Original Research

An Exploration of Knowledge, Attitudes, and Competencies of Ambulance Nurses in a Pre-Hospital Setting in the Special Region of Yogyakarta

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ABSTRACT

Background: Trauma-related deaths outside of hospitals predominate over those that occur in hospital settings. Inadequate resuscitation and staff delays in treating patients were two factors that could raise the risk of death in the pre-hospital setting. For sustainable pre-hospital service quality improvement programmes, ambulance nurses' knowledge, attitudes, and competencies were crucial. This study aims to explore the ambulance nurses' knowledge, attitudes, and competencies in the Special Region of Yogyakarta (DIY).

Methods: This research was a descriptive quantitative study using a cross-sectional design. A total of 54 respondents from Sleman, Bantul, Kulon Progo, Gunungkidul, Yogyakarta, and the DIY Public Safety Center (PSC) were included using total sampling. The research was carried out in September 2023. The Kruskal-Walsis, Man-Whitney, and Spearman rank tests were used to analyse the data.

Results: The result of this study showed that the attitude score, which was 69.8 (87.25%), was the greatest score, and the competency score, which was 118.65 (78%), was the lowest. The knowledge, attitudes, and competencies of ambulance nurses variables showed an insignificant result (p-value > 0.05) based on age, gender, educational experience, nurse experience, experience working as an ambulance nurse, or quantity of training completed.

Conclusion: According to this study, ambulance nurses' attitudes towards pre-hospital services obtain the greatest marks overall, although their competency in these services still needs more improvement. In conclusion, the knowledge, attitudes, and competencies of ambulance nurses in the Special Region of Yogyakarta did not differ significantly from one another.

INTRODUCTION

According to the Indonesian Ministry of Health (2016), an emergency is a circumstance that necessitates immediate medical action to save lives and avoid impairment. With 4,402,205 cases in 2017, Indonesia ranked among the ASEAN countries with the greatest number of crises (Directorate of Health Services, Ministry of Health of the Republic of Indonesia, 2022). Approximately 8% of fatalities globally were related to emergencies such as trauma or wounds.

Up to 90% of trauma-related incidents result in the deaths of 4.4 million individuals annually in Low- and Middle-Income Countries (LMICs). Trauma can be caused by traffic accidents, falls, drowning, burns, poisoning, and acts of violence (World Health Organization, 2021). In the Special Region of Yogyakarta, the number of accident events increased from 4,000 to 6,000 cases annually between 2020 and 2024 (Indonesian National Police, 2024).

Trauma-related deaths outside of hospitals predominate over those that occur in hospital settings. The overall risk for pre-hospital death was 4.0%, while the risk for in-hospital death was 2.8%. Trauma to the head and neck and polytrauma—a combination of injuries to many organs—are risk factors for death in the pre-hospital setting (Gewiess et al., 2021).

Two other factors that can increase the risk of death in pre-hospital settings are inadequate resuscitation and staff delays in administering treatment. According to Smith, those factors have an impact on the patient fatality rate, which is 86% for delayed response and 226% for insufficient pre-hospital care (Gabriella Smith, 2019). The significance of proper pre-hospital care lies in its potential to decrease patients' length of stay, increase ED discharges, decrease mortality rates, and lessen the workload for ER physicians and nurses who treat in-hospital patients (Afzali et al., 2021).

In 2016, Public Safety Centre 119 (PSC 119) was formed by the Indonesian Ministry of Health in collaboration with the Indonesian Ministry of Transportation. Its primary purpose is to offer and provide emergency services, including ambulance services (Ministry of Health, Republic of Indonesia, 2016). In Indonesia, ambulances are used in just 9.3% of emergency responses. Ambulances are primarily employed as hospital referral transport vehicles, and they merely facilitate a stretcher (Brice et al., 2022; Suryanto et al., 2018).

Pre-hospital emergency care in several countries is supplied by paramedics and emergency medical technicians (EMTs); meanwhile, in Indonesia, health professionals, such as nurses or midwives provided with emergency training, will be employed to perform pre-hospital care (Directorate General of Health Services, Ministry of Health of the Republic of Indonesia, 2022; Sanjana et al., 2022; Suryanto et al., 2018). Both in developing countries such as Sri Lanka and Indonesia, the role of the EMT team is not yet recognized and well-established (Nandasena et al., 2018).

There is no formal pre-hospital education program for nurses who work on ambulances, whereas ambulance nurses' knowledge, attitudes, and competence can be utilized to assess whether they are providing adequate pre-hospital care or not (Nugroho K. D., 2019; Suryanto et al., 2018). A study by O'Connor et al., (2021) stated that these factors are critical to lowering Patient Safety Incidents (PSI) and protecting patients from things that can endanger patients' health in pre-hospital settings. Because emergency medical services require a high degree of critical thinking, knowledge in pre-hospital settings is crucial.

A broad basis of knowledge is necessary for nurses working in ambulance care settings (Sjolin et al., 2020). Based on the study conducted by Nandasena et al., (2018), some components of knowledge still need to be increased, including pharmacology and paediatric life support. Ambulance nurses in Indonesia often lack knowledge of pre-hospital care due to the main focus on the Indonesian nursing curriculum in in-hospital settings, so there is a need for improvement (Suryanto et al., 2018).

Nurses must prepare for their role because the pre-hospital care setting is unpredictable and complex (Sjolin et al., 2020). Other than knowledge, skills to practice services in emergency settings are important. According to a prior literature review, a common method for assessing an ambulance nurse's competency is through procedural skills, for instance, basic lifesaving, trauma emergency management, airway management, resuscitation, transporting patients, etc. (Nandasena et al., 2018; Sugiarto et al., 2023).

A prior study conducted by Sanjana et al., (2022) reported that training experience and level of education can contribute to ambulance nurse practice in performing pre-hospital emergency services. Since training facilitates practice or simulation to enhance nurses' technical skills. A qualitative study conducted by Sjolin et al., (2020) reported that confidence in managing patients with critical illnesses is in line with the growth of experience, whereas skill can be developed with the help of constant training. In Indonesia, the majority of ambulance nurses lack prehospital management training (Sugiarto et al., 2023). Meanwhile, there was a relationship between the practices of ambulance nurses and the satisfaction of pre-hospital service users (Sanjana et al., 2022).

A negative attitude towards prehospital emergency care might harm patients' health outcomes (Mamo et al., 2023). A positive attitude in the pre-hospital setting is able to enhance patient safety and satisfaction and facilitate effective communication among healthcare providers (Najafi Ghezeljeh et al., 2022). Positive and encouraging ambulance nurses can improve recovery rates and patient health outcomes. A study conducted in Indonesia and Sri Lanka showed that attitudes toward pre-hospital care were good among nurses (Nandasena et al., 2018; Suryanto et al., 2018) and even higher compared to knowledge and competencies (Suryanto et al., 2018).

A study by Nandasena et al. (2018) reported that there were mostly unfavourable attitudes about the outcomes of pre-hospital care in Sri Lanka. Hence, the exploration of attitude towards attitude in various components of pre-hospital settings is pivotal. The important components of sustained pre-hospital service quality improvement programmes include knowledge, attitudes, and competencies (Scott et al., 2017). Therefore, a preliminary study is required to assess the ambulance nurses' knowledge, attitudes, and competencies in the Special Region of Yogyakarta.

MATERIALS AND METHOD
Study Design
This descriptive quantitative research was conducted using a cross-sectional design to assess the knowledge, attitude, and competencies of the ambulance nurses.

Samples and settings
The study was held in multiple districts in the Special Region of Yogyakarta, Indonesia. The population of this study was all healthcare professionals who work in Public Safety Centres (PSC) within the Special Region of Yogyakarta and offer pre-

hospital services. The sample of the study that met the inclusion and exclusion criteria was 54 ambulance nurses, who were selected using total sampling from all PSCs. The number of ambulance nurses specifically for those areas is not available in published data. The data collection was carried out from September to October 2023 in PSC Sleman District, PSC Bantul District, PSC Kulon Progo District, PSC Gunung Kidul District, PSC Yogyakarta District, and PSC Special Region of Yogyakarta (*Daerah Istimewa Yogyakarta*).

Those PSCs were varied in terms of area and population, and each represents every district in the Special Region of Yogyakarta. The inclusion criteria were: 1) ambulance nurses in the Special Region of Yogyakarta who were responsible for directly delivering pre-hospital emergency care to patients; and 2) ambulance nurses who worked shifts with a maximum duration of eight hours. Meanwhile, the exclusion criteria were as follows: 1) ambulance nurses who were on leave during the time of data collection; and 2) ambulance nurses who declined to participate in the study.

Instruments

The self-administered questionnaire used was a modification from a study in India by Kumar et al., that was modified by Suryanto et al., to be adjusted to Indonesian settings (Kumar et al., 2008; Suryanto et al., 2018). It contained Likert-scale questions with 13 items for knowledge and 20 items for attitude. The pre-hospital knowledge questions concerned case management in the pre-hospital context and the perception of patient treatment during transport. The attitude questions addressed the views of the participants regarding post-hospital healthcare providers' continuing education. The Likert scale ranged from one to four, with 1 = very poor, 4 = very good for the "knowledge" section, 1 = strongly disagree, and 4 = strongly agree for the "attitude" section. The questionnaire has strong internal consistency, as indicated by the scale reliability score of 0.932 obtained from an internal consistency test conducted with Cronbach's alpha.

The competencies questionnaire was developed by Nugroho from Australasia Competencies of Paramedics (2011) (Nugroho, K. D., 2019). It contained 38 items with a Likert scale ranging from one to four, which indicated "strongly disagree," "disagree," "agree," and "strongly agree." The competencies questionnaire concerned three main components, which were professional practice, clinical practice, and professional knowledge. The reliability test shows that the Cronbach's alpha value is 0.917. If it is compared with the r table value (0.514) when Cronbach's alpha value is greater than the r table, it shows that the questionnaire is reliable.

Data Collection

The survey instrument was designed to collect demographic information and quantitative measures related to the variable of interest. Closed-ended questions assessed knowledge, attitude, and competencies. The surveys were distributed offline using paper and completed anonymously to ensure confidentiality. The data collection was assisted by a research assistant in each location. Participants who finished the questionnaire received a souvenir. The data would be coded anonymously and ready for further analysis.

Statistical Analysis

The data was processed using the SPSS 25 software. This study included both univariate and bivariate analyses. The results of the univariate analysis were shown in a table with frequencies and percentages, such as employment status, PSC location, gender, prior education, nurse experience, ambulance nurse experience, and amount of training. The variables related to knowledge, attitude, and competency were displayed as a mean score. The bivariate analysis was used to analyze differences in respondents' characteristics regarding the variables of knowledge, attitudes, and competencies of ambulance nurses using the Spearman rank, Mann-Whitney, and Kruskall-Walis tests.

Ethical Considerations

Ethical principles and guidelines were adhered to throughout the data collection process to protect the rights and welfare of all respondents. After being informed of the aim of the study and the respondents' rights and responsibilities, all respondents were asked to sign an informed consent form indicating their willingness to participate in the study. The research team has obtained ethical permission from the Institutional Review Board (IRB) of the Faculty of Medicine, Public Health, and Nursing UGM (FM-PHN UGM) number KE/FK/1359/EC/2023. Anonymity was guaranteed to all the participants, all the data was securely stored, and only the authorised research team was able to access it. It was promised that respondents would not be penalised if they chose to leave the study at any time.

RESULTS

Study Characteristics

A total of 54 respondents participated in this study, which involved 8 respondents from PSC Kulon Progo, 4 respondents from PSC Gunung Kidul, 7 respondents from PSC Sleman, 12 respondents from PSC Bantul, 7 respondents from PSC Special Region of Yogyakarta, and 16 respondents from PSC Yogyakarta City.

An overview of the respondent demographic information is shown in Table 1, which reveals that the average respondent is 30.5 years old, and 29 individuals (53.7%) are male. More than three-quarters of respondents, or 46 individuals (85.2%), possess a Diploma-III in Nursing. The majority of respondents, or 23 individuals (42.8%), had experience working as nurses for six to ten years. Over half of the respondents, or 31 individuals (57.4%), had experience working as an ambulance nurse for one to five years during their life as a nurse. A total of 22 individuals (40.7%) who worked as ambulance nurses made up the majority; they had only received training three times in total.

Knowledge, Attitudes, and Competencies Variables

Table 1 also indicates the respondents' knowledge, attitudes, and competency scores. Based on the table, the highest score is the attitude score of 69.8 (87.25%), while the lowest score is the competency score of 118.65 (78%) compared to another score. The highest average scores on the variables of knowledge (46.6), attitude (77.6), and competency (138.3) were owned by ambulance nurses who had work experience for 6–10 years. Meanwhile, the lowest average scores on the variables of knowledge (38.6), attitude (61.3), and competency (110.6) were owned by ambulance nurses who had experience working as medical ambulance officers for less than one year.

The average score for knowledge and attitude of ambulance nurses in the Special Region of Yogyakarta is above 80%, except for the competency aspect, which gets a score of 78%. However, this score is an aspect of knowledge, attitudes, and competencies that is measured by the personal reflection of the ambulance nurses themselves. It is necessary to measure further aspects of knowledge, attitudes, and competencies apart from nurses' reflections.

Based on the results, a p-value >0.05 was found in the variables of knowledge, attitudes, and competencies regarding age, gender, education, nurse experience, ambulance nurse experience, and the number of trainings attended. The absence of significant differences in the results could be influenced by several factors, such as the small sample involved in the research, even though this research used total sampling. Based on the analysis, however, this shows that the knowledge, attitudes, practices, and competencies possessed by ambulance nurses at PSC in the Special Region of Yogyakarta area are relatively the same.

Table 1. Comparison of Knowledge, Attitude, and Competency Scores based on Demographic Data

Demographic characteristics		Knowledge		Attitude		Competence	
		Mean rank	**P** *value*	*Mean rank*	**P** *value*	*Mean rank*	**P** *value*
Contract employment status (n=54, 100%)							
Age (mean: 30.5 years)			0.847 [a]		0.123 [a]		0.489 [a]
PSC Location	PSC Yogyakarta (n=16, 29.6%)	42.06	0.128 [c]	70	0.508 [c]	119.31	0.109 [c]
	PSC Bantul (n= 12, 22.2%)	41.9		71.08		123.5	
	PSC Sleman (n= 7, 12.96%)	41.2		69.14		117.85	
	PSC Gunungkidul (n=4, 7.48%)	39		71		114	
	PSC Kulonprogo (n=8, 14.8%)	43.37		72.12		120.37	
	PSC Yogyakarta Special Region (n=7, 12.96%)	40.2		64.42		110.28	
Gender	Male (n=29, 53.7%)	42.1	0.768 [b]	68.96	0.308 [b]	119.65	0.487 [b]
	Female (n=25, 46.3%)	41.2		70.76		117.48	
Prior education	Diploma-III (n = 46, 85.2%)	41.69	0.693 [b]	70	0.558 [b]	118.9	0.693 [b]
	Undergraduate (n= 8, 14.8%)	41.5		68.5		117.1	
Nurse experience	<1 year (n= 4, 7.4%)	42		68.75		117.5	
	1-5 years (n=22, 40.7%)	41.1		67.5		115.6	
	6-10 years (n=23, 42.8%)	41.6	0.308 [c]	70.9	0.258 [c]	119.8	0.07 [c]
	11-15 years (n=1, 1.8%)	39		75		114	
	16-20 years (n=3, 5.5%)	46.6		77.6		138.3	
	>20 years (n=1, 1.8%)	39		69		107	
Ambulance experience	< 1 year (n= 3, 5%)	38.6		61.3		110.6	
	1-5 years (n= 31, 57.4%)	42.1	0.373 [c]	70	0.414 [c]	118.5	0.986 [c]
	6-10 years (n =20, 37.6%)	41.3		70.7		120	
Amount of training	1-3 training (n = 22, 40.7%)	41.3		68.2		116.4	
	4-6 training (n=13, 24.1%)	41.3	0.712 [c]	70.1	0.528 [c]	121.3	0.395 [c]
	7-9 training (n=19, 35.2)	42.3		71.3		119.3	
Average of total respondents		41.67 (80.13%)		69.8 (87.25%)		118.65 (78%)	

[a] Spearman rank test [b] Mann Whitney test [c] Kruskal Wali

DISCUSSION

This study, however, indicates that there are no appreciable variations in the domains of competencies, attitudes, and knowledge of ambulance nurses regarding demographic characteristics. It contrasts with other research that indicates ambulance nurses' knowledge, attitudes, and practices were influenced by their training experience (Suryanto et al., 2018). According to this study, there was no discernible variation in the competency variable of ambulance nurses based on their recent education.

This is consistent with earlier studies that demonstrate no competency gap exists between ambulance nurses and those holding bachelor's or master's degrees (Jorgen Janssons, 2023). Nonetheless, this research differs from earlier studies in terms of educational levels. In the Special Region of Yogyakarta, most ambulance nurses hold a Diploma III in nursing.

It was aligned with a study by Suryanto et al., (2018) that found that the majority of ambulance nurses in Indonesia had diplomas. Additionally, work experience is a predictor of ambulance nurse competency (Jorgen Janssons, 2023). This is consistent with the research's findings, which show that nurses with 16–20 years of work experience have the greatest competency scores when compared to other groups.

The Knowledge of Ambulance Nurses

The findings demonstrated that all ambulance nurses were employed under contract and had varying levels of training. According to other studies, ambulance nurses' knowledge and attitudes were also influenced by their training experience (Abate & Mekonnen, 2020). This might occur as a result of the sample sizes used in this study and earlier investigations differing. Furthermore, the study's sample consisted of ambulance nurses who rendered pre-hospital services in outside settings; ambulance nurses who rendered pre-hospital services inside hospitals were excluded. The involvement of hospital-based ambulance nurses may show different results regarding the experience and variety of cases encountered.

The study showed that the knowledge of ambulance nurses was around 80% in Yogyakarta. In a study conducted by Suryanto et al., (2018) the knowledge score of ambulance nurses in Malang, Indonesia, was around 70%, which is the lowest score compared to attitude and practice variables. A study conducted by Shakeri et al., (2018) found that only about 17% of emergency medical technicians in Iran had a good level of knowledge regarding trauma and providing pre-hospital care due to the limited time allotted for updating their knowledge and method of learning; this was not mandatory learning.

Meanwhile, training is crucial for increasing nurses' knowledge in critical settings. 16 courses regarding trauma resuscitation training significantly affect the improvement of nurses' knowledge (p<.001), which will possibly enhance adequate care in emergencies (Chowdhury et al., 2022). However, the level of prehospital knowledge possessed by qualified ambulance nurses in Indonesia remains unknown due to the lack of a formal education program (Suryanto et al., 2018).

Sanjana et al., (2022) found that the knowledge of nurses was statistically significant in patient satisfaction with the pre-hospital ambulance service they have gotten ($p<0,05$) and in nurses' capabilities in giving information related to patients's condition and nursing intervention. Further, good knowledge influences better communication in service delivery delivered by ambulance nurses (Sarjana et al., 2022). Lower death and disability rates from trauma, pregnancy-related problems, heart

attacks, strokes, and sepsis have been associated with high-quality pre-hospital care (Saifan et al., 2024).

The Attitude of Ambulance Nurses

The attitude score is considered the highest score among all variables in this study. The attitude score of ambulance nurses in Yogyakarta was around 87%. This study indicates that the ambulance nurses in the study had a favorable opinion regarding pre-hospital care. A similar study conducted in Malang showed that ambulance nurses' attitude score was the highest, at around 84% (Suryanto et al., 2018).

A study by Birasaw et al., (2020) reported that many factors, such as age, knowledge, and training experience, significantly correlated with nurses' attitudes towards patient safety ($p<0.05$). In the matter of doing triage, especially in pre-hospital settings, one out of three main reasons requiring triage was the attitude of ambulance nurses in critical and non-critical cases (Heidarzadeh et al., 2020). When ambulance nurses approach pre-hospital settings with a positive attitude, they will demonstrate compassionate behavior. Hence, it will benefit the satisfaction of pre-hospital ambulance services (Sanjana et al., 2022).

The cultural background could influence the attitude of nurses. In Yogyakarta itself, some values will related to how individuals perceive and interact with their environment, including in emergency situations, such as 1) *Gotong royong/*Cooperation (a culture of mutual cooperation that encourages nurses to work together and help each other as a team), 2) *Welas asih*/empathic and caring (nurses show high empathy towards patients, understand their situation, and try to provide emotional support), 3)*Tanggung gung*/Responsible (Nurses usually have a strong commitment to carrying out their duties with full responsibility, especially in emergencies where fast and appropriate action is crucial), 4)*Luhur Budi*/ sincerity (nurses demonstrate sincerity in giving treatment to the patients, provide the best care selflessly, and ensure patient safety and welfare). A study by Yaghmour, (2021) showed that nurses' perceptions and attitudes towards palliative care were influenced by religion and culture. Hence, it can possibly happen on an emergency occasion.

The Competencies of Ambulance Nurses

In this study, practice variables had the lowest score among the other variables measured. The competencies of ambulance nurses in Yogyakarta were 78%. It was slightly different from the study performed by Suryanto et al., (2018) on ambulance nurses in Malang in that practice score was the second highest variable among knowledge, attitude, and practice; however, the score was around 75%.

A study by Shakeri et al., (2018) showed that 62.4% of emergency medical technicians have good clinical skills in an emergency. It is suggested that to improve the professional competence of nurses in pre-hospital ambulance services, regular training, and refresher materials are needed (Sanjana et al., 2022). Certain competencies regarding pre-hospital emergency care are needed to make nurses feel secure, independent, and confident (Falk et al., 2022).

Limitations

The sample size of ambulance nurses included in this study may limit the generalisability of the findings to the broader population of ambulance nurses in the region. It is envisaged that a bigger sample size and a broader study region are needed

for future studies. This cross-sectional design employed in this study provides a snapshot of ambulance nurses' knowledge, attitudes, and competencies at a single point in time.

Longitudinal or qualitative research approaches may offer deeper insights into the dynamics and changes over time in these domains. Response biases may arise when self-report measures are used to evaluate knowledge, attitudes, and competencies. To validate self-reported data, future studies could use objective metrics or observational techniques.

Implications and Recommendations

Formal and informal competency enhancement programs are necessary, such as training or mentoring, to provide ambulance nurses with a forum to enhance their knowledge, skills, and collaboration competencies. A pre-hospital services curriculum for ambulance nurses can also be recommended to be incorporated in both diploma and undergraduate programs as a first step towards enhancing the competency of nurses in pre-hospital services.

CONCLUSION

According to this study, the pre-hospital ambulance nurses' attitude was rated as the highest, but their competencies still require improvement. Results show that most newly hired nurses receive minimal training, which supports the idea that efforts should be made to improve competency through education and training support. Regarding age, gender, prior education, nursing experience, experience as an ambulance nurse, and quantity of training attended, there were no significant differences in the knowledge, attitudes, and competencies of ambulance nurses at the PSC where they worked. The study's findings demonstrate that PSC ambulance nurses throughout the Special Region of Yogyakarta largely have similar levels of knowledge, attitudes, and competencies.

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