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Outcome of the critically ill patient brought to emergency department and their mode of transportation

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Abstract

Introduction: General Practice and Emergency Medicine is the backbone of the health system of a developing country like Nepal with a significant number of cases being encountered in the general practice clinics and Emergency Department (ED). However, Emergency Medical Services in Nepal face significant challenges with a need for numerous improvements. The medical care provided while using ambulance services in Nepal is insufficient. This study assessed the outcomes of patients brought to Patan Hospital's ED, considering the method of transportation used for their arrival.

Method: A cross-sectional analytical study was conducted at Patan Hospital from April 2021 to March 2022. Total 72 patients were considered for the study. Frequency, Percentage, Median, and Inter-quartile Range were calculated for descriptive analysis. The Chi-square test was used for analytical study and p-value <0.05 was considered statistically significant.

Result: The maximum percentage of critically ill patient was 25.0% (in age group of >60 years) and the minimum was 8.3% (in age group of 0-14 years). 66.7% were male and 33.3% were female. Among all, 34.7% patients presented to emergency via ambulance (33.3% via ka/kha and 1.4% via gha ambulance), 37.5% via private transportation (27.8% via bike and 9.72 via car) and 27.8% patients via public transportation (18.05% via taxi and 9.72 via micro/bus/tempo). There was no association between the modes of transportation and the mortality outcomes and ICU admission among the critically ill patient (p=0.385, and p=0.716 respectively).

Conclusion: Regardless of the transportation method, there was no significant difference in mortality outcomes and the requirement for ICU care among critically ill patients presenting to the emergency department signifying the insufficient emergency medical services provided during the ambulance transportation.

Keywords: Critically ill patient; Emergency Department; ICU; Mode of transportation; Mortality

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1. Introduction

General Practice and Emergency Medicine (GPEM) is an emerging field in developing nations, whereas it has reached an advanced stage in developed countries[1-3]. Emergency medical services (EMS) plays an important role in saving lives and preventing disabilities. Numerous factors may influence health outcome of the patients presenting to emergency department including injury mechanism, injury severity, transportation mode and pre-hospital time [2-4]. Out of Hospital emergency care (OHEC) includes a spectrum of care delivery from first responder care (FRC), pre-hospital (PH) care, and emergency medical services (EMS). OHEC is an umbrella term coined by the African Federation for Emergency Medicine (AFEM) in 2013[5]. Pre-hospital care is extremely limited in Nepal, and the concept of an Emergency Medical Services (EMS) system is relatively new in the country[6]. Skill of EMS providers and preparedness of transfer vehicle with basic life-saving supplies are vital for PH Care[7]. While in resource constrain setting like Nepal, preparedness for Emergency Health Care focuses on health facility strengthening and PH care remains in shadow[8].

Critically ill patients are defined as patients shifted to Red area and they include those with life threatening conditions and must be seen within 1 minute[9-11]. A study done at Tribhuvan University teaching hospital (TUTH) demonstrated that a large number of critically ill patients present to Emergency Room (ER) on a daily basis. Out of these, nearly 20% are admitted, while over 70% of patients either need to be referred to another hospital or must stay in the Emergency Room[12]. Networking among the hospitals along with other solutions may be required to save lives of critically ill patients. Prolonged ED boarding times were associated worse patient outcomes, suggesting a need for improved throughout and targeted care for patients awaiting ICU admission[13]. ICU admission decisions for critically ill ED patients are affected by Medical ICU bed availability, though higher ED volume and other ICU occupancy did not play a role. There was a delay in ICU admission of critically ill patients from the ED. Shortage of ICU bed and delay in radiological investigation results were the reasons for the prolonged ED stay[14,15]. People were more likely to access private care than public, and reported longer times to access a hospital than the national average[16]. Females were shown to have significantly larger transportation barriers in accessing care and lower satisfaction compared with males[17]. There was no difference in the adjusted clinical outcome according to mode of transport. Patients with severe trauma transported by private means in this setting have better survival than those transported via the EMS system[18]. Ambulance is categorized as Ka and kha without paramedics and Ga with paramedics as per government of Nepal[19, 20]. In the UK, primary transfer to hospital from a pre-hospital site of illness or injury is commonly the responsibility of the ambulance service. Only a minority of patients attending hospitals on emergency basis call for ambulance and majority make their way in vehicles other than ambulance precluding any pre-hospital intervention even for triage category I and II patients[21].

The main issues with EMS in Nepal is that it is poorly established and many of EMS-related services are to be improved. Despite the inadequate EMS in our nation, ambulance services offer preliminary medical assistance. However, their effectiveness is limited due to the insufficiently equipped ambulances in Nepal, lacking trained personnel. As a result, these ambulances primarily serve as transportation to medical facilities in the urban areas of Lalitpur and Kathmandu. Therefore, the care provided to patients within ambulances falls short of meeting the needs of individuals utilizing ambulance services in Nepal.

The aim of this study was to assess the outcomes of patients brought to the emergency considering the method of transportation used for their arrival.

2. Material and methods

A cross-sectional analytical study was conducted at Patan Hospital, Patan Academy of Health Sciences (PAHS) from April 2021 to March 2022. Ethical Approval was taken from the Institutional Review Committee of Patan Academy of Health Sciences “IRC-PAHS” on March 30, 2021 (Ref. No.: PMG21033015017).

Inclusion Criteria: This study involved patients from the districts of Kathmandu, Bhaktapur, and Lalitpur, who were brought to the emergency department of Patan Hospital and were coded as "Red" in the ER triage system.

Exclusion Criteria: This study excluded patients who were brought dead to the hospital, cases involving inter-hospital transfers, patients shifted from the red zone to the yellow zone, and individuals receiving palliative care services.

Total 72 patients were considered for the study. The data was collected using convenient sampling technique. The individual accompanying the patient was inquired about the mode of transportation used to bring the patient to the emergency department, as outlined in the study-Performa. The variables like emergency mortality (Mortality within 1

hour of emergency stay), ICU admission, age, gender and mode of transportation were analyzed using Frequency, Percentage, Median, and Inter-quartile Range for descriptive analysis. The Chi-square test was used for analytical study and p-value <0.05 was considered statistically significant.

3. Results

Total 72 patients were considered for the study, out of which 66.7% were male and 33.3% were female. The maximum percentage of critically ill patient was 25.0% (in age group of >60 years) and the minimum was 8.3% (in age group of 0-14 years). Among all, 34.7% patients presented to emergency via ambulance (33.3% via ka/kha and 1.4% via gha ambulance), 37.5% via private transportation (27.8% via bike and 9.72 via car) and 27.8% patients via public transportation (18.05% via taxi and 9.72 via micro/bus/tempo) (Table 1 and 2).

Table 1 Age and gender of the critically ill patient brought to Emergency Department

Variable	Number	Percentage %
Age		
0-14	6	8.3
15-30	17	23.6
31-40	11	15.3
41-50	11	15.3
51-60	9	12.5
>60	18	25.0
Gender		
Male	48	66.7
Female	24	33.3
Others	0	0

Table 2 Mode of transportation of the critically ill patient brought to Emergency Department

Mode of transport	Number	Percentage
Ambulance	**25**	**34.7**
Nepal Government classified (ka/kha): Without paramedics	24	33.3
Nepal Government classified (ga): With paramedics	1	1.4
Private Transportation	**27**	**37.5**
Bike	20	27.8
Car	7	9.72
Public Transportation	**20**	**27.8**
Taxi	13	18.05
Micro/Bus/Tempo	7	9.72

Out of the critically ill patients admitted to the emergency department through ambulance, private transportation, and public transportation, only one patient who arrived via ambulance experienced mortality. The calculated p-value was 0.385, indicating a lack of statistical significance. Consequently, this dataset cannot be compared, given that no deaths were documented in the other modes of transportation and the p-value is not significant (Table 3).

Table 3 Association of mortality outcome of patients as per mode of transportation of the critically ill patient brought to Emergency Department

Mode of transport	Mortality	Mortality	Fischer Exact Significance
	Yes	No	
Ambulance	1	24	1.906
Private Transportation	0	27	df (2)
Public Transportation	0	20	P=0.385

Across various modes of transportation, the ICU admission rate remained consistent among critically ill patients. Specifically, among 15 patients transported via ambulance, 18 via private transportation, and 11 via public transportation, none were admitted to the ICU. The resulting p-value of 0.716 lacks statistical significance, rendering the data incomparable regarding ICU admission rates based on the mode of transportation (Table 4).

Table 4 Association of ICU admission outcome of patients as per mode of transportation of the critically ill patient brought to Emergency Department

Mode of transport	ICU admission	ICU admission	X^2
	Yes	No	
Ambulance	9	15	0.668
Private Transportation	9	18	df (2)
Public Transportation	9	12	p=0.716

4. Discussion

The study demonstrated that 33.3% of critically ill patients arrived via Ka/Kha category ambulance, and 1.4% via Ga category ambulance. Additionally, 27.8% arrived on motorcycles, 9.72% in cars, 18.05% in taxis, and 9.72% in microbuses, buses, or tempos. The study's findings further revealed that ICU admission rates did not vary based on the mode of transportation.

A prior study at Patan Hospital conducted by Gongol et al. revealed that only 10% of patients reached the emergency room via ambulance, while 54% arrived by taxi. This diverges from our present findings. The primary cause might be the enhanced awareness among patients. Moreover, our study's discovery of private transport accounting for only 37% implies a heightened general understanding that ambulances are a superior choice for hospital transportation compared to private vehicles. The literature has widely acknowledged that delivering patients by taxi or makeshift ambulances can lead to unfavorable outcomes, occasionally even severe ones[22]. A review of 5486 cases received by the Nepal Ambulance Service total of over one year showed a rise in cases over the 12-month period which they have attributed to the increased level of awareness[23]. Our discovery that 34.7% of patients arriving at the Emergency Department utilized ambulances is lower than the findings of a study at B.P. Koirala Institute of Health Sciences (BPKIHS), Dharan, Nepal, where out of 2211 patients in the emergency ward, 43.2% (955) arrived by ambulance[24]. In that same study, patients demonstrated a preference for private vehicles when coming to the emergency ward. One plausible explanation is the widespread availability of taxi services in the Kathmandu valley. Other contributing factors could include lack of awareness about ambulance contact information and the convenience of finding alternative transportation.

Our study demonstrated a single mortality among critically ill patients transported via ambulance, whereas no mortality was observed in patients using alternative transportation methods. Likewise, the ICU admission count remained uniform across various transportation modes, with 9 cases each. Notably, the highest number of patients arriving via private transportation did not require ICU admission (18 cases). Similarly, 15 ambulance-transported patients and 12 publicly transported patients didn't necessitate ICU care. One potential explanation for these findings is the absence of an assessment of patients' actual diagnoses. The general and specific outcomes of critically ill patients are heavily influenced by diagnosis and the healthcare system involved. Omitted from our study were cases involving inter-hospital referrals and patients referred from lower-tier medical centers, which could result in the oversight of more severe cases.

Moreover, there are additional variables within the Emergency Department, such as time between the incident and hospital arrival, symptom recognition at the ED, co-morbidities, etc., which significantly impact outcomes. Regrettably, these variables were not considered in the present study.

In a study involving 109 ambulances at BPKIHS Dharan, approximately 90% were equipped with oxygen cylinders and adult oxygen masks, which were commonly utilized items. However, over half of the ambulances possessed less than 23% of the equipment recommended by national guidelines[25]. The study's conclusion highlighted that a significant majority of the ambulances affiliated with BPKIHS, Nepal, lacked even a quarter of the essential equipment required for basic life support. This factor plays a crucial role in influencing outcomes such as mortality rates and hospital stay durations.

In a Korean study, conducted in 2016, involving 42,188 patients transported from other hospitals, 482 patients (1.1%) were conveyed by the Seoul Mobile Intensive Care Unit (SMICU). Among patients transported by SMICU, there was a higher prevalence of severe emergency conditions and the utilization of mechanical ventilators. After adjusting for relevant factors, the odds ratio for 24-hour mortality following interhospital transport was 0.45 (95% CI: 0.26–0.81) in the overall group and 0.34 (95% CI: 0.16–0.71) in a one-to-one propensity-matched subgroup[26]. Hence, even in a high-quality facility, 1.1% of patients were transferred using an ICU ambulance. In our situation, this kind of ambulance is not easily accessible. However, it has been proven that using a specialized critical care transport unit for inter-hospital transfers resulted in reduced 24-hour mortality, highlighting the advantages of the SMICU. This improvement in outcomes isn't limited to inter-hospital transport alone; it extends to situations involving transportation from home to hospital or from lower-tier to higher-tier medical centers.

This principle can also be applicable to trauma patients. An examination of a substantial nationwide group of trauma patients in the USA revealed that those transferred by helicopter exhibited enhanced survival rates and an increased likelihood of being discharged to their homes, despite longer pre-hospital transport durations, greater severity of injuries, elevated injury severity scores, higher ICU admission rates, and a higher probability of requiring mechanical ventilation[27]. However, this study doesn't encompass air ambulances or helicopters. The patients arriving at the ER exhibited a range of organ system involvement. The most frequent diagnoses in our study were Cerebrovascular Accidents (CVAs), followed by cases of intoxication, Acute Exacerbation of Chronic Obstructive Pulmonary Disease (COPD), pneumonia, and Chronic Kidney Disease (CKD) in that order. A Nepalese study involving 1393 patients, the leading cause for summoning ambulances was gastrointestinal issues (22.6%). Likewise, respiratory (17%), obstetric and gynecological (15.2%), trauma (12.7%), and neurological (9.6%) concerns constituted the other prevalent reasons[28].

Ambulance with required facilities with trained paramedics-Emergency Medical Technicians (EMTs) ensure that key interventions are achieved and patients transported to the most appropriate facility. It is well accepted that timely intervention and rapid transport reduce morbidity and mortality[29]. Recognizing the significance of transporting critically ill patients in adequately equipped ambulances, governmental policies should enforce mandatory paramedic training, encompassing defibrillator operation and basic life support, as a prerequisite for granting licenses to ambulance drivers. Collaborative efforts with the Government of Nepal and various tertiary hospitals are imperative for delivering these training programs. Additionally, creating awareness about the necessity of ambulances and introducing cost-effective ambulance services to the Nepalese population by our government is an essential requirement at this juncture.

5. Conclusion

Thus, the notable strength of our study is its rarity as one conducted at our institution concerning the modes of transportation of critically ill patients. We anticipate that this study will establish foundational data in this area for future investigations. We suggest conducting subsequent research considering influential variables that contribute to outcomes. Additionally, we advocate for larger sample size in future studies.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

Prior conducting the study, Ethical Approval was obtained from the Institutional Review Committee of Patan Hospital, Patan Academy of Health Sciences "IRC-PAHS" on March 30, 2021 (Ref. No.: PMG21033015017).

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] Bhandari D, Yadav NK. Developing an integrated emergency medical services in a low-income country like Nepal: a concept paper. Int J Emerg Med. 2020 Feb 7; 13(1):7. doi: 10.1186/s12245-020-0268-1. PMID: 32028893; PMCID: PMC7006070. | PubMed | | Google Scholar| | DOI | | Full Text |.

[2] Shrestha SK, Koirala K, Amatya B. Patient's Mode of Transportation Presented in the Emergency Department of a Tertiary Care Centre, Kavre, Nepal. Kathmandu Univ Med J. Online first-2018. | Google Scholar | | PDF |

[3] Shrestha SK, Pradhan B, Shakya YM, Paneru HR. Clinical Profile of Critically Ill Patients Presenting to Emergency Department of Tertiary Level Hospital of Nepal. JIOM Nepal, Volume 41, Number 1, April 2019, page 67-74. | DOI | | PDF |

[4] Government of Nepal, Ministry of Health and Population. Guideline for integrated ambulance and prehospital service operation 2077.Kathmandu: Ministry of Health and Population. | PDF |

[5] Kironji, A., Hodkinson, P., de Ramirez, S.S. et al. Identifying barriers for out of hospital emergency care in low and low-middle income countries: a systematic review. BMC Health Serv Res 18, 291 (2018). https://doi.org/10.1186/s12913-018-3091-0 | PDF | Full Text |

[6] Bhattarai N, Thapa A, bhandary S. Access to pre-hospital care among patients visiting emergency department of a tertiary hospital in Nepal: A Mixed Methods pilot study. Journal of General Practice and Emergency Medicine of Nepal. Issue 11: 2021, page 14-20. Available at: www.jgpeman.com, eISSN: 2363-1168 | Google Scholar | | PDF | | Web Link |

[7] Sprigings D, Chambers JB. The critically ill patient. Acute Medicine: A Practical Guide to the Management of Medical Emergencies, Chapter 1, Fifth Edition. doi.org/10.1002/9781119389613.ch1. | DOI | | Full Text |

[8] Shrestha SK, Pradhan B, Shakya YM, Paneru HR. Clinical Profile of Critically Ill Patients Presenting to Emergency Department of Tertiary Level Hospital of Nepal. JIOM Nepal, Volume 41, Number 1, April 2019, page 67-74. | DOI | | PDF |

[9] Otero ML, Menezes RC, Ferreira IBB, Issa FL, Agareno G, Carmo TA, Arriaga MB, Fukutani KF, Pamplona Neto L, Agareno S, FilgueirasFilho NM, Akrami KM, Andrade BB. Factors Associated with Mortality in Critically Ill Patients Diagnosed with Hospital Acquired Infections. Infect Drug Resist. 2020;13:2811-2817 https://doi.org/10.2147/IDR.S264276.| PubMed | | Google Scholar | | DOI | | PDF |

[10] Chaudhuri S, Malla G, BhandariR,Poudel M, Giri S. Transport and Pre hospital Care Prior to Arrival in Tertiary Care Emergency Department of Eastern Nepal. A Cross sectional Study JBPKIHS 2019; 2(1): 60-67.| Google Scholar| | DOI | | PDF | | Full Text |

[11] Mathews KS, Durst MS, Vargas-Torres C, Olson AD, Mazumdar M, Richardson LD. Effect of Emergency Department and ICU Occupancy on Admission Decisions and Outcomes for Critically Ill Patients. Crit Care Med. 2018 May; 46(5):720-727. doi: 10.1097/CCM.0000000000002993. PMID: 29384780; PMCID: PMC5899025..| PubMed | | Google Scholar | | DOI | | Full Text |

[12] Eklie H, Engida H, Melaku B, Workina A. Factors contributing to delay intensive care unit admission of critically ill patients from the adult emergency Department in TikurAnbessa Specialized Hospital. BMC EmergMed. 2021 Oct 26; 21(1):123. doi: 10.1186/s12873-021-00518-z. PMID: 34702169; PMCID: PMC8547562.| PubMed | | DOI | | Full Text |

[13] Shrestha SK, Koirala K, Amatya B. Patient's Mode of Transportation Presented in the Emergency Department of a Tertiary Care Centre, Kavre, Nepal. Kathmandu Univ Med J. Online first-2018. | PubMed | | Google Scholar | | PDF |

[14] Ashworth HC, Roux TL, Buggy CJ. Healthcare accessibility in the rural plains (terai) of Nepal: physical factors and associated attitudes of the local population. Int Health. 2019 Nov 13; 11(6):528-535. doi: 10.1093/inthealth/ihz008. PMID: 30916330.| PubMed | | Google Scholar | | DOI | |

[15] Demetriades D, Chan L, Cornwell E, Belzberg H, Berne TV, Asensio J, Chan D, Eckstein M, Alo K. Paramedic vs private transportation of trauma patients. Effect on outcome. Arch Surg. 1996 Feb; 131(2):133-8. doi: 10.1001/archsurg.1996.01430140023007. PMID: 8611068. | PubMed | | Google Scholar | | DOI | | Full Text |

[16] Plans, Policies, Acts & Rules [Internet]. [cited 2021 Mar 26]. Available from: https://www.mohp.gov.np/eng/publications/acts-rules-regulations . | Web Link |

[17] Pandey NR. Emergency medicine in Nepal: present practice and direction for future. Int J Emerg Med. 2016 Dec;9(1):20. doi: 10.1186/s12245-016-0118-3. Epub 2016 Jul 15. PMID: 27416937; PMCID: PMC4947072.. | PubMed | | Google Scholar | | DOI | | PDF | | Full Text |

[18] Aljerian N, Alhaidar S, Alothman A, AlJohi W, Albaqami FA, Alghnam SA. Association between the mode of transport and in-hospital medical complications in trauma patients: findings from a level-I trauma center in Saudi Arabia. Ann Saudi Med. 2018 Jan-Feb; 38(1):8-14. doi: 10.5144/0256-4947.2018.8. PMID: 29419523; PMCID: PMC6074188. | PubMed | | Google Scholar | | DOI | | PDF |

[19] Regmi, P., Paneru, D. P., Oli, P., Baral, U., Poudel, D., Khadka Thapa, D. (2022). Ambulance Service in Kathmandu, Nepal: Service Delivery Constraints, Challenges, and Achievements during the COVID-19 Pandemic. Prehospital and disaster medicine, 1–8. Advance online publication. https://doi.org/10.1017/S1049023X22002242

[20] Bulger EM, Guffey D, Guyette FX, MacDonald RD, Brasel K, Kerby JD, Minei JP, Warden C, Rizoli S, Morrison LJ, Nichol G; Resuscitation Outcomes Consortium Investigators. Impact of prehospital mode of transport after severe injury: a multicenter evaluation from the Resuscitation Outcomes Consortium. J Trauma Acute Care Surg. 2012 Mar; 72(3):567-73; discussion 573-5; quiz 803. doi: 10.1097/TA.0b013e31824baddf. PMID: 22491538; PMCID: PMC3495608.| PubMed | | Google Scholar | | DOI | | Full Text |

[21] Gongol R, Dhungana B, Regmi S, Nakarmi M, Yadav B. Need of Improvement in emergency Medical Service in Urban cities. J Nepal Med Assoc. 2009; 489(174): 139- 43.

[22] Peskett AR, Williams J, Thapa K. A review of cases received by the Nepal Ambulance Service over one year. International Paramedic Practice. 2021 Jun 2; 11(2):40-8.

[23] Giri SC, Malla G, Bhandari R, Poudel M, Giri S. Transport and Pre-hospital Care Prior to Arrival in Tertiary Care Emergency Department of Eastern Nepal: a Cross sectional Study. Journal of BP Koirala Institute of Health Sciences. 2019 Jul 24;2(1):60-7.

[24] Acharya R, Badhu A, Shah T, Shrestha S. Availability of life support equipment and its utilization by ambulance drivers. Journal of Nepal Health Research Council. 2017 Sep 15; 15(2):182-6.

[25] Effect of Specialized Critical Care Transport Unit on Short-Term Mortality of Critically ILL Patients Undergoing Interhospital Transport Pages 46-54 | Received 25 Aug 2018, Accepted 11 Apr 2019, Accepted author version posted online: 18 Apr 2019, Published online: 13 May 2019.

[26] Brown JB, Stassen NA, Bankey PE, Sangosanya AT, Cheng JD, Gestring ML. Helicopters and the civilian trauma system: national utilization patterns demonstrate improved outcomes after traumatic injury. J Trauma.2010; 69:1030–1034.discussion 1034-1036. [PubMed: 21068607]

[27] Shrestha SK, Jacobson C, Dahal S, Shrestha R, Weiner Y, Sheridan A. Reasons for Summoning Ambulance Services in the Hilly Region of Nepal. Kathmandu Univ Med J. 2019 Apr 1; 17(66):141-4.

[28] Gongal R, Vaidya P. Responding to the need of the Society: Nepal Ambulance Service. Journal of Institute of Medicine Nepal. 2012; 34(1):1-.

[29] Kobusingye OC, Hyder AA, Bishai D, Joshipura M, Hicks ER, Mock C. Emergency Medical Services. In: Jamison DT, Breman JG, Measham AR, et al., editors. Disease Control Priorities in Developing Countries. 2nd edition. Washington (DC): The International Bank for Reconstruction and Development / The World Bank; 2006. Chapter 68. Available from: https://www.ncbi.nlm.nih.gov/books/NBK11744/ Co-published by Oxford University Press, New York.