health fact sheets as part of the training of paramedic students. The health fact sheet was aimed at evaluating a students' knowledge about anatomy and physiology, as well as core competency skills like workplace skills such as emergency clinical management tasks to undertake, managing the disaster scene, working as part of a team, and enabling credible communications, as well as communicating scientific terminology and processes in a way that is understood by the general public. In the same way, Abelsson et al (2014) used a mixed methodology qualitative study approach using a group of experts, observation, as well as document evaluation to study the impact of simulation on the paramedic learning process and found that it could act as a powerful learning device in order to equip the students with a deeper understanding of the application of their learning in real life settings.

Thompson et al (2015) conducted an exhaustive document and curriculum analysis for a paramedic course in an Australian university and found that the final year syllabus needed to have a capstone education model to focus on individual students' need that could help them in rounding up their learning and aligning all their conceptual and theoretical knowledge and learning with an understanding of practical implications. This research provided useful insights about the lack of connect that the students may be facing between academic learning and practical applications.

Williams et al (2013b) used a quantitative methodology and surveyed 259 student participants from four Australian universities to explore whether students were ready for self-directed learning and found that the undergraduate paramedic students displayed substantial self-directed learning inclination, but the existing course curriculum did not incorporate this need.

In the same stream, Williams, Boyle, and Brightwell (2013a) also evaluated the paramedic students' needs for inter-professional learning by surveying 303 paramedic students from five different universities.

Teaching and Learning Approaches

Another set of studies were found to be focused on review of the curriculum as well as teaching approaches and methodologies in paramedic students' disaster medicine management courses. For example, Brown, Williams, and Lynch (2011) evaluated the Health Science students' perceptions of the learning environment in Monash University, Australia in

International Journal of Novel Research in Healthcare and Nursing

Vol. 12, Issue 1, pp: (73-82), Month: January - April 2025, Available at: www.noveltyjournals.com

terms of reality and their expectations. The researchers found that the students’ preferred learning environment differed considerably from their actual learning environment. .

Another study conducted in the same Australian university aimed at evaluating the students’ perceptions of their teachers (Ross, Williams, Fielder, and Veenstra, 2014). The study found that the students believed that their teachers were able to help them connect the theoretical content with practical life situations, thus helping students to translate their learning in a variety of contexts.

Also, some researchers have evaluated the use of CBL or case-based learning approaches to teaching. Using a quantitative survey methodology, Williams (2009) evaluated the perceptions of 247 students who were participants in CBL processes as part of their course training. They stated that CBL was enjoyable and an encouraging approach to learning.

Williams and Fowler (2014) conducted a quantitative survey of 74 students and evaluated their perceptions of the near-peer teaching program and its impact on their learning and development of core competencies. The researchers found that the students had a positive perception regarding this approach and believed that their academic performance benefited from it.

Hamilton (2008) conducted a qualitative research with an expert panel as the interviewees and assessed the current teaching and learning model employed as a pre-hospital care course in an Australian university. The research led to the development of a model of teaching that was based on information literacy and which was evaluated as contributing to the development of the core competencies in paramedics.

Researchers have also evaluated the scope of using a preparatory program for disaster medicine management courses. For example, Renkiewicz and Hubble (2015) found that a preparatory program that equipped the students with the academic and psychological skills needed for completing the disaster medicine management training was able to increase the likelihood of students completing the course by 5 times as compared to those who did not enrol in the preparatory program.

Table 1: Studies included in the Review

Research	Findings	Methodology
Boyle et al (2008)	The students suffered from self-doubt when placed in work environments, which could be traced to lack of linkages of their educational program with real life situations	Quantitative, students
Boyle, Williams and Brown (2011)	The student communication styles impacted their on job performance.	Qualitative interviews
Pullum et al (2009)	Paramedics were found to be lacking in the competencies and skills needed to meet the demands of the 21 st Century settings	Qualitative, interview of paramedics
Johnston, MacQuarrie, and Rae (2014)	Core competencies included professionalism, personal qualities, ability to follow policies and guidelines, being self-aware, and having a learning and professional development attitude.	lose-ended survey questionnaires that were obtained from a sample of 215 respondents comprising paramedic and nursing students, paramedic tutors, academics, and technical support staff
Alanazi (2012)	Need to adapt curriculums to the local context	Panel group discussion (Saudi Arabia)
Kuo et al (2012)	Need to adapt in-service curriculums that are relevant to the continuous development needs of paramedics and contain targeted skills for specific service delivery	1127 respondents’ qualitative survey approach (Tai Pei)

International Journal of Novel Research in Healthcare and Nursing

 Vol. 12, Issue 1, pp: (73-82), Month: January - April 2025, Available at: www.noveltyjournals.com

Brice et al (2014)	Curriculum that is congruent with core knowledge and provides for a delivery schedule and format that delivers specific skills and knowledge to students. Curriculum that is accompanied with specific goals and objectives, implementation strategies, and evaluation strategies.	Review of Curriculum Development Literature in the context of the USA
Cooper (2005)	Curriculum needs to be contextualized to the local societal as well as healthcare needs and equip paramedics with the skills and knowledge base needed in the local context.	Qualitative Review of Paramedic training curriculum in the context of the UK
O'Meara et al (2014)	Need to extend the curriculum's scope to make it more community relevant, but resistance expected from students due to overburden and lack of understanding for such a scope.	Qualitative Focus Group, 40 experts
Hryciw (2009)	Aim - To evaluate the utility of health fact sheet in the curriculum for disaster medicine management The health fact sheet was found to be a valuable tool of assessment for paramedics	Quantitative survey, students
Abelsson et al (2014)	To evaluate the impacts of simulation methods in paramedic teaching. The researchers found simulation to be a useful tool to enable the students to experience and apply their learning in real life settings.	Qualitative methodology – panel of experts, observation, document analysis.
Thompson et al (2015)	To explore the scope of using capstone education model for final year disaster medicine students. The research found the capstone model to be useful in providing customized and personalized training to individual students in order to meet their specific learning needs	Document analysis and review of literature
Williams et al (2013b)	To evaluate the curriculum for catering to the self-directed learning needs of paramedic students in Australian universities. The research found that the need for self-directed learning was exhibited by students, but the curriculum needed to be aligned to cater to this need.	Quantitative, students
Williams, Boyle and Brightwell (2013a)	To evaluate the curriculum for catering to the inter-professional learning needs of paramedic students in Australian universities. The research found that the need for inter-professional learning was	Quantitative, students

International Journal of Novel Research in Healthcare and Nursing

Vol. 12, Issue 1, pp: (73-82), Month: January - April 2025, Available at: www.noveltyjournals.com

	exhibited by students, but the curriculum needed to be aligned to cater to this need.	
Brown, Williams and Lynch (2011)	There was a need to align the learning environment with the students' preferred learning environment and to develop a more supportive approach to teaching, where students were encouraged to communicate in a two-way format with their teachers.	Quantitative methodology, students
Ross et al (2014)	Teachers were able to empower students to take control of their learning	Quantitative methodology Students
Williams (2009)	CBL was an effective and enjoyable approach which led to better learning outcomes	Quantitative methodology, students
Williams (2005)	CBL was found to be enjoyable by both the instructors and the paramedic students and hence expected to lead to better learning outcomes.	Literature Review
Williams and Fowler (2014)	Researchers found evidence based support to establish positive correlation between the near-peer program and academic performance	Quantitative methodology, students
Williams, Wallis and McKenna (2014)	The near-peer program was found effective in delivering mentoring and leadership skills to the students	Quantitative survey of peer teachers
Williams, Olausson, and Peterson (2015)	The researchers found that peer teaching was appreciated by the students, as it enhanced their communication skills and provided them with the experience of teaching and mentoring.	Qualitative methods, students
Hamilton (2008)	The development of a model of teaching that was more likely to deliver core competencies	Qualitative methods, panel group
Renkiewicz and Hubble (2015)	The preparatory program enhanced the likelihood of completion by 5 times and reduced drop-out rates enrolment	Mixed methodology, Students, document analysis.

4. DISCUSSION

The review of literature has led to the emergence of several themes related to the effectiveness of disaster medicine curriculums. This section, therefore, presents a discussion of the emerging themes below.

Need for Curriculums that Provide Basic Core Competencies

The literature review highlighted several studies that have explored the core competencies that are required by the disaster medicine management paramedics, and by extension, must be an essential part of their core curriculums. The available researches has reported similar findings as to the types of core competencies that are required for disaster medicine management.

The following Table 5 develops a comprehensive list of core competencies that need to be included in the disaster medicine management curriculums.

International Journal of Novel Research in Healthcare and Nursing

 Vol. 12, Issue 1, pp: (73-82), Month: January - April 2025, Available at: www.noveltyjournals.com
Table 2: List of Core Competencies

Core Competency	Alanazi, 2012	Johnston, MacQuarrie, and Rae, 2014	Boyle et al (2008)	Pullum et al, 2009
Communication	*	*	*	*
Critical thinking	*		*	
Assessment Skills	*		*	*
Safety Management Skills	*			
Scene management/Management	*	*	*	*
Clinical skills/ Clinical decision making	*	*	*	*
Professionalism / Policy/ guidelines	*	*	*	
Team approach	*			
Teaching skills	*			
Research	*			
Intellectual skills		*		
Knowledge base/ Learning and professional development/ Educational background		*	*	*
Personal qualities/ Self-awareness		*	*	*
Driving		*		

The review underscores the need for curriculum designing that is focused on the delivery of these core competencies as well as equipped to relate the academic learning with real life needs of the students.

Need for Curriculums that Support Continuous Learning and Development

Existing curriculums are found to be lacking in supporting the need for continuous development of the paramedics (Kuo et al, 2012), and the paramedics need to keep pace with new knowledge and new insights that are found in research. The theme that has emerged is, therefore, that the existing curriculums lack the flexibility to be dynamic and do not evolve with time, which makes the students' development restrictive and limited.

Need for Curriculums that Adapt to the Local Health Needs and Cultural Sensitivities

Besides, there is evidence that standardized curriculums are deployed across the globe in institutes that want to develop their disaster management courses, but research indicates that there is a need to modify and adapt standardized curriculums to the local sensitivities.

Need for Curriculums that Employ Range of Teaching and Learning Tools and Methods

The research highlighted the fact that different studies have provided evidence to support the use of different tools and methods for teaching core competencies in disaster medicine management curriculums. So, the review of literature did lead to the theme that using different tools and methods can be helpful.

Need for Curriculums that are Supported by Suitable Pedagogy

Research has also indicated that the effectiveness of the curriculum may depend upon the teaching approach like teachers that can provide practical hands-on guidance and support in addition to delivering lecture content are likely to encourage students to perform better in their studies (Ross et al, 2013).

5. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The research was successfully concluded and the answers for the two research questions were provided adequately. The first research question, "What are the core competencies that are needed for disaster medicine management?" was answered by presenting an exhaustive list of core competencies as follows:

International Journal of Novel Research in Healthcare and Nursing

 Vol. 12, Issue 1, pp: (73-82), Month: January - April 2025, Available at: www.noveltyjournals.com
Table 3: Core Competencies

Core Competency
Communication
Critical thinking
Assessment Skills
Safety Management Skills
Scene management/Management
Clinical skills/ Clinical decision making
Professionalism / Policy/ guidelines
Team approach
Teaching skills
Research
Intellectual skills
Knowledge base/ Learning and professional development/ Educational background
Personal qualities/ Self-awareness
Driving

In response to the second research question, “*Do the existing international curriculums impart the core competencies to paramedic students?*”, the research found the existing curriculums to be lacking in several areas including not just adequate implementation of core competencies and skills, but also in their lack of contextual and cultural relevance. Moreover, existing curriculums do not provide for continuous learning and development scope.

Owing to the above conclusions drawn from the literature review findings, the following set of recommendations are made:

Recommendations

Based on the literature view and all the studies, it is recommended to refurbish the present curriculum with all the themes that are discussed above. Those are:

- *Need for Curriculums that Provide Basic Core Competencies*
- *Need for Curriculums that Support Continuous Learning and Development*
- *Need for Curriculums that Adapt to the Local Health Needs and Cultural Sensitivities*
- *Need for Curriculums that Employ Range of Teaching and Learning Tools and Methods*
- *Need for Curriculums that are Supported by Suitable Pedagogy*

These themes will prove to be beneficial for the paramedics’ students for the upliftment of their performance in real-life situations. So, these have to be a part of the curriculum of disaster management courses.

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