Crashfree India

Pre-Hospital Care in India

A Primer on ERSS-112 Implementation, Global Comparisons and Regional Innovations

Executive Summary

While the country has made significant strides, such as implementing ERSS-112 across all states, deploying advanced GPS-enabled dispatch systems, and establishing comprehensive legislative frameworks, critical gaps still remain in translating these capabilities into consistent, timely pre-hospital care. This report examines India's emergency response landscape through the lens of international best practices, revealing that the technological foundation exists, but implementation varies significantly across states. Through comparative analysis of EU-112 and US-911 systems alongside innovative state models like Maharashtra's centralized dispatch and Tamil Nadu's integrated care network, we identify that the challenge lies not in system design but in optimizing existing infrastructure for citizen-centric outcomes.

The term "Golden Hour," while emphasizing the critical nature of timely intervention, requires contextual adaptation to India's geographic and infrastructure realities. Our analysis suggests that strengthening the complete "Chain of Survival", from the pre-hospital phase to accessing appropriate hospital-based care, demands focused attention on data standardization, technology integration, and evidence-based performance metrics that reflect India's unique emergency care environment.

This paper emerges from Crashfree India's commitment to transforming our nation's mobility ecosystem. It focuses on pre-hospital emergency response and lays the groundwork for deeper inquiry; it serves as a segue for future studies on post-crash care systems and the broader emergency medical services ecosystem.

Credits

Crashfree India

A national movement committed to making mobility safer. Our vision is a nation with zero road fatalities by 2040.

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1. Introduction

In November 2024, two youngsters lost their lives in a road accident in Tripunithura (Times of India, 2024). At first glance, there is nothing unfamiliar about this piece of news. It simply made its way into the massive hoard of road accidents that occur in India every single day. But this particular incident, shared by an eyewitness on her social media, highlighted the 30-minute delay in the arrival of the ambulance. She claims that she called up the 108-ambulance service, in hope of getting some urgent medical help for the crash victims. However, no ambulances were available at the time. She was advised to transport the victims to a hospital by the responders, but she and others present were unable to do so due to the victims' severe injuries, which required professional medical attention. Eventually, the police reached the scene, followed shortly by the ambulance, but by then, the critical time had already been lost.

This is not an isolated incident. Every year, 4,80,583 road accidents claim 1,72,890 lives in India, with young breadwinners accounting for the majority of these (MoRTH, 2025). A large number of trauma deaths occur outside of the hospital in India (Varshney, Dwivedi, Mishra, et al., 2025). Initiatives such as the Good Samaritan Protections (MoRTH, 2020) mark a major legislative achievement, and provision of nationwide access to the Emergency Response Support System (ERSS-112) unifies police, fire and medical helplines under one number (MHA, 2019). However, thousands of people are still deprived of their best chance of survival every "Golden Hour" due to de facto pre-hospital delays. (SaveLIFE Foundation & FTI Consulting, 2024; NITI Aayog & AIIMS, 2020)

The Golden Hour, first formalised by Cowley (1981), is the critical first 60 minutes following injury. It is universally recognized as the window of time during which prompt, effective care can drastically reduce the possibility of death and long-term disability among trauma patients. This term is used to highlight the essence of time in trauma care literature; however, "there are risks and costs involved in attempting to deliver patients to trauma centres within an hour" (Lerner & Moscati, 2001). Interrelated to this is the concept of the "Chain of Survival," proposed by Mary Newman and later adopted by the American Heart Association, which represents six interdependent links critical to emergency survival: early recognition and activation, immediate bystander care, rapid professional response, advanced life support, definitive hospital care, and rehabilitation (Newman, 1989; American Heart Association, 2020). Like any chain, the Chain of Survival is only as strong as its weakest link. This Report examines India's current pre-hospital care landscape through an extensive literature review and policy analysis. It analyses India's pre-hospital emergency response infrastructure and initiatives such as ERSS-112, by looking at important lessons learned from Europe's 112 system, the US 911 model, and state-level practices. The aim is to identify practical, evidence-based recommendations which could help build a truly resilient "Chain of Survival".

Chain of survival represents six interdependent links critical to emergency survival:

Early recognition and activation

Immediate bystander care

Rapid professional response

Advanced life support

Definitive hospital care

Rehabilitation

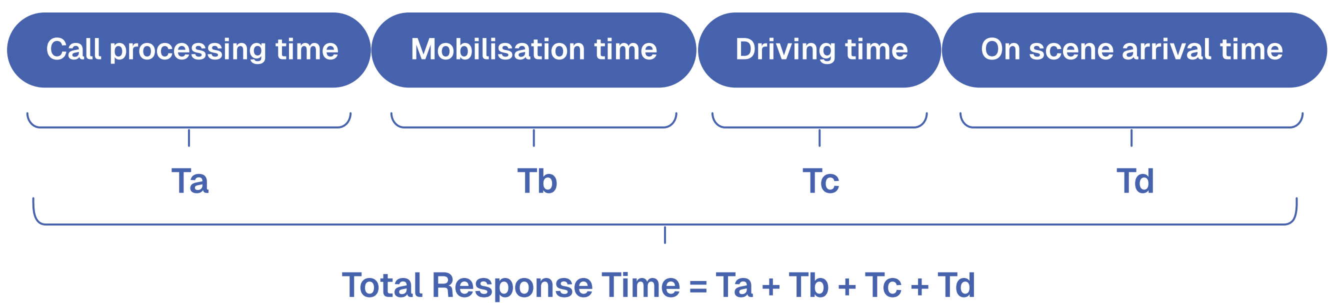
SOURCE - Newman, 1989; American Heart Association, 2020.

2. India's Emergency Response Ecosystem:

Current Status and Enhancement Opportunities

2.1 India's 112 Vision

According to the European Emergency Number Association (EENA, 2014), the elements that make up the 'total response time' in EMS delivery include:



Source: EENA Operations Document, 2014

Different emergency organisations may be involved in the different steps outlined above, but, this framework emphasises that citizens experience the full journey, from the time they make the emergency call to the time the emergency vehicle arrives on site (EENA, 2014). Unlike internal agency metrics that may focus on operational efficiency, citizen-experienced response time reflects the actual delay in life-saving intervention. This perspective becomes particularly relevant in India's context, where multiple helpline numbers (100, 101, 102, 108, 112) can create initial confusion, and varied measurement protocols across states may not capture the full patient journey documented in cases like the Tripunithura incident.

Although the significance of timely care following a road crash has been highlighted, several helpline numbers dot the borders of our national highways, and state-specific emergency response numbers also exist. This may lead to confusion regarding 'whom to call' during emergencies, when every second counts. India launched ERSS-112 with the vision of "One India, One Emergency Number 112" to integrate legacy numbers (100, 101, 102, 108) into a single internationally recognized emergency contact via GPS-enabled call centres (MHA, 2015). While all 36 states and Union Territories have implemented the ERSS-112 system, opportunities exist to harmonize state-level infrastructure, standardize performance metrics, and enhance interagency coordination to achieve more consistent implementation and coverage.

2.2 Response Time Performance: India vs Global Benchmarks

The rationale for using response time as a quality measure of EMS is based on research evidence (Turner, Jacques, Crum et al., 2017) demonstrating the relationship between time and patient outcome (predominantly on cardiac arrest). Shorter ambulance response time is significantly associated with increased probability of survival in such emergencies; however, quality of care should not be overlooked for patient outcomes.

Approximately 30% of trauma patients in India die before they reach a hospital (Varshney, Dwivedi, Mishra, et al., 2025). Trauma care specialists consulted for this paper emphasised that India requires context-specific definitions of critical care windows.

As Dr. Sushma Sagar, Professor & In-charge, Division of Trauma Surgery & Critical Care, JPN Apex Trauma Centre, AIIMS New Delhi, notes: *"In our country, even 6 or 12 hours can be considered golden hours. We need to change that definition and revise it geographically, especially by terrain".*

This clinical perspective suggests that existing Golden Hour benchmarks may not appropriately reflect India's trauma care realities, where infrastructure constraints and geographic challenges necessitate adapted timeframes for optimal patient outcomes.

While global benchmarks measure call-to-scene response time, Indian studies often measure comprehensive episode duration including transport to definitive care. A pan-India study was conducted on Indian National Highways that aimed to determine the response time of ambulance reachability to the accident spot, plus, the time to transport the injured to the nearest trauma facility (Giribabu, Ghosh, Hari, et al., 2024). On the core highways, the time taken for the ambulance to arrive at the accident scene is 25–35 minutes. Importantly, from the interviews, it was understood that there were occasions where the injured were taken directly to hospitals 30–40 km from the accident spot, for which the time was more than 40 minutes. The results provide evidence that on the highways that are adjacent to/passing through the city limits or on the core highways, the total time for emergency care accessibility is nearly 60 minutes or greater.

Episode of timeline		Time taken in the case of accidents on the highways adjacent to the city limits/dense settlement	Time taken in the case of accidents on the core highways
T_1	the time between the occurrence of an accident on the highways and the crowd gathering and recognising the need to support the injured	**5 min**	Five minutes or greater on remote ghat roads or highways along forests/forest fringes and fewer traffic highways
T_2	the time taken for a Good Samaritan to call the ambulance call/service centre and get a response	**5 min**	5 min with a reduced success rate
T_3	the time taken for an ambulance to reach the accident spot and the vehicle extrication process	**25 min**	>30 min
T_4	the time taken to transport the injured to the trauma centre	**20 min**	Bimodal: within 20 min if the nearest trauma centres exists or >40 min
Total time ($T_1 + T_2 + T_3 + T_4$)		55 min	Either ~60 min or greater

Source: Road accidents on Indian National highways, ambulance reachability and transportation of injured to trauma facility: Survey-based introspection of golden hour, 2024

When comparing India's response time against international standards, the total episode time (complete emergency care accessibility) of 55-75 minutes (where the scene response component: 25-30 minutes, and transport component: 30-40 minutes) consumes substantial time before definitive medical intervention begins, whereas international systems achieve complete call-to-hospital delivery within comparable timeframes. The National Health Mission acknowledges these infrastructure realities, establishing targets of 20 minutes for urban areas and 30 minutes for rural regions—still significantly above international benchmarks but recognizing India's geographic and resource constraints.

2.3 Infrastructure Assessment

Ambulance Fleet

India's ambulance fleet comprises both NHM-supported and independently operated vehicles. As per NHM norms, one ALS ambulance is recommended per 5 lakh people, while one BLS ambulance is recommended per 1 lakh people (with a relaxed standard of one per 70,000 in hilly or remote regions). State and Union Territory Governments retain flexibility in the deployment of ambulances, enabling them to adapt to local circumstances and healthcare requirements, including rural and underserved areas (Lok Sabha, 2024). International standards recommend the provision of 1 ambulance for every 50,000 people to fulfill demand for transporting patients to definitive care facilities in Low and Middle Income Countries (LMICs) (Mishra et al., 2020), though developed EMS systems operate with ratios as low as 1 per 15,000-20,000 people. Although in India, 1,90,138 total ambulances are registered on VAHAN portal (MoHFW, 2024), there is no record of how many of these ambulances are available for pre-hospital transport of crash victims, so the high numbers may not indicate true scenarios.

Quantity vs Quality: Why Ambulance Numbers Don't Matter Without Functionality

The Numbers	Reality Check
3,044 Advanced Life Support (ALS) ambulances and 15,283 Basic Life Support (BLS) units operating under the National Ambulance Service scheme	95%: Use untrained personnel (unsafe)
Registered ambulances: 1,90,138 across India	90%: Lack life-support equipment (just transport vehicles)
	98.5% of 'ambulance runs' transporting dead bodies

Source: SaveLIFE Foundation & FTI Consulting, 2024; AIIMS & NITI Aayog, 2020

As per NHM norms, one ALS ambulance is recommended per 5 lakh people, while one BLS ambulance is recommended per 1 lakh people

SOURCE - National Health Mission, 2023

Blinkit launched a rapid-response ambulance service, to help deliver aid within 10 minutes. While the idea is innovative, it requires strict adherence to health regulations, trained personnel, and collaboration with healthcare institutions to ensure seamless patient care. Noting the unpredictability of events that can occur during emergencies, ambulance staff should be able to resuscitate and stabilise patients, and there is limited evidence of Blinkit's prior engagement or demonstrated expertise in this domain (Source: India Today, 2025).

Quality Enforcement

AIS 125 ambulance standard (MoRTH, 2014) has been strengthened with enhanced enforcement in 2025, mandating GPS tracking, uniform designs, and licensed paramedics, yet rigorous auditing mechanisms remain inconsistent (GoAid, 2025). The CAG audit on 'Public Health Infrastructure and Management of Health Services' in Delhi noted "Many Ambulances of Centralised Accident and Trauma Services (CATS) were running without essential equipment and devices" (CAG Chapter III, 2024). As per the CAG Report, the shortage in the cadres of Nurses and Paramedic staff was 21% and 38% respectively.

Rural Coverage Challenges

The National Highways Authority of India has deployed over 900 ambulances at 50km intervals or at toll plazas along national highways (PIB, 2024). However, research indicates that free ambulance facilities provided by the government are neither well-resourced nor staffed by trained personnel capable of managing post-crash care (Urfi et al., 2020). According to an audit by the Karnataka State Road Safety Authority, ambulances are often based too far from accident sites in sparsely populated or remote areas, causing "pre-trip delays" that push response times beyond 30 minutes even when vehicles are available. Although the audit covers Karnataka's 108 system, its findings—9,000 cases over 30-minute response, driven by distant base locations—mirror the patchy geographic coverage and long travel distances documented across rural India. (KSRSA, 2021)

2.4 Communication and Coordination: Where the Chain Breaks

Pre-Hospital Notifications

A study was conducted on the evaluation of a structured pre-hospital notification system, wherein 4 major trauma centres in India were assessed: AIIMS Trauma Centre, Delhi (admits approx. 4000 severely injured patients per year), GTB Hospital, Delhi (approx. 1500 patients per year with life-threatening injuries), LTMG Hospital, Mumbai (receives about 2500 patients with life-threatening injuries per year), and VS Hospital, Ahmedabad (average admission of about 1200 per year) (Mitra, Mathew, Gupta, et al., 2017). It was suggested that disjointed communication links exist between the transport team and the clinical team in terms of pre-arrival notifications. With sufficient notice, trauma hospitals can usually mobilise a team—anaesthetists, surgeons, specialist nurses and radiographers—an intervention independently associated with reduced mortality.

Transport Modes and Bystander Care

In India and in most LMICs, the majority of injured victims are transported by private vehicles, taxis, auto rickshaws, cycle rickshaws, police vehicles or bystanders rather than ambulances (Bhalla et al. 2019; Schmid and Doerner 2010; Arbon and Hayes 2007). According to Dr. Sagar, ***"more than 60-70% patients are brought by their family only"***. In addition to expediting specialist care on arrival to the hospital, pre-hospital communication also enables information sharing from the trauma centre to the caller (such as 'ensure the airway is clear' or 'if you can see the bleeding site, apply pressure'), which may be valuable for variably trained non-medical transporters.

Data Silos and Learning Gaps

Data siloing prevents systematic learning and improvement across trauma centres. Since the majority of trauma cases bypass formal emergency transport systems entirely, there exists a critical need for standardized data collection across all patient transport modes.

Certain practices adopted by tertiary trauma centres, such as AIIMS, as brought to light during the CFI Team's visit to 'AIIMS Trauma Centre' (Crashfree India, 2025), include pre-care coordinators and color-coded triage protocols, but these practices are not widespread or standardized. (NITI Aayog & AIIMS, 2020)

Having established the current landscape of India's emergency response infrastructure, it becomes essential to understand how other nations have addressed similar challenges. The next section examines international emergency systems to identify proven approaches that could inform India's continued evolution.

3. International EMS Models: Comparative Overview

Metric	EU-112	US-911	India (ERSS-112)
Launch Year	**1991**	**1968**	**2018**
No. of Call Centres	In some countries, 112 is the national number for all emergencies. Other countries have separate national emergency numbers for police, fire and/or ambulance services and 112 as a secondary emergency number.	49 states reporting 4,637 Public Safety Answering Points (PSAPs) across the United States. (911.gov, 2021)	36 state/UT call centres. (MHA,2025)
Annual Call Volume	Out of a total of 285 million emergency calls placed in the EU, 176 million were '112' calls. (European Commission, 2024)	213.65 million calls (911.gov, 2021)	108.88 million calls (data.gov.in, 2024)
Average Call Answering Time	No national average, but 22 Member States reported an average answering time of 10 seconds or less for emergency services.	No single national average, as times vary significantly by location, call priority, and staffing levels. However, a widely accepted standard is to answer 90% of 911 calls within 15 seconds.	Varies by state and not published centrally.
Location Technology	Some member states use Advanced Mobile Location (AML) technology that provides caller location within 50 meters in 80% of calls. (European Commission, 2024)	The US 911 system uses Enhanced 911 (E911) technology, where wireless calls are routed to PSAPs based on cell tower coverage areas, and not AML. (FCC, 2015)	Cell-tower triangulation; AML pilot in select states.
Response Time Standard	No unified EU-wide emergency response time standard. Response times vary across Europe, with some independent studies citing mean response time as 11.1 minutes (Ishikawa, 2024).	No national standard, but according to a 2017 study, average response time for the arrival of EMS personnel to an emergency scene was 7 minutes. (Alvarado, 2017)	No specific mandated standard across India, but the NHM recommends a benchmark of 30 minutes for rural areas and 20 minutes for urban areas for an ambulance to reach a patient
Quality Assurance	The European Commission reports on 112 performance metrics, and so does EENA.	911 Quality Assurance programs evaluate call handling, protocol adherence, and response times.	Self-reported metrics; few independent audits.

Dispatch System	The Computer-Aided Dispatch (CAD) system transmits all relevant information, including geolocation data and the digital contact card, which contains structured details about the emergency. (Lelow, Marincioni, 2025)	CAD systems with real-time resource tracking facilitate automated unit deployment based on proximity and availability. (Pižl, 2022)	CAD with GIS-driven nearest-unit recommendation and dynamic routing. (MHA, 2024)
Advanced Features	Next Generation 112 enabling text/video transmission for enhanced emergency communication (EENA, 2023), and automated translation services for tourist emergencies and diverse populations (EENA, 2012).	Medical Priority Dispatch System (MPDS) categorizes emergencies into priority levels (eg: ECHO, DELTA, CHARLIE, etc.), with life-threatening conditions (ECHO level) receiving the fastest dispatch (Nicoletta, Fortin, Bélanger, et al., 2025, Scott, Olola, Toxopeus, 2016).	1. Pre-arrival alerts in TN (pilot); no national standard yet. 2. Multi-channel Signal Intake: voice, SMS, email, web, app, chatbot, media crawl, IoT alerts. 3. Live tracking of all ERU (ambulance, police, fire) vehicles via mobile data terminals, displayed on PSAP's digital map. 4. The 112 India mobile app's SOS "Shout" feature and volunteer network, which pushes audible alerts to registered nearby volunteers.
Current Challenges	VoLTE roaming incompatibility prevents emergency access abroad, with many Europeans unable to access emergency services while traveling. (EENA, 2025) Only 8 EU Member States provide handset-derived location data for roaming users, despite almost all Member States having implemented AML. (EENA, 2025) Major national disruptions of emergency services access have been reported across many European countries. (EENA, 2025)	System outages hit at least 8 states in 2024, including Massachusetts (7 million people affected for 2 hours), Nevada, Nebraska, South Dakota, and Texas. (Armour, 2024; FitzGerald, 2024) Partial failure of computer-aided dispatching, pointing to aging technology (18 incidents in DC alone). (Domen, 2024) High modernisation costs (estimated $15.3 billion) needed for Next Generation 911 modernization nationwide. (Gainor, 2025)	Bengaluru's 112 PSAP received 2.692 million calls in 2024, of which 58% were blank or crank calls and only 16 percent were genuine emergencies. (D'Souza, 2025; D'Souza, 2025) Need for modernisation of ERSS (NextGen ERSS), as, owing to the increasing call volume, "the existing resources will become insufficient in near future" (MHA, 2023).

While international models provide valuable frameworks, India's emergency response evolution is also shaped by innovative state-level implementations that demonstrate contextually appropriate solutions. The following section examines two contrasting yet complementary approaches that offer insights into scaling effective pre-hospital care across diverse Indian contexts.

4. State Case Studies: Maharashtra Dispatch vs. Tamil Nadu Integration

Maharashtra, the second-most populous state in the country, launched a comprehensive EMS scheme in 2014. MEMS is a publicly funded scheme, offering free-of-cost service, by the Government of Maharashtra under the National Health Mission (NHM), and is operated via a public–private partnership model. (Jana, Sarkar, Parmar & Saunik, 2023)

Architecture:

MEMS operates through a centralized Emergency Response Centre (ERC) in Pune, managing 937 ambulances across Maharashtra's 36 districts through a single toll-free number 108, and via integrated GPS-GPRS, GIS, AVLT (Automatic Vehicle Location Tracking), and voice logging systems, demonstrating centralized dispatch coordination, but with opportunities for downstream optimization. The current fleet includes 233 ALS and 704 BLS ambulances, equipped with German defibrillators and Spanish oxygen delivery systems. (PHD, 2025; Jana, Sarkar, Parmar & Saunik, 2023; Sabnis, 2022)

Performance Analysis:

November 2022 data (n=38,823) reveals average episode times of 134.5 minutes (emergency) and 222.8 minutes (inter-facility transfers), decomposed as:

t1 (Preparation): 3.5 minutes

t2 (Base-to-Scene): 23.2 minutes

t3 (Scene Assessment): 12.1 minutes

t4 (Scene-to-Hospital): 39.4 minutes

t5 (Handover): 10.9 minutes

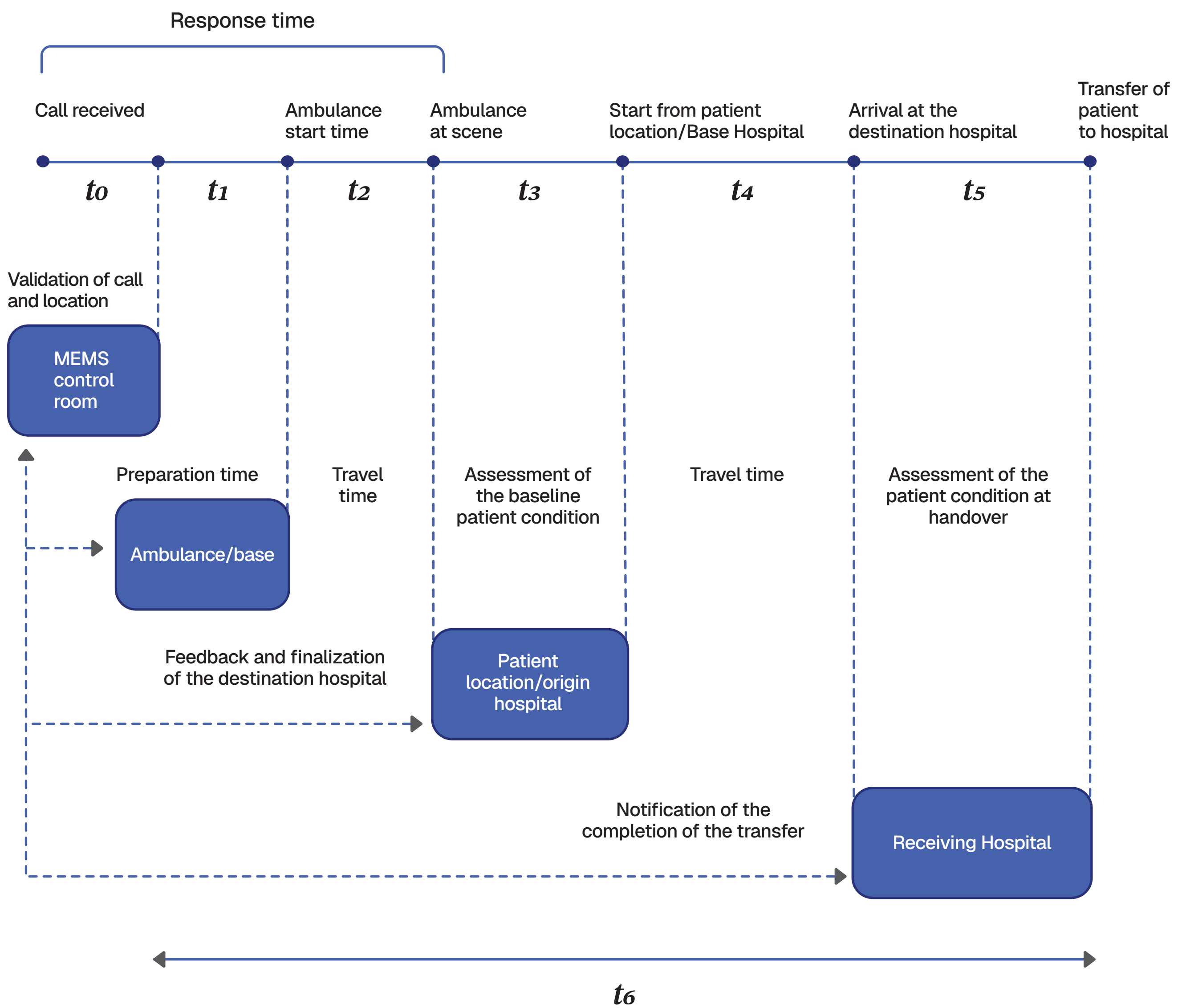
t6 (Return-to-Base): 41.9 minutes

Transport delays (t4+t6) dominate total time, indicating that there is less availability of definitive care in most districts. Response times varied dramatically by district; Osmanabad was the only district achieving a median RT under 60 minutes for emergency calls (Jana, Sarkar, Parmar & Saunik, 2024). Response time delays were attributed to lack of trained medical personnel and emergency care essentials at the control centres for addressing emergencies, lack of ambulances at the bases, sparsely-distributed patient locations in remote villages, lack of road connectivity and poor road infrastructure, among other reasons. (Jana, Sarkar, Parmar & Saunik, 2024)

What emerged from literature on the MEMS was that 5 key factors determine ambulance travel time:

- Population density
- Total number of hospitals
- Population-to-ambulance ratio
- Area covered per ambulance
- Road density

SOURCE - Jana, Sarkar, Parmar & Saunik, 2024.



Conceptual framework demonstrating the operational framework and complete episode of patient transfer by MEMS (108 Ambulance service) (Source: Jana, Sarkar, Parmar & Saunik, 2023)

The Tamil Nadu Accident and Emergency Care Initiative (TAEI) was launched in 2017, representing a shift from transport-focused to care-focused emergency response. (SaveLIFE Foundation, 2024; NHINP, 2022).

Key innovations:

Component	Framework
Trauma Registry	Each patient receives a unique TAEI ID that follows them through inter-hospital transfers, enabling real-time patient tracking from ambulance pickup through rehabilitation. *(IIT Madras Evaluation Report, 2025; National Health Mission Tamil Nadu, 2022)*
Pre-Arrival Data Link	EMTs transmit critical patient data like vital signs, chief complaints, etc., directly to hospital emergency departments using a mobile app. Critical cases trigger pre-arrival alerts that enable hospital teams to prepare for incoming patients, with GPS-enabled tracking showing ambulance locations and estimated arrival times. *(NHINP, 2022)*
Automated Triage	The system automatically calculates Revised Trauma Scores (RTS) based on Glasgow Coma Scale, systolic blood pressure, and respiratory rate, categorizing patients as: RED (RTS 0.1-3) | YELLOW (3.1-6) | GREEN (6.1-7.34) with healthcare personnel retaining override capabilities. *(National Health Mission Tamil Nadu, 2022)*
Hub-and-Spoke Network	TAEI implements a three-tiered system: Level 1 centres (comprehensive definitive care), Level 2 centres (secondary care with specialist support) Level 3 centres (stabilization and initial care), based on feasibility analysis ensuring "assured referral linkages". *(G.O.Ms. No.214, Tamil Nadu, 2018)*

In terms of measuring impact, according to SaveLIFE Foundation (2024), district-wise improvements in response times ranged from 5.38% (48 seconds) in Vellore to 17.5% (3 minutes, 27 seconds) in Kancheepuram. Also, patient transport through organized emergency services increased by 24.1-37.2% across pilot districts, with Kancheepuram showing the highest improvement at 37.2%.

Important lessons to be learnt from Maharashtra include the power of scale and centralized coordination, and Tamil Nadu's model leverages technology for pre-arrival notification, automated triage, and continuous patient tracking. These state-specific case studies indicate that integrated digital workflows and patient-centric protocols can outpace sheer fleet capacity in delivering timely care.

State-level innovations, combined with lessons from international models and understanding of India's current infrastructure, point towards specific areas where targeted improvements could significantly enhance pre-hospital care outcomes. The recommendations that follow synthesize these insights into actionable priorities for strengthening India's Chain of Survival.

5. Priority Areas for Further Investigation

Some key areas for future research and development in delivering timely pre-hospital care in India that emerge from an analysis of global benchmarks, state-level innovations, ground realities, and expert clinical insights documented throughout this paper include:

5.1 Establish National Data Infrastructure and Performance Standards

Focus on Citizen-Centric Performance Metrics:

Move beyond selective t2 (dispatch-to-arrival) reporting to mandate comprehensive call-to-arrival measurement with 90th percentile performance standards disaggregated by urban/rural geography, measuring the complete citizen experience rather than internal agency benchmarks. Based on clinical expert consultation highlighting infrastructure limitations, develop context-specific trauma care benchmarks. Rather than universal 60-minute standards, establish geographic categories measuring patient outcomes at varying time durations, particularly in challenging terrains.

Deploy Real-Time Data Mandates:

Implement a standardized trauma registry platform connecting all Level I-III trauma centres, building on Tamil Nadu's TAEI model that focuses on systematic patient tracking. This system must capture currently missing hospital-to-hospital transfer data and enable quarterly state-wise data release with standardized metrics, moving from aspirational policy targets to evidence-based decision making.

5.2 Strengthen 112 Dispatch, Technology Integration and Definitive Care System

Enhance 112 Geo-Location Capabilities:

To address utilization gaps, deploy AML technology enabling 50-meter location accuracy within 20 seconds of emergency calls, following EU standards where the goal is to provide AML within 50 meters for 80% of calls (EENA, 2023).

Mandate Interoperable Computer-Aided Dispatch:

Establish real-time resource tracking and AI-optimized deployment across all states, integrating Geographic Information Systems for dynamic routing optimization. Following US 911 best practices, CAD systems must employ algorithms considering unit availability, proximity, traffic conditions, and demand patterns for optimal resource allocation (Neusteter, O'Toole, Khogali, et al., 2020).

Institutionalize Independent Performance Auditing:

Establish quarterly 112 performance reviews with transparent public reporting, moving beyond self-reported metrics to independently verified time metrics integrated with injury severity for patient-centric and informed assessments.

5.3 Scale Proven Models Through Digital Integration

Replicate TAEI's Triangulated Registry System:

Implement trauma tracking with unique patient IDs following Tamil Nadu's model, which eliminated care duplicates and enabled continuous monitoring from ambulance pickup through rehabilitation (National Health Mission Tamil Nadu, 2022). This digital infrastructure must automatically populate hospital portals with pre-hospital data, enabling seamless information flow from scene to discharge.

Deploy Pre-arrival Notification Networks:

Connect EMT mobile applications to hospital display systems for critical case alerts that enable hospital teams to prepare for incoming patients (NHINP, 2022). This addresses the communication gaps identified across India's four major trauma centres where pre-hospital notification remains unstructured (Mitra, Mathew, Gupta, et al.,2017).

Optimize Ambulance Deployment:

Deploy dynamic ambulance staging at crash hotspots within four-kilometer radii using Geographic Information System mapping. Utilize ambulance deployment modeling to match resources with demand patterns, particularly addressing the five key factors determining travel time: population density, road density, hospital accessibility, coverage area per ambulance, and population-to-ambulance ratio (Jana, Sarkar, Parmar & Saunik, 2024).

5.4 Reinforce Policy Framework and Institutional Mechanisms

Strengthen Emergency Care Legislation:

Establish comprehensive legislation defining enforceable response time standards and institutional accountability mechanisms. As SaveLIFE Foundation's comparative analysis reveals, India requires specific trauma care legislation similar to international models (SaveLIFE Foundation, 2024).

Establish Clinical Expert Review Panels:

Create mandatory monthly multi-stakeholder coordination involving ambulance drivers, emergency technicians, department heads, and nursing staff to systematically review cases and address system gaps, institutionalizing evidence-based feedback mechanisms.

5.5 Increase First-Responder and Community Engagement

Bystander Training Programs:

Roll out standardized CPR, hemorrhage control, and basic trauma response education for the communities around high-crash zones, addressing the reality that most victims lack professional pre-hospital care.

Conclusion: Crashfree India's Call for Transformation

Every minute of delay in India's emergency response system represents lives lost, families shattered, and potential unrealized. This report has dissected the anatomy of the Chain of Survival, from the confusion of multiple helpline numbers to the 30-minute ambulance delay that claimed two young lives in Tripunithura. Yet within this analysis was also highlighted: Maharashtra's GPS-enabled dispatch coordination, Tamil Nadu's trauma registry innovation, and global benchmarks from EU-112 and US-911 systems prove that transformation is not only possible but immediately achievable.

Saving lives encompasses an entangled system, right from calling for help, bystander care, to ambulance services and pre-hospital care. These components make up the “Chain of Survival”, operating not independently but as a cohesive chain. The path forward requires more than incremental improvements; it requires systematic enhancement of emergency care from a citizen-centric perspective. Crashfree India's vision extends beyond this paper to a fundamental transformation of our post-crash mobility ecosystem to patient-centric care-giving systems. We envision a nation where every emergency call receives swift response, where every bystander possesses life-saving skills, where every ambulance carries trained professionals with advanced equipment, and where every trauma centre operates 24×7 with seamless digital integration.

This report serves as an evidence-based foundation, based on which Crashfree India aims to take up the next phase of inquiry: rigorous data trials, targeted pilot programs, and policy evaluations that can drive sustained change. We invite policymakers, technologists, healthcare leaders, community advocates, and other experts to join us on this journey. Ultimately, Crashfree India envisions a future where delivering timely care is not a race against time but a promise kept, and where every road crash becomes an opportunity for coordinated, compassionate care that saves lives and restores hope.

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