International Journal of Research in Medical Sciences
Eabenson S et al. Int J Res Med Sci. 2026 Aug;14(8):xxx-xxx
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20262331

Original Research Article

Role of 108 ambulance services in road traffic accidents in Vijayapura, North Karnataka: a mixed methods study

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Received: 15 June 2026
Accepted: 29 June 2026

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ABSTRACT

Background: Every year, traffic accidents claim more than 150,000 lives in India. Rather than being signs of systematic shortcomings in urban planning, enforcement and response, these are portrayed as individual incidents. Road trauma is one of India's most underappreciated public health emergencies in the absence of combined visibility. The WHO estimates that 1.19 million people dies on Indian roads each year, making it a serious public health concern.
Methods: This study is a mixed method study. Both qualitative and qualitative study 108 ambulance drivers, emergency medical staff and road traffic accident victims admitted in BLDE(DU), Vijayapura. Key person interview, focus group discussion, in-depth interview technique.
Results: The time taken to shift the patient from site of accident to primary health care facility was ascertained and we found that, 105 (51%) cases it took 30 minutes to 1 hour, while 72 (34.9%) cases took less than 30 minutes and 29 (14.1%) took more than an hour to reach a health facility.
Conclusions: 51% cases it took 30 minutes to 1 hour, while 34.9% cases took less than 30 minutes and 14.1% took more than an hour to reach a health facility. The use of advanced machinery by traffic police to regulate traffic is the need of the hour: From hand held walkie talkies, signalling systems, crash barriers, reflective lights, AI cameras, automated traffic violation finding tools and software's integrated to Chellan generation for fines.

Keywords: Road traffic accidents, RTA, Accidents, India accidents, Vijayapura accidents, 108 ambulance, Emergency medical service

INTRODUCTION

A major public health concern, road traffic injuries (RTIs) continue to be the leading cause of death for people between the ages of 15 and 49, accounting for almost 1.2 million deaths annually worldwide. The number of traffic accidents in India is still increasing, the ministry of road transport and highways reports that 4,12,432 traffic accidents occurred in 2022 with 1,42,163 fatalities and over 3.8 lakh injuries.[1] Every year, traffic accidents claim more than 150,000 lives in India. Rather than being signs of systematic shortcomings in urban planning, enforcement and response, these are portrayed as individual incidents. Road trauma is one of India's most underappreciated public health emergencies in the absence of combined visibility. The world health organization estimates that 1.19 million people dies on Indian roads each year, making it a serious public health concern.[2] In high risk and high-pressure settings, emergency medical technicians and emergency physicians run ambulances and fast response vehicles. Being involved in traffic accidents while reacting to crisis is a significant but sometimes disregarded occupational hazard in this field, in addition to endangered physical safety, these situations may have an impact on the prehospital care providers professional performance and mental wellbeing.[3] In order to avoid at

least half of all traffic fatalities and injuries by 2030, the world health organization and the United Nations general assembly launched a "Decade of action for road safety."[4]

In India, the 108-ambulance service is a privately run Emergency medical service (EMS) that operates similarly to EMS systems in developed nations. The 108-ambulance service in India operates in a public private partnership, whereas EMS systems in developed countries are usually owned and managed by the government. This is the main difference between the two services.[5] Emergency medical services is a complete system created to guarantee the efficient, timely, and well-coordinated provision of healthcare and safety services to people who are suddenly ill or injured, it includes all the staff, facilities, and tools needed to deliver emergency medical care. EMS's main objective is to minimize long term morbidity and preventable mortality by providing timely and adequate care to people in life threatening situations.[5] The purpose of this study is to ascertain how quickly ambulances can reach the scene of an accident on Indian roadways. Another aspect is to figure out how long it will take to get the injured to the closest trauma centre.[6]

In low-income nations like Bangladesh, Cape Verde, Colombia, and the Dominican Republic, EMS has recently operated through a single centralized telephone contact. A cross-national analysis showed that ambulance response times were greater in Ghana (19 minutes) and Brazil (21-27 minutes), but lower in Asia (7.3 minutes) and Oceania (8 minutes).[7] On Indian roadways, there are on average, 57 accidents and 17 fatalities each hour. "The first hour after injury which largely determine a critically injured persons chance of survival is the definition of the golden hour". According to studies, the amount of time taken for patients to receive emergency care is crucial to their recovery. Some claim that the time to receive trauma care varies depending on the type of injury, despite the fact that the "golden hour" notion is still up for debate in international literature.[8]

Some of the main issues with trauma care in India include a lack of first aid, delays in patient transfers, insufficient information, a longer period between being hurt and getting to a definite hospital, a lack of triage, and a lack of facilities in hospitals. Negative consequences could arise if a trauma victim take a longer time to get to the hospitals. The majority of RTA related deaths happen within 24 hours of the incident. Usually before they get to the hospital, and are generally caused by delays in getting to a suitable medical institution.[8]

The International federation of red cross and red crescent societies IFRC reports that irreparable brain damage brought on by oxygen deprivation accounts for over half of traffic related fatalities, which happen within minutes of the occurrence, the chance of survival decreases by about 10% every minute if prompt action is not taken.[9] Ther aims and objective of the study was to identify the role of 108 ambulance services in road traffic accidents. The objective was to determine the effectiveness of ambulances in getting road traffic accident victims to treatment centers in the golden hour.

METHODS

Study area

BLDE (DU), Shri BM Patil Medical college and research center, Vijayapura city and District Hospital Vijayapura.

Study period

The study was conducted from January 2024 to December 2025.

Study design and participants

This study is a mixed method study, both qualitative and qualitative study.

Inclusion criteria

Ambulance drivers, 108 ambulance drivers, emergency medical staff and road traffic accident victims admitted in BLDE(DU), Vijayapura. 108 ambulance drivers associated with District Hospital Vijayapura.

Exclusion criteria

Participants who are not willing to participate in the study.

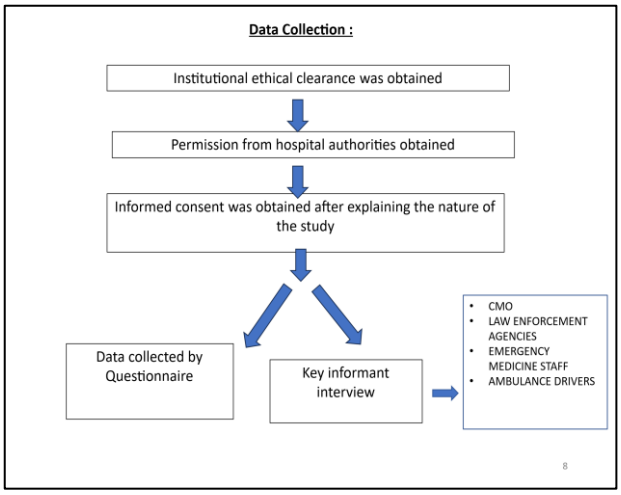

Figure 1: Data collection process.

Data analysis

The acquired data was entered into a Microsoft Excel spreadsheet, and statistical analyses was carried out with the help of SPSS v26. The findings are represented in graphs, counts and percentages, mean, and standard deviation. An independent sample test was used to compare continuous variables with normally distributed distributions between the two groups. A p value of less

than 0.05 is considered statistically significant. Regarding the qualitative part, key informant interviews were done, included chief medical officers, law enforcement officials, emergency medicine staff, ambulance drivers etc. The data was generated, analysed, themes generated, codes generated and final data interpretation was done.

RESULTS

In our study we interviewed 206 road traffic accident victims who were admitted in our tertiary care hospital during a one-year period. The purpose is to explore the epidemiological profile of road traffic accident victims. A qualitative study was also done to explore the role of digital technology in the prevention of road traffic accidents (Table 1). 51% cases it took 30 minutes to 1 hour, while 34.9% cases took less than 30 minutes and 14.1% took more than an hour to reach a health facility. The use of advanced machinery by traffic police to regulate traffic is the need of the hour: from hand held walkie talkies, signalling systems, crash barriers, reflective lights, AI cameras, automated traffic violation finding tools and software's integrated to Chellan generation for fines (Table 2).

Table 1: Sociodemographic characteristics of the participants (n=206).

Characteristics		Frequency (N)	Percentage (%)
Age group (years)	Less than 18	14	6.8
	18-30	73	35.4
	31-40	60	29.1
	41-50	29	14.1
	51-60	20	9.7
	More than 60	10	4.9
Gender	Female	21	10.2
	Male	185	89.8
Residence	Rural	182	88.3
	Urban	24	11.7
Education status	Degree	97	47.1
	High school	26	12.6
	Illiterate	3	1.5
	Post graduation	11	5.3
	Primary school	18	8.7
	PUC	51	24.8
Religion	Christian	1	0.5
	Hindu	176	85.4
	Muslim	29	14.1
Employment status	Employed	171	83.0
	Unemployed	35	17.0
Marital status	Married	138	67.0
	Separated	1	.5
	Unmarried	67	32.5
Type of family	Joint	57	27.7
	Nuclear	104	50.5
	Third generation	45	21.8
Socio economic status	Class 1 9400 and above	15	7.3
	Class 2 4700-9399	68	33.0
	Class 3 2820-4699	64	31.1
	Class 4 1410-2819	47	22.8
	Class 5 <1410	12	5.8
Number of family members	1	1	.5
	2	9	4.4
	3	26	12.6
	4	57	27.7
	5	59	28.6
	More than 5	54	26.2

In this research study there were 206 participants and history was taken from the patient in 186 (90.3%) cases and 20 (9.7%) from the bystanders in case of patients who weren't able to answer our questions as a result of the road

traffic accident. The time taken to shift the patient from site of accident to primary health care facility was ascertained and we found that, 105 (51%) cases it took 30 minutes to 1 hour, while 72 (34.9%) cases took less than 30 minutes and 29 (14.1%) took more than an hour to reach a health facility. Blood group of the road traffic accident was analysed and we found that 94 (45.6%) had B positive blood group, followed by O positive 39 (18.9%), A positive 36 (17.5%), AB positive 12 (5.8%), B negative 11 (5.3%), A negative 7 (3.7%), O negative 5 (2,4%), and AB negative 2 (1%). HIV status among victims of road traffic accident in our study we noted that, 204 (99%) were HIV negative and 2 (1%) was HIV positive. The role of 108 ambulance service in getting the patients to a hospital as quickly as possible was explored. 108 ambulance service has been instrumental in saving a lot of lives on the roads of different states of India. As soon as a message about an accident is received to the ambulance driver from the call centre the vehicle is dispatched. With horns blazing and sirens wailing these vehicles ply at incredible speeds to reach the destination. These vehicles are equipped with life saving devices. Some may include basic life support or advanced cardiac life support systems. Ambulances have oxygen supply. Some ambulances will have paramedical staff to do the first aid, give injections or medications.

Table 2: Accident victims transportation time from site of accident to the healthcare facility and relevant information.

Characteristics		Frequency (N)	Percentage (%)
Informant	Bystander	20	9.7
	Patient	186	90.3
Time taken to shift patient from site of accident for primary care	<30 minutes	72	34.9
	30 minutes-1 h	105	51
	>1 h	29	14.1
Blood group	A negative	7	3.4
	A positive	36	17.5
	AB negative	2	1.0
	AB positive	12	5.8
	B negative	11	5.3
	B positive	94	45.6
	O negative	5	2.4
	O positive	39	18.9
HIV	Negative	204	99.0
	Positive	2	1.0

Stretchers are available in ambulances which ensure that spinal cord injuries are not inflicted due to injurious handling of the patient in the aftermath of a road crash.

Ambulances will also be able to transport at least one caregiver along with the patient. Several initiatives by the government both state and central government are in place to ensure that prompt treatment is provided to patients in case of a road traffic accident. Free treatment can be provided in emergencies. Also, there are insurance schemes that cater to the victims. The use of software's and applications to streamlines the flow of road traffic, congestion, signalling systems to mitigate these are in place. Usually, the golden hour, when they are brought in to the hospital, that is the main deciding factor, for these kinds of patients. That may be delayed, earlier picking up of accident victims at the earliest, transportation to the hospital as quickly as possible, could improve the outcome.

If we develop better ways of preventing accidents that will be the best thing to happen. In our study done on 108 ambulance drivers we found that the time taken to go to the accident sites varies and the time taken to mobilize is also varied based on the location. Generally, within half an hour the ambulances were able to transport the victims to the nearest hospital. In district hospital Vijayapura. we were informed that there were 4 ambulances and four private ambulances. Not only that there were 108 ambulances and highway ambulances. As soon as the message was relayed from the headquarters the call centre personnel activated the emergency response system.

Immediate dispatch of the nearest available ambulance was done in record time. The ambulance in turn speeds up negotiate traffic with blazing horns. The cooperation of the public to give way for an ambulance is paramount. Ambulances with high tech digital equipment's is the need of the hour. Oxygen cylinders, dressing equipment's, essential drugs and medicines. Stretchers, basic life support ambulances, advanced cardiac care ambulances etc. with trained paramedic is the need of the hour.

The use of telemedicine applications can help specialist doctors to advise the nursing and paramedic staff to perform emergency procedures. Smart ambulances with Bluetooth AI stethoscope, digital X ray machines, digital ECG machines, etc. is essential. Smart gadgets like mobile phones with smart apps, iPad with patients' data and good internet coverage is needed.[11]

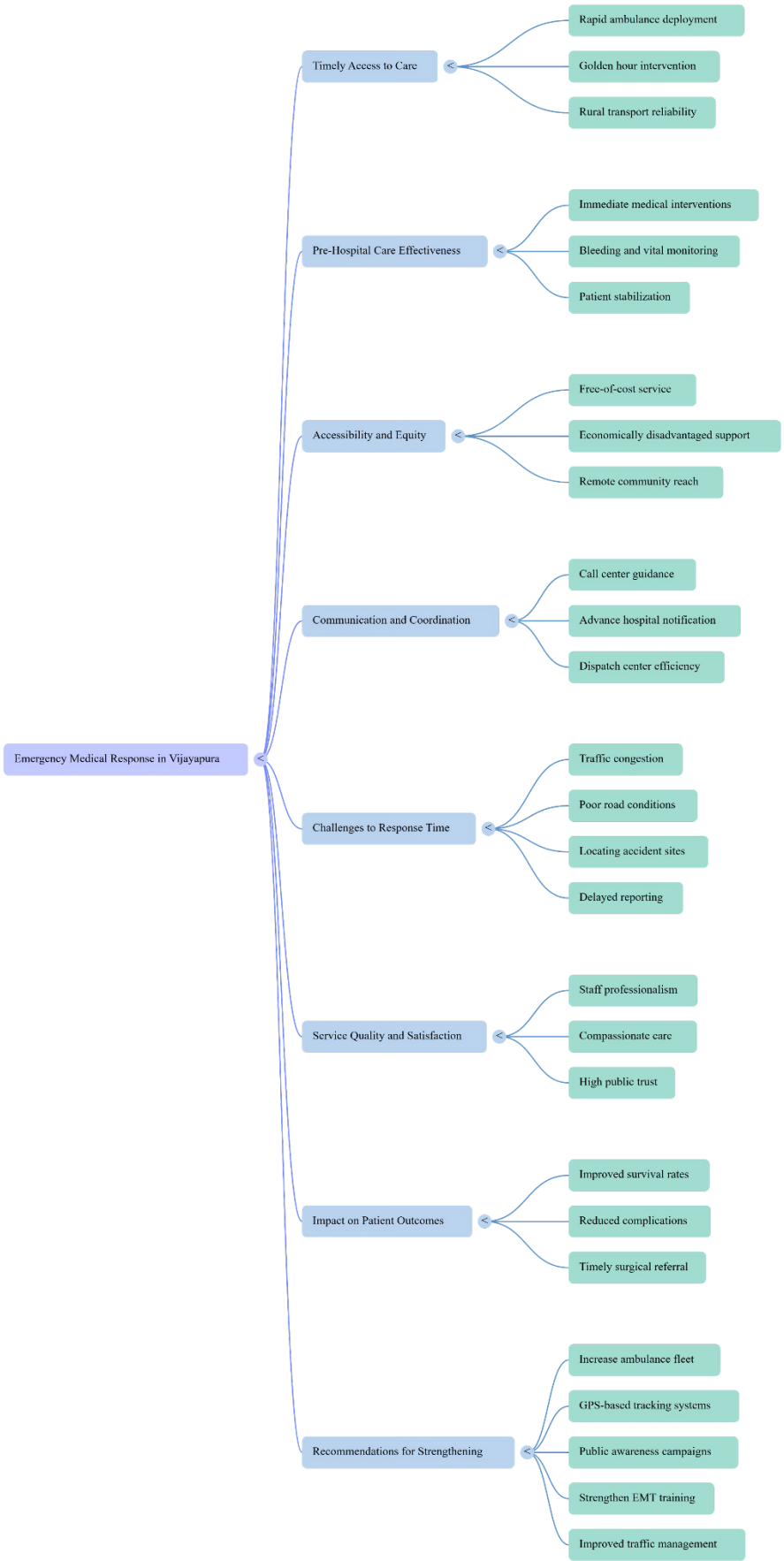

Figure 2: Qualitative mind mapping emergency medical response in Vijayapura.

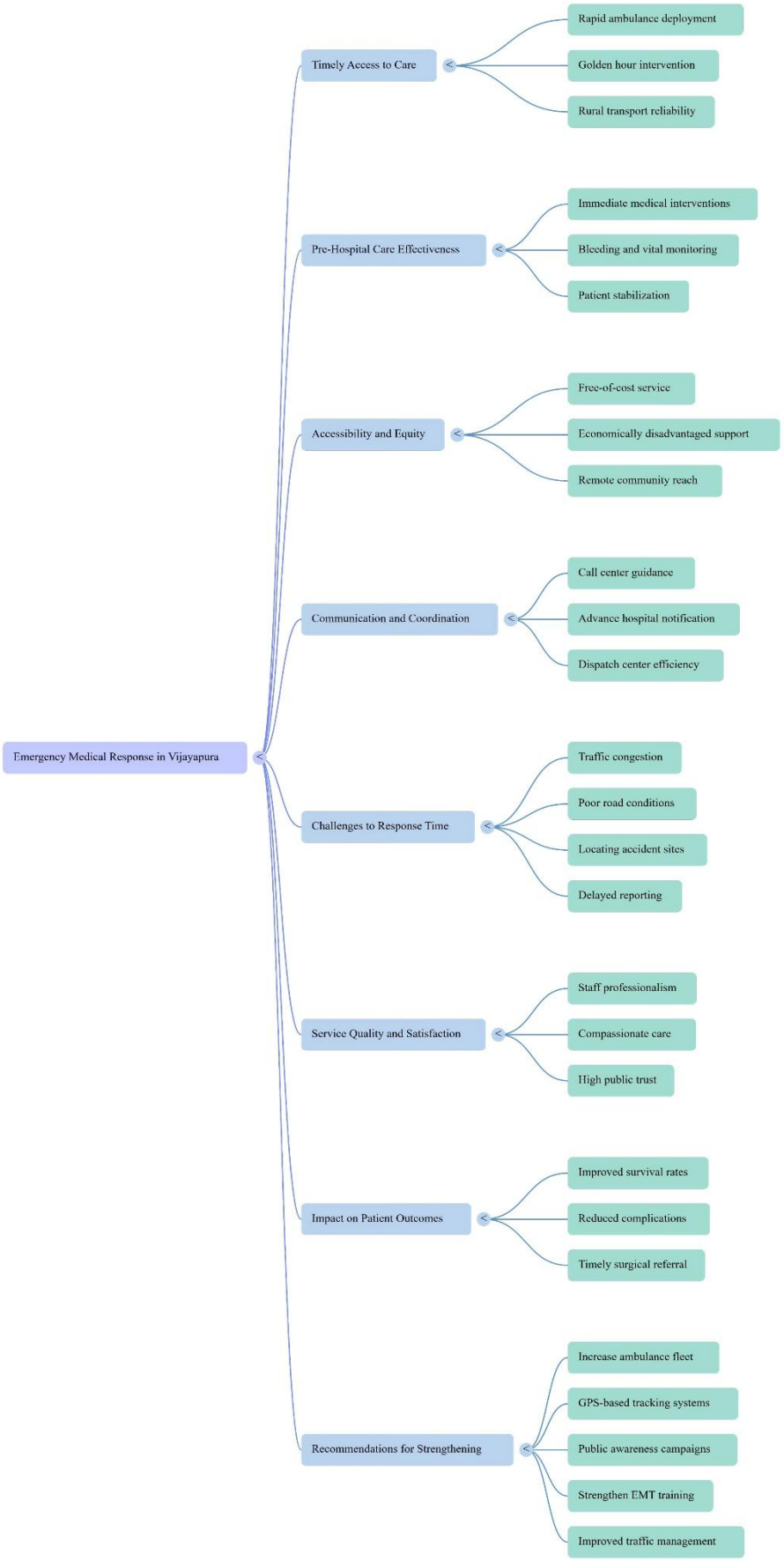

Figure 3: Emergency medical response key themes.

Figure 4: Lifesaving response: the role of 108 ambulance service in Vijayapura.

Themes

Regarding the emergency medical response provided by the 108-ambulance service in Vijayapura, several major themes were identified. These included timely access to care, the effectiveness of pre-hospital care, and issues related to accessibility and equity. Additional themes highlighted were communication and coordination among responders, challenges affecting response time, and overall service quality and patient satisfaction.

The findings also reflected the impact of the service on patient outcomes, along with recommendations for strengthening and improving the emergency response system. With regard to timely access to care we identified the main factors were, rapid ambulance deployment, golden hour intervention and rural transport reliability. With regards to pre hospital care effectiveness, immediate medical intervention, bleeding control and management, vitals recording and management, patient stabilisation using medicines, oxygen, fluids etc. Accessibility and equity involve free of cost care, support of economically disadvantaged sections via insurance packages, free medicines and supplies, government schemes and hospital led care. Communication and coordination play a vital role in the effectiveness of 108 ambulance system. It involves, call centre guidance, advanced hospital notifications, despatch centre efficiency. The challenges to response time were deemed to be due to traffic congestion, poor road conditions, locating accident sites, delayed reporting of the accident to the concerned call centre.

Service quality and satisfaction of the 108 ambulances rely on staff professionalism, compassionate care and high public trust. The impact on patient outcomes is linked to improved survival rates, reduced complications, timely surgical reference. The recommendations to strengthening the 108-ambulance service are to increase the 108-ambulance fleet size, use of GPS based tracking systems, public awareness campaigns, strengthen EMT training, improved traffic management (Figure 4).

DISCUSSION

Golden hour

Gaikwad SA et al, in his study done in Maharashtra India, summarizes that to reduce mortality and morbidity associated with RTAs rapid medical attention and timely presentation to a health center are essential. The purpose of the study was to determine the obstacles that RTA patients face when arriving during golden hour and to examine the effects of these obstacles on RTA mortality at a tertiary health facility. The golden hour was when less than 25% of RTA victims arrived to a medical facility. There are several reasons for delays in emerging nations

like India. RTA fatality is determined by the severity of the injuries.[10]

108 ambulance service in Maharashtra

By moving from the current inadequate public health structure to a more effective and patient centric system, the use of digital health in India is playing a critical role in improving healthcare services. Electronic health records (EHRs), telemedicine, mobile health applications, health information exchange systems and other technical innovations that enhance access effectiveness and quality of healthcare delivery are all examples of digital health. The opportunities and difficulties faced by the recent digitized Maharashtra emergency medical service (MEMS) are examined in this paper. This study examines the state of emergency response delivery systems in Maharashtra using the 38,823 MEMS calls from November 2022. The present state of emergency service delivery systems in Maharashtra is examined in this study. This study also investigates the reasons behind the calls using spatial analysis. According to the study's findings, calls from 108 ambulance services were dispersed among the districts and had varying service delivery times.

The system is now facing socio cultural issues in addition to a number of urban and hospital infrastructure issues. Digitized MEMS system would help in improving the services.[11] In a study done by Pranav D Modi et al, in Maharashtra India, on the public awareness of the EMS in Maharashtra, the study received replies from 1220 persons throughout the state of Maharashtra, with Mumbai receiving the most.

The majority of respondents (59.2%) were between the ages of 15 and 30, and the majority (78.2%) held a doctorate degree or higher. Just 17.5% of respondents stated that if they observed someone unconscious by the side of the road and there was no danger, they would attempt to check for responsiveness. It is interesting to note that 78.9% of the medical professionals who took part in this study said that they would not check for responsiveness. Just 76.2% of respondents were aware that 108 is the number of a medical emergency and just 20.2% of those surveyed had requested an ambulance by calling EMS.

If the ambulance lights and sirens were on, 68.5% of respondents said they would get out of the way right away, and 27.5% said they would do the same. The creation of a single emergency number was unknown to about two thirds of the respondents (112). Nonetheless, a huge majority (82.9%) supported having a single emergency number rather than several numbers for every situation. Merely 43.8% of the participants expressed their belief that the existing EMS coverage was insufficient. The present EMS was judged as good by 24,9% of participants, ordinary by 53.5%, and poor by 16.9%.[12]

In a study conducted by Kjetil Myhr et al, a Norwegian study on team work among ambulance professionals, the five primary themes of team structure, communication, leadership, situation monitoring, and mutual support were used to arrange the fifteen subthemes that our study identified as describing ambulance workers experiences with collaboration and a team training program.

The experiences of ambulance professionals ranged from their preferences about various communication strategies and the need for team leaders within the ambulance service to the importance of team composition and the interpersonal and professional connections. While both individual and contextual factors affected the adoption of teamwork tools, the team training program increased awareness of teamwork.[13]

In a study by Shreyaswi M Sathyanath et al, fear of medicolegal concerns among first responders (36.9%) and ambulance delays (41.5%) were the most often mentioned causes that raising awareness can shorten transportation delays. According to 66.7% of emergency physicians and 75% of nursing staff, teaching first aid to the general people is crucial. Patient spectators frequently reported issues with documentation procedures (15.4%), lengthy wait times (10.2%), and out of pocket costs and financial limitations (10.2%). The two crucial suggestions to avoid prehospital treatment delays were raising awareness and enhancing access to ambulances. Improving insurance coverage is crucial to lowering financial restraints, according to the majority of carers and patient bystanders.[14]

In a study by Helle Matzke Ramsssen, regarding coordination among healthcare workers in acute care settings, four themes emerged from the qualitative analysis: inadequate communication, using phone conversations to exchange information while navigating care, multiple objectives with impeded observers, motivated by the units coexisting aims and a lack of comprehensive understanding of the entire treatment pathway, and interprofessional conflicts in acute care collaboration, stemming from difficulties with the roles, duties, incentives, and competencies needed to attain the optimal treatment route for every patient.[15]

In a study conducted by Santani M Selveindran et al, with key informants in Vishakhapatnam India, regarding prevention of road traffic accidents and neurotrauma in India. According to the participants, RTCs are a major issue in India and a major contributor to neurotrauma. Significant risk factors were found to be associated with both the user state drunk driving and underage driver and the user action, such as speeding and failing to employ personal safety equipment. Poor infrastructure, moving roadblocks like cars and inadequate safety gear were among the additional danger factors that were mentioned. Participants talked about how RTC's impact not just the casualty's health but also the healthcare system, families, and the economy of the country.[16]

Limitations

This study was limited to Vijayapura, Karnataka, India. The data generated cannot be generalized as the area of focus was limited to one particular district. The number of participants or key informants of this study was limited in number. 108 ambulance drivers were not easy to access as they were always in a state of readiness to respond to any emergency, the information gained from these interviews highlight the need to do a similar study nationwide so that accurate data can be generated to improve the functioning of the system.

CONCLUSION

Life is precious and can be saved by the prompt action of 108 ambulance drivers when road traffic accident victims or the public report the site of the accident to the control centre. The prompt despatch of these ambulances, the driving skills of 108 ambulance drivers can sometimes mean the difference between life and death. Stabilisation of the patient, airway, breathing, circulation by nurses or trained paramedics ensure the safe transport of the victim to a tertiary trauma care centre. Blood transfusion, CPR, oxygen, Fluid management, adequate and specialised trauma care ensures lives are saved. It is a team effort and each and every person in this chain of survival needs to be appreciated.

Recommendations

108 ambulance drivers are indeed doing a great job in rescuing the life of people who meat with road traffic accidents. Their prompt service is commendable. The problems raised by them including safety issues, work timings, the dangerous nature of their work, lack of cooperation from road vehicle users at times need to be addressed. Better awareness regarding road traffic accidents and how to prevent them should be taught to school children, college students, driving school teachers and students.

Also, IEC activities should do via newspaper adds, radio, television, social media platforms highlighting the use of helmets, seatbelts, safety equipment's. Awareness regarding the dangers posed by rash and negligent driving, over speeding, drunken driving, lack of sleep, not following the traffic rules, speed limits, overtaking carelessly, not following the traffic lane systems were deemed to be the major causes of road traffic accidents as opined by the 108 ambulance drivers.

ACKNOWLEDGEMENTS

The staff of the Department of Community Medicine, BLDE DU Shri B M Patil Medical College Hospital and Research Centre, Vijayapura, North Karnataka, India, are gratefully acknowledged for their contributions. The guide, Head of the Department, professors, faculty members, and fellow postgraduate students are also sincerely acknowledged for their guidance and support. The authors also acknowledge the road traffic accident victims for providing consent to share details of the accidents in which they were involved.

Funding: Received one time fellowship from (DHR) Department of Health Research as a financial support for research work. Financial support for MD thesis program (HRD-DHR-ICMR-PG 2024/2521) dated 24-01-2025.
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee (BLDE (DU)/IEC-SBMPMC/101/2023-24)

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Cite this article as: Eabenson S, Gudadinni MR, Yadavannavar MC, Rangoli AM. Role of 108 ambulance services in road traffic accidents in Vijayapura, North Karnataka- a mixed methods study. Int J Res Med Sci 2026;14:xxx-xx.