European Commission

Thematic Report
Post-crash data

Mobility and Transport

This document is part of a series of 20 thematic reports on road safety. The purpose is to give road safety practitioners and the general public an overview of the most important research questions and results on the topic in question. The level of detail is intermediate, with more detailed papers or reports suggested for further reading. Each report has a 1-page summary.

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Summary

Post-crash data and Road Safety

Road crashes continue to impose a heavy toll on individuals and society: for every fatality, around five people suffer serious injuries with lasting consequences, and the annual economic cost across EU 27 remains high. Post-crash data are essential for mapping the care continuum and identifying delays or failures in the chain of survival. From the moment a crash occurs, every second counts. The sequence begins when a bystander or in-vehicle system dials 112 and conveys critical details – especially the precise location, often via automatic handset-derived data. Dispatchers then mobilise the right mix of fire, medical and rescue units, which race to the scene. Upon arrival, responders rapidly assess casualty numbers and injury severity, secure the site and, where needed, use rescue sheets and extrication tools to free trapped victims. Emergency medical teams administer on-scene care before transporting patients to hospital, where they are stabilised. Ideally casualties are brought immediately to the most appropriate trauma centre for specialized treatment. However, depending on the patient's condition and available resources, stabilization may occur at the scene or en route to the hospital before transfer to a higher-level trauma centre if necessary. Finally, survivors enter rehabilitation to reclaim function and quality of life. By capturing data at each of these links – call receipt, dispatch, travel time, on-scene interventions, transport intervals, clinical treatment and rehab – authorities can pinpoint bottlenecks, improve protocols and ensure that all phone-users, including those with disabilities or while roaming, receive timely help.

Countermeasures

A suite of technologies and strategies work together to strengthen the post-crash response. Automatic crash notification systems in vehicles dial emergency services and send essential crash details without driver intervention, significantly speeding up alerts to first responders. Enhanced mobile-phone location services harness handset GPS and Wi-Fi signals to pinpoint callers with far greater precision than cell-tower methods, improving accuracy even when callers cannot describe their position. Integrated crash-detection functions in smartphones and wearables use motion sensors to recognise collisions and trigger emergency calls when users are unable to act. On multi-lane roads, legislation requiring motorists to form a clear central corridor ensures that ambulances and fire-rescue units reach accident sites without

obstruction. Additionally, traffic signal priority systems automatically provide green lights to emergency vehicles at signalized intersections, further reducing response times and improving safety during emergency responses. Detailed rescue sheets supplied by vehicle manufacturers guide rescuers in rapid, safe extrication by showing optimal cutting points and hidden hazards. Innovative tools, such as drones equipped with automated external defibrillators – can deliver life-saving equipment faster than ground ambulances in many settings, while electronic triage tags enable real-time tracking of patient condition during mass-casualty events. Mandatory first-aid training for novice drivers creates a network of bystanders capable of providing immediate assistance. Together with mobile medical teams (MMT) and helicopter emergency medical services (HEMS), these countermeasures create a seamless continuum from detection to definitive care, helping save lives and reduce the long-term consequences of injuries.

1. What is the problem?

This thematic report outlines the complete post-crash landscape: it begins by defining the problem, then describes each stage of the post-crash care chain, reviews targeted measures – including eCall and first-aid training – and concludes by spotlighting emerging developments to enhance outcomes. This report focuses on severe crashes with potentially lasting consequences. Persons experiencing minor injuries that require only basic pre-hospital treatment or outpatient care without significant intervention are excluded.

1.1 Introduction

What are the consequences of road traffic injury?

Over the period from 2014 to 2024, the EU27 achieved a collective 17% reduction in road deaths. However, in 2024, road deaths decreased by just 2% compared to 2023, which is far below the annual 6.1% reduction required to achieve the EU's target of halving the number of road deaths by 2030 (ETSC, 2025). Despite this progress, the number of casualties remains high: for every life lost on EU roads, multiple people suffer serious injuries with life-changing consequences, although this ratio varies significantly between Member States (European Commission, 2024a). Road traffic injuries continue to have substantial and long-term negative impacts on the lives of those affected and impose considerable costs on society, with the total crash costs for the 28 EU member states estimated at approximately €270 billion annually, corresponding to 1.8% of GDP (Wijnen et al., 2017).

What is post-crash care?

Road safety policy traditionally focuses on preventing collisions or, when they occur, mitigating their impact. However, effective post-crash care – the coordinated sequence of emergency and medical interventions following a collision – is equally vital for reducing fatalities and improving survivors' outcomes (ETSC, 2025; Høye, 2009).

Despite advances in trauma medicine, most road traffic deaths still happen before a patient reaches definitive hospital care – either at the crash site, en route, or within the first hour after impact (Alharbi et al., 2022). These pre-hospital deaths underscore the importance of every link in the post-crash chain, which comprises:

- Emergency call receipt (112 or national numbers)

- Dispatch of rescue and medical services
- Rapid travel to the scene
- On-scene triage and immediate care
- Patient transfer to an appropriate medical facility
- Trauma centre treatment and rehabilitation

Timely, effective action at each stage dramatically increases the chances of survival and full recovery. Care may be delivered by bystanders, trained volunteers, or professional services, but coordination and rapid response remain the keys to saving lives (ETSC, 2019a; Høye, 2009).

2. What are the main components of post-crash data?

The post-collision response chain comprises a series of time-sensitive actions by emergency and rescue teams. Each link – from call receipt through on-scene rescue to transfer – is critical and must be executed without delay in order to maximize survival and reduce the long-term consequences of injuries (ETSC, 2019a).

2.1 Receipt of the emergency call

A key first step in the post-collision response chain is answering the emergency call. Since its introduction in 1991[1], the single European number 112 has been deployed alongside national emergency numbers in all Member States. In 2023, 112 accounted for 62% of all emergency calls across the EU, up from 56% in 2021 (European Commission, 2024b). Public awareness drives this uptake: a 2021 Eurobarometer found that nearly 75% of Europeans would call 112 in their home country, while about 42% would do so abroad, though many remain uncertain which number to dial outside their own state (European Commission, 2021).

All 112 calls are routed automatically to the most appropriate Public Safety Answering Point (PSAP) based on the caller's location, regardless of nationality or network. Rapid call handling is essential: in most Member States, 112 calls are answered within 10 seconds on average,

[1] 91/396/EEC: Council Decision of 29 July 1991 on the introduction of a single European emergency call number, OJ L 217, 6.8.1991.

allowing rescue teams to be dispatched without delay (European Commission, 2024b).

2.2 Dispatching

The organisation taking the call – unless it originates via eCall – follows a standardised protocol to gather critical information (caller identity, estimated location, collision type, number of injured, callback number) while advanced mobile location (AML) increasingly provides location data automatically transmitted from the caller's mobile device using its onboard GPS and Wi-Fi positioning systems (Delegated Regulation 2019/320, European Commission, 2019). Precise scene context (road type, travel direction) is confirmed next to ensure that dispatched vehicles can access the site. Call-takers also coach any bystanders on safe, immediate first aid, such as airway clearance, recognizing that lay responders often arrive first but must prioritise their own safety (ETSC, 2019a).

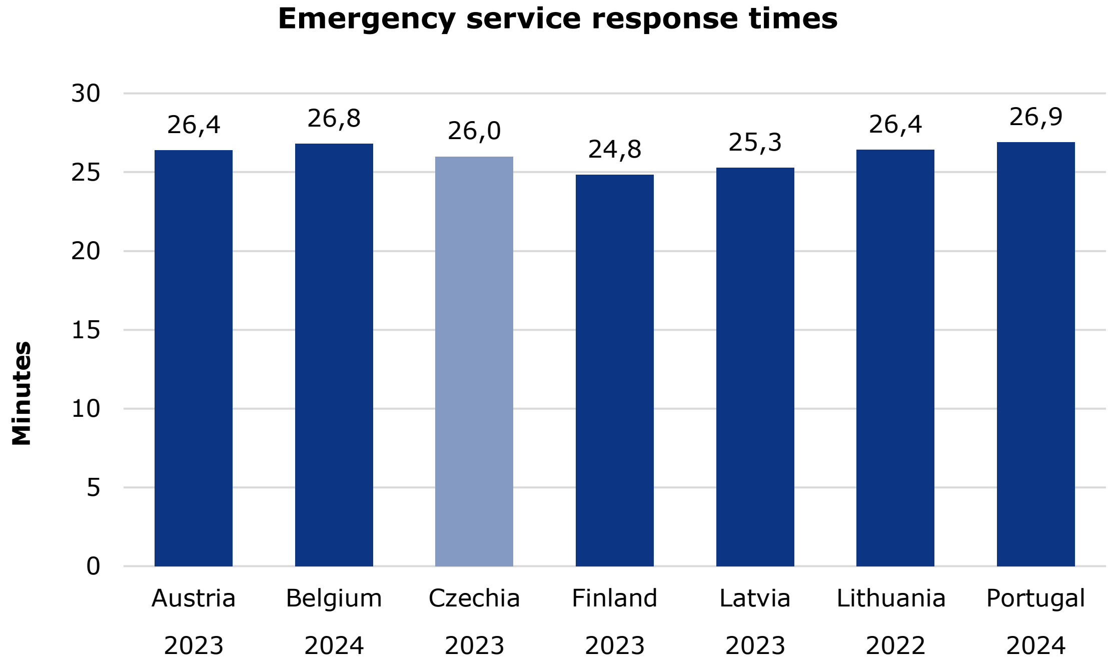
Once the incident parameters are clarified, the call-taker either directly dispatches the appropriate emergency units with the required urgency or, in larger PSAPs, triages calls to specialised dispatchers for assignment (European Bank for Reconstruction and Development, 2021). The call-taker maintains real-time visibility of nearby available resources and their approximate travel times to the scene. This entire workflow is supported by computer-aided dispatch (CAD) systems, which integrate call data, resource availability, and pre-programmed response scenarios to optimize decision-making and accelerate deployment of police, fire, and medical services (ETSC, 2019a).

2.3 Travelling to the scene

The journey from dispatch to scene arrival must balance speed with safety. Once units are en route, drivers employ sirens and flashing lights to warn other road users and rely on specialised training to navigate traffic without creating new hazards. Motorists' cooperation – by yielding and forming emergency corridors (see section 3.3) on multi-lane roads – is equally vital to ensure unimpeded access for ambulances/emergency vehicles.

Response time, the interval from call receipt to Emergency Medical Services (EMS) arrival, is a key indicator of pre-hospital care quality. Figure 1 shows the 95th percentile of this interval (P95) for seven countries which are commonly around 26 minutes . Faster response is consistently linked to better survival: a Spanish study found that cutting P95 by 10 minutes (from 25 to 15 minutes) reduced mortality by one third, noting that their analysis excludes on-scene fatalities (i.e. those who die before EMS transport, Sánchez-Mangas et al., 2010). Response times depend on factors such as station-to-scene distance, crew availability, traffic conditions, and location accuracy (Høye, 2009).

Figure 1. *Emergency service response times in seven countries. Source: Van den Berghe & Stelling, 2025.*



Light coloured Only one region in Czechia*
Note: data in all graphs show minutes and fractions of minutes (e.g., 23 minutes and 30 seconds = "23.5")

2.4 Arrival and care at the scene

Upon arriving at the crash site, emergency responders immediately conduct a comprehensive assessment of both the situation and the condition of all casualties. This initial appraisal involves determining the exact number of victims, cordoning off the roadway to protect responders from oncoming traffic, and keeping bystanders at a safe distance. Concurrently, fire, rescue, and emergency medical teams initiate life-saving interventions.

In collisions involving multiple victims, responders follow this with field triage, categorizing patients by injury severity and urgency to ensure that those in greatest peril receive priority treatment while still delivering timely care to all casualties. Once the scene is stabilized and triage is complete, technical rescue units – typically fire services under medical supervision – proceed with extrication, if needed. While faster extrication has been associated with reduced risk of major secondary injuries and improved survival in some studies (Reed, 2017), overly rapid rescue may increase the likelihood of harm, particularly spinal or other vulnerable injuries (Nutbeam et al., 2022). To facilitate rapid, safe access to trapped occupants, rescuers use manufacturer-provided rescue sheets (see section 3.4) and rely on cross-model training to identify optimal cutting points and avoid hidden hazards (ETSC, 2019a).

Following extrication, pre-hospital care is provided by emergency medical services (EMS), typically comprising paramedics supported by on-site physicians (MDs) when needed. Extrication and medical interventions are usually performed in parallel, and extrication time often depends on the interventions carried out by the medical team prior to final removal. In most countries, the approach to patient transfer is standardized: teams follow established protocols that prescribe either a "scoop and run" strategy, prioritizing rapid transport to definitive care, or a "stay and play" approach emphasizing on-scene stabilization (Johannsen et al., 2017). Current evidence remains inconclusive on which strategy yields superior outcomes, highlighting the urgent need for systematic research into pre-hospital protocols (ETSC, 2019a).

Mobile Medical Teams (MMTs) are specialized pre-hospital units composed of physicians and paramedics who provide advanced diagnostics and on-scene interventions beyond standard ambulance capabilities. Deployments typically include rapid airway management, advanced haemorrhage control, and critical triage decisions, with physicians often accompanying patients during transport to definitive care. A recent meta-analysis showed that the targeted deployment of interprofessional teams led by physicians in the pre-hospital care of critically ill or injured patients improves patient outcomes by increased survival rates (Lavery et al., 2025). However, another recent Belgian study has raised concerns about over-qualification and resource use: a multicentre analysis of MMT activity found many deployments retrospectively judged unnecessary, high proportions of MMT missions that did not require physician-level intervention were reported (Van Biesen et al., 2023).

2.5 Patient transfer to a medical facility

Transporting road-traffic casualties from the crash site to definitive care is the next critical step in post-crash care. Two internationally recognised training programmes – International Trauma Life Support (ITLS) and Advanced Trauma Life Support (ATLS) – offer structured guidance for pre-hospital and in-hospital providers, respectively. ITLS (formerly Basic Trauma Life Support) equips ambulance crews and first responders with non-invasive techniques, while ATLS provides hospital teams with a standardised approach for rapid patient assessment, resuscitation, and preparation for surgery (Johannsen et al., 2017).

After on-scene stabilisation, casualties are either taken to the nearest medical facility for initial treatment and, if required, secondary transfer, or transported directly to a specialised trauma centre capable of definitive care. Evidence indicates that reducing the number of inter-hospital transfers lowers delays in definitive treatment and is associated with improved survival (ETSC, 2019a). For severely injured patients, direct transport to a level I trauma centre[2] is recommended when the additional travel time remains within established safety thresholds, thus avoiding potential delays and complications associated with intermediate stops. However, in cases of extreme or urgent medical considerations, temporary stabilization at a closer facility may be necessary before definitive care.

Furthermore, international evidence indicates that Helicopter Emergency Medical Services (HEMS) can improve survival in trauma patients, particularly in regions where rapid access to definitive care is critical and has been associated with faster transport times and reduced mortality compared with ground EMS (Galvagno et al., 2012; Den Hartog et al., 2015; Meuli et al., 2021). However, a comparative study between HEMS in Austria and Germany (Deluca et al., 2024) highlighted that HEMS should be explicitly deployed only for trauma patients, in particular for:

a) for the rescue and care of accident victims or persons in life threatening situations,

b) for the transport of emergency patients with an Injury Severity Score (ISS) > 16,

c) for the transport of rescue or recovery personnel to hard-to-reach areas, and

[2] A Level I Trauma Center is capable of providing total care for every aspect of injury – from prevention through rehabilitation.
Source: American Trauma Society, https://www.amtrauma.org/page/TraumaLevels

d) for the transport of pharmaceuticals, particularly blood products, organ transplants, or medical devices.

Despite progress in harmonising triage criteria and pre-notification protocols across European systems, substantial variation persists in transport intervals and destination choices. This underscores the need for systematic data collection and closer alignment of transfer guidelines among Member States to ensure the most effective use of trauma care resource (ETSC, 2019a).

2.6 Trauma care

A trauma care system is designed to deliver the most appropriate level of care to injured individuals within a specific geographical region, ensuring that each patient receives timely and specialised treatment according to the severity of their injuries. These systems are composed of multiple interconnected components, including injury prevention, pre-hospital emergency response, in-hospital care, and rehabilitation (Schipper et al., 2025). The structure and maturity of trauma care systems vary significantly between European countries, with notable differences in integration of trauma registries (Scharringa et al., 2023). Recent studies confirm that well-developed trauma systems are closely linked to improved patient outcomes. The presence of an organised trauma network is associated with shorter pre-hospital times, more effective triage, and higher survival rates (Scharringa et al., 2023; Alharbi et al., 2022).

Recent studies confirm that well-developed trauma systems are closely linked to improved patient outcomes. For example, in Sweden, treatment at a trauma centre was associated with a 41% lower adjusted 30-day mortality compared to non-trauma centre care, and for the most critically injured patients, the reduction in mortality exceeded 70% (Candefjord et al., 2020). Similar benefits have been observed in other European countries, with overall mortality reductions ranging from 16% to 20% following the implementation of structured trauma systems and networks (Chesser et al., 2019).

Despite these advances, substantial variation remains in trauma system development across Europe, particularly regarding quality assurance and the consistent application of triage and transfer protocols. Future efforts should prioritize integrating trauma networks, fostering collaboration among all levels of care, and developing active systems where none exist. Such initiatives will ensure equitable, high-quality trauma care across regions (Schipper et al., 2025).

2.7 Rehabilitation

Rehabilitation is the final and essential stage in the post-crash care continuum, typically commencing once a patient's injuries have been stabilised. The primary objective is to restore the individual as closely as possible to their pre-injury level of health and functioning. Rehabilitation may involve a combination of physical therapy, pain management, psychological support, and occupational therapy, tailored to the unique needs of each patient.

The intensity and duration of rehabilitation are highly individualised and depend on several factors, including the type and severity of injuries, the patient's age, pre-injury health status, and overall physical and psychological condition. Recent studies underscore that, while acute trauma care in Europe is generally well organised, access to comprehensive rehabilitation services remains inconsistent across countries (WHO, 2019).

Furthermore, evidence highlights the importance of early and continuous rehabilitation in reducing long-term disability, enhancing return to work, and improving quality of life for survivors of road traffic injuries (Brakenridge et al., 2024). The level and length of rehabilitation required by each patient differ and are determined by the number and type of injuries, the patient's age, pre-injury health status, and overall health (Rotondo et al., 2019 cited in Alharbi et al., 2022).

3. Specific post-crash measures

This chapter follows the sequence of how post-crash interventions support each other – from automatic crash and location notification, through measures that clear access and guide responders, to advanced technologies and training – and thereby mirrors the real-world timeline of an incident.

3.1 Advanced mobile location (AML)

Advanced Mobile Location (AML) technology automatically transmits precise location information from smartphones to emergency services when 112 is dialled, utilizing Global Navigation Satellite Systems (GNSS) and Wi-Fi data to achieve significantly better accuracy levels (typically within 100 metres) *compared to cell-tower-based methods (within several kilometres)*. As of September 2024, 25 EU Member States, Iceland, and Norway have AML-enabled Public Safety Answering Points (PSAPs), representing significant progress from earlier implementations. However, only eight Member States have confirmed that handset-derived location is available for roaming end-users (European Commission, 2024b), highlighting an ongoing gap in cross-border emergency response capability.

The 2022 European Roaming Regulation mandates that mobile network operators ensure caller location information – both network-based and handset-derived – is transmitted free of charge to PSAPs when roaming customers contact emergency services. AML operates automatically without user intervention, activating only when emergency numbers are dialled to protect privacy, and has been mandatory on all smartphones sold in the European single market since March 2022 (European Commission, 2024b).

3.2 Automatic Crash Detection Technologies

3.2.1 eCall

The eCall (Emergency Call) system in EU-registered vehicles automatically contacts the European emergency number 112 when a serious collision is detected and can also be activated manually. Its primary goal is to shorten the interval between crash occurrence and alerting emergency services – especially vital when occupants are incapacitated. Research from across Europe indicates that eCall can reduce emergency response times by 40–50%, depending on network infrastructure and area type (urban vs. rural), with corresponding reductions in injury severity (European Commission, 2013; EENA, 2022). More recent research in Finland, as part of the Trendline project, show that the use of eCall reduces the response time by several minutes; the gain is highest on motorways. Upon activation, eCall connects to the most appropriate eCall Public Safety Answering Point (PSAP) and transmits a minimum set of data – including precise accident location, travel direction, vehicle identification and other critical details – while still allowing occupants to speak with the operator if able. Manual activation is available via an in-vehicle button, for example when a witness presses it or in case of security concerns. Mandatory in all new types of passenger cars and light commercial vehicles from 31 March 2018, eCall deployment is estimated to prevent 2–4% of fatalities (Høye, 2020).

3.2.2 eCall evolution

Existing eCall systems face a critical transition as 2G/3G networks are progressively shut down across Europe. Therefore, the eCall legislation was updated in 2024 to adapt PSAPs and vehicles to new IMS packet-switched networks (4G/5G), with implementation mandatory for new vehicle types from January 1, 2026, and all new vehicles by January 1, 2027 (European Commission, 2024c). eCall PSAPs are required to support the reception and handling of eCalls using IMS packet switched networks from 1 January 2026 (Delegated Regulation (EU) 2024/1084).

3.2.3 Crash detection in smartphones and wearables

Independent crash-detection features built into modern smartphones and wearables (e.g. smartwatch) now serve as a valuable supplement to in-vehicle systems. These applications leverage built-in accelerometers, gyroscopes, GPS positioning, and audio analysis to recognise high-impact events. Upon detecting a likely collision, the device initiates a brief countdown – typically around 30 seconds – during which the user can cancel if no assistance is needed. If the alert is not cancelled, the device automatically contacts emergency services and transmits its precise location, while simultaneously notifying pre-selected emergency contacts.

Recent research has demonstrated the feasibility and accuracy of such systems: one study achieved 94 percent crash detection accuracy with fewer than 5 percent false positives using only smartphone sensors (Bharath et al., 2024), and another prototype matched dedicated in-vehicle hardware by detecting impacts with notification delays under 10 seconds (Langa et al., 2024). By harnessing ubiquitous consumer devices, this capability extends automatic crash notification to older vehicle fleets and vulnerable road users – though its effectiveness still depends on sufficient cellular or Wi-Fi connectivity and may not capture very low-severity incidents.

However, while these automatic alerts can enhance prehospital response, anecdotal experience indicate that false alarms are common and emergency services may need to triage responses to avoid unnecessary dispatches. Nevertheless, in a subset of cases, automatic smartphone or wearable alerts have provided the first and only notification of a serious accident, highlighting their potential to improve early recognition and timely intervention in severe trauma incidents.

3.3 Emergency corridor implementation

An emergency corridor (also known as a rescue lane) is a legally mandated clear lane in multi-lane traffic that grants priority passage to ambulances, fire engines and other emergency vehicles, enabling them to reach crash scenes without unnecessary delay. Under the European Transport Safety Council guidelines, drivers on motorways and high-capacity roads must, when traffic slows to a near-standstill, clear a central lane of at least three metres wide – sufficient for most rescue vehicles – to form this corridor (ETSC, 2018).

In recent years, the legal adoption of this safety feature has accelerated: Spain introduced its emergency-corridor law in early 2025, joining Belgium (2024), Croatia (2023), Poland (2019) and the original seven countries – Austria, the Czech Republic, Germany, Hungary, Luxembourg, Slovenia, and Switzerland – bringing the total to eleven EU Member States mandating corridor formation.

Effectiveness depends entirely on driver compliance and public awareness. Where motorists consistently clear a rescue lane, research indicates that corridor use can shorten emergency response times by roughly four minutes and increase survival chances by up to forty percent (ETSC, 2018). Accordingly, ongoing public information campaigns and enforcement measures are essential to maximise corridor compliance and save lives.

3.4 Traffic signal priority systems

Traffic signal priority or pre-emption systems are designed to reduce delays at intersections by providing a green phase for emergency vehicles while holding back cross traffic. These systems operate through vehicle-based transmitters that communicate directly with intersection receivers. More recently, system-based approaches integrate computer-aided dispatch (CAD) and automated vehicle location (AVL) technologies with advanced traffic management systems to pre-empt signals and adjust traffic lights centrally (FHWA, 2024). Evidence from the U.S. Federal Highway Administration (FHWA) indicates that signal pre-emption deployments have reduced emergency vehicle travel times by 14-50%, with additional safety benefits including substantial reductions in crashes involving emergency vehicles (FHWA, 2004). Modelling studies support these findings, showing reductions in travel time of up to 43% under certain traffic and congestion conditions (Su et al., 2023). These data suggest traffic light priority systems are a promising complement to other interventions for improving pre-hospital response. However, real-world evaluations comparing safety outcomes – rather than response time alone – remain limited.

3.5 Rescue sheets

After a serious collision, rapid and safe extrication of trapped occupants is clinically critical. Rescue sheets, which are manufacturer-provided documents detailing vehicle structure, design and component locations, are indispensable tools for fire and rescue services. They guide rescuers to optimal cutting points and highlight hazards, reducing extrication time by 30% in controlled tests (ETSC, 2019b)

Vehicle advances – stronger materials, alternative propulsion systems (electric, hybrid, hydrogen) – and the proliferation of models complicate on-scene decision-making. First responders cannot be expected to recognize every vehicle's specifics by sight alone. Rescue sheets, accessible online or via the European New Car Assessment Programme (Euro NCAP) Rescue app, ensure responders obtain accurate, standardized guidance regardless of vehicle type.

Since 2023, Euro NCAP requires that all ISO 17840-compliant rescue sheets be supplied in all official EU languages, improving accessibility for responders across Europe (Euro NCAP, 2023). Moreover, the "Euro NCAP Rescue" app, where standard rescue sheets for hundreds of models can be viewed, has surpassed more than half a million downloads by September 2023, reflecting strong uptake among emergency services (International Fire & Safety Journal, 2023).

3.6 Advanced emergency response systems

3.6.1 Electronic triage systems

A triage tag is a portable label (typically a foldable card or wristband), used during mass-casualty incidents to record a patient's identity, injury severity (via standardized colour codes), vital signs, and treatments administered. Its primary purpose is to enable first responders to prioritize care, track each patient through transfer points, and ensure continuity of documentation and resource allocation under chaotic conditions.

Electronic triage tags build on this concept by embedding IoT capabilities into the physical tag. Modern prototypes employ wireless mesh networks to stream patients' real-time vital signs and triage categories directly to incident command centres, vastly improving situational awareness and patient tracking. In a 2021 evaluation of such a system, the IoT-enabled tag earned excellent assessment for uninterrupted data delivery, portability, and device durability, alongside strong scores for usability and power efficiency (Park, 2021). These devices pair seamlessly with existing triage bracelets and vital-sign sensors, preserving responder workflows while enhancing data reliability.

3.7 First aid training for drivers

First-aid training equips drivers with the skills to provide immediate care at crash scenes, potentially stabilizing victims before professional help arrives. The new Directive (EU) 2025/2205 on driving licences[3], which entered into force in November 2025, explicitly calls for mandatory cardiopulmonary resuscitation (CPR) instruction as part of novice driver education. The content of the theory test concerning all vehicle categories includes "general rules specifying how the driver must behave in the event of an accident (setting warning devices and raising the alarm), including rules on how to behave if an emergency vehicle is approaching, and what to do at the site of a collision, and the measures which the driver can take to assist road accident victims where necessary, including basic knowledge of first aid, in particular CPR;"[4]

As of 2023, 12 out of 27 EU Member States along with Norway and Switzerland already require some form of first-aid or basic life support course to obtain a category B licence, although many curricula emphasize general first aid over focused CPR training (Semeraro et al., 2023). While a number of studies indicate that first aid training for drivers improves their first aid knowledge, skills, self-confidence, and willingness to provide first aid at the scene of an accident, no studies have so far proved this training's impact on mortality (Goldenbeld & Weijermars, 2017).

[3] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202502205
[4] Concerning the theory test, Member States may exempt applicants from the questions regarding the basic knowledge of first aid "…where the applicant has completed certified first aid practical training, including cardiopulmonary resuscitation (CPR), any time before the test of skills and behaviour is taken."

3.7.1 Drone-delivered Automated External Defibrillators

Drone-delivered automated external defibrillator systems represent a transformative advancement in emergency medical response for out-of-hospital cardiac arrest. A comprehensive 2024 scoping review of 39 studies demonstrated that drone-delivered AEDs reach patients before ambulances in approximately two-thirds of the cases, achieving time advantages ranging from 1 minute 52 seconds to 3 minutes 14 seconds compared with standard EMS response times (Jakobsen et al., 2024). These findings align with real-world evidence from Sweden, where a prospective observational study found that drone-delivered AEDs arrived before ambulances in 67 percent of deployments, achieving a median time advantage of approximately three minutes over EMS response (Schierbeck et al., 2023).

However, effectiveness varies significantly by local context. A Danish feasibility study in Aalborg's urban centre found that while drone deliveries were consistently successful and safe, the median drone response time was 4 minutes 47 seconds compared to 3 minutes 25 seconds for ambulances, demonstrating that in settings with exceptionally rapid EMS services, drones may not provide time advantages but can still supplement existing response systems (Jakobsen et al., 2025).

Simulation and modelling studies consistently indicate that integrating drones into cardiac arrest response can meaningfully boost survival chances and offer cost-effective solutions, particularly in areas where traditional EMS response times are longer or where fixed AED networks are sparse (Jakobsen et al., 2024).

While drone-delivered AEDs offer significant time advantages in many out-of-hospital cardiac arrest scenarios, their added value in road-traffic accidents may be limited in comparison to other types of ambulance missions.

4. What new developments can be expected?

Advances in technology and forthcoming European regulations promise further enhancements in the accessibility, accuracy, and scope of emergency response services across the EU.

4.1 Enhanced caller location and full roaming coverage

The European Electronic Communications Code (EECC) has required since December 2020 that all Member States provide both network-based and handset-derived caller location information for emergency calls (European Parliament and Council, 2018). As of September 2024, Advanced Mobile Location is enabled in 25 Member States plus Iceland and Norway, delivering location accuracy typically within 100 metres compared to several kilometres for basic cell-tower triangulation. However, a critical gap persists: only eight Member States currently ensure that roaming callers also benefit from handset-derived location data, leaving millions of cross-border travellers without optimal emergency positioning (European Commission, 2024b). Under the Commission Delegated Regulation (EU) 2023/444 (European Commission, 2022), full AML coverage for all EU-roaming users remains an immediate priority, with Member States required to establish caller location criteria and report on implementation progress annually.

4.2 Enhanced accessibility for callers with disabilities

Despite existing EU legislation and improvements in Member States' emergency services, many people with disabilities currently lack equivalent access to emergency services via 112 (European Disability Forum, 2024). However, under the European Accessibility Act, which entered into force on 28 June 2025 (European Parliament and Council, 2019), all EU citizens, including those with sensory or communication impairments, must have equivalent access to 112, even when roaming.

Although Member States must natively deploy Real-Time Text (RTT) by 28 June 2025 (or, by derogation, by 28 June 2027) and support Total Conversation (TC) wherever video calling is available (European Parliament and Council, 2019), many still rely on interim solutions, such as SMS and dedicated apps in order to provide text-based access to 112 (European Disability Forum, 2024). However, these interim solutions do not automatically share a caller's exact location, making it difficult for dispatchers to reach individuals who cannot verbally describe where they are. To address this, 24 EU Member States have introduced handset-derived location technology (Advanced Mobile Location, see section 3.1), which automatically forwards accurate coordinates to the Public Safety Answering Point during an emergency communication. AML is especially valuable for people with sensory, intellectual or speech impairments who may struggle to convey their exact position. Yet its full benefit is eroded by gaps in implementation: Poland, Cyprus and Malta have not activated AML, and in several countries, it applies only to 112 voice calls, not to SMS or app-based alerts (European Disability Forum, 2024).

Despite the enhanced functional equivalence promised by RTT, TC and AML, significant accessibility barriers remain for diverse disability groups, particularly when roaming. In addition, infringement proceedings against several Member States are ongoing to enforce truly equivalent emergency-communication access (European Disability Forum, 2024).

4.3 eCall extension to other vehicle categories

The Commission's 2024–2028 work programme under the ITS Directive includes as a possible activity the extension of eCall beyond passenger cars (vehicle class "M1") and light commercial vehicles (vehicle class "N1") to cover motorcycles, heavy trucks, buses and coaches, as well as agricultural tractors (European Commission, 2024d).

The possible extension is related to, and depends on, developments in the existing legal framework for eCall PSAPs and eCall in-vehicle system, which includes legislation beyond the ITS Directive, and must be supported by a comprehensive impact assessment covering all aspects of eCall implementation, including the unique challenges posed by different vehicle categories, such as rider separation from motorcycles in crashes and the varied operational environments of agricultural and commercial vehicles, and their possible impact on the functioning of eCall PSAPs.

4.4 Post-Crash Care Key Performance Indicators

The EU's new road-safety Key Performance Indicator (KPI) for post-crash care, introduced in 2019, tracks the 95th percentile of EMS response times across Member States, typically around 26 minutes (Van den Berghe & Stelling, 2025; see section 2.3). The 2024 methodological guidelines of the EU-funded “Trendline” project specify that this KPI should represent the 95th percentile of the interval between emergency-call receipt and EMS arrival to ensure consistency and comparability of response-time reporting across countries (Weijermars et al., 2024).

Despite growing policy focus on post-crash response, systematic data collection remains fragmented. In its REVIVE synthesis report, the European Transport Safety Council called on the EU and Member States to establish clear performance indicators for post-collision response – such as the proportion of incidents where EMS arrives within a defined time threshold (ETSC, 2019a). The Trendline KPI represents one concrete operationalization of this recommendation, focusing on response-time percentiles rather than proportions.

Robust, harmonised data reporting, underpinned by regular KPI reviews, is essential to identify weak links in the post-crash care chain and to inform future regulatory and technological improvements.

5. Further reading

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