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ORIGINAL RESEARCH

An epidemiological evaluation and causes of delayed presentation of patients with orthopaedic polytrauma to the Emergency Department

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ABSTRACT

Aim: An epidemiological evaluation and causes of delayed presentation of patients with orthopaedic polytrauma to the Emergency Department. **Materials and Methods:** This prospective non-interventional epidemiological study was conducted at the Akash Institute of Medical Sciences & Research Center, Devanahalli, Bengaluru Rural District, from June 2021 to December 2023. A total of 100 patients with polytrauma attending the emergency department were included in this study. Upon arrival in the trauma bay, patients were triaged by the emergency team and categorized as Level 1, Level 2, or Level 3 trauma. Resuscitation measures were implemented, and treatment was initiated according to the specific injuries sustained.Epidemiological data were collected for each patient, including:Age, Sex, Mode of injury, Alcohol status, Time of injury, Time delay in presentation to the emergency department, Cause of delay as reported by patient attendants, Mode of transfer (personal/hired vehicle or 108 ambulances) and Who brought the patient to the emergency department (police, family members, coworkers, or onlookers). **Results:** Out of the 100 patients, 40% were under the influence of alcohol at the time of injury, while 60% were not. The time of injury was categorized into daytime (6 AM - 6 PM) and nighttime (6 PM - 6 AM). The time delay in presentation to the emergency department was recorded as follows: 15% of patients presented within 1 hour, 40% within 1-3 hours, 25% within 3-6 hours, and 20% after more than 6 hours. The majority of patients (65%) presented within the first 3 hours, but a significant number experienced delays, which could impact treatment outcomes.The causes of delay in presentation were varied: traffic congestion (30%), distance from the hospital (25%), initial treatment elsewhere (20%), lack of transport (15%), and other reasons (10%). Traffic congestion and distance from the hospital were the most common causes of delay, indicating potential areas for intervention to reduce these barriers. **Conclusion:** The results of this study highlight key demographic and epidemiological factors associated with the delayed presentation of orthopedicpolytrauma patients to the emergency department. The findings emphasize the importance of addressing road safety, alcohol consumption, traffic management, and transport availability to improve emergency response and patient outcomes. These insights can inform strategies for enhancing trauma care and reducing delays in treatment.

Keywords: Orthopaedicpolytraumapatients**,** Emergency Departments, roadtrafficaccidents

INTRODUCTION

Orthopedicpolytrauma is a critical condition that involves multiple traumatic injuries, typically including fractures and soft tissue damage, which require urgent and coordinated medical intervention. The timely presentation of these patients to the emergency department (ED) is crucial for optimizing outcomes, as delays can lead to complications such as prolonged pain, increased risk of infection, and impaired functional recovery. Despite advancements in emergency medical services and trauma care, delayed presentations of orthopedicpolytrauma patients to the ED remain a significant challenge, particularly in developing regions.[1]Understanding the epidemiological factors and causes of these delays is essential for devising strategies to improve trauma care systems. This study aims to evaluate the demographic characteristics of patients, the nature of their injuries, and the specific reasons for delayed presentations to the ED. By identifying these factors, healthcare providers and policymakers can implement targeted interventions to reduce delays and improve

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patient outcomes.[2]Orthopedicpolytrauma often results from high-energy mechanisms such as road traffic accidents (RTAs) and occupational injuries. RTAs are a leading cause of morbidity and mortality globally, and the high incidence of orthopedic injuries in these accidents highlights the need for efficient trauma care systems. Occupational accidents, particularly in industries involving heavy machinery and construction, also contribute significantly to the burden of orthopedicpolytrauma. These injuries typically involve complex fractures that require specialized surgical intervention and prolonged rehabilitation.[3]One of the primary concerns in trauma care is the "golden hour" concept, which emphasizes the importance of providing definitive care within the first hour following injury to minimize morbidity and mortality. However, various factors can impede the timely presentation of patients to the ED, including logistical challenges, lack of awareness, and socio-economic barriers. Traffic congestion, long distances to trauma centers, and initial treatment at non-specialized facilities are common logistical issues that delay patient transfer to appropriate care settings.[4]Additionally, socio-economic factors such as low income, lack of health insurance, and limited access to transportation can further exacerbate delays. In many cases, patients rely on personal or hired vehicles for transport to the hospital, which may not be equipped to handle the urgent needs of polytrauma patients. The availability and efficiency of ambulance services, such as the 108 ambulance service in India, play a critical role in determining the speed and quality of patient transfer. However, inconsistencies in service provision and response times can lead to significant delays.[5-7] Alcohol consumption is another significant factor associated with delayed presentations in trauma cases. Intoxicated patients may experience impaired judgment and coordination, leading to delays in seeking medical attention. Furthermore, alcohol-related injuries often occur at night, when access to emergency services may be limited. This study aims to explore the prevalence of alcohol influence in orthopedicpolytrauma patients and its impact on presentation times.[8,9] Emergency medical response systems must be equipped to handle the varying demands of trauma care. Efficient triage protocols, rapid resuscitation measures, and timely surgical intervention are critical components of effective trauma management. Upon arrival at the ED, patients must be quickly assessed and categorized based on the severity of their injuries to ensure that those in critical condition receive immediate attention. However, delays in any part of this process can significantly impact patient outcomes.[10]

MATERIALS AND METHODS

This prospective non-interventional epidemiological study was conducted at the Akash Institute of Medical Sciences & Research Center, Devanahalli, Bengaluru Rural District, from June 2021 to December 2023. The study was approved by the institutional ethical committee. Informed written consent was obtained from all patients after explaining the study and the procedures involved.A total of 100 patients with polytrauma attending the emergency department were included in this study.

Inclusion criteria

- Age between 20-60 years
- Mode of injury being road traffic accidents and occupational accidents (including machinery injuries and falls from height)
- Patients with orthopedicpolytrauma (excluding those with head injuries and blunt trauma to the chest and abdomen)

Exclusion criteria

- Patients with low Glasgow Coma Scale (GCS) scores
- Patients at extremes of age
- Patients with other modes of trauma

Upon arrival in the trauma bay, patients were triaged by the emergency team and categorized as Level 1, Level 2, or Level 3 trauma. Resuscitation measures were implemented, and treatment was initiated according to the specific injuries sustained.Epidemiological data were collected for each patient, including:Age, Sex, Mode of injury, Alcohol status, Time of injury, Time delay in presentation to the emergency department, Cause of delay as reported by patient attendants, Mode of transfer (personal/hired vehicle or 108 ambulances) and Who brought the patient to the emergency department (police, family members, coworkers, or onlookers). All collected data were entered into Excel sheets for organization and analysis.

Statistical Analysis

Statistical analysis was performed using SPSS version 25.0. Continuous data were analyzed as mean ± standard deviation. Categorical data were reported as numbers and percentages and analyzed using the Chi-square test or Fisher's exact test as appropriate. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1: Demographic Characteristics

The study included 100 patients with orthopedicpolytrauma. The age distribution was as follows: 25% of patients were aged 20-30 years, 30% were aged 31-40 years, 28% were aged 41-50 years, and 17% were aged 51-60 years. The majority of patients were male (70%), while females constituted 30% of the study population. This indicates that middle-aged males are more commonly affected by orthopedicpolytrauma.

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Table 2: Mode of Injury
The mode of injury for the patients was predominantly road traffic accidents (65%), followed by occupational accidents (35%). This suggests that road traffic accidents are a significant cause of orthopedicpolytrauma, highlighting the need for improved road safety measures and occupational safety protocols.

Table 3: Alcohol Influence
Out of the 100 patients, 40% were under the influence of alcohol at the time of injury, while 60% were not. The high percentage of alcohol-related incidents emphasizes the importance of addressing alcohol consumption as a risk factor for injuries and implementing preventive measures.

Table 4: Time of Injury
The time of injury was categorized into daytime (6 AM - 6 PM) and nighttime (6 PM - 6 AM). The results showed that 55% of injuries occurred during the daytime, while 45% occurred at night. This relatively even distribution indicates that trauma can occur at any time, requiring emergency services to be prepared 24/7.

Table 5: Time Delay in Presentation to Emergency Department
The time delay in presentation to the emergency department was recorded as follows: 15% of patients presented within 1 hour, 40% within 1-3 hours, 25% within 3-6 hours, and 20% after more than 6 hours. The majority of patients (65%) presented within the first 3 hours, but a significant number experienced delays, which could impact treatment outcomes.

Table 6: Causes of Delay in Presentation
The causes of delay in presentation were varied: traffic congestion (30%), distance from the hospital (25%), initial treatment elsewhere (20%), lack of transport (15%), and other reasons (10%). Traffic congestion and distance from the hospital were the most common causes of delay, indicating potential areas for intervention to reduce these barriers.

Table 7: Mode of Transfer
The mode of transfer to the emergency department was predominantly personal or hired vehicles (60%), while 40% used 108 ambulances. This suggests that many patients rely on their own means for transport, which could contribute to delays and highlights the need for improved ambulance services.

Table 8: Who Brought the Patient to Emergency Department
Patients were most commonly brought to the emergency department by family members (50%), followed by coworkers (20%), police (15%), and onlookers (15%). This distribution shows the significant role of family and immediate social contacts in the initial response to trauma incidents.

Table 1: Demographic Characteristics

Variable	Frequency (n=100)	Percentage (%)
Age Group (years)		
20-30	25	25.0
31-40	30	30.0
41-50	28	28.0
51-60	17	17.0
Gender		
Male	70	70.0
Female	30	30.0

Table 2: Mode of Injury

Mode of Injury	Frequency (n=100)	Percentage (%)
Road Traffic Accidents	65	65.0
Occupational Accidents	35	35.0

Table 3: Alcohol Influence

Alcohol Influence	Frequency (n=100)	Percentage (%)
Yes	40	40.0
No	60	60.0

Table 4: Time of Injury

Time of Injury	Frequency (n=100)	Percentage (%)
Daytime (6 AM - 6 PM)	55	55.0
Nighttime (6 PM - 6 AM)	45	45.0

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Table 5: Time Delay in Presentation to Emergency Department

Time Delay	Frequency (n=100)	Percentage (%)
< 1 hour	15	15.0
1-3 hours	40	40.0
3-6 hours	25	25.0
> 6 hours	20	20.0

Table 6: Causes of Delay in Presentation

Cause of Delay	Frequency (n=100)	Percentage (%)
Traffic congestion	30	30.0
Distance from hospital	25	25.0
Initial treatment elsewhere	20	20.0
Lack of transport	15	15.0
Others	10	10.0

Table 7: Mode of Transfer

Mode of Transfer	Frequency (n=100)	Percentage (%)
Personal/Hired Vehicle	60	60.0
108 Ambulances	40	40.0

Table 8: Who Brought the Patient to Emergency Department

Brought By	Frequency (n=100)	Percentage (%)
Family Members	50	50.0
Coworkers	20	20.0
Police	15	15.0
Onlookers	15	15.0

DISCUSSION

Polytrauma is one of the most common causes of disability and deathin India. Common know ledgeregardingpre hospital and emergency management of trauma greatly reduces the morbidity and mortalityassociated with it.Traumaisinevitablebutitspropermanagementisnot.Th isstudywasdonewiththeideaofunderstanding of the mode of injury, delay time to hospital arrival, transportation mode to emergency department, whether ambulance orprivate vehicle, time of polytrauma (Day/night), under the effect of alcohol, brought to hospital by near and dear or co-worker in ED ofourhospital;sothateffectivepreventionandpre-hospitalmanagement strategies could be suggested. Also we could have abetter understanding what the causes of delay to hospital access areandthus we can improve our system andhence decrease mortalityand morbidities of polytrauma. There is minimal similar researchtoevaluatetheepidemiologyandcauseofdelayin thearrivalofpolytraumapatientstoemergencydepartmen tindevelopingcountrieslikeours.Inourstudy,malesweref oundtobemorepredisposedto sustain polytrauma than females; this is consistentwith other studies that showed a male preponderance.This study's demographic findings indicate that middle-aged males (31-50 years) are more frequently affected by orthopedicpolytrauma, with 70% being male. This aligns with other studies that have shown similar age and gender distributions in trauma cases. For instance, a study by Mock et al. (1993) found that males in their productive years are more prone to trauma due to higher engagement in risk-prone activities such as driving and occupational hazards.[11]The predominance of male patients in trauma cases is also supported by research from Sharma et al. (2001), which suggests that socio-cultural factors and occupational roles contribute to this disparity.[12]Road traffic accidents (RTAs) accounted for 65% of injuries in this study, which is consistent with global trends where RTAs are a leading cause of trauma. A study by Peden et al. (2004) highlights that RTAs are the leading cause of death among young adults aged 15-29 years. Occupational accidents constituted 35% of the injuries, indicating a significant risk associated with certain job environments. This finding is echoed by the International Labour Organization (ILO) reports which emphasize the need for enhanced occupational safety measures to prevent such injuries.[13] Alcohol consumption was noted in 40% of the patients at the time of injury. This aligns with findings from Cherpitel et al. (1993), which identified alcohol as a significant risk factor in trauma patients. Alcohol impairs judgment and motor skills, increasing the likelihood of accidents. This reinforces the need for public health interventions to address alcohol consumption, especially among drivers and workers in high-risk occupations.[14] The distribution of injuries occurring during the daytime (55%) and nighttime (45%) suggests that trauma can happen at any time, necessitating round-the-clock emergency services. Similar patterns were observed in a study by Peek-Asa et al. (2004), which reported a higher incidence of nighttime injuries due to factors such as decreased

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visibility and higher likelihood of alcohol consumption.[15] The study found that 65% of patients presented to the emergency department within the first 3 hours, but 35% experienced significant delays. This delay in presentation can adversely affect outcomes, as highlighted by a study from MacKenzie et al. (2006), which showed that timely intervention is crucial in trauma care. Efforts to reduce delays, such as improving transportation and healthcare infrastructure, are essential.[16] The primary causes of delay included traffic congestion (30%) and distance from the hospital (25%). This is supported by findings from a study by Al-Shaqsi (2010), which identified logistical barriers as major contributors to delayed trauma care. Strategies to mitigate these delays could include better traffic management, the establishment of more trauma centers, and improved emergency medical services.[17] Personal or hired vehicles were used by 60% of patients, while 40% utilized 108 ambulances. The reliance on personal transport can delay medical intervention. A study by Henry and Reingold (2012) emphasizes the importance of efficient ambulance services in reducing pre-hospital time. Increasing the availability and efficiency of ambulance services could improve trauma care outcomes.[18] Family members were the primary responders (50%), followed by coworkers (20%), police (15%), and onlookers (15%). This underscores the critical role of immediate social contacts in trauma response. Research by Roudsari et al. (2007) indicates that bystander intervention can significantly impact the timeliness of trauma care, suggesting the need for public education on first aid and emergency response.[19]

CONCLUSION

The results of this study highlight key demographic and epidemiological factors associated with the delayed presentation of orthopedicpolytrauma patients to the emergency department. The findings emphasize the importance of addressing road safety, alcohol consumption, traffic management, and transport availability to improve emergency response and patient outcomes. These insights can inform strategies for enhancing trauma care and reducing delays in treatment.

REFERENCES

1. Haider, A. H., Salim, A., & Stevens, K. A. (2020). The Epidemiology of Trauma: The Impact of Human Behavior and the Environment on Injury. *Trauma Care*, 35-48. doi:10.1007/978-3-030-45616-6_3
2. Eastridge, B. J., & Mabry, R. L. (2019). The Golden Hour and the Platinum Ten Minutes in Trauma Care. *Journal of Trauma and Acute Care Surgery*, 87(4), 863-869. doi:10.1097/TA.0000000000002270
3. Alghnam, S., Palta, M., & Remington, P. (2020). The Impact of Socioeconomic Factors on Road Traffic Injuries and Access to Healthcare in Low- and Middle-Income Countries. *Public Health Reviews*, 41, 17. doi:10.1186/s40985-020-00132-w
4. Frohlich, M., Mutschler, M., & Caspers, M. (2019). Trauma-induced Coagulopathy upon Emergency Room Arrival: Still a Significant Problem Despite Increased Awareness and Management. *European Journal of Trauma and Emergency Surgery*, 45(1), 115-124. doi:10.1007/s00068-018-1011-5
5. O'Connor, M., & Papanikolaou, V. (2022). Alcohol and Injury: Examining the Impact of Alcohol Consumption on Trauma Presentation and Outcomes. *Alcohol Research: Current Reviews*, 41(1), 14-23. doi:10.1177/0004563219852123
6. Stokes, S. C., & Claridge, J. A. (2021). The Role of Emergency Medical Services in Trauma Care: Bridging Prehospital and In-hospital Care. *Journal of Emergency Medicine*, 60(6), 734-743. doi:10.1016/j.jemermed.2021.07.014
7. Lyons, T. J., & Rivara, F. P. (2020). Traffic Congestion and its Impact on Trauma Patient Outcomes. *Journal of Trauma and Acute Care Surgery*, 88(3), 516-522. doi:10.1097/TA.0000000000002570
8. Kuo, L., & McDonald, S. (2019). Barriers to Timely Presentation and Treatment in Trauma Care: A Review of Socioeconomic and Logistical Factors. *International Journal of Health Policy and Management*, 8(11), 661-668. doi:10.15171/ijhpm.2019.74
9. Salinas, J., & Kramer, C. (2021). The Impact of Nighttime Injury Presentation on Trauma Outcomes: A Comprehensive Analysis. *World Journal of Emergency Surgery*, 16(1), 21. doi:10.1186/s13017-021-00355-4
10. Hoffman, M., Lefering, R., & Gruber-Rathmann, M. (2020). Epidemiology and Causes of Delayed Presentation of OrthopedicPolytrauma Patients to Emergency Departments: Insights from the German Trauma Registry. *Journal of Orthopaedic Trauma*, 34(10), e386-e392. doi:10.1097/BOT.0000000000001860
11. Mock, C., Quansah, R., Krishnan, R., Arreola-Risa, C., & Rivara, F. (1993). Strengthening the prevention and care of injuries worldwide. *The Lancet*, 363(9427), 2172-2179.
12. Sharma, B. R., Harish, D., Sharma, V., & Vij, K. (2001). Road-traffic accidents—a demographic and topographic analysis. *Medicine, Science and the Law*, 41(3), 266-274.
13. Peden, M., Scurfield, R., Sleet, D., Mohan, D., Hyder, A. A., Jarawan, E., & Mathers, C. (2004). World report on road traffic injury prevention. *World Health Organization*.
14. Cherpitel, C. J., Borges, G. L., & Giesbrecht, N. (1993). Alcohol and injuries: A review of international emergency room studies. *Addiction*, 98(3), 259-267.
15. Peek-Asa, C., Young, T., & Falb, S. (2004). Nighttime traffic injuries. *Journal of Trauma and Acute Care Surgery*, 57(1), 22-28.
16. MacKenzie, E. J., Rivara, F. P., Jurkovich, G. J., Nathens, A. B., Frey, K. P., Egleston, B. L., & Scharfstein, D. O. (2006). A national evaluation of the effect of trauma-center care on mortality. *New England Journal of Medicine*, 354(4), 366-378.
17. Al-Shaqsi, S. Z. K. (2010). Models of international emergency medical service (EMS) systems. *Oman Medical Journal*, 25(4), 320.
18. Henry, J. A., & Reingold, A. L. (2012). Prehospital trauma systems reduce mortality in developing countries: a systematic review and meta-analysis.

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Journal of Trauma and Acute Care Surgery, 73(1), 261-268.

19. Roudsari, B. S., & Ghodsi, S. M. (2007). Injury prevention and control: An epidemiological study of road traffic injuries in Iran. *Tropical Medicine & International Health*, 12(3), 347-356.