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OVERVIEW OF AMBULANCE TRANSPORT UTILIZATION: SCOPING REVIEW

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ABSTRACT

Background: The demand for ambulance transports has increased by 29.2% worldwide. This rise necessitates system improvements and standardization. There are differences in prehospital transport ambulance services utilization between developed and developing countries. **Objective:** Review aims to describe utilization of ambulance transports in developed and developing countries. **Methods:** Scoping review method was conducted based on 5 databases: ScienceDirect, PubMed, ClinicalKey, Cochrane, SpringerLink, and handsearching on Google. **Results:** Inclusion criteria were original articles, in English and Indonesian, published in last 5 years (2019-2024), open access, available in full text, review yielded 2,739 articles, 6 articles meeting criteria for analysis, 2 additional articles identified through hand searching. **Conclusion:** There are differences in ambulance transport usage between developed and developing countries. In developed countries, most transport ambulances are used for prehospital emergency care, primarily for trauma cases. In contrast, most ambulance transport in developing countries is used for inter-facility referrals, primarily for medical emergencies. In developing countries, not all patients receive prehospital care, if they do, it is often limited to basic aid, whereas in developed countries, prehospital care can include advanced aid. Review highlights differences between developed and developing countries in ambulance transport utilization and services.

Keywords: Ambulances; Developed country; Developing country; Emergency medical services; Emergencies

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BACKGROUND

Ambulance transport is a type of transportation used to move living victims or patients to receive medical assistance. It is part of prehospital emergencies and inter-hospital transport services. Ambulance transport systems and standards vary across countries (Kemenkes RI, 2019).

The prevalence of ambulance transport use has increased compared to previous years. The demand for ambulance transport has risen by 29.2% worldwide (Sakagianni et al., 2022). According to data from the National Command Center (NCC) 119 for the year 2019, 65,006 referral cases used ambulance transport over the past three years in Indonesia, with 26,306 cases being emergency cases and 15,987 cases being non-emergency cases (Kemenkes RI, 2019).

Although used solely for transport, ambulance transport has its own equipment and service standards. Maintaining patient stability is a priority during transportation (Maryani & Ulfa, 2023). Many independent ambulance transports from various religious institutions or community units lack or have insuffipendent ambulance transports from various religious institutions or community units lack or have insufficient knowledge and skills regarding prehospital care and adequate referral procedures (Maryani & Ulfa, 2023). The knowledge and skills of ambulance transport crews or emergency medical technicians (EMTs) also affect the standardization of ambulance transport. A previous study indicates that ambulance transports that do not meet standards have EMTs with lower levels of knowledge (Tiwary et al., 2020).

Prehospital care in developed countries is organized within Emergency Medical Services (EMS), whereas in developing countries, there is no formal system for providing prehospital services (Roudsari et al., 2007). The lack of a formal system in developing countries results in unclear administration and the use of ambulance transport, impacting the effectiveness of its utilization (Amalia, Priyanti & Nahariyani, 2018). In developed countries, ambulance transport services can provide emergency and prehospital transportaIn developed countries, ambulance transport services can provide emergency and prehospital transportation with trained and professional EMTs. In contrast, in developing countries, particularly in Indonesia, many ambulance transports professional EMTs. In contrast, in developing countries, particularly in Indonesia, many ambulance transports from non-contrast, in developing countries, particularly in Indonesia, many ambulance transports from non-healthcare community institutions only serve the role of patient transportation without providing first aid and patient stabilization, often with EMTs who have limited knowledge (Amalia, Priyanti & Nahariyani, 2018). Standardization of ambulance transport and the quality of EMTs are crucial for effectively using ambulance services. Ambulance transports that do not meet standards and EMTs with low knowledge levels will impact the quality of care provided. This literature review aims to discuss the utilization of ambulance transport in several developed and developing countries, providing insights into developing prehospital services in developing countries, particularly Indonesia.

METHODS

The article search for this scoping review was conducted using the PCC (Population, Concept, Context) framework with writing methodology based on the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) checklist and explanation (Tricco et al., 2018). The search was performed across five databases: ScienceDirect, PubMed, ClinicalKey, Cochrane, and SpringerLink. A hand search was also conducted on Google. Inclusion criteria were: research/original articles published in English or Indonesian, published within the last five years (2019-2024), open access, and available in full text. Exclusion criteria were articles that did not align with the research objectives.

The PCC framework established for the article search is detailed in Table 1. Based on this framework, the keywords used for the search in each database were "(emergency medical service) AND (utilization) AND (prehospitals)". The search yielded 2,739 articles, with eight articles meeting the eligibility criteria. Table 2 provides a breakdown of the articles found in each database.

Eight articles were deemed relevant to the research topic. The studies were conducted in Ethiopia, Armenia, Canada, Scotland, Pakistan, and Indonesia. The research designs used include four articles employing quantitative design, one article using qualitative design, and one article utilizing a mixed-methods approach. Table 2 presents a synthesis of the results from these eight articles. According to the table, there are two main topics: ambulance transport utilization and ambulance transport services.

Table 1. The PCC framework

PCC Elements	Keywords
Population	emergency medical service
Concept	utilization
Context	pre hospitals

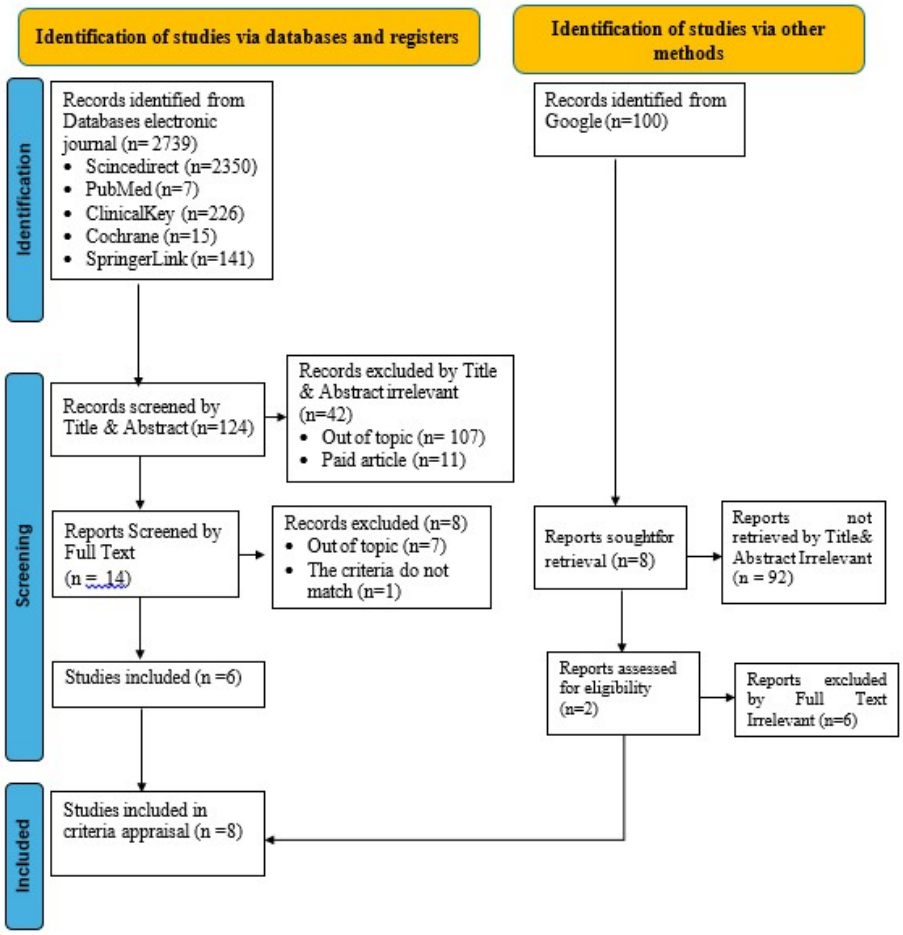

Figure 1. PRISMA flow diagram for literature search

RESULTS

Utilization of Ambulance Transport

The use of ambulance transport in developing countries, in Ethiopia, remains relatively low. Three studies on EMS utilization in Ethiopia report that the use of ambulance transport in country is still below 40% (Adem, Tezera & Agegnehu, 2024; Sultan et al., 2019; Mekonen et al., 2024). In Indonesia, utilization of ambulance transport is below 10% (Brice et al., 2022). This finding contrasts sharply with utilization of ambulance transport in developed countries like Scotland, where it exceeds 60% (McHenry et al., 2023). Despite low utilization of ambulance transport in developing countries, most study respondents indicate that ambulance transport is an important part of emergency care, is considered safer, faster than other emergency transportation methods (Sultan et al., 2019).

There are various reasons behind the low utilization of ambulance transport in developing countries. According to Newton et al. (2024), the frequency of calls exceeding EMS resources leads to extended response times for ambulance transport. This is also compounded by overcrowding in emergency departments (EDs), which delays the transfer of patients from EMS to the ED. Additionally, limited resources result in a poor working environment for EMS, including staff reductions, workplace culture issues, organizational barriers, and paramedic empowerment (Newton, Carpenter & Zwicker, 2024). The additional costs associated with using ambulance transport services lead people in developing countries to prefer other modes of transportation (Brice et al., 2022). Besides poor EMS systems, factors related to EMS ser-

Table 2. An overview of studies' characteristics and main findings

No	Author/Year/Country	Aim of the study	Sample	Study Design	Main Findings
1	Adem et al./2024/Ethiopia	Assessing the utilization of ambulance transport and its determinants for patients treated in the ED within the context of the prehospital care system	451 patients who arrived at the ED	Cross-sectional, quantitative	39.5% of respondents used ambulance transport services to ED (19.7% for emergency care, 80.3% for inter-facility referrals). 35.4% of patients received care during transportation to hospital, with bleeding control being most common intervention (32.8%). Arrival time at ED, referral source, patient mental status, first responder, distance from hospital, previous experience are main variables significantly associated with utilization of ambulance transport in prehospital emergency conditions.
2	Arzoumanian et al./2024/Armenia	Explaining the pattern of EMS utilization in Armenia	Locator software database used by 54 ambulance stations from January 2016 to July 2022	Descriptive retrospective cohort study	The dominant complaints in the capital city and other provinces are high blood pressure in adults and fever in children. The majority of those using ambulance transport services do not require hospital treatment.
3	Sultan et al./2019/Ethiopia	Assess the proportion of patients using EMS and evaluate both quantitatively and qualitatively the barriers to EMS utilization in Addis Ababa.	429 patient visited 5 selected general hospitals in Addis Ababa with specific emergency condition	Cross-sectional, quantitative, and qualitative mixed-method study	20.3% of patients arrived by ambulance transport. 53.4% of respondents remembered at least one access number for ambulance services, and 96.3% stated that ambulance transport is an important part of emergency care. Most respondents believe ambulance transport is safer (78.5%) and faster (69.5%) than taxis or private cars.
4	Newton et al./2024/Canada	Identifying Core Issues Impacting EMS Services in Alberta	19 primary /advanced care paramedic	Qualitative research design and interview	The EMS system is facing a sustainability crisis with call volumes exceeding EMS resources. The core themes identified are poor response times and a poor working environment within EMS, which mutually affect and impact each other.
5	McHenry et al./2023/Scotland	Investigate trends in services and patient care over the past decade and factors associated with clinical deterioration and prehospital mortality.	All EMRS assignments over first 10 full calendar years as a national service (including January 2011 – December 2020)	Retrospective cohort study	65.2% of EMRS services were directed toward prehospital critical care, 34.8% were for referrals from remote and rural healthcare facilities. Majority of prehospital critical care cases were trauma, with 45.8% due to traffic accidents, 8.8% due to interpersonal violence, 6.9% due to self-harm or suicide, 2.8% due to work or industrial accidents. Advanced airway management was provided to 22.8% of patients in prehospital critical care. Common referral cases from remote facilities included injuries and poisoning (22.5%), respiratory diseases (20.7%), circulatory system diseases (18.5%). During transfer, 52.5% of patients received mechanical ventilation, 59.7% received other critical care interventions prehospital blood transfusions, chest drain placement, neuroprotective procedures, ultra sonography.

Continue Table 2. An overview of studies' characteristics and main findings

6	Mekonen et al./2024/Ethiopia	Evaluate factors associated with the utilization of EMS among the community in Hawassa, Ethiopia.	422 patients visited the ED at four general hospitals in Hawassa City	Cross-sectional study	24.9% of respondents utilized EMS services. Reported cases included medical emergencies (52.4%), psychiatric emergencies (38.2%), and injuries/trauma (35.1%). The most commonly provided service was first aid (82.8%). Significant factors associated with EMS utilization include living in urban areas, having previously used ambulance services, having an ambulance contact number, and awareness of the availability of free government ambulance services.
7	Khattak et al./2023/Pakistan	Assess patient satisfaction with prehospital care using ambulance transport services across tertiary hospitals.	378 conscious patients used ambulance transport services to the ED.	Cross-sectional study	43.9% of participants used the Rescue 1122 service, 26.2% used private ambulance transport services, and 11.6% used public ambulance transport services. Traffic accidents were the most common complaint, reported by 25.9% of participants. Among all ambulance services, 61.3% of participants were dissatisfied with Chippa (humanitarian/public ambulance) services regarding vehicle cleanliness, whereas participants were highly satisfied with the Rescue 1122 service.
8	Brice et al./2022/Indonesi	Assess the use of ambulance transport by patients arriving at emergency departments in hospitals in Jakarta, Indonesia.	5 general hospitals (4 public hospitals, 1 private hospital)	Cross-sectional study	Only 9.3% of patients used ambulance transport, and 38% reported not being aware of its availability. The response time for ambulance transport was longer than that for other modes of transportation. Patients who used ambulance transport incurred higher costs than those who did not.

vice users also affect EMS utilization. Significant factors impacting EMS utilization include urban residence, previous use of ambulance transport services, having an ambulance transport number, arrival time at the ED, referral sources, patient mental status, first responders, distance from the hospital, and awareness of free government ambulance transport services (Mekonen et al., 2024; Adem, Tezera & Agegnehu, 2024).

Ambulance Transport Services

According to the review findings, the primary services provided by ambulance transport include emergency care from the incident site to the hospital and inter-facility referral services (Adem, Tezera & Agegnehu, 2024; McHenry et al., 2023). There are notable differences in the utilization of ambulance transport services between developed and developing countries. In developing countries like Ethiopia, ambulance transport services are predominantly used for inter-facility referrals (Adem, Tezera & Agegnehu, 2024), whereas in developed countries such as Scotland, ambulance transport services are primarily used for prehospital emergency care (McHenry et al., 2023). Cases that were handled can include medical, psychiatric, and trauma cases affecting adults and children (Mekonen et al., 2024; Arzoumanian et al., 2024). In developed countries, most prehospital cases handled are trauma cases, while in developing countries, the focus is on medical emergencies (McHenry et al., 2023; Mekonen et al., 2024). In developing countries, not all patients receive prehospital care, and when they do, the care provided is often limited to essential assistance. In contrast, developed countries offer basic and advanced prehospital care (Adem, Tezera & Agegnehu, 2024; McHenry et al., 2023).

DISCUSSION

The utilization of ambulance transport in developing countries remains low. Research in several developing countries indicates that ambulance transport usage is below 40%. The proliferation of ambu-

lance services from various institutions and the lack of a formal system regulating ambulance transport have led people to prefer other modes of transportation over ambulance transport (Amalia, Priyanti & Nahariyani, 2018; Brice et al., 2022). One factor contributing to the low utilization of ambulance transport is the high cost of services. The lack of comprehensive ambulance transport coverage in health insurance is a known barrier to accessing emergency transportation in developing countries. The government typically provides free ambulance transport services in developing countries under universal health coverage policies, which can lead to longer response times (Brice et al., 2022). Research also shows that despite many humanitarian ambulance services from various institutions, 61.3% of patients are dissatisfied with the services provided (Khattak et al., 2023). Although most people in developing countries know at least one access number for ambulance services and recognize the importance of ambulance transport in emergency care, this awareness does not significantly affect their tendency to use ambulance transport services (Sultan et al., 2019).

There are similarities in the functions of ambulance transport services in developed and developing countries, including emergency care from the scene to the hospital and inter-facility referral services. However, there is a notable difference in the proportion of ambulance transport utilization: in developed countries, the majority of ambulance services are used for emergency care, whereas in developing countries, they are predominantly used for inter-facility referrals (Adem, Tezera & Agegnehu, 2024; McHenry et al., 2023). This difference may be influenced by the knowledge and skills of ambulance transport crews or emergency medical technicians (EMTs) in prehospital care. In developed countries, EMTs receive training in basic life support up to advanced life support, equipping them with the skills needed for prehospital care and earning public trust for handling prehospital cases (Roudsari et al., 2007).

Since most ambulance transport usage in developing countries is for inter-facility referrals, the cases handled are predominantly medical emergencies (Mekonen et al., 2024). However, trauma cases or traffic accidents are also common in ambulance transport services in both developed and developing countries. Middle- and low-income countries account for 90% of global traffic accident fatalities. This high rate can be attributed to the absence of a uniform EMS system with a single access number and inadequate operational standards with slow response times (Mishra et al., 2020). Poor transportation methods, inadequate infrastructure, lack of public awareness in recognizing emergencies, and untrained healthcare personnel are some major issues in developing countries. Factors affecting patient safety in ambulance transport include poor quality and maintenance of medical equipment, non-compliant ambulance conditions, and delays in reaching emergency sites (Tiwary et al., 2020). In many developing countries lacking formal EMS systems or facing EMS capacity deficits, patients are often transported in private vehicles by others (not EMTs) (Mishra et al., 2020).

There are specific standards for providing ambulance transport services. International standards recommend providing 1 ambulance for every 50,000 people to meet the demand for patient transportation to definitive care facilities in low- and middle-income countries (Mishra et al., 2020). Beyond the number of ambulances, standardization of ambulance transport and EMTs is also crucial. Research conducted in India, a developing country, shows that most ambulances (68%) met overall standards. However, there were issues such as non-compliant medical equipment (29.3%) and inadequate hygienic storage for disposable medical supplies (71.3%). Additionally, most EMTs' knowledge regarding prehospital care in India remains below average (71%). Most ambulances that did not meet standards had EMTs with low knowledge (Tiwary et al., 2020). This indicates that despite operational standards for ambulance transport in developing countries, many ambulances still fail to meet standards in terms of facilities and crew. The limited availability of ambulances and the lack of a formal system regulating their use result in suboptimal prehospital emergency care and contribute to high prehospital mortality rates. Therefore, an integrated system with comprehensive standardization is needed in developing countries to improve patient safety.

Nurses play an important role in ambulance transport services. According to Indonesian law, ambulance transport staff should consist of at least one driver with basic life support (BLS) and communication skills, and one nurse with Basic Trauma Cardiac Life Support skills (BTCLS). (Decree of the Minister of Health and Social Welfare of the Republic of Indonesia No. 143/MENKES-KESOS/SK/II/2001). Nurses who perform duties in ambulance transport have primary duties and responsibilities in clinical practice, guidance and leadership, documentation, communication, and responsibility for the care of ambulance equipment and vehicles. Nurses play a role in assessing, caring for, managing, referring, and transporting

patients according to their severity to the appropriate health facility. Nurses should be able to assess the scene, identify environmental and clinical risks to patients, themselves, and colleagues, and take action to minimize them. Nurses must ensure the safe transfer of patients from the vehicle to the vehicle using existing procedures. In performing their duties, nurses must also report and document issues in a structured manner (NHS, 2022).

Limitations

The limitations of this review include the limited number of developed and developing countries used for comparison in ambulance transport utilization, as well as the majority of studies being single-center studies, which may not be generalizable to all developed or developing countries. Additionally, the article search was restricted to the past 5 years, which may mean that this review does not cover recent improvements in EMS systems in developed countries. The review is also limited to open-access articles and was analyzed subjectively by the author, potentially overlooking relevant articles not included.

CONCLUSSION

Different ambulance transport services differ between developed and developing countries in terms of utilization and the services provided. Regarding utilization, the key concern is the lower prevalence of ambulance transport use in developing countries. Regarding the services offered, ambulances in developed countries are more frequently used for prehospital emergency care, with trauma cases being more commonly handled. In contrast, in developing countries, ambulance transport is more often used for inter-facility referrals, with medical emergencies being more frequently addressed. Additionally, the prehospital care provided in developed countries tends to be more advanced than in developing countries.

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