

Assessing Changes in Knowledge and Practical Skills of Community Ambulance Volunteers Following Emergency Medical Training

Nur Chayati¹, Nur Hidayati², Esa Pradita Dazza¹, and Toriquel Albab Firdaus¹

¹Nursing Department, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, Indonesia

²Nursing Department, Faculty of Health Sciences, Universitas Muhammadiyah, Indonesia

*nur.chayati@umy.ac.id

Received
02/06/2026

Accepted
27/07/2026

Published
31/07/2026

DOI

[10.59329/carmin.v6i1/278](https://doi.org/10.59329/carmin.v6i1/278)

ABSTRACT

The effectiveness of community-based ambulance services depends not only on ambulance availability but also on volunteers' capacity to recognize emergencies and ensure safe patient transport. This study examined the effect of emergency medical training on the knowledge and practical skills of community ambulance volunteers. A pre-experimental, one-group pretest-posttest design was employed involving 25 volunteers. The intervention comprised interactive lectures, demonstrations, simulation-based training, and hands-on practice addressing initial patient assessment, basic life support, first aid, and patient transfer techniques. Knowledge was measured before and after training using a validated questionnaire, while practical skills were assessed through direct observation using a standardized checklist derived from current resuscitation guidelines. Data were analyzed with a paired t-test. All participants were male, with a mean age of 43 years; most had completed senior high school, while the remainder held a bachelor's degree. Half had previously received emergency care training. Mean knowledge scores increased from 84.29 to 90.71 following the intervention, reflecting a 6.42-point (7.6%) improvement, though this change did not reach statistical significance ($p = 0.082$). Observational assessment indicated that most participants correctly performed the sequence of first aid interventions and patient transfer procedures. However, deficiencies persisted in specific psychomotor skills, including carotid pulse assessment, chest compression quality, and effective stretcher use, highlighting the need for continued practical training. Overall, emergency medical training demonstrated a favorable trend toward enhancing volunteers' knowledge and practical competencies in basic emergency care and safe patient transport. These findings suggest that simulation-enhanced training combined with interactive instruction can strengthen the capacity of community ambulance volunteers in prehospital emergency response. Regular refresher training and ongoing competency evaluation are recommended to sustain long-term knowledge retention and skill proficiency.

Keywords: ambulance, emergency, patient transport, training, volunteer

How to cite:

Chayati, N., Hidayati, N., Dazza, E. P., & Firdaus, T. A. (2026). Assessing Changes in Knowledge and Practical Skills of Community Ambulance Volunteers Following Emergency Medical Training. *Carmin: Journal of Community Service*, 6(1), 117-125



INTRODUCTION

Public awareness of emergencies affecting other members of the community tends to decline as individual activity and mobility increases (Nurdiansyah, 2016). As a result, health emergencies occurring in the community are often recognized and managed late, which prolongs the time needed to reach health services. One strategy that has developed in various regions of Indonesia is the provision of community-based ambulance services, managed either by the government, social organizations, or the community itself, such as village ambulances, neighborhood-level (RT/RW) ambulances, and Lazismu ambulances (Akbar et al., 2018). This service model has the potential to accelerate community access to health facilities, particularly in areas with limited transportation options or constrained economic conditions.

RT 01 Tegalsari, *Dusun Ngrame*, Tamantirto Village, Kasihan Subdistrict, Bantul Regency, is one area that has developed a neighborhood-based ambulance service as an expression of community social concern. This ambulance service was established in response to residents' growing need for patient transportation, both for emergency conditions and for referrals to health facilities. In addition to serving local residents, the location of RT Tegalsari, which lies in a densely populated area surrounded by several universities and crossed by a main traffic route, exposes the area to a relatively high risk of traffic accidents (Kelurahan Tamantirto, 2022). Data from the Bantul Police Department indicate that 69 traffic accidents occurred within the Bantul traffic jurisdiction between 20 December 2025 and 2 January 2026 (Fahrizaldy, 2026). Throughout 2025, 2,109 traffic accidents were recorded in the region, resulting in 140 deaths and material losses of approximately IDR 1.2 billion (Polres Bantul, 2025). This high accident rate suggests that the availability of a community ambulance can be an important factor in accelerating the initial response before patients receive definitive care.

Nevertheless, the effectiveness of a community ambulance is determined not only by vehicle availability but also by the competence of the volunteers who operate it. A joint needs assessment with the partner organization found that all RT ambulance volunteers were local residents with driving ability but had never received training in emergency management, first aid, or safe patient transport techniques. Prior research has shown that competency- and simulation-based training can improve volunteers' knowledge, skills, confidence, and readiness to respond to emergency conditions (Fahey et al., 2003; Phung et al., 2017, 2018). In addition, World Health Organization guidance emphasizes that prehospital care systems require personnel with basic competence in patient stabilization and safe transport in order to minimize the risk of secondary injury (WHO, 2018).

Numerous emergency volunteer training programs have been reported, ranging from community first aid training to the strengthening of community-based emergency medical responders (Pattanarattanamolee et al., 2021; McBride et al., 2020). However, most of these programs have focused mainly on improving general knowledge or basic first aid skills. Few community service activities have developed a model for empowering community ambulance volunteers that integrates emergency education, hands-on simulation of patient transport techniques using an operational ambulance, and strengthening of patient transport equipment according to community needs. This gap forms the basis for developing a training model that is simple, practical, and suited to the characteristics of community volunteers.

Based on these considerations, this community service activity was designed not merely as first aid training but as a model for strengthening the community ambulance system through three main components: improving volunteers' competence in emergency care, conducting realistic scenario-based simulations of patient handling and transport, and providing basic patient transport equipment to support the operation of the community

ambulance. This approach is expected to improve volunteer readiness while strengthening the capacity of the community ambulance system to provide an initial response to emergencies at the neighborhood level.

METHODS

This study used a pre-experimental approach with a one-group pretest-posttest design. Twenty-five ambulance volunteers took part as participants. The activity was carried out at Pondok Al-Mahabbah, RT 01 Tegalsari, on Saturday, 22 November 2025, from 08:00 to 17:00, with four facilitators (a facilitator-to-participant ratio of 1:6). The intervention consisted of health education followed by simulation and independent practice for each participant, described in the following stages.

1. To improve volunteers' understanding, oral health education was delivered together with a question-and-answer session using PowerPoint slides that included supporting images. The material was presented interactively to engage participants, using appealing media and open discussion (Prastia et al., 2023). Topics covered the noble role of a volunteer, the ethics of helping others, warning signs of emergencies, types of cases, initial management, and safe transport methods (Figure 1). Participants' knowledge was assessed using pretest and posttest questionnaires consisting of 10 multiple-choice items that had been content-validated by a surgeon, a neurologist, and an orthopedic specialist. The questionnaire items addressed the objectives of initial assessment in emergency conditions, first aid using the ABCD approach, communication technique, and the patient transport system. Questionnaire results were analyzed using a paired t-test, as the data were normally distributed (normality test, $p = 0.463$, $p > 0.05$), in order to determine whether the material significantly improved participants' knowledge.



Figure 1. Classroom-based presentation of material and question-and-answer session

2. To improve participants' skills in assisting victims and performing safe transport, practical sessions were conducted after the health education component. These sessions covered assessment of the level of consciousness, chest compression technique, splinting and bandaging, transporting victims using a long spine board and scoop stretcher, helmet removal, loading and unloading patients into the ambulance, and

patient care during transport (Figure 2). All participants took part in the practical sessions, divided into small groups. Each session began with a demonstration of the correct technique by an instructor, after which every volunteer practiced each technique individually. This skill-based session was assessed through observation using a basic life support checklist (European Resuscitation Council, 2025; Kleinman et al., 2025). Participants were considered to have passed if at least 80% of the required actions were performed correctly.



Figure 2. Simulation and practice. 2a. Assessing the victim's level of consciousness. 2b. Chest compression technique. 2c. Stabilizing and transferring the victim onto a spine board. 2d. Transporting the patient to the ambulance stretcher.

The role of the partner organization in this activity included providing the venue and training facilities, arranging additional instructors, distributing invitations, and organizing

refreshments. Safety throughout the activity was ensured and monitored by the instructors and facilitators, all of whom were health professionals. This was formalized through a learning contract, the use of a private activity area, the use of data solely for publication purposes, and the absence of any form of physical punishment or bullying.

RESULTS AND DISCUSSION

A total of 25 ambulance volunteers took part in the full training program and completed both the pretest and the posttest. All participants were male, with a mean age of 43 years. Most participants had completed senior high school as their highest level of education (64.3%), while 35.7% held a university degree. Most participants (64.3%) had never previously taken part in emergency training (Table 1). These characteristics indicate that most volunteers were laypeople without formal experience in emergency management. The main reasons residents were motivated to become ambulance volunteers were a sense of humanity, a desire to help others, and the pursuit of religious merit.

Table 1. Characteristics of respondents

Characteristic		n	Percentage
Gender	Male	14	100%
	Female	0	0%
Education Background	Senior High School	9	64.3%
	Bachelor's Degree	5	35.7%
Prior emergency training	Yes	5	35.7%
	No	9	64.3%

Not all participants showed an improvement in score; some scores remained unchanged, and a few even decreased. However, an increase in score was observed for the majority of participants (Figure 3).

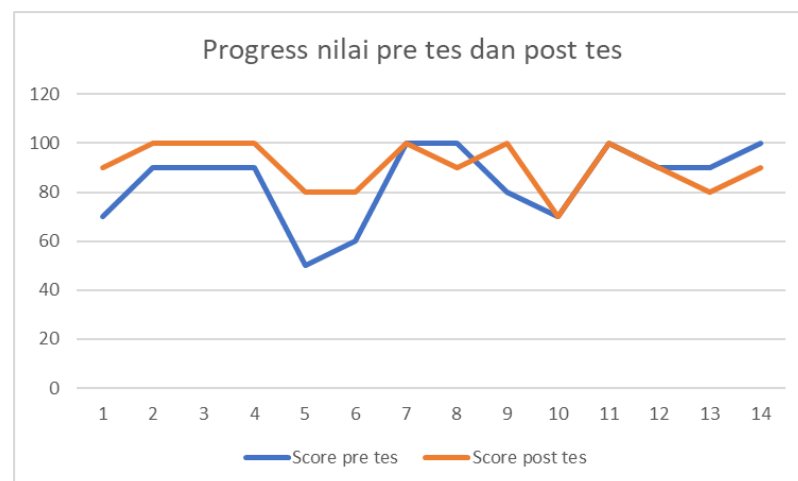


Figure 3. Comparison of volunteers' pretest and posttest scores

The mean knowledge score increased from 84.29 ± 16.04 to 90.71 ± 9.97 after training. Although this represents a descriptive increase of 6.42 points (7.6%), the paired t-test showed that the increase did not reach statistical significance (mean difference = 6.42; 95% CI, minus 13.80 to 0.95; $p = 0.082$). This finding indicates a favorable trend toward improved knowledge, although the magnitude of change was not sufficient to reject the null hypothesis at the 5% significance level (Table 2).

Table 2. Results of the paired t-test (n = 25)

Variable	Mean	Mean difference	SD	p	95% CI
Pretest	84.29	6.42	16.04	0.082	-13.80 to 0.95
Posttest	90.71		9.97		

The emergency medical training provided to community ambulance volunteers resulted in a mean knowledge score increase of 6.42 points, or approximately 7.6%, although this increase did not reach statistical significance ($p = 0.082$). This finding suggests that the intervention had a favorable trend toward improving volunteers' understanding of recognizing emergency conditions, first aid, and patient transport technique, although the magnitude of change was not sufficient to meet the threshold for statistical significance. In education-based intervention research, a non-significant result of this kind does not necessarily indicate that the training was ineffective; it can instead be influenced by various methodological factors and participant characteristics, such as participants' baseline ability, prior experience, instructor quality, training duration, opportunities for practice, feedback, and retraining. Knowledge and skill retention can decline over time, so refresher training or spaced learning is needed to sustain competence (Avau et al., 2019; Perkins et al., 2021).

Another factor contributing to the non-significant result was the relatively high baseline knowledge of participants. The mean pretest score already reached 84.29 out of 100, leaving relatively little room for improvement. This condition is known as a ceiling effect, in which participants' baseline ability is already high enough that an intervention can only produce a limited increase. In addition, the relatively small sample size ($n = 25$) reduced the statistical power of the test, meaning that a difference that is practically meaningful may not necessarily be detected as statistically significant. Interpretation of the results should therefore not rely on the p value alone but should also take into account the magnitude of the score change and the practical benefit gained by participants after training.

These findings are consistent with several previous studies showing that first aid and emergency training for laypeople generally produces gains in knowledge, although the magnitude of improvement is influenced by training duration, teaching method, participant experience, and the evaluation method used. A systematic review by Van de Velde reported that first aid training consistently improves the public's ability to recognize and provide initial assistance, particularly when combined with hands-on practice and skill repetition (Van de Velde et al., 2009). Similarly, research on community first responders has shown that volunteers who received structured training were better prepared to provide an initial response before patients received definitive medical care (Minna et al., 2022).

Observation of skill performance after the simulation showed that the overall sequence of actions was performed correctly, although several elements required correction, such as the depth and rate of chest compression and carotid pulse checks before and after compression. Nearly every participant needed to be reminded and re-guided. Overall, 50% of the taught skills were performed correctly, while the remainder still required correction (Table 3).

Table 3. Observation results for basic life support performance (n = 25)

No.	Action	Performed correctly	Performed incorrectly	Not performed
1	Ensure the 3 A's (safety of the rescuer, environment, and victim)	25 (100%)		
2	Check for a response by firmly tapping the victim's shoulder ("Hello! Hello! Are	25 (100%)		

No.	Action	Performed correctly	Performed incorrectly	Not performed
	you all right?") and observe chest movement			
3	If the victim shows no response and no chest movement is visible, call for help and activate the emergency number (118)	25 (100%)		
4	Check the carotid pulse for 5 to 10 seconds	10 (40%)	15 (60%)	
5	If no carotid pulse is felt, perform CPR: a. Place the rescuer's hands at the center of the victim's chest, with the knees at a 90-degree angle, arms straight, and the dominant hand placed over the non-dominant hand b. Compression rate of 100-120 compressions per minute c. Compression depth of 5-6 cm d. Ensure full chest recoil between compressions e. Continue compressions for 2 minutes (30 compressions per cycle, 5 cycles = 150 compressions)	15 (60%)	10 (40%)	
6	Recheck the carotid pulse for 5 to 10 seconds	15 (60%)	5 (20%)	5 (20%)

CONCLUSION

Simulation-based emergency training showed a favorable trend toward improving ambulance volunteers' knowledge and strengthening their first aid skills, although the increase in knowledge did not reach statistical significance. These findings suggest that an active learning approach combining education, demonstration, and simulation has the potential to strengthen the capacity of community ambulance volunteers. Future research should use an experimental design with a control group, a larger sample size, and long-term evaluation of competency retention to provide stronger evidence of effectiveness.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

- Akbar, M. F., Dewi, L. K., & Amin, M. (2018). Implementation of Mayor Policy About Free Ambulance Program on Improvement of Health Services in Health Care Development Bandar Lampung. *Jurnal Ilmu Sosial*, 16(3), 185–191.
- Avau, B., Veegaete, A. Vande, Scheers, H., Vandekerckhove, P., & Buck, E. De. (2019). Determining First Aid Knowledge and Skills Retention With Laypeople: A Randomized Controlled Trial in Nepal. *International Journal of First Aid Education*, 2(2), 55–66. <https://digitalcommons.kent.edu/ijfae/vol2/iss2/6>
- Decker, S., Alinier, G., Crawford, S. B., Gordon, R. M., Jenkins, D., & Wilson, C. (2021). Healthcare Simulation Standards of Best Practice™ The Debriefing Process. *Clinical Simulation in Nursing*, 58, 27–32. <https://doi.org/10.1016/j.ecns.2021.08.011>
- European Resuscitation Council. (2025). *Guidelines on Cardiopulmonary Resuscitation*. <https://www.erc.edu/science-research/guidelines/guidelines-2025/guidelines-2025-english/>

- Fahey, C., Walker, J., & Lennox, G. (2003). Flexible, Focused Training: Keeps Volunteer ambulance officers. *Australasian Journal of Paramedicine*, 1, 1–9. <https://doi.org/10.33151/ajp.1.1.74>
- Fahrizaldy. (2026). *Kecelakaan Laulintas Selama Nataru di Wilayah Bantul Mengalami Penurunan*. <https://tvriyogyakartanews.com/2026/01/07/kecelakaan-laulintas-selama-nataru-di-wilayah-bantul-mengalami-penurunan/>
- Guerrero, J. G., Tungpalan-Castro, G. M., & Pingue-Raguini, M. (2022). Impact of simulation debriefing structure on knowledge and skill acquisition for postgraduate critical care nursing students: three-phase vs. multiphase. *BMC Nursing*, 21(1), 318. <https://doi.org/10.1186/s12912-022-01100-z>
- Kalurahan Tamantirto. (2022). *Profil kalurahan Tamantirto*. <https://tamantirto.bantulkab.go.id/first/artikel/33>
- Kleinman, M. E., Buick, J. E., Huber, N., Idris, A. H., Levy, M., Morgan, S. G., Nassal, M. M. J., Neth, M. R., Norii, T., Nunnally, M. E., Rodriguez, A. J., Walsh, B. K., & Drennan, I. R. (2025). Part 7: Adult Basic Life Support: 2025 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*, 152(16_suppl_2). <https://doi.org/10.1161/CIR.0000000000001369>
- McBride, R., Ski, C. F., Thompson, D. R., Quinn, T., & Wilson, M. H. (2020). Championing survival: connecting the unknown network of responders to address out-of-hospital cardiac arrest. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, 28(1), 49. <https://doi.org/10.1186/s13049-020-00748-3>
- Minna, S., Leena, H., & Tommi, K. (2022). How to evaluate first aid skills after training: a systematic review. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, 30(1), 56. <https://doi.org/10.1186/s13049-022-01043-z>
- Nurdiansyah, E. (2016). Improving Social Sensitivity in Society with Internalization Value of Multicultural Education. *Proceedings of the 2nd SULE – IC*, 269–283.
- Oh, Y.-J., Kang, H.-Y., Song, Y., & Lindquist, R. (2021). Effects of a transformative learning theory based debriefing in simulation: A randomized trial. *Nurse Education in Practice*, 50, 102962. <https://doi.org/10.1016/j.nepr.2020.102962>
- Pattanarattanamolee, R., Sanglun, R. Y., & Nakahara, S. (2021). Community-Based First Responder Network in Rural Thailand: A Case Study of Out-of-Hospital Cardiac Arrest. *Prehospital and Disaster Medicine*, 36(2), 234–236. <https://doi.org/10.1017/S1049023X20001545>
- Perkins, G. D., Gräsner, J.-T., Semeraro, F., Olasveengen, T., Soar, J., Lott, C., Van de Voorde, P., Madar, J., Zideman, D., Mentzelopoulos, S., Bossaert, L., Greif, R., Monsieurs, K., Svavarsdóttir, H., Nolan, J. P., Ainsworth, S., Akin, S., Alfonzo, A., Andres, J., ... Zideman, D. A. (2021). European Resuscitation Council Guidelines 2021: Executive summary. *Resuscitation*, 161, 1–60. <https://doi.org/10.1016/j.resuscitation.2021.02.003>
- Phung, V.-H., Trueman, I., Togher, F., Orner, R., & Siriwardena, A. N. (2017). Community first responders and responder schemes in the United Kingdom: systematic scoping review. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, 25(1), 58. <https://doi.org/10.1186/s13049-017-0403-z>
- Phung, V.-H., Trueman, I., Togher, F., Ørner, R., & Siriwardena, A. N. (2018). Perceptions and experiences of community first responders on their role and relationships: qualitative interview study. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, 26(1), 13. <https://doi.org/10.1186/s13049-018-0482-5>
- Polres Bantul. (2025). *Angka Kecelakaan Lalu Lintas di Bantul Menurun Selama 2025, Pelajar Jadi Perhatian Serius*. <https://jogja.polri.go.id/bantul/tribrata->

news/online/detail/angka-kecelakaan-lalu-lintas-di-bantul-menurun-selama-2025--pelajar-jadi-perhatian-serius.html

- Prastia, T. N., Dewi Pertiwi, F., & Nasution, A. (2023). Assistance for Disaster Nutrition Intervention Through Food Supply Management Activities, Nutrition Counselling and Education. *Abdi Dosen: Jurnal Pengabdian Pada Masyarakat*, 7(1), 92. <https://doi.org/10.32832/abdidos.v7i1.1674>
- Van de Velde, S., Heselmans, A., Roex, A., Vandekerckhove, P., Ramaekers, D., & Aertgeerts, B. (2009). Effectiveness of Nonresuscitative First Aid Training in Laypersons: A Systematic Review. *Annals of Emergency Medicine*, 54(3), 447-457.e5. <https://doi.org/10.1016/j.annemergmed.2008.11.005>