

Skill and Knowledge of Prehospital Care Competency of Emergency and Trauma Department Personnel: A Systematic Review

Mohd. Said Nurumal¹, Thandar Soe Sumaiyah Jamaludin^{2*}, Muhammad Lutfi Abd Talib³, Muhammad Kamil Che Hasan², Mohd Khairul Zul Hasymi Firdaus², Resti Yulianti Sutrisno⁴

¹Department of Critical Care Nursing, Kulliyyah of Nursing, International Islamic University Malaysia, Kuantan, Pahang.

²Department of Medical Surgical Nursing, Kulliyyah of Nursing, International Islamic University Malaysia, Kuantan, Pahang.

³Sunway Medical Centre, Subang Jaya, Selangor.

⁴Department of Medical Surgical Nursing, School of Nursing, Universitas Muhammadiyah Yogyakarta, Indonesia.

ABSTRACT

Pre-hospital care is among the critical components in the healthcare delivery system. The effectiveness of pre-hospital performance relies very much on the competency of the personnel specifically the knowledge, skills, and attitude of the personnel to provide care at the scene, and during transport to a definitive care centre. Thus, sufficient knowledge and skills in prehospital care are important to ensure the high effectiveness of prehospital care. This study aims to review the available previous literature related to skills and knowledge of prehospital care competency among the healthcare personnel of the Emergency and Trauma Department. A systematic review was conducted with twenty-one articles. The articles were searched systematically by using the PRISMA 2020 framework and the PICO and PICOS frameworks were used for study selection. Three are two themes that emerge in this study: pre-hospital care and pre-hospital care competency. Pre-hospital competency of the healthcare personnel of the emergency and trauma department enables early advanced care across a range of disciplines. Thus, the healthcare personnel of the Emergency and Trauma Department should equip with the essential knowledge and skills of prehospital care but because of different settings and factors beyond their control, the knowledge and skills are often affected.

Keywords: Prehospital care, Skill, Knowledge, Competency

*Corresponding author

Sumaiyah Thandar Soe Jamaludin
Department of Medical Surgical Nursing,
Kulliyyah of Nursing,
International Islamic University Malaysia,
Jalan Sultan Ahmad Shah, Bandar Indera Mahkota,
25200 Kuantan, Pahang, Malaysia.
Email: sumaiyah@iiu.edu.my

Article History:

Submitted: 2 November 2022
Accepted: 27 November 2022
Published: 30 November 2022

DOI: 10.31436/ijcs.v5i3.280
ISSN: 2600-898X

INTRODUCTION

Pre-hospital care is among the critical components of the healthcare delivery system. It is defined as emergency medical care given to patients before they arrived in the hospital after the activation of emergency medical services by either bystanders or prehospital care personnel (1). Prehospital care plays a vital role in saving one's life as timely and adequate management including quick referral of the trauma patient to a designated trauma centre may limit the occurrence of secondary injury and may improve the patient's outcomes during the transfer process (2).

In Malaysia, prehospital care services are managed by the emergency departments of the hospitals and a universal system or '999' system that was begun in 2008 helps to dispatch the ambulances from the hospital to the scene. Only one tier of the three levels of training and skills is available in Malaysia that is the third tier consisted of advanced life support level or paramedic or emergency nurses for prehospital care while the other two tiers of Emergency Medical System (EMS) system are still in development (3). As of November 26, 2020, according to the Department of Statistic Malaysia (2020), ischemic heart disease is the major cause of mortality in Malaysia followed by pneumonia, cerebrovascular diseases, transport accident and malignant neoplasm of trachea, bronchus, and lung with the percentage of 15%, 12.2%, 8.0%, 3.8% and 2.4% respectively. These major causes of mortality such as ischemic heart disease and transport accident are time-sensitive illness that requires fast intervention and effective management of prehospital care from the place of accident to a definitive treatment facility. Many prehospital deaths can be avoided if the victim receives immediate and appropriate care.

The effectiveness of pre-hospital performance relies very much on the competency of the personnel specifically the knowledge, skills and attitude of the personnel to provide care at the scene, and during transport to a definitive care centre (3). The competency of prehospital care nurses stated that the major changes and development of care require adaptation of the competency regarding on-scene care, care during transportation and the care towards the

patient with time-critical conditions and the high competency of personnel might contribute to prehospital care improvement (4). Therefore, a high level of competency especially in the context of skills and knowledge on prehospital care of prehospital care personnel is believed to contribute to the high efficacy rate of successfulness of the prehospital care system which can lower the mortality rate caused by the exacerbation of disease or complication on-scene or during transportation to the hospital. Thus, this literature review aims to describe the review of previous literature as well as the exploration of previous findings that have been conducted in the area of skills and knowledge of prehospital care competency among emergency care personnel. The authors believe that reviewing previous literature, will gain a better understanding and insight into the related area and expand the knowledge of prehospital care including the skills and knowledge of the prehospital personnel for future study.

METHODS

A systematic review of primary sources from the databases was carried out. Qualitative and quantitative research articles and mixed-method approaches are taken into consideration to maximize the exploration of the study topic of this review.

Data sources and search strategies

In this literature review, a few databases were used to aid in helping to search the related article on the research interest area. Google Scholar is the main search database used alongside Cochrane Library and Science Direct. Keywords are used to find suitable and reliable articles that will lead to more findings and themes for the study topic. Among the keywords used are prehospital care, competency, skill, and knowledge.

Selection criterion

There are a few inclusions and exclusions criteria that were developed in order to filter and help choose the best articles to be reviewed.

The inclusion criteria include prehospital care only, dated between 2014 to 2021 and articles that are in English language only. The exclusion criteria in the search strategies are articles dated older than 2014, articles that are in a different language other than the English language and to exclude grey materials and unpublished research articles. PICOS framework is also used in order to create clear questions and to identify the information needed to refine and develop the search approach.

Table 1: PICO framework for quantitative and RCT studies

PICo element	Inclusion criteria for review
Population	Prehospital care personnel include paramedics, nurses, and physicians
Interest	Prehospital care competency
Context	Skill and knowledge

Table 2: PICOS framework for qualitative studies

PICo element	Inclusion criteria for review
Population	Prehospital care personnel including nurses, medical assistant (MA/AMO), physician, paramedic and assistant paramedic.
Intervention	Simulation, assessment of knowledge and skills of prehospital care personnel
Control/Comparison	Before and After
Outcomes	Competency of prehospital care personnel
Study design	Cross-sectional Intervention Action-research Qualitative or quantitative

Data Extraction and Search Outcomes

All information and available data regarding the competency of prehospital care personnel were extracted from the literature. The main outcomes are to look at the skills and knowledge of the prehospital care personnel on

prehospital care competency. All data were extracted from the articles including the research subject, the measure used to assess the skills and knowledge of the skills and knowledge of prehospital care personnel and the result of the findings and the association of it with any variables. Three thousand eight hundred and eighteen articles were identified from the electronic databases. A hundred articles were selected for eligibility and finally, twenty-one articles were included and reports their findings in this review.

Quality Appraisal and Assessment Studies

In this systematic review of literature research, the articles are assessed using the Joanna Briggs Institute (JBI) critical appraisal tools for qualitative and randomized controlled trials to assess the trustworthiness, relevance, and results of the published papers. The tools addressed clear focused questions regarding the methods used including:

- the criteria for inclusion in the sample used
- the detailed explanation of study subjects and settings
- the appropriate statistical analysis used and the measurement of outcomes in a valid and reliable way

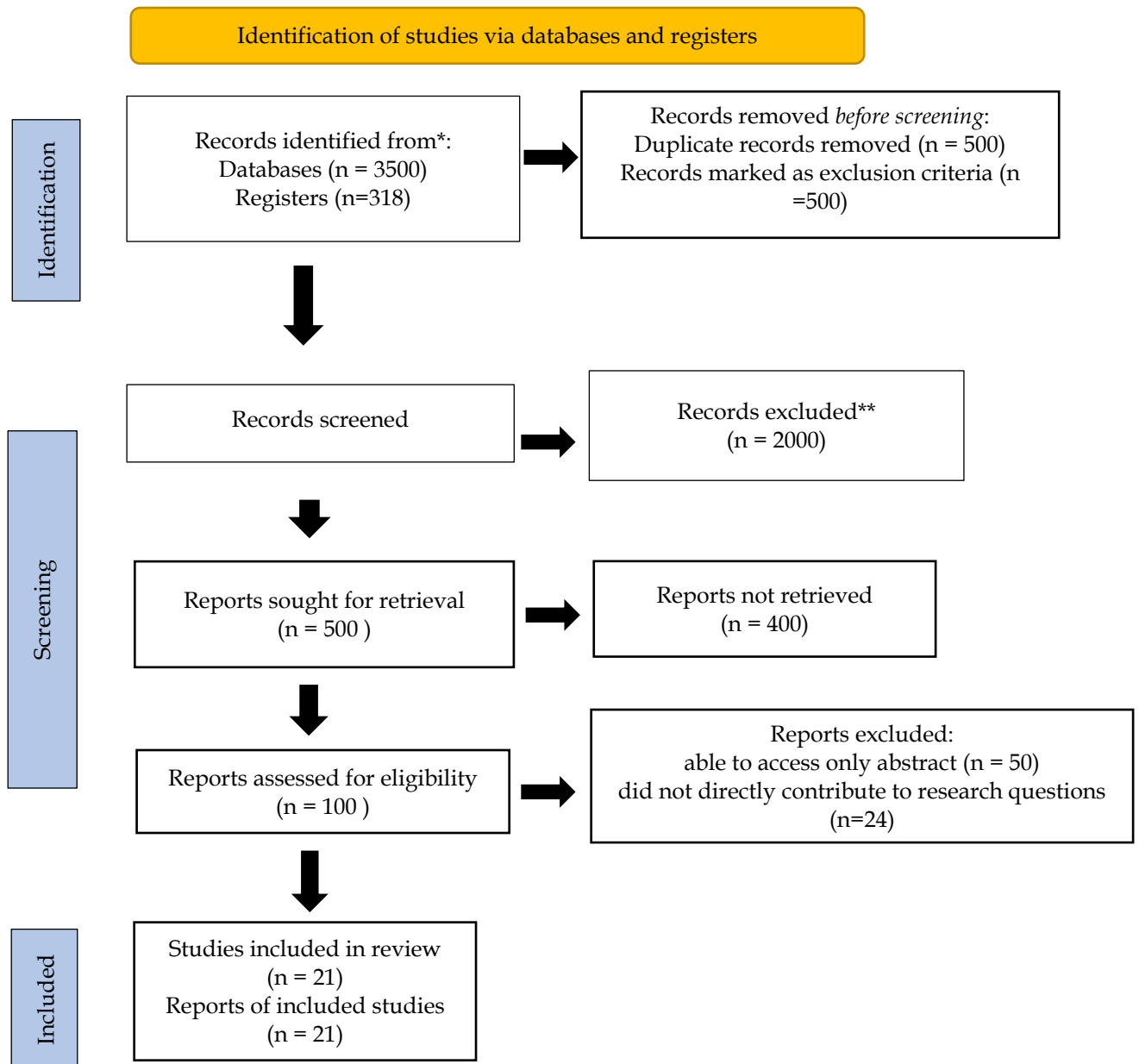
Data extraction and Synthesis

Finalized selected articles were synthesized in a table according to the author, country and date of publication, the objective of the study, the population used in the research, study design, sample size with sampling method, data collection instruments, key findings with my remarks on the articles. The review process was done by two authors independently. The appraised articles were included in this review if both reviewers agreed. If the two reviewers disagreed, a third reviewer would be invited to appraise the article. Finally, twenty-one articles have remained in this literature review. The data extraction table is tabulated in Table in the Appendix.

RESULTS

Twenty-one research articles had been chosen to be used as guidance and reference throughout this study. Five out of 21 articles are research that was designed by using qualitative method and 13 out of the 21 articles chosen are

Figure 1: The review process using PRISMA 2020



research that used quantitative method while the rest of the articles was designed by using mixed-method approaches. The majority of the articles and research took place in Sweden which makes up 6 articles out of 21 articles chosen and to the knowledge extension and findings of the researcher, the research on the competency of prehospital care personnel in Asia is next to nothing as there are only a few articles that had been found and as for Malaysia. Two themes emerge in this study. Those are pre-hospital care and competency of pre-hospital care.

Pre-hospital care

A study done among the Klang Valley prehospital care personnel in Malaysia showed that the Emergency Medical Service (EMS) personnel have adequate knowledge and skills regarding alert in an emergency, examining the scene and examining the patient (3). However, the required knowledge and skills for invasive procedures such as drug administration is still lacking. A descriptive cross-sectional study was carried out at the National Hospital of Sri Lanka by Gangadevi Nandasena and Chrishanta Abeysena to assess the knowledge, attitudes and skills of doctors, nurses and emergency technicians in pre-hospital care and emergency medicine (5). A self-administered questionnaire was used to assess the knowledge, skills, practices and attitudes of the major medical staff. The knowledge was categorized into three levels, Emergency Medical Technician (EMT) level one or basic level, EMT level two or intermediate level and EMT level three or paramedic level. At a basic level, the content areas were knowledge and skill of triage, transporting patients, basic life support, first aid, airway management at the primary level, administration of oxygen, spinal immobilization, splinting, traction splinting and bleeding control. The intermediate level includes intravenous therapy, endotracheal intubation and initial cardiac drug therapy. The content area for EMT level three includes Electrocardiogram (ECG) interpretation, advanced respiratory support, airway skills, pharmacology, trauma resuscitation, pediatric life support and advanced cardiac life support. The scores then were converted into percentages. The results of the knowledge are 57.5%, 42.9% and 33.9% respectively from basic, intermediate and paramedic levels (5). The

authors also added that from all the content and components of knowledge, pediatric life support and pharmacology show very poor knowledge among major medical staff. However, the knowledge of doctors was slightly better than the other two categories. For the skills, there are some areas where the performance was poor such as cricothyroidotomy, pleural drainage, laryngoscopy, and intubation.

Another research was carried out on the perceived knowledge, attitude, and practice of ambulance nurses in prehospital care in Malang, Indonesia (6). The instruments used by the author originated from a previous study and modifications were made to suit the Indonesian practice. The modification resulted in a total of 41 Likert-scale questions, 13 for knowledge, 20 for attitude and 8 for practice. The modified questions were also tested in a pilot study and had high internal consistency. A total number of 465 participants were included in the study. The result of the study shows that the participants' attitude scores were the highest compared to the participant's knowledge and practice scores.

A study found that the overall response rates were: EMTs 43 % (n = 399), Paramedics and APs 43 % (n = 789), with 82 % of Paramedics and Advanced Paramedics (APs) and 38 % of Paramedics participating (7). The majority of participants in all groups agreed that registration was of personal importance and that evidence of Continuous Professional Competence (CPC) should be maintained; 39 % of Paramedics/APs and 78 % of EMTs believed that persistent failure to meet CPC requirements should mandate denial of registration. From a pre-determined list of activities, in excess of 88 % of all respondents indicated practical training scenarios, cardiac re-certification, e-learning supplemented by related practice, and training with simulation manikins were most relevant to these roles. However, least relevant to them were: e-learning alone (Paramedic/AP 36 %; EMT 35 %); project work (Paramedic/APs 27 %; EMT 48 %); and appraisal of journal articles (Paramedic/AP 24 %; EMT 39 %).

Competency of pre-hospital care

A quantitative design with a cross-sectional descriptive design, conducted in the context of

a simulation exercise was done in Sweden to examine the actual individual competence among ambulance nurses in prehospital emergency care practice and individual perception of trauma care knowledge, skills, experience, and training (8). A total of 63 ambulance nurses participates in the study with 29 females and 37 males. The authors also evaluate the competency by the means of simulation using the Global Rating Scales (GRS) and evaluate the participants' perceived skills and knowledge using the questionnaire after the simulation evaluation. In the study, the ambulance nurses self-rated perceptions of having sufficient theoretical and practical knowledge and skills of prehospital care with the actual competence evaluation by the means of simulation show discrepancy. The self-perceived questionnaire scores higher than the actual competency.

In a study carried out in Europe, they designed a competency course consisting of 10 domains (9). These are as follows: threat identification; health effects of chemical, biological, radiological and nuclear (CBRN) agents; planning; hospital incident command system; information management; safety, personal protective equipment and decontamination; medical management; essential resources; psychological support; and ethical considerations. Expected competencies for each domain were defined and a blended approach was chosen. By identifying a set of core competencies, their study aimed to provide the specific knowledge and skills required by medical staff to respond to CBRN emergencies. They found that a blended approach may be a suitable delivery method, allowing medical staff to attend the same training sessions despite different time zones and locations. Their study output provides a CBRN training scheme that may be adapted and used at the European Union level.

A study found that prehospital emergency nurses with ((traffic and pedestrians and lack of motivation to update their professional knowledge)) as barriers to efficient professionals agree completely (10). Therefore, managers need to reduce barriers that affect the effectiveness of professional nurses through the necessary consultations with policymakers and transport authorities and municipalities. Besides, their study also suggests that nurses'

moral distress is at the city's average level. The need to pay more attention to the authorities to implement strategies and solutions towards preventing and mitigating factors in distress and demands (11). Due to the significant relationship between moral distress and job satisfaction and considering the fact that awareness of the job satisfaction of nurses can provide important information for the management of pre-hospital emergency management planning so authorities should seek ways to reduce the distress morally (12).

DISCUSSION

Education and training are key elements of health system preparedness in the healthcare delivery system. This systematic literature review presents the previous studies on the skills and knowledge of prehospital care among the competency of emergency and trauma department personnel. The discussion will be based on the two themes identified in this review.

Prehospital care

Pre-hospital care is among the critical components of the healthcare delivery system. It is defined as emergency medical care given to patients before their arrival at in hospital after the activation of emergency medical services by either bystanders or prehospital care personnel (13 & 14). Prehospital care plays a vital role in saving one's life as timely and adequate management including quick referral of the trauma patient to a designated trauma centre may limit the occurrence of secondary injury and may improve the patient's outcomes during the transfer process (2). The relationship between gender and competency namely the skills and knowledge are of interest to the researcher when doing the competency research. Similar results from previous studies of prehospital care nurses, the self-reported competency of 500 nurses show that men scored higher than women in competence areas of medical technical Care and Care Environments Serious Events. Meanwhile, women scored higher in Nursing Care and Value-based Nursing Care (15 & 16).

A study also highlighted that the current practices to appropriately educate EMS providers on the novel coronavirus may not be sufficient, and families of providers and the future patient may benefit from a nationally

established EMS response protocol that complements or supersedes the recommendation of the current Interim Guidance by the centre for disease centre (CDC) (17). Thus, prehospital care is vital for the care provider and care receiver.

Competency of prehospital care

The competency of prehospital care is always continuing to be of interest to researchers in order to implement the necessary requirements to deliver better healthcare. A qualitative study reported it is necessary to assess and report the outcomes and processes of medical response and performance as assessments can improve the emergency medical response (18). Prehospital care is regarded as a significant part of a patient's total care and therefore, the prehospital care staff must have the same level of competence as staff working in hospitals who wrote about the competency in research that develops and validate the ambulance nurse competence scale (19).

When comparing the participants' self-rated perception of having sufficient theoretical knowledge and skills knowledge skills and practical knowledge and skills for trauma care to the actual competence observed during the simulation exercise, the two results suggest a discrepancy (20). If the prehospital care is improved, only then, a better health outcome can be manifested. A study also revealed that it is only once the resulting prehospital care improvements begin to manifest, that more advanced trauma centres can change health outcomes (21). A higher level of education does not have any association with the competency of prehospital care; however, a higher level of education is found to improve the cognitive abilities of the participants. (15). In another research stated that the emergency-related training courses undertaken by the participants in their study had enhanced their knowledge and skills in prehospital care (6).

A study described that nurse with more than three years of experience in ambulance services scored significantly higher in competence (15). Prehospital care personnel competency is among the least discussed and studied among all the healthcare delivery systems. The need to do research on prehospital care competency was highlighted by a few researchers in the literature review as studies stated that there is

a paucity of research conducted with pre-hospital practitioners and there is a need to do and develop more research regarding the prehospital care personnel's competency (21 & 22). The gap in their studies is to resolve the issue of pre-hospital care competency which is the research findings on the competency are outdated. The need to follow up on the results of research competencies is necessary to know whether it is up to date with the guidelines and to implement necessary changes if indicated (23-25). In the local settings of Malaysia, the research on prehospital care competency is mainly focused on the setting of Klang Valley meanwhile in other parts, the research on prehospital care competency among prehospital care personnel is not yet been developed.

CONCLUSION

This study's findings evidence that most of the previous research is done outside Malaysia and the local context regarding the research is still lacking, there is no research on prehospital care ever recorded yet. The lack of research on local context needs to be addressed and research to assess the knowledge and skills of local prehospital care personnel need to be evaluated to provide better and appropriate care to a person until a person is delivered to a primary health care team and facilities. Hence, research to evaluate the skills and knowledge of the prehospital care personnel should be carried out. This, however, must include the nurses although they are not dispatched to the scenes to not only investigate their skills and knowledge as a primary health team, it is to also evaluate their readiness in case they are to be dispatched to the scene. Having an excellent prehospital care team competent in handling all types of cases, both trauma and non-trauma will ensure the incident of out-hospital cardiac arrest will be dropped drastically within our covered area.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

ACKNOWLEDGEMENT

We would like to thank the SULTAN AHMAD SHAH MEDICAL CENTRE @IIUM (SRG21-044-0044) for sponsoring this project.

REFERENCES

1. Wilson MH, Habig K, Wright C, Hughes A, Davies G & Imray C H. Pre-hospital emergency medicine. *The Lancet*. 2015; 386(10012), 2526-2534.
2. Maegele M. Prehospital care for multiple trauma patients in Germany. Chinese Medical Journals Publishing House Co., Ltd. 42 Dongsi Xidajie. 2015; 18, 125-134.
3. Nurumal MS, Sukonthasarn A, Wangsrikhun S & Chanpransit C. Assessing and exploring the competency of prehospital emergency medical service personnel in Klang Valley, Malaysia: A mixed method approach. *International Medical Journal Malaysia*. 2014; 13(2), 7-20. <https://doi.org/10.31436/imjm.v13i2.472>.
4. Jansson J, Josse Eklund A, Larsson M & Nilsson J. Prehospital care nurses' self reported competence: A cross-sectional study. *International Emergency Nursing*. 2020; 52. <https://doi.org/10.1016/j.ienj.2020.100896>
5. Araújo FDP, Brito OD, de Sousa Lima MM, Nelson Miguel Galindo N, Caetano JÁ & Barros LM. Assessment of the quality of life of prehospital care nursing professionals. *Revista Brasileira de Medicina do Trabalho*. 2018; 16(3), 312.
6. Suryanto PV & Boyle M. Knowledge, attitude, and practice of ambulance nurses in prehospital care in Malang, Indonesia. *Australasian Emergency Care*. 2018; 21(1), 8-12. <https://doi.org/10.1016/j.auec.2017.12.00>.
7. Knox S, Cullen W & Dunne CP. A national study of Continuous Professional Competence (CPC) amongst pre-hospital practitioners. *BMC Health Services Research*. 2015; 15(1), 1-10. <https://doi.org/10.1186/s12913-015-1197-1>
8. Abellsson A, Rystedt I, Suserud BO & Lindwall L. Mapping the use of simulation in prehospital care-a literature review. *Scandinavian journal of trauma, resuscitation and emergency medicine*. 2014; 22(1), 1-12.
9. Djalali A, Della Corte F, Segond F, Metzger MH, Gabilly L, Grieger F & Arnod-Prin P. TIER competency-based training course for the first receivers of CBRN casualties: a European perspective. *European journal of emergency medicine*. 2017; 24(5), 371-376.
10. Rahimzadeh M, Zafarnia N, Borhani F, Malekian L, Delshad V & Borzouei S. Barriers professional competence and its relationship with job satisfaction of nurses' moral distress and pre-hospital emergency city of Bam and Jiroft in 1393. *Int J Med Res Health Sci*. 2016; 5(5), 47-51.
11. Dehghannezhad J, Rahmani F, Rajaei Ghafouri R, Hassankhani H, Dadashzadeh A & Damanabad ZH. Promotion of knowledge, skill, and performance of emergency medical technicians in prehospital care of traumatic patients: An action-research study. *Archives of Trauma Research*. 2020; 9 (2), 81-86.
12. Kanizsai P, Molnár G, Sztudva R, Berényi T & Hornyák I. Does level of training predetermine the success rate of prehospital sepsis assessment? A prospective survey on early recognition. *Developments in Health Sciences*. 2018; 1(2), 33-38. <https://doi.org/10.1556/2066.2.2018.12>
13. Nilsson J, Johansson S, Nordström G & Wilde-Larsson B. Development and Validation of the Ambulance Nurse Competence Scale. *Journal of Emergency Nursing*. 2020; 46(1), 34-43. <https://doi.org/10.1016/j.jen.2019.07.019>
14. Knox S, Walter C & Colum PD. A national study of continuous Professional Competence (CPC) amongst pre-hospital practitioners. *BMC Health Services Research*. 2015; 15:532. DOI 10.1186/s12913-015-1197-1.
15. Jansson J, Josse E A, Larsson M & Nilsson J. Prehospital care nurses' self-reported competence: A cross-sectional study. *International Emergency Nursing*. 2020; 52. <https://doi.org/10.1016/j.ienj.2020.100896>
16. Vyas D, Hollis M, Abraham R, Rustagi N, Chandra S, Malhotra A, Rajpurohit V, Purohit H & Pal R. Prehospital care training in a rapidly developing economy: A multi-institutional study. *Journal of Surgical Research*. 2016; 203(1), 22-27. <https://doi.org/10.1016/j.jss.2016.03.026>
17. Gibson C, Ventura C & Collier GD. Emergency Medical Services resource capacity and competency amid COVID-19 in the United States: preliminary findings from a national survey. *Heliyon*. 2020; 6(5), e03900.
18. Sorani M, Tourani S, Khankeh HR & Panahi S. Prehospital emergency medical

- services challenges in disaster; a qualitative study. *Emergency*. 2018; 6(1).
19. Nilsson J, Johansson S, Nordström G & Wilde-Larsson B. Development and validation of the ambulance nurse competence scale. *Journal of emergency nursing*. 2020; 46(1), 34-43.
 20. Berger JD, Kuszajewski M, Borghese C & Muckler VC. A quality improvement project using high-fidelity simulation training to improve clinical knowledge among critical care transport nurses. *Clinical simulation in Nursing*. 2018; 14, 54-60.
 21. Mäkinen M, Haavisto E, Lindström V, Brolin K & Castren M. Finnish and Swedish prehospital emergency care providers' knowledge and attitudes towards pressure ulcer prevention. *International Emergency Nursing*. 2021; 55, 100873.
 22. Sjölin H, Lindström V, Vicente V, Hult H, Ringsted C & Kurland L. Prehospital emergency nurses' experiences of care in critical incidents. *International Emergency Nursing*. 202; 51, 100890.
 23. Leggio WJ, Miller MG & Panchal AR. Advanced placement paramedic education for health care professionals: A descriptive evaluation. *Journal of emergency nursing*. 2020; 46(1), 44-50.
 24. Uhm D, Jung G, Yun Y, Lee Y & Lim C. Factors affecting the disaster response competency of emergency medical technicians in South Korea. *Asian Nursing Research*. 2019; 13(4), 264-269.
 25. Luckey-Smith K, High K & Cole E. Effectiveness of surgical airway training laboratory and assessment of skill and knowledge fade in surgical airway establishment among prehospital providers. *Air Medical Journal*. 2020; 39(5), 369-373.

Table 1: Critical Review Table for the Included studies

No	AUTHOR/ YEAR	OBJECTIVE	POPULATION	RESEARCH DESIGN	INSTRUMENT	FINDINGS	REMARKS (CRITIQUE)
1	Shane Knox, Walter Cullen and Colum P. Dunne 2015	-to identify attitudes towards continuous professional competence (CPC) and factors that might influence such a framework.	-registered emergency medical technician (EMT) (n=925), registered paramedics and advanced paramedics (AP) (n=1816)	Qualitative research and quantitative analyses were performed-	questionnaire/ survey questions via Survey Monkey™	<p>the majority of the participants agreed that registration to a CPC was of personal importance and that CPC should be maintained.</p> <p>-88% of the participants agreed that from the pre-determined list of activities of CPC, practical training scenarios, cardiac re-certification, e-learning supplemented by related practice and training with simulation manikins were most relevant to these roles.</p> <p>-the mandatory nature CPC had influenced the nurses in pursuing education.</p> <p>-those professional bodies utilising compulsory or mixed policies with respect to continuous professional development (CPD) were likely to be promoting CPD as a means of maintaining competence.</p> <p>-there is paucity of research conducted with registered pre-hospital practitioners in Ireland and there is evidence of the need for pre-hospital practitioners maintaining competence in other ambulance 2services internationally.</p>	<p>-the method is appropriate.</p> <p>-the questionnaire was piloted, analysed, trialled and finalised and those who were involved were excluded from the survey.</p> <p>-it highlights the Continuous professional Competence (CPC) framework that in my personal point of view it is still unknown to Malaysia, and it should be adapted to our country as the requirement is linked to a set of professional competencies associated with the profession and as it might exist a relationship between competency and the imbueement of CPD/CPC.</p>
2	Djalali et al., 2017	-to determine which competencies are needed by hospital staff when responding to chemical, biological, radiological, and nuclear (CBRN) emergencies, to define	-medical staff at ED, OR and ICU, supportive staff, administrative staff, EMS staffs.	-qualitative study- phenomenology	-designed using a modified Delphi method, with no open-ended questionnaires in the first round; instead, a list of main domains and competencies was	<p>-competence and involvement of frontline medical personnel are unsatisfactorily low in Europe and it is suggested that training efforts be focused on medical first respondents.</p> <p>-education and training are key elements of disaster preparedness and if it is inadequate, emergency respondents</p>	-this research is mainly focusing on CBRN and not focusing generally on prehospital care. However, the argument and the integration of participant that range between in-hospital and out-of hospital staffs are useful as it compares the knowledge and skills between the two.

		educational needs to develop these competencies and to implement a suitable delivery method.			compiled and then submitted to the participants.	cannot reasonably be expected to attain the requisite competency standards.	-this study might and/or might not help fully in intended research.
3	Rahimzadeh, Zafarnia, Borhani, Malekian Delshad & Borzouei. (2016)	-to determine the effectiveness of professional barriers and its relation to moral distress and job satisfaction. -to provide effective solutions in order to increase the satisfaction of pre-hospital emergency.	-90 nurses working in pre-hospital emergency in the city of Bam and Jiroft in 1393 with at least a bachelor's degree and at least a year in pre-hospital emergency care in the city of Bam and Jiroft.	-quantitative correlational research	-questionnaire	-the result of this research shows that traffic and pedestrians, lack of motivation to update their professional knowledge are barriers for the nurses to be efficiently professional. -managers need to reduce the barriers that effect their effectiveness of professional nurses such as necessary consultations with policymakers and transport authorities and municipalities. -custodians of nursing education should be tailored to the job training provided and must look for ways to encourage staff to update their knowledge in the field. -the authorities need to pay more attention to implement strategies and solutions towards preventing and mitigating factors in distress and demand.	-the method is appropriate. -the inclusion criteria are clear. -the research papers is a bit hard to understand due to the confusion of English words used. -no conflict of interest reported.
4	Kanizsai et al., 2018	-to assess the extent to which sepsis is recognized as an emergent process in the pre-hospital care among caretakers of different level of training by comparing the physician skills with paramedics and paramedic assistant skills and also to look into the treatment and disposition of patients with different severities of sepsis by different providers.	-120 of prehospital personnel consisted of inexperienced paramedic assistant, trained paramedic assistants, nurses, BsC nurses, paramedics, general physicians, emergency medicine specialists and others.	-quantitative-descriptive	-an internet-based questionnaire	-it seems that in prehospital care, sepsis is now a potentially recognised condition by the paramedics, but the knowledge of other staffs who are dealing with patients out of the hospital still need significant improvement, which is in accordance with previous finding. -a systematic approach might overcome the difficulties resulting from the lack of knowledge and lack of adequate tools in acute care, but we surely need more training to understand the pathophysiology, early recognition, treatment, and rehabilitation of those who are at risk or suffering with the disease. -the authors believe that teaching alongside with workshops and hands-on experience will improve the early recognition and early treatment of sepsis.	-the method is appropriate, no bias was stated or shown, and the correct population was used in this study.

5	Araújo et al., 2018	-to investigate the quality of life of prehospital care nursing professionals.	-Servico de Atendimento Movel de Urgencia /9SAMU) nursing professionals (n=17) that has been working at least 6 months with SAMU.	-cross-sectional descriptive study with quantitative approach	-two instruments: the Flanagan scale and the WHOQOL instrument.	-the results evidenced poor quality of life in the physical health and environment domains. -health managers and organizations representing nursing professionals should permanently seek to assess the impact of quality of life and stress on these workers' satisfaction to formulate measures to solve the aforementioned problems. The authors suggest for future studies to analyze the satisfaction of prehospital care nursing staff in all the Brazillian states to provide a broad-scope and trustworthy picture of the poor quality of life of prehospital care professionals in each Brazillian region.	-stated in the research, as limitations, the present study only included the nursing staff, resulting in a small sample size and it was conducted at one single prehospital care service, which prevents generalizing of the information.
6	Dehghannezhad, Rahmani, Rajaei Ghafour, Hassankhani, Dadashzadeh& Damanabad. (2020).	-to improve knowledge, skills and performance of medical emergency staff in providing care for trauma patients so that with such approach, the upcoming issues would be addressed and resolved, and the quality of service provided to trauma patients would improve.	-target group: Tabriz Prehospital Emergency Center -sample size: n=115 -inclusion criteria: working in prehospital emergency services. Having at least 1-year clinical work experience. -exclusion criteria: physical and psychological problems.	-action-research study -quantitative descriptive -mixed method	-questionnaire and simulation.	-the EMT basic staff knowledge is medium level and intermediate and paramedic personnel knowledge is medium to low. -participation of majority of beneficiaries in planning for trauma patients planning as a foundation for professional clinical services within the existing educational programme can be effective in reducing the deficits in education and care for trauma patients.	-the methods are appropriate as it is tailored to the participants need and no conflict of interest reported.
7	Abelsson, Lindwall, et al., 2018	To examine actual individual trauma care competence among ambulance nurses in prehospital emergency care practice.	-sample size: 63 ambulance nurses.	-quantitative, cross-sectional descriptive design.	-simulation exercise and questionnaire.	-the ambulance nurses feels that they did not have had enough training or experience regarding trauma care and their lack of ability to provide adequate care in a simulated trauma care practice.	

8	Gibson, Ventura & Collier (2020)	-to investigate available resources, personal protective equipment (PPE) availability, sanitation practices, institutional practices, and opinions among EMS professionals in the United States amid the COVID-19 pandemic using self-report questionnaire.	-192 emergency medical services (EMS) personnel.	-qualitative, descriptive	-an online multiple-choice survey	-51% of EMS providers reported of having limited training in COVID-19 response. -	-the limitation of this study predominantly revolves around marginal error. -this research are more specific towards COVID-19.
9	Suryanto et al., (2018)	-to investigate the perceived knowledge, attitude and practice of ambulance nurses in prehospital care in Malang, Indonesia.	-n=465 of ambulance nurses in Malang, Indonesia.	-quantitative cross-sectional study.	-paper-based survey	-this study revealed that Indonesian ambulance nurses lacked prehospital care and knowledge. -this study demonstrated that participants' attitude score was the highest compared to participants' knowledge and practice scores. -training experience had a significant influence on the knowledge, attitude, and practice scores for prehospital care.	-the method was appropriate. -really suitable to use for this research.
10	Berger et al., (2018)	-to assess the feasibility of pairing pre- and posttests with a high-fidelity simulation scenario to evaluate whether CCT nurses' clinical knowledge improved immediately after and three months after the simulation training activity.	-52 registered nurse	-quantitative experimental, pretest posttest repeated-measures design.	-20 multiple choice items.	-although participants demonstrated increased knowledge immediately after the simulation training activity, knowledge was not sustained after three months. -the degree and duration of knowledge retention after simulation training is inconsistent, with no distinct pattern.	-the method was appropriate, the instrument used was also validated by content expert.
11	Mäkinen et al., (2021)	-to describe and compare Finnish and Swedish prehospital emergency care providers' knowledge and attitudes concerning the	-prehospital emergency providers in Finland (n=179) and in Sweden (n=662)	-quantitative	-survey questionnaire	-healthcare personnel play a key role in the prevention of pressure ulcer and a good level of knowledge is essential for pressure ulcer prevention.	-the method was appropriate however the number of sample size should be about the same.

		prevention of pressure ulcer (PU)					
12	Jansson et al., (2020)	-to investigate and compare self-reported professional competence among nurses working in the ambulance service and to explore associations between potentially predictive background factors and self-reported professional competence.	- n=500 nurses working in selected prehospital organisations.	-quantitative cross-sectional study	-questionnaire	-significant differences were found among the nursing categories in terms of age, gender, education, and work experience. -prehospital emergency nurses reported the highest professional competence. -nurses with master's degree did not report significantly higher professional competence than nurses with bachelor's degree. -length of work experience in the ambulance service was the most significant factor associated with higher professional competence.	-the research method is appropriate. -same tools for competency may be suitable to be used in this research.
13	Sjölin et al., (2020)	-to explore prehospital emergency nurses' experiences of care in critical incidents.	-17 prehospital emergency nurses	-qualitative phenomenology	-in depth interview, open ended and semi-structured questions.	-in a critical incident, personal ability based on experiential knowledge is essential to patient care. -the results show that PENs relied on personal ability based on experiential knowledge in care when managing critical incidents.	-the method is appropriate. -limitation existed that some PENs had only experienced working in a metropolitan area and their experience is not representative of working in a rural environment.
14	Leggio et al., (2020)	-to evaluate the demographics and performance of non-EMS health care professionals who attended an advanced placement paramedic education program from 2007 to 2017 at a Midwestern university.	-305 participants consisted of registered nurse, advance practice registered nurse, medical doctor, physiscian assistant, and certifies nurse anaesthetist.	-quantitative.	-retrospective descriptive evaluation.	-the existence of nontraditional and bridge educational pathways to EMS paramedic provider across he US needs to be further understood and evaluated. -future research is needed to identify the best practices in student requirements and methodologies in delivering advanced placement paramedic education bridging programs.	The method is appropriate however the study was only limited to a single Midwestern university-based EMS educational program in Omaha, Nebraska.
15	Uhm et al., (2019)	-to explore the factors influencing the disaster response competency of EMTs who work in four of the largest South Korean cities based on basic information such	-1020 of EMT personel.	-quantitative, descriptive cross-sectional design.	-self reported questionnaire.	-there is a need for an antidisaster program to enhance the disaster risk perception, self-efficacy, personal disaster (household and workplace) preparedness, and the disaster education/training participation rate toward enhancing the disaster response competency of	-the method was very appropriate.

		as the degree and correlation between variables (demographic and disaster-related characteristics, personal disaster preparedness, disaster risk perception, self-efficacy for disaster and disaster response competency)				emergency medical technicians in South Korea.	
16	Abelsson, Rystedt, et al., (2018)	-to describe nurses' perceptions of high-energy trauma care through simulation in prehospital emergency care.	-20 nurses in prehospital emergency care in two counties in central Sweden.	-qualitative design, phenomenography	-two participant interview of open-ended questions followed by in depth questions.	-trauma simulation is perceived to increase knowledge and skills in trauma care among ambulance nurses. -trauma simulation establishes, corrects, and confirms knowledge and skills in a prehospital care setting.	-the method was appropriate. -bias might have happened as nurses in prehospital care may be nurses who are interested in trauma thus may cause a higher level of knowledge within trauma care and therefore have influenced the results in a positive way.
17	Luckey-Smith et al., (2020)	-to establish the effectiveness of a currently used surgical airway education curriculum in increasing both knowledge and skill relating to surgical airway placement. -to evaluate both the prevalence and if present, the degree of knowledge and skill fade over time.	-the participants are recruited from an academic medical centre helicopter emergency medical services (HEMS) program. (n=14)	-quantitative experimental research	-examination and timed assessment	-training using theoretical lecture-based instruction coupled with the placement of surgical airway in human cadavers is proven effective in increasing knowledge and skill of participants. -more training is necessary to achieve higher goals. -further research is needed to investigate when the skill and knowledge retention begin to decline.	-the method is appropriate.
18	Nilsson et al., (2020)	-to develop and validate the new instrument to measure the self-reported professional competency of specialist ambulance nursing students and registered/specialist	-n=34 specialist ambulance nursing students, registered nurse and specialist nurses working in prehospital care.	-quantitative cross-sectional design.	-psychometric testing	-the ANC scale was systematically tested and showed satisfactory psychometrical properties and it can be used in education of future registered specialist ambulance nurses as a tool for self-reflected learning and could also be of potential use in identifying competence gaps in registered/specialist ambulance nurses.	-the method is appropriate, and no bias was reported.

		nurses working in prehospital care.					
19	Vyas et al., (2016)	-to identify improvement in confidence on the part of the participants after completing our training curriculum.	-918 participants.	-quantitative research design.	-practical skills simulation training.	-it is imperative that rapidly developing countries like India have to establish a ground force of effectively trained medical first responders.	-the method was appropriate, and no bias is reported.
20	Sorani et al., (2018)	-to explore the challenges of prehospital Emergency Medical Services (EMS) during disaster response in Iran.	-23 people including nurses, four paramedics, three physicians, two dispatchers. Five managers and seven experts.	-qualitative research design.	-semi structured interviews.	-disaster response is a difficult career to get involved without extensive experience in certain skill set such as disaster medicine, triage, coordination, teamwork, mental health care, communication and safety. -many employees do not have enough knowledge, skills and motivation.	-the small number of participants is the limitation, future research needs to be done in order to do generalization of the data.
21	Nurumal et. al, (2014)	-to appraise and explore the competency of prehospital care staff and provide strategies for improvement.	-111 of nurses and Medical Emergency Coordination Centre (MECC)	-mixed method of both qualitative and quantitative.	-questionnaire and semi structured group interviews.	-from the quantitative findings, all had the essential skills and knowledge in handling prehospital EMS but not having good skills and knowledge for invasive procedures and giving medications. -prehospital EMS system need to consider that the competency of prehospital EMS personnel has to come along with few things including continuous professional-development courses that requires them to maintain their professional proficiency.	-the method was appropriate, and no conflict of interests reported.