

THE EFFECTIVENESS OF THE IN-HOUSE PREHOSPITAL CARE TRAINING PROGRAM FOR THE EMERGENCY MEDICAL TEAM

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Abstract

In the Malaysian context, the prehospital personnel are not only solely dedicated to the prehospital service but at the same time they are also functioning as hospital-based staff in the emergency and trauma department. Based on the previous study, the perceived level of knowledge and skills of prehospital care personnel at SASMEC @ IIUM is still not properly executed overall. Thus, this study aimed to assess the effectiveness of the prehospital care in-house training programme for the emergency medical team in SASMEC@IIUM. A total of 28 prehospital care personnel participated in this study. The prehospital care in-house training programme included both lectures and demonstration sessions. Then the participants answered a self-administered questionnaire that originated from the WHO's Essential Knowledge and Skills Questionnaire to test the effectiveness of the prehospital care in-house training programme. It was found that the knowledge and skills of the studied participants drastically increased after attending the programme. Besides, there were also positive associations found between the participants' sociodemographic data, their knowledge and their skills related to prehospital care with a p-value of < 0.05. Therefore, this study's findings indicated a continuous and sustained structured in-house training programme for the emergency medical team in SASMEC@IIUM to provide quality care towards society.

Keywords: Prehospital Care, Competency, Knowledge, Skills, In-House Training Programme.

INTRODUCTION

In the continuum of emergency medical services, prehospital care is essential because it provides the initial point of contact for patients with catastrophic injuries or medical issues. Prehospital staff members in Malaysia carry two responsibilities: they work in prehospital settings and also support emergency and trauma departments in hospitals. This particular case highlights the need for these practitioners to have extensive training and well-honed abilities in order to provide quality care in a variety of healthcare settings. Prehospital care services in Malaysia are facing great challenges towards performance relating to the knowledge and skills required from pre-hospital personnel (Nurumal et al, 2022; Nurumal et al, 2014). On the one hand, emergency call volumes and demand for dispatch are increasing day by day across all the states in Malaysia. Based on statistics provided by the Malaysia Emergency Coordinating

Center (MECC), the volume can be reached up to 150 calls in a day for a single centre. Globally has experienced the same issues in the prehospital care demand, where in particular most calls are for non-trauma care needs (Vuilleumier et al, 2021; Burkholder et .al, 2019).

As a consequence, the traditional focus of Assistant Medical Officers (AMO)/nurses' practice, immediate treatment and transport of life-threatening illnesses and injuries, has shifted towards assessment and treatment for a large variety of life-threatening conditions. From a previous study in Klang Valley, the AMO/nurses have responded to this challenge with the enhancement of training requirements such as emergency and trauma care practitioners with additional primary care competencies (Nurumal, 2014). The primary focus of the prehospital care personnel's competency notion is the level of professional proficiency that they must exhibit when delivering the intervention in an out-of-hospital setting. Therefore, the competency of the staff when providing care at the scene and during transfer to the care facility is a major factor in the effectiveness of prehospital care performance. Looking into the previous studies, prehospital care personnel knowledge and skills gaps still exist in managing patients transitioning from prehospital care (O'connor et al, 2023; O'connor et al, 2021; Stander, Hodkinson & Dippenaar, 2021). Besides, studies have also shown that simulation has been characterized as an effective means of instruction and training for prehospital care personnel (Bredmose et al, 2022; Vyas et al, 2016). A previous study also demonstrated the need to reevaluate modifications to prehospital emergency teaching methods and instructional content given the current circumstances (Häske et al, 2022). The primary function of prehospital care personnel in a prehospital setting is as gatekeepers between the patient and the hospital during emergencies (Bruun et al, 2022). Prehospital personnel need to acquire appropriate knowledge and unique skills and proficiency relating to prehospital care performance (Jansson et al, 2022). Since prehospital service at Sultan Ahmad Shah Medical Center @ International Islamic University Malaysia (SASMEC @ IIUM) which is the setting of the present study, is relatively new, thus it requires special development to get the maximum service to the surrounding society. A recent study done at the SASMEC @ IIUM revealed that the perceived level of knowledge and skills of prehospital care personnel is still not fully performed as a whole, based on all of the elements required in the self-administered questionnaire (Jamaludin et al, 2024). Therefore, this study aimed to assess the effectiveness of the prehospital care in-house training programme for the emergency medical team in SASMEC@IIUM.

METHOD

This study was carried out at the Emergency and Trauma Department (ETD) of SASMEC@ IIUM, a hospital that is actively engaged in providing prehospital care in Kuantan, Pahang, Malaysia. The emergency medical team including medical officers, assistant medical officers, and registered nurses who worked in SASMEC@ IIUM's ETD serve in the prehospital care. All ETD of SASMEC@ IIUM staff members, including nurses, assistant medical officers, and medical officers, who had been actively participating in prehospital care services for longer than a year, met the inclusion criteria to be included in the study. The study's exclusion criteria were people who declined to take part in it or were on leave at the time. Those who met the inclusion requirements were contacted and offered the choice to voluntarily take part in the in-house training programme. This study used an in-house training programme for the

emergency medical team in SASMEC @IIUM. The researcher and team have developed a module on essential knowledge and skills for prehospital care personnel prior to this study. Besides, this module has been copyrighted by the team. All the studied participants are required to attend the training session to learn the content of the module. After completing of attending the training session, all the studied participants were given demonstration videos about the prehospital care skills procedures. Once they had completed both the module and demonstration videos, the participants were given the self-administered questionnaire to answer about the knowledge and skills that they had learnt.

A self-administered questionnaire from an earlier research project was used for the post-in-house training assessment (Nurumal et al, 2014). The original source of this questionnaire was the World Health Organization's Essential Knowledge and Skills Questionnaire (EKSQ) for prehospital care. The author adjusted it to account for Malaysia's cultural context. The questionnaire was divided into two sections: A) demographic information and B) a test of prehospital care knowledge and skills. The participants' age, gender, educational background, employment history, and completion of professional development courses in trauma, advanced life support (ALS), and basic life support (BLS) are among the demographic data. The knowledge and skills subscale consists of five main subscales: alert, scene survey, patient evaluation, provider safety, and intervention. In total, there are 58 items. Two columns, knowledge and skill, comprised the competency of pre-hospital care professionals variable on the questionnaire, which is designed as a binary option of "yes" or "no." The study participants' prehospital care competency was measured using a minimum score of "0," which indicates "no" knowledge or abilities, and a maximum score of "58," which indicates "high" knowledge or skills. Reliability testing of this questionnaire revealed a Cronbach Alpha score of 0.89 in an earlier investigation. Prior to the data collection, the Clinical Research Center (CRC) of SASMEC @ IIUM, the Kulliyah of the Nursing Postgraduate Research Committee (KNPGRC), and the International Islamic University Malaysia Research Ethics Committee (IREC) issued their ethical authorization. Every participant in this study also provided informed consent. The data was analyzed using both inferential statistical tests (Kruskal-Wallis and Mann-Whitney test) and descriptive statistical tests (frequency, percentage, mean, and SD) using IBM SPSS Version 26.0 because convenience sampling was used in this study to recruit participants and the data was not normally distributed. Initially, a total of 59 staff of the ETD of SASMEC@ IIUM staff members participated in and attended the in-house training programme. However, for the post-in-house training programme assessment, only 28 participants completed the questionnaire. Therefore, the findings of the effectiveness of the in-house training programme are based on the 28 participants.

FINDINGS

In this study, there are a total of 28 participants completed the assessment of the effectiveness of the in-house training programme. Table 1 presents the sociodemographic characteristics of the studied participants. Among the participants, there are a total of 9 (32.10 %) males and 19 females (67.90 %) participated in this study. Their age ranged from 21 to 50 years old. Moreover, there were 2 (7.10 %) emergency specialists, 7 (25.00 %) medical officers, 16 (57.10 %) and 3 (10.7 %) assistant medical officers completed the assessment. The highest education level of the studied participants was master/PhD and the lowest was diploma education. Their

year of experience of involvement in prehospital care ranged from 1 year to 9 years. For their credential qualification such as BLS, ACLS and Trauma care, all of the participants have their valid BLS certificates, however, 17 (60.70 %) have their ACLS certificate and 11 (39.30 %) have their trauma care certificate.

Table 1: Sociodemographic Characteristics (N=28)

Variables	Frequency (n)	Percentage (%)
Age		
21-30	9	32.10
31-40	18	64.30
41-50	1	3.60
Gender		
Male	9	32.10
Female	19	67.90
Job		
Specialist	2	7.10
Medical officer	7	25.00
Nurse	16	57.10
Assistant Medical officer (AMO)	3	10.7
Educational level		
Diploma	10	35.70
Post Basic	8	28.60
Degree	8	28.60
Master/PhD	2	7.10
Year of experience as Nurse/AMO/Medical officer		
0-4	6	21.40
5-9	14	50.00
10-14	8	28.60
Year of experience as prehospital staff		
0-4	19	67.90
5-9	9	32.10
10-14	0	0
Credential Qualification:		
Basic Life Support		
Valid	28	100.00
Due for renewal	0	0
Advanced Life Support (ALS)		
Yes	17	60.70
No	11	39.30
Trauma Care		
Yes	11	39.30
No	17	60.70

Analysis of the data revealed a significant improvement in the knowledge and skills of participants following their participation in the in-house training program as shown in Tables 2 and 3. The participants scored a minimum for knowledge 33 and a minimum score for skills 38 which can see so much improvement after attending the in-house training programme. Thus, this improvement suggests that the structured training approach effectively addressed existing gaps in competency among prehospital care personnel.

Table 2: Prehospital Care Knowledge Level (N=28)

Characteristics	Median (IQR)	Minimum	Maximum
Total Score of Knowledge	46(4)	33	47

Table 3: Prehospital Care Skill Level (N=28)

Characteristics	Median (IQR)	Minimum	Maximum
Total score of skills	55.5(9)	38	58

The statistical analysis of the Mann-Whitney test or the Kruskal-Wallis test is also used to assess the relationship between prehospital care skills, prehospital care knowledge and sociodemographic data after completing the in-house training programme. As shown in Tables 4 and 5, there was a positive association between participants' sociodemographic characteristics and their proficiency in prehospital care, highlighting the importance of tailoring training interventions to meet the diverse needs of the emergency medical team in SASMEC@IIUM.

Table 4: Relationship between Socio-demographic Data and Prehospital Skills (N=28)

Variables	Frequency (n)	H (df)	Statistical Test	p-value*
Age		5.96 (2)	Kruskal Wallis Test	0.05
21-30	9			
31-40	18			
41-50	1			
Gender		0.16 (1)	Mann-Whitney Test	0.69
Male	9			
Female	19			
Job		10.26(3)	Kruskal Wallis Test	0.01
Specialist	2			
Medical officer	7			
Nurse	16			
Assistant Medical officer (AMO)	3			
Educational level			Kruskal Wallis Test	
Diploma	10			
Post Basic	8			
Degree	8			
Master/PhD	2			
Year of experience as Nurse/AMO/Medical officer		6.57(2)	Kruskal Wallis Test	0.04
0-4	6			
05-Sep	14			
Oct-14	8			
Year of experience as prehospital staff		3.29(1)	Kruskal Wallis Test	0.07
0-4	19			
05-Sep	9			
Oct-14	0			
Credential Qualification:				
Basic Life Support				
Valid	28			
Due for renewal	0			
Advanced Life Support (ALS)		-3.37 [#]	Mann-Whitney Test	<0.001
Yes	17			
No	11			
Trauma Care		-1.82 [#]	Mann-Whitney Test	0.04
Yes	11			
No	17			
# Z score				
*p-value significance at 0.05				

Table 5: Relationship between Socio-demographic Data and Prehospital Knowledge (N=28)

Variables	Frequency (n)	H (df)	Statistical Test	p-value*
Age		2.24 (2)	Kruskal Wallis Test	0.33
21-30	9			
31-40	18			
41-50	1			
Gender		0.38 (1)	Mann-Whitney Test	0.54
Male	9			
Female	19			
Job		8.32(3)	Kruskal Wallis Test	0.04
Specialist	2			
Medical officer	7			
Nurse	16			
Assistant Medical officer (AMO)	3			
Educational level			Kruskal Wallis Test	
Diploma	10			
Post Basic	8			
Degree	8			
Master/PhD	2			
Year of experience as Nurse/AMO/Medical officer		0.88(2)	Kruskal Wallis Test	0.65
0-4	6			
5-9	14			
10-14	8			
Year of experience as prehospital staff			Kruskal Wallis Test	
0-4	19			
5-9	9			
10-14	0			
Credential Qualification:				
Basic Life Support				
Valid	28			
Due for renewal	0			
Advanced Life Support (ALS)		-2.09 [#]	Mann-Whitney Test	0.04
Yes	17			
No	11			
Trauma Care		-1.82 [#]	Mann-Whitney Test	0.07
Yes	11			
No	17			
# Z score				
*p-value significance at 0.05				

The association between sociodemographic data and the skills of prehospital care, the result from the statistical test shows that there is an association between age, job, year of working experience as a prehospital care staff and credential qualification with the skills of prehospital care with a p-value of < 0.05. As for the association between sociodemographic data and knowledge of prehospital care, sociodemographic data and credential qualification show statistically significant with a p-value of, 0.05.

DISCUSSION

The findings of this study align with existing literature on the effectiveness of in-house training programs for the emergency medical team (Häske et al, 2022). The significant increase in knowledge and skills observed in our study participants following the program demonstrates its positive impact on improving competency. This is crucial for ensuring the emergency medical team is well-equipped to handle the diverse

emergencies they encounter in the field. The findings of this study underscore the critical role of structured training programs in enhancing the competency of prehospital care teams. By equipping personnel with the requisite knowledge and skills, such initiatives contribute to the delivery of timely and effective care, ultimately improving patient outcomes. A previous study also found that team training with intensive scenario training and short theoretical inputs significantly improved the care of severely injured patients, even a year after the course (Bredmose et al, 2022). Kopschina (2008) similarly emphasized the importance of teamwork in prehospital trauma care, with a focus on integrating emergency physicians and rescue services. Soleimani (2019) highlighted the need for teamwork training in prehospital emergency care, as it leads to better performance and results, reduced clinical errors, and shorter patient length of stay. In this study, the positive associations observed between participants' sociodemographic characteristics and their proficiency in prehospital care emphasize the need for targeted training interventions that consider the diverse backgrounds and experiences of healthcare professionals.

A study by Smith (2009) cautioned that prehospital interventions beyond basic life support may not always be effective, particularly in urban environments with short transport times to trauma centres. This study also acknowledges limitations. The relatively small sample size may limit the generalizability of the findings. Additionally, the use of a self-administered questionnaire may introduce potential bias in responses. Despite these limitations, the study findings hold significant implications for improving prehospital care at SASMEC @ IIUM. The effectiveness of the in-house training program highlights the importance of ongoing training initiatives in maintaining and enhancing the competency of the emergency medical team.

Recommendations

Based on the study findings, it is recommended that SASMEC@IIUM continues to implement structured, in-house training programs for prehospital care personnel. These programs should be periodically reviewed and updated to incorporate advancements in prehospital care practices and address emerging challenges. Additionally, efforts should be made to promote interdisciplinary collaboration and knowledge-sharing among prehospital and hospital-based healthcare teams, fostering a cohesive approach to patient care across the continuum.

CONCLUSION

This study highlights the effectiveness of a structured, in-house training program in enhancing the knowledge and skills of prehospital care personnel within SASMEC@IIUM. By addressing existing competency gaps, such initiatives contribute to the delivery of high-quality care and ultimately improve patient outcomes. Moving forward, sustained investment in training and professional development is essential to ensure that prehospital care teams remain equipped to meet the evolving needs of the communities they serve.

A conflict of interest

There are no conflicts of interest among the authors.

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References

- 1) Bredmose, P. P., Hooper, J., Viggers, S., Linde, J., Reid, C., Grier, G., & Mazur, S. (2022). Prehospital Care: An International Comparison of Independently Developed Training Courses. *Air Medical Journal*, 41(1), 73-77. <https://doi.org/10.1016/j.amj.2021.10.009>.
- 2) Bruun, H., Milling, L., Mikkelsen, S., & Huniche, L. (2022). Ethical challenges experienced by prehospital emergency personnel: a practice-based model of analysis. *BMC medical ethics*, 23(1), 1-14.
- 3) Burkholder, T.W., Hill, K., Calvello Hynes, E.J. (2019). Developing emergency care systems: a human rights-based approach. *Bull World Health Organ.* 97(9):612–9. <https://doi.org/10.2471/BLT.18.226605>.
- 4) Häske, D., Beckers, S. K., Dieroff, M., Gliwitzky, B., Hofmann, M., Lefering, R., & Münzberg, M. (2022). Training effectiveness and impact on safety, treatment quality, and communication in prehospital emergency care: The prospective longitudinal mixed-methods EPPTC trial. *Journal of Patient Safety*, 18(2), 71-76.
- 5) Jamaludin, T. S. S, Nurumal, M. S., Abd Talib, M. K., Che Hasan, M. K., Adnan, M. S, Mohd Shah, A. N. S, & Shorey, S. (2024). Knowledge and skills of prehospital care personnel In Sultan Ahmad Shah Medical Centre@IIUM: A cross sectional survey. *Community Practitioner*, 21 (01). <https://doi.org/10.5281/zenodo.10642787>.
- 6) Jansson, J., Eklund, A. J., Larsson, M., & Nilsson, J. (2020). Prehospital care nurses' self reported competence: A cross-sectional study. *International emergency nursing*, 52, 100896.
- 7) Kopschina, C., & Stangl, R. (2008). Prehospital trauma care training course: Integration of emergency physician and rescue services. *Der Unfallchirurg*, 111, 641-644.
- 8) O'connor, P., O'malley, R., Lambe, K., Byrne, D., & Lydon, S. (2021). How safe is prehospital care? A systematic review. *International Journal for Quality in Health Care*, 33(4), mzab138.
- 9) O'connor, P., O'malley, R., Oglesby, A.-M., Lambe, K., & Lydon, S. (2023). Measurement and monitoring patient safety in prehospital care: a systematic review. *International Journal for Quality in Health Care*, 33(1), mzab013.
- 10) Nurumal, M. S., Jamaludin, T. S. S., Abd Talib, M. L., Hasan, M. K. C., Firdaus, M. K. Z. H., & Sutrisno, R. Y. (2022). Skill and Knowledge of Prehospital Care Competency of Emergency and Trauma Department Personnel: A Systematic Review. *International journal of care scholars*, 5(3), 79-94.
- 11) Nurumal, M.S., Sukonthasarn, A., Wangsrikhun, S., & Chanpransit, C. (2014). Assessing and exploring the competency of prehospital emergency medical service personnel in Klang Valley, Malaysia: A mixed method approach. *International Medical Journal Malaysia*, 13(2), 7–20. <https://doi.org/10.31436/imjm.v13i2.472>
- 12) Soleimani, M., Dadashzade, A., & Khani, J. (2019). The need to pay attention to teamwork in pre-hospital emergency. *Journal of Injury and Violence Research*, 11(4 Suppl 2).
- 13) Smith, R. M., & Conn, A. K. (2009). Prehospital care– Scoop and run or stay and play? *Injury*, 40, S23-S26.
- 14) Stander, C., Hodkinson, P., & Dippenaar, E. (2021). Prehospital care providers' understanding of responsibilities during a behavioural emergency. *South African Journal of Psychiatry*, 27.
- 15) Vuilleumier, S., Fiorentino, A., Dénéreaz, S., & Spichiger, T. (2021). Identification of new demands regarding prehospital care based on 35,188 missions in 2018. *BMC Emergency Medicine*, 21(1), 1-12.
- 16) Vyas, D., Hollis, M., Abraham, R., Rustagi, N., Chandra, S., Malhotra, A., . . . Pal, R. (2016). Prehospital care training in a rapidly developing economy: a multi-institutional study. *Journal of Surgical Research*, 203(1), 22-27.