



# An overview of post-collision response and emergency care in the EU

May 2018



European Transport Safety Council



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## About the European Transport Safety Council

ETSC is a Brussels-based independent non-profit organisation dedicated to reducing the numbers of deaths and injuries in transport in Europe. Founded in 1993, ETSC provides an impartial source of expert advice on transport safety matters to the European Commission, the European Parliament and member states. It maintains its independence through funding from a variety of sources including membership subscriptions, the European Commission and public and private sector support.

## About the Revive project

Improvements in emergency response can help prevent deaths and life-changing injuries in road collisions. However, emergency response has not been getting a fair share of attention in terms of research, best practice exchange and measures in the European Union. The aim of the Revive project is to map Emergency Medical Service (EMS) and Fire and Rescue Service (FRS) practices in the EU28 and raise the profile of both EMS and FRS on the national and European political agendas.

The Revive project aims at improving post-crash care provided by EMS and FRS in order to mitigate the consequences of road collisions. One of the key outcomes of the project is to have established an international network of experts, researchers and practitioners in the field of post-collision care and emergency response. Lastly, the Revive project will contribute to promoting the need for EU-wide action on tackling serious road traffic injuries.

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# BACKGROUND

25,250 people lost their lives on EU roads in 2017.<sup>1</sup> For every death, there are an estimated four permanently disabling injuries such as damage to the brain or spinal cord, eight serious injuries and 50 minor injuries.<sup>2</sup>

Road safety policies typically aim to prevent collisions from occurring and to mitigate the impact of the collisions that do occur. An issue that has received less attention is how improvements in emergency response can also help prevent deaths and reduce the severity of injuries. Emergency response as it applies to road traffic collisions has not had a fair share of attention in terms of research, best practice exchange and policy measures in the European Union.

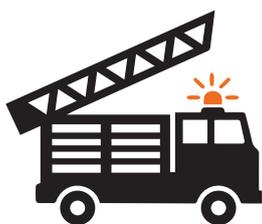
*An issue that has received less attention is how improvements in emergency response can also help prevent deaths and reduce the severity of injuries.*

ETSC's Revive project aims at initiating a multi-sectoral collaboration, involving road safety experts as well as emergency medical service (EMS) and fire and rescue service (FRS) professionals.



EMS

Emergency medical service



FRS

Fire and rescue service

Better health outcomes for people with injuries resulting from road traffic collisions could be achieved by improving collaboration between emergency/rescue teams and coordination of relevant work methods and procedures at the scene. Prompt, efficient and accurate care delivered to a road traffic victim immediately after the collision may lead to a faster recovery, better prognosis and/or improved survival rate, decreasing the burden of injuries on victims, relatives and society at large.

At the time of writing, research on post-collision response and emergency care across the EU has been rather fragmented. Studies evaluating the road safety situation across Europe are available as is research on ambulance care and pre-hospital treatment for patients with a variety of emergency health issues – but not specifically those caused by road collisions.

Some EU countries have carried out research in the field of transport, health and rescue covering the situation at a particular regional or national level. However, there has been no thorough analysis of emergency care and rescue in relation to road collisions and patients' outcomes conducted across Europe. Literature on which components of emergency care contribute most to differences in patient health outcome also remains limited.<sup>3</sup>

EMS and FRS intervene in a broad range of incidents, this contributes to the difficulty of analysing the specific case of treatment after a road collision. Nevertheless, such research is needed. If Europe is to reduce the numbers of people who suffer serious life-changing injuries every day on its roads, an extensive analysis of the management and tasks of all actors involved in actions following road traffic collisions will be required in the near future.

In parallel, a set of indicators that could be used to evaluate the work of emergency/rescue teams is also recommended. In particular, it is important to develop a road safety performance indicator based on timing of pre-hospital care. This would provide the EU with the means to compare how different countries are doing in terms of post-collision response and emergency care and allow for concrete recommendations for improvements.

The Revive project's goal is to spark a European-wide discussion on this topic and to deliver recommendations on what can be done to make post-collision response more effective.

<sup>1</sup> ETSC (2018), 12th Annual Road Safety Performance Index (PIN) Report, <https://etsc.eu/pin12>.

<sup>2</sup> European Commission, Road safety statistics - Accidents data, [goo.gl/tAwNks](http://goo.gl/tAwNks).

<sup>3</sup> World Health Organisation (2017), Save LIVES - A road safety technical package, page 35, [goo.gl/cpazJH](http://goo.gl/cpazJH).

# INTRODUCTION

*“Timely emergency care saves lives  
and reduces disability”*

World Health Organization<sup>4</sup>



When a collision occurs, fast, appropriate and well-coordinated emergency response is crucial for effective treatment of seriously injured people.

This paper outlines the actions that are undertaken every time a road collision occurs. It describes the role of emergency/rescue services from the moment a call is taken to handover to hospital, and identifies areas where application of best practice are particularly important.

It is directed towards the road safety community: policy makers and experts who do not necessarily possess knowledge in the field of health/emergency care or rescue and is intended to serve as an introduction to post-collision response and emergency care in Europe.

The Revive project aims to produce recommendations for possible future action and policy. These will be developed in a report to be published in the project's concluding stages.

It is already clear that differences in both EMS and FRS national structures and functioning make the development of one-size-fits all recommendations a challenge.

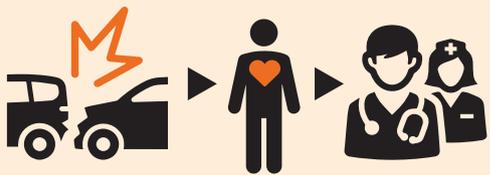
The potential differences lie in:

- Similar work being carried out by different actors;
- Differing levels of background and training;
- Differences in who is the regulator of the service, on what level the service functions, who coordinates the work and the like.

Besides differences between member states and/or regions, FRS/EMS are also subject to constant evolution due to technological developments and structural changes in working practices. At the same time, the demographics of road traffic are also changing as a growing proportion of elderly people use the roads and more commuters opt for active travel such as cycling. New vehicle technologies and new risks such as distraction also pose challenges for FRS/EMS and for the road safety community at large.

<sup>4</sup> Ibid.

# RESPONSE TO A ROAD COLLISION



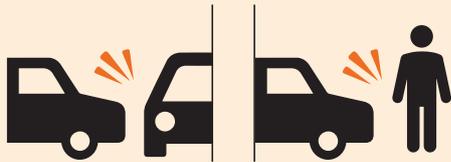
### Post-collision care

(sometimes also referred to as post-crash care, post-impact care, or emergency/rescue chain) is the chain of care that follows a road collision and aims to reduce the severity of the injury consequences sustained. The care may be provided by a combination of lay bystanders, trained volunteers, or professionals from EMS or FRS. In this paper, the term post-collision care refers to the help provided to road users involved in a road collision by fellow road users, bystanders, volunteers, as well as trained emergency and fire and rescue professionals, police and other authorities, until the handover of the injured person to a hospital.



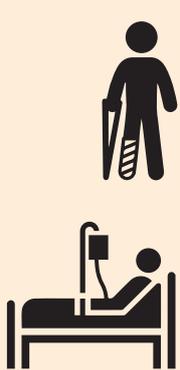
### Emergency services

are agencies responsible for the protection and preservation of life and property from harm resulting from incidents and emergencies.<sup>5</sup> Emergency services in this text refer to EMS and FRS as they are known in Europe.



### Traffic collisions

occur when at least one road vehicle in motion on a public road or private road to which the public has right of access collides alone or with one or more vehicles, pedestrians, or a moving or stationary object. Road collisions can result in road deaths, injuries and/or property damage.<sup>6</sup>



AIS Score	Injury
1	Minor
2	Moderate
3	Serious
4	Severe
5	Critical
6	Unsurvivable

### Serious injury

is an injury scoring 3 or more on the international medical Maximum Abbreviated Injury Scale trauma scale (MAIS3+).<sup>7</sup> However, some EU Member States do not use this definition and collect data on serious injury in a slightly different way. Nevertheless, the MAIS3+ standard has been used as the official EU definition of a serious road injury since 2014.<sup>8</sup> The Abbreviated Injury Scale (AIS) is an anatomical scoring system, ranking the severity of injury on a scale of 1 to 6, with 1 being minor, and 6 an unsurvivable injury.<sup>9</sup>

<sup>5</sup> Australian Institute for Disaster Resilience (2009). Skills for Emergency Services Personnel. Manual 34: Road Rescue, page 37, goo.gl/iKA65Q.

<sup>6</sup> Eurostat (2009), Illustrated Glossary for Transport Statistics, page 68, goo.gl/LQhBby.

<sup>7</sup> Aarts, L.T., Commandeur, J.J.F., Welsh, R., Niesen, S., Lerner, M., Thomas, P., Bos, N., Davidse, R. J. (2016), Study on Serious Road Traffic Injuries in the EU, page 6, goo.gl/kEzgzj.

<sup>8</sup> European Commission (2016), Road safety at the European Union, page 10, goo.gl/RPSwB6.

<sup>9</sup> Brohi, K., (10.03.2007), Abbreviated Injury Scale (AIS) Score, goo.gl/NHygYp.

Every response to a road collision consists of several sequential steps performed by emergency/rescue teams:

- Receipt of the call;
- Dispatching;
- Travelling to the scene;
- Arrival and care at the scene;
- In case of injury, patient transfer to a medical facility.<sup>10</sup>

Each of these steps can be sub-divided. The next section examines each part of the process in further detail.

## 1. RECEIPT OF THE EMERGENCY CALL



**Emergency call** is a telephone request for public safety agency emergency services which requires immediate action to save a life, tackle a fire or stop a crime.<sup>11</sup> The 112 emergency number can be dialled free of charge in the whole of the EU territory for this purpose.<sup>12</sup>

**The European Emergency Number 112** is a unique number consolidating police, fire and medical emergency services answering points. In some of the Member States besides 112, alternative emergency numbers are operational, be it health emergency numbers, police, or national fire brigade numbers. In Denmark, Estonia, Finland, Malta, the Netherlands, Portugal, Romania and Sweden 112 is now the only national emergency number.<sup>13</sup>

The structure of emergency services varies significantly in different countries as does the system used for answering emergency calls meant for different emergency services.<sup>14 15 16</sup> This chapter describes processing of 112 calls received in integrated call centres, where 112 calls meant for police, EMS and FRS are gathered. It focuses on actions taken once a 112 call is dialled, received in the call centre, how it is processed and how dispatch of emergency services is carried out.



### 1.1. Dialling an emergency number

When an emergency incident occurs there is usually a delay until the incident has been recognised by the patient or bystanders. This delay is followed by the time it takes to alert the relevant medical services.<sup>17</sup> Usually, when a road traffic collision occurs, road users or witnesses to the collision dial an emergency number as soon as they identify the need to do so. It is important that such numbers are well known to the general population.

<sup>10</sup> Australian Institute for Disaster Resilience (2009), Skills for Emergency Services Personnel. Manual 34: Road Rescue, page 17, [goo.gl/iKA65Q](http://goo.gl/iKA65Q).

<sup>11</sup> European Emergency Number Association (12.10.2012), EENA Operations Document - 112 Terminology, page 12, [goo.gl/ttisn5](http://goo.gl/ttisn5).

<sup>12</sup> European Commission (07.03.2002), Universal Service Directive, Article 26 (1), [goo.gl/tVr4BV](http://goo.gl/tVr4BV).

<sup>13</sup> European Commission, Digital Single Market – 112, [goo.gl/s4WYBx](http://goo.gl/s4WYBx).

<sup>14</sup> The European Emergency Number Association defines several different Public Safety Answering Points (PSAP) organisation models that can be found in Europe but the list is not exhaustive.

<sup>15</sup> European Emergency Number Association (2015), Public Safety Answering Points in Europe, page 5-7, [goo.gl/9GHAaF](http://goo.gl/9GHAaF).

<sup>16</sup> Castrén, M., Karlsten, R., Lippert, F. et al. (November 2008). Recommended guidelines for reporting on emergency medical dispatch when conducting research in emergency medicine: the Utstein style. Resuscitation, Vol. 79 (2), page 193-197, [goo.gl/9fB2sL](http://goo.gl/9fB2sL).

<sup>17</sup> Ibid.

Some countries within the EU have maintained a national number for health emergencies, others have removed it and use only 112. In general, the advantage of 112 is that it functions all over Europe, so especially for people who work or travel abroad it is practical to remember just one European emergency number instead of having to know different numbers for each Member State.



In some countries, in case of severe road collisions with injuries, it is better to call the national emergency health number if there is one. If one calls 112, the call can be transferred several times before reaching the right person. The system functions differently in different European countries, because 112 line can be operated by FRS, EMS, or another operator.



### False emergency calls

All emergency services are affected by false emergency calls.<sup>18</sup> However, the ratio of false calls to the total number of calls appears to vary considerably among EU Member States.<sup>19</sup> There are many causes of false emergency calls, from unintentional pocket calls to deliberately abusive ones.<sup>20</sup> According to the European Emergency Number Association, EU Member States do not use the same definition for false calls, which makes it difficult to compare data across the EU.<sup>21</sup> For example, while some countries classify calls where the caller hangs up immediately after the call has been answered as false calls, other countries exclude them from their false calls statistics.

According to the European Commission (EC), false calls are those not followed up with intervention or assistance from the PSAP or the emergency services.<sup>22</sup> Irrespective of the differences in methodology/definitions used in data collection in different countries, the EC gathered false calls statistics in 2017 from 21 countries.

Source: EC 2017 Data<sup>26</sup>

COUNTRY	% OF FALSE CALLS
Austria	-
Belgium	37%
Bulgaria	36%
Croatia	42%
Cyprus	8%
The Czech Republic	-
Denmark	-
Estonia	-
Finland	19%
France	16%
Germany	-
Greece	97%
Hungary	49%
Ireland	51%
Italy <sup>23</sup>	44%
Latvia	-
Lithuania	60%
Luxembourg	38%
Malta	29%
The Netherlands	38%
Poland	45%
Portugal	63%
Romania	61%
Slovakia	-
Slovenia	-
Spain	25%
Sweden	32%
United Kingdom	34%
Israel	-
Norway	45%
Serbia	-
Switzerland	-

<sup>18</sup> European Emergency Number Association (15.03.2011), EENA Operations Document – False Emergency Calls, page 4, [goo.gl/kMR9KX](http://goo.gl/kMR9KX).

<sup>19</sup> European Commission (10.02.2017), Implementation of the European emergency number 112 - Results of the tenth data-gathering round, page 5, [goo.gl/ghwWdW](http://goo.gl/ghwWdW).

<sup>20</sup> European Emergency Number Association (15.03.2011), EENA Operations Document – False Emergency Calls, [goo.gl/kMR9KX](http://goo.gl/kMR9KX).

<sup>21</sup> Ibid.

<sup>22</sup> European Commission (10.02.2017), Implementation of the European emergency number 112 - Results of the tenth data-gathering round, page 5, [goo.gl/ghwWdW](http://goo.gl/ghwWdW).

<sup>23</sup> Data for the 112 NUE service in the Lombardia Region and Rome province.

<sup>24</sup> Reported only by the Police.

<sup>25</sup> A call shorter than 30 seconds is considered to be a false call in Norway.

<sup>26</sup> European Commission (10.02.2017), Implementation of the European emergency number 112 - Results of the tenth data-gathering round, page 5, [goo.gl/ghwWdW](http://goo.gl/ghwWdW).



From April 2018, all new types of car sold in the EU have to be fitted with eCall. Immediately following a crash, an eCall-equipped car automatically calls the nearest emergency call centre. If no passenger is able to speak, e.g. due to injuries, a 'minimum set of data' is sent, including the exact location of the crash site. According to the European Commission eCall will cut emergency service response time by 50% in the countryside and 60% in built-up areas and the quicker response will save hundreds of lives in the EU every year.<sup>27</sup>

It will also be possible to trigger eCall manually by pushing a button, for situations where people witness a collision and decide to call the emergency services from their car. In both cases, use of eCall would facilitate early assistance and prompt delivery of adequate medical care, contributing to improvements in injury outcomes, as well as lowering the death rate.

A number of car manufacturers already offered proprietary automated emergency call solutions on some vehicles, prior to the introduction of the eCall system.

Each Member State has the right to organise its emergency services in the most cost effective and appropriate way, including the right to let authorised private organisations deal with the receipt and handling of eCalls, in accordance with the specifications laid down by Delegated Regulation (EU) No 305/2013.<sup>28</sup>

According to the European Commission's impact assessment on eCall, it will take until 2034 for 100% of cars in the European Union to be fitted with the devices.<sup>29</sup> While the technology represents a positive step forward, it is obvious that other steps need to be taken in the meantime to improve the efficiency and response times of EMS and FRS personnel and thus improve collision outcomes.

## 1.2. Answering the emergency call



### Public safety answering points (PSAPs)

are call centres responsible for answering calls to an emergency telephone number. Each PSAP serves a limited geographic area. Each call to the 112 emergency number is always routed to the nearest PSAP as transferring calls manually delays the emergency response.<sup>30</sup>



### Caller location information

According to European law - caller location information should be available to authorities handling emergencies.<sup>31</sup> Differences only lie in to what extent the information is precise. However, there are cases where the caller location information cannot be determined, due to technical problems in the networks or on the PSAP side.<sup>32</sup> It is not clear how often this problem occurs. Only 17 Member States report these data. In most Member States the lack of availability of caller location occurs in less than 10% of the calls. Higher rates of failure to provide caller location were reported for Italy (13%), Poland (18,6%) and the Slovakia (16,03%).<sup>33</sup>

<sup>27</sup> European Commission (06.06.2014), Digital Single Market - eCall: Time saved = lives saved, [goo.gl/Zzzhu7](http://goo.gl/Zzzhu7).

<sup>28</sup> European Commission (26.11.2012), Commission Delegated Regulation (EU) No 305/2013, <http://goo.gl/g6BTaL>.

<sup>29</sup> European Commission (08.09.2011), Impact Assessment accompanying the Commission Recommendation on support for an EU-wide eCall service in electronic communication networks for the transmission of in-vehicle emergency calls based on 112 ('eCalls'), page 14, [goo.gl/bqbvvgi](http://goo.gl/bqbvvgi).

<sup>30</sup> Rosen, B., Schulzrinne, H., Polk, J., Newton, A. (December 2011), Framework for Emergency Calling Using Internet Multimedia, [goo.gl/1YnbM3](http://goo.gl/1YnbM3).

<sup>31</sup> European Commission (07.03.2002), Universal Service Directive, Article 26(3), [goo.gl/tVr4BV](http://goo.gl/tVr4BV).

<sup>32</sup> European Commission (10.02.2017), Implementation of the European emergency number 112 - Results of the tenth data-gathering round, page 7, [goo.gl/ghwWdW](http://goo.gl/ghwWdW).

<sup>33</sup> Ibid.

Once an emergency call has been connected, the caller's location information is either transmitted automatically or can be obtained following a request by the call centre. In some countries (the UK, Lithuania and parts of Austria<sup>34</sup>), advanced mobile location technology is used to provide the caller's location to emergency services automatically.



### **Advanced mobile location (AML)**

is a system that automatically activates the location services on the phone from which the emergency call has been made. Then, with the help of GPS or Wi-Fi, it defines a radius of around 30 meters, and sends this information via a text message to the emergency services.<sup>35</sup> The system is built-in to the latest Android and iOS mobile phones. Some Member States have deployed emergency apps providing location if needed but this needs to be downloaded and installed by individual users. Once the emergency call has been identified by the appropriate PSAP, the call is handled by a call taker/dispatcher.



### **The call taker**

is an agent of a PSAP who answers emergency calls.<sup>36</sup>



### **Location estimate**

is the approximate physical position of a caller, which may or may not be precise,<sup>37</sup> depending on the circumstances of the particular emergency. It is of crucial importance to know where the incident has occurred, especially on motorways.



### **Answering time**

is the time period between the moment the emergency call is presented to the PSAP switch and the moment the call is answered by a PSAP human operator.<sup>38</sup>

The European Commission's data on answering time show that in 22 EU Member States, less than 10 seconds is needed on average to get in contact with the emergency services. The best performing Member States where more than 90% of the calls are answered in 10 seconds are: Croatia, Czech Republic, Estonia, Finland, Ireland, Latvia, the Netherlands, Poland, Portugal, Romania, Slovenia, Spain and the United Kingdom. A pre-recorded message is played before getting in contact with an operator in Cyprus, France, Greece, Poland and Spain.<sup>39</sup>

### **Answering an eCall**

If an emergency call is made from a vehicle fitted with an eCall device, the PSAP operator should be able to process it in a similar way to any other emergency call made by a human. According to European legislation, PSAPs must be adjusted to be able to answer and handle eCalls no later than 1 October 2017.<sup>40</sup>

<sup>34</sup> European Commission (10.02.2017), Implementation of the European emergency number 112 - Results of the tenth data-gathering round, page 8, [goo.gl/ghwWdW](http://goo.gl/ghwWdW).

<sup>35</sup> European Emergency Number Association (06.11.2014), UK Shows the Way Towards Accurate Caller Location – An Example For Others To Replicate!, [goo.gl/5yfLFX](http://goo.gl/5yfLFX).

<sup>36</sup> European Emergency Number Association (12.10.2012), EENA Operations Document - 112 Terminology, page 6, [goo.gl/tt5n5](http://goo.gl/tt5n5).

<sup>37</sup> Ibid.

<sup>38</sup> European Commission (10.02.2017), Implementation of the European emergency number 112 - Results of the tenth data-gathering round, page 6, [goo.gl/ghwWdW](http://goo.gl/ghwWdW).

<sup>39</sup> Ibid.

<sup>40</sup> European Parliament, Council of the European Union (15.05.2014), Decision No 585/2014/EU of the European Parliament and of the Council of 15 May 2014 on the deployment of the interoperable EU-wide eCall service, Article 1(1), [goo.gl/5MWhxu](http://goo.gl/5MWhxu).

## 2. DISPATCHING

### 2.1. Processing the call

**The dispatcher** is a person responsible for decisions on what kind of vehicle and personnel needs to be sent to the scene of an emergency. In some cases, a call taker may also work as a dispatcher, and may work in a centre handling all calls (police, fire and rescue service, ambulance), or only one of them. This is country-specific as significant differences in call handling and dispatching systems persist across Europe. This includes differences in education and background of such personnel between Member States, and even between regions within a country.

The call taker may or may not follow a certain procedure, depending on the particular country/region. In a typical road collision scenario, the caller is asked to provide his/her name, estimated location, description of the road collision, number of people injured, and his/her phone number, providing the call taker with as many details as possible.

At the time of making the call, the caller may be distressed thus the operator must exercise considerable self-control to gain as much information as possible regarding the incident. For the call taker, it is important to know where approximately the incident occurred, in which direction of the road, if it is in town, suburb, or on a highway, in order to ensure the emergency vehicle(s) will be able to access the scene.

Although it is essential for post-collision care, at present, it is not possible to pinpoint the precise location of a call in 100% of cases. Even though the caller location information should be passed on to the call taker/dispatcher automatically, some may still be asked to provide their location estimate orally.

All of the information obtained is immediately entered into a computer system by the call taker/dispatcher. Further action depends on the circumstances of the collision and on the country where the collision occurred. There may be a number of different scenarios depending on each national/regional system. In case of no injuries at the scene of the collision, the call may be transferred to the police only. If the caller reports that injured vehicle occupants are not trapped in the crashed vehicle, the call taker may decide not to dispatch the fire brigade and may pass this information to the EMS and the police. Alternatively, if the caller reports the presence of dangerous goods or danger of fire/explosion, an electric or hybrid vehicle, or injured persons trapped in the vehicle, the call taker/dispatcher dispatches a FRS unit to the scene and informs both EMS and the police as well.



## 2.2. Dispatching an appropriate vehicle

While processing the call, the call taker/dispatcher performs a telephone triage. The call is usually processed by following a certain protocol (script) which makes it easier for the call taker/dispatcher to obtain all the necessary information. It is also important that the call taker/dispatcher provides the caller with suitable advice and instructions for the immediate care of the victim.<sup>41</sup> Based on the information received, the call taker/dispatcher identifies the nature of the problem and decides what kind of vehicles and professionals need to be dispatched to the site and with what level of urgency.<sup>42</sup> In some cases, a decision support system known as computer-aided dispatch is used to do this in an attempt to facilitate and standardise the process of dispatching.

**Computer aided dispatch (CAD)** is a system whereby software helps the call taker/dispatcher collect information and react according to a pre-programmed scenarios. It results in prompt actions being taken in similar emergency situations, creating consistent and efficient responses to emergencies. Once the type of emergency and location has been entered, the program ranks it with a certain priority level and shows the dispatcher the nearest available appropriate emergency vehicle that can be dispatched to the scene.

The call taker/dispatcher has an overview of what emergency vehicles are currently nearby and whether they are available. At the same time, he/she has a rough estimate of travel time to the scene.

It is the call taker's duty to advise the caller on how to proceed in case the victim(s) can be helped with an intervention by the caller him/herself or another lay bystander. Lay bystanders play a key role in post-collision care as they are usually the first ones to arrive at the scene. They can significantly improve the injury outcome, for instance by providing first aid and clearing the victim's airway.<sup>43</sup> However, the primary concern of a bystander should always be his/her own safety and help should only be provided if it is safe to do so.

Once advice on first aid has been passed to the caller or fellow bystanders and the emergency vehicles are on their way to the scene, the call taker/dispatcher may stay on the line to continue the conversation in order to provide further first aid instructions and keep the caller calm.

Road collisions involving people with injuries may require the dispatch of Emergency Medical Services (EMS), Fire and Rescue Services (FRS), and the police, or just some of those services in different combinations, depending on the particular national/regional system.



<sup>41</sup> Castrén, M., Karlsten, R., Lippert, F. et al. (November 2008). Recommended guidelines for reporting on emergency medical dispatch when conducting research in emergency medicine: the Utstein style. *Resuscitation*, Vol. 79 (2), page 193-197, [goo.gl/9fB2sL](http://goo.gl/9fB2sL).

<sup>42</sup> *Ibid.*

<sup>43</sup> Thomas, P., Muhlrud, N., Hill, J., Yannis, G., Dupont, E., Martensen, H., Hermitte, T., Bos, N. (2013). Final Project Report, Deliverable 0.1 of the EC FP7 project DaCoTA, page 13, [goo.gl/zNq2RD](http://goo.gl/zNq2RD).

### 3. TRAVELLING TO THE SCENE

#### 3.1. Compliance with road safety laws



Ambulance and fire engine drivers play a vital role in the emergency response chain. Their task is to reach the road collision site in the shortest possible time whilst maintaining a high level of road safety. Their crews are challenged to respond as quickly as possible while at the same time they are expected to reduce the incidence of death and injury to patients, themselves and the public due to collisions en-route.<sup>44</sup> Emergency service personnel may receive training on how to avoid collisions. But it is also necessary for other road users in the proximity to avoid getting in the way.<sup>45</sup>

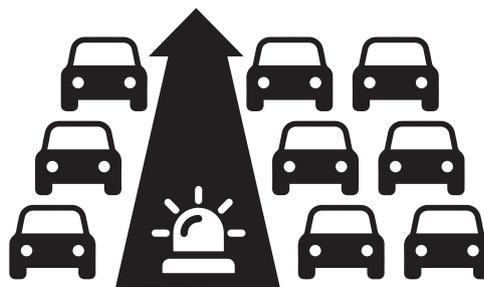
EMS/FRS are often under pressure to reach the site of the collision within just a few minutes - some countries have response time targets. It is of the utmost importance that the targets are set in a realistic way, otherwise they might endanger the quality of the care provided by putting an additional pressure on the emergency care providers. The safety of ambulance occupants or other road users should not be compromised and response time targets and policies should be examined, taking into consideration risks, value and consequences. Safe driving should be a concern of drivers of emergency vehicles, with regards to the fellow crew members, awaiting patient(s) as well as other road users. In Europe, policy on speeding of emergency vehicles varies from one country to another and between regions within a country. In Ireland, for example, exemptions for emergency vehicles apply under the condition that the safety of other road users is not endangered.<sup>46</sup> In the Czech Republic, the speed of emergency vehicles can exceed the speed limit by 10 km/h to 30 km/h, depending on the type of road.

#### 3.2. Emergency corridors

Emergency/rescue teams may have access to the location of a collision site impeded by traffic congestion. In some European cities certain lanes have been marked with a sign indicating which lane should be cleared in case of emergency vehicles approaching.<sup>47</sup> Some European countries have adopted laws regulating how drivers should react if the traffic around them is coming to a halt and/or when an emergency vehicle is approaching them, whilst others do not regulate this issue. In some countries, it is compulsory to clear one lane and form an emergency corridor.

**Emergency corridor** (also known as a rescue lane) is what drivers of all types of vehicles are required to form on roads with two or more lanes, on the left, right, or in the middle,<sup>48</sup> in order to allow emergency/rescue vehicles to drive without unnecessary delay. The emergency corridor has to be formed should the surrounding traffic slow down significantly before coming to a halt, and only on certain types of roads, such as motorways and highways. However, this measure is in place in only a handful of EU countries, such as Austria, Czech Republic, Germany, Hungary, Luxembourg, Slovenia, Switzerland.

It is important that drivers are well informed about laws and regulations of the country where they are driving because measures of this kind bring the desired benefits only if all road users comply. For efficient post-collision care, it is crucial that emergency vehicles are granted priority, thus ensuring quick and safe access to the scene of the road collision. Surrounding drivers should be able to react quickly, safely and carefully to allow emergency vehicles to pass.<sup>49</sup> However, drivers are often not aware of what they need to do in such situations.<sup>50</sup>



<sup>44</sup> American Ambulance Association (06.05.2002), EMS Safe Driving Statement, [goo.gl/qFUjYb](http://goo.gl/qFUjYb).

<sup>45</sup> Road Safety Authority, Sharing the road with emergency Service vehicles: Some basic tips, page 2, [goo.gl/MjGcAg](http://goo.gl/MjGcAg).

<sup>46</sup> Irish Road Traffic Act (2004), [goo.gl/fN32hs](http://goo.gl/fN32hs).

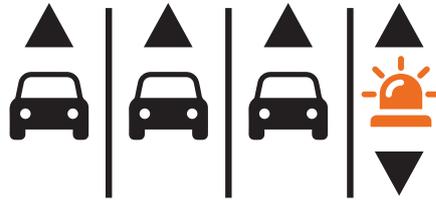
<sup>47</sup> Björnstig, U. (2004), Pre-hospital emergency care in Sweden: with special emphasis on care of traffic victims, page 27, [goo.gl/55Sa1E](http://goo.gl/55Sa1E).

<sup>48</sup> Depending on the country and type of the road.

<sup>49</sup> Road Safety Authority, Sharing the road with emergency Service vehicles: Some basic tips, page 2, [goo.gl/MjGcAg](http://goo.gl/MjGcAg).

<sup>50</sup> European Parliament (23.10.2017.), Saving Lives: Boosting Car Safety in the EU, page 6, [goo.gl/aLocVg](http://goo.gl/aLocVg).

A hard shoulder or **emergency lane** is a hardened strip of road alongside a motorway that can be used in the event of a break down or for emergency stops.<sup>51</sup> In some countries, in a non-emergency situation, it is forbidden to drive or stop on this part of the road.<sup>52</sup> It is a common misconception that a hard shoulder exists in order to allow emergency vehicles to pass.



### 3.3. Use of visible and audible emergency signals



When responding to road collisions, flashing lights and sirens are often used by emergency vehicles. The lights and sirens are intended to alert all road users that an emergency exists and that they need to take extra care. Emergency flashing lights indicate a danger. These lights are designed to be seen from a distance and offer an early warning of a hazard.<sup>53</sup> In most European countries, flashing lights of EMS/FRS vehicles are blue, however, in some countries other colours such as yellow or amber may be used. The blue lights used by most emergency vehicles notify surrounding drivers on the priority in traffic. In addition to blue lights, red lights are sometimes used as secondary warning lights.

### 3.4. Rendez-vous system

The **rendez-vous system** is a deployment tactic in which two units are alerted to the same site to provide joint assistance. It means a separate arrival of the ambulance and the emergency doctor at the emergency site. At the point of deployment, the two rescue service units meet (rendez-vous), and the crews work together. The emergency service physician does not ride in the ambulance with the paramedics, but is brought to the scene in a different car from another place. In rare cases the physician may ride a motorcycle.



<sup>51</sup> RAC, What is the Hard Shoulder?, [goo.gl/TmcpP3](http://goo.gl/TmcpP3).

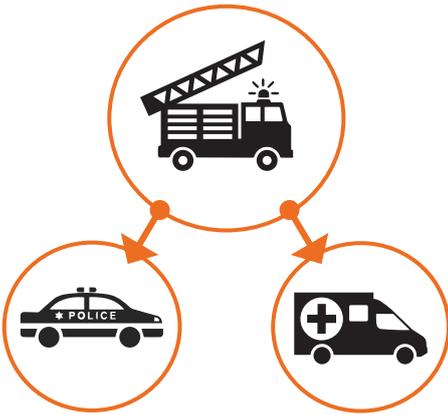
<sup>52</sup> European Commission, Transport, Road Safety: Going Abroad – Ireland: Forbidden lane, <http://goo.gl/vMBTDV>.

<sup>53</sup> Road Safety Authority, Sharing the road with emergency Service vehicles: Some basic tips, page 3, [goo.gl/MjGcAg](http://goo.gl/MjGcAg).

## 4. ARRIVAL AND CARE AT THE SCENE

### 4.1. Assessment of the situation

Once services reach the site of a collision, tasks are divided. The division of tasks at the scene is often done by the leader of the FRS, who is considered to be the main team leader also for EMS and police teams who are attending the scene. However, if the EMS arrives first, then it is the EMS team who takes the lead and assess the situation. Before emergency services start to deal with casualties, hazards need to be identified and the scene made safe.<sup>54</sup>



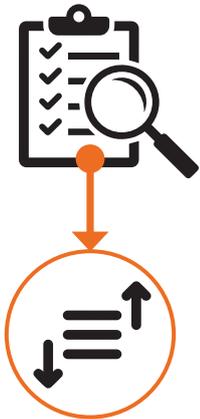
A quick assessment of the overall situation as well as evaluation of injuries and state of all casualties is done within seconds by the leader. This includes knowing the exact number of people involved in the collision and creating a safe working area on the scene by blocking the site from oncoming traffic and securing it from bystanders, while others from the FRS or EMS team provide the first necessary medical care. Before doing that, the EMS/FRS have to make sure that walking injured do not “wander” and they move them to a safe place away from other traffic.<sup>55</sup>

Although in some countries it may be the police who are formally responsible for the incident site, they still rely on FRS advice in assessing what rescue techniques are best for that particular collision.<sup>56</sup> Core tasks where the FRS has expertise and takes the lead are freeing, removing the risk of fire at the incident site, stabilising vehicles, alleviating risks at an incident site by disconnecting batteries, releasing trapped casualties, cleaning up glass, oil or other debris.<sup>57 58</sup>

### 4.2. Field triage

One of the first steps done on the scene is general assessment of the situation and state of casualties, followed by triage, if there are more victims involved.

**Field triage** is the categorisation and prioritisation of casualties according to the severity of symptoms and the availability of aid at the site.<sup>59</sup> This categorisation of injured is used at the scene in case there are insufficient resources for medical care of everyone at once.<sup>60</sup>



Upon arrival at the scene, the person responsible for triage – usually a triage officer - identifies victims needing immediate care and immediate transport to a healthcare facility and these are given priority. Those whose care can be delayed are dealt with once the more acute cases are attended to. During this process, all victims are assigned to several categories depending on their injuries. Some countries use red, yellow, green, white, and black tags but this varies across Europe. The purpose of field triage is to provide timely and appropriate treatment that can improve the injury outcome as much as possible to the greatest number of casualties, ensuring priority treatment for those whose injuries are likely to deteriorate quickly. While taking the decision on who needs to be helped first due to the severity of injuries sustained, other factors such as hospital proximity, availability and its equipment must be taken into account.<sup>61</sup> Triage at a road traffic collision is especially important in a mass-casualty scenario. Accurate field triage in seriously injured road collision victims remains a difficult task even for trained personnel.<sup>62</sup>

<sup>54</sup> Coats, T. J., Davies, G. (2002), Prehospital care for road traffic casualties. *BMJ : British Medical Journal*. 324(7346), page 1135-8, [goo.gl/nCunVP](http://goo.gl/nCunVP).

<sup>55</sup> Ibid.

<sup>56</sup> Calland, V. (2005), Extrication of the seriously injured road crash victim, *Emergency Medicine Journal* 22, page 817, [goo.gl/FymKAT](http://goo.gl/FymKAT).

<sup>57</sup> Svensson, S. et al. (2005), Tactics, command, leadership, page 143, [goo.gl/AYsNro](http://goo.gl/AYsNro).

<sup>58</sup> Björnstig, U. (2004), Pre-hospital emergency care in Sweden: with special emphasis on care of traffic victims, page 26, [goo.gl/555a1E](http://goo.gl/555a1E).

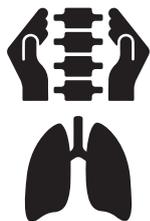
<sup>59</sup> European Emergency Number Association (12.10.2012), EENA Operations Document - 112 Terminology, page 33, [goo.gl/ttisn5](http://goo.gl/ttisn5).

<sup>60</sup> In mass-casualty incidents the process of triage is divided into two phases, the primary triage followed by the secondary triage.

<sup>61</sup> Morbidity and Mortality Weekly Report (23.01.2009), Guidelines for Field Triage of Injured Patients, Vol. 58, No. RR-1, page 2, [goo.gl/QAeZwx](http://goo.gl/QAeZwx).

<sup>62</sup> Helm, M., Faul, M., Unger, T., Lampl, L., (2013), Reliability of emergency medical field triage: Exemplified by traffic accident victims.

### 4.3. Accessing casualties



Once the tasks are assigned by the team leader, crews start working immediately.

After the first assessment of the situation and primary triage, during which bleeding is stopped and rapid airway control is done, the next step is gaining access to the casualty to provide definitive airway control and protection of the cervical spine.<sup>63</sup> This is normally done by the FRS but guidance provided by medical personnel is desirable, in particular in severe road collisions. Subsequently, the FRS take care of the stabilisation of the vehicle(s).

### 4.4. Extricating casualties from severe road collisions

Safe and prompt removal of injured vehicle occupants is very important. Before the FRS start releasing the occupants and manipulating them, they should ideally consult with EMS experts so as to avoid causing further injuries.

The FRS personnel have to assess quickly what kind of vehicle has been involved in the collision and proceed accordingly. After the vehicle has been stabilised, entry to the vehicle needs to be secured in order to extricate the person. In order for the FRS to do this, firefighters must be familiar with different types of vehicles and models.

In some cases, they are unable to positively identify the type or year of manufacture of the damaged vehicle. Moreover, it may be a challenge for some FRS teams to find the right cutting spots, and to actually cut materials as they are often reinforced due to improved crash protection in modern vehicle design.<sup>64</sup> Safety features vary widely from year to year in their design and placement amongst makes and models. For this reason it is essential for rescuers to know how these safety improvements may affect their everyday rescue operations.<sup>65</sup> Furthermore, continuous training is crucial for both FRS and EMS in order to be informed about new technologies.

In some cases, FRS may be required to pull vehicles apart in order to release trapped car occupants, especially in the case of vehicle-to-vehicle collisions. The process of extricating may require use of hydraulic tools such as spreaders, cutters, or rams. As the technology is evolving, vehicles are being equipped with new features and devices and using alternative fuels. For this reason, it is necessary to study vehicle structure and how it may affect rescue operations.<sup>66</sup> In order to make their tasks easier, the FRS may use rescue sheets.



A **rescue sheet** is a document containing information on the location of cabin reinforcements, fuel tank, battery, airbags, gas generators, control units and the like.<sup>67</sup> It serves as a manual for FRS on how to access people who may be trapped inside, indicating suitable cutting points. Rescue sheets are provided by car manufacturers as the information must be adapted for each brand and each model. Some rescue sheets are available online whilst others are placed behind the driver's sun visor of each car.<sup>68</sup> There is an ISO standard for rescue sheets, however, their provision and use is voluntary throughout the EU.

Research indicates that strengthening the collaboration between FRS and EMS at the scene could be of a benefit for both services. Doctors and paramedics involved in road traffic crashes need to be familiar with extrication techniques just as firefighters need a greater understanding of the psychological effects their procedures can have on crash victims.<sup>69</sup> Collaboration between actors, mutual understanding as well as clear task division at the scene are crucial. This understanding is ideally based on combined training.<sup>70</sup>

<sup>63</sup> Calland, V. (2005), Extrication of the seriously injured road crash victim, *Emergency Medicine Journal* 22, page 817, [goo.gl/FymKAT](http://goo.gl/FymKAT).

<sup>64</sup> Eicher, C., C. (April 2010), The On-Board Rescue Sheet: Helping the rescuers, [goo.gl/C9Dqwj](http://goo.gl/C9Dqwj).

<sup>65</sup> Ibid.

<sup>66</sup> Sukegawa, Y., Sekino, M. (June 2011), Analysis of the Rescue Operations of Injured Vehicle Occupants by Fire Fighters, [goo.gl/Y1NbLm](http://goo.gl/Y1NbLm).

<sup>67</sup> Eicher, C., C. (April 2010), The On-Board Rescue Sheet: Helping the rescuers, [goo.gl/C9Dqwj](http://goo.gl/C9Dqwj).

<sup>68</sup> Ibid.

<sup>69</sup> Calland, V. (2005), Extrication of the seriously injured road crash victim, *Emergency Medicine Journal* 22, page 821, [goo.gl/FymKAT](http://goo.gl/FymKAT).

<sup>70</sup> Coats, T. J., Davies, G. (2002), Prehospital care for road traffic casualties. *BMJ : British Medical Journal.* 324(7346), page 1135-8, [goo.gl/nCunVP](http://goo.gl/nCunVP).



### Challenges for FRS<sup>71</sup>

The degree of familiarity with new technologies amongst FRS personnel may vary considerably between European countries. Similarly, approaches to handling road collisions involving vehicles with new technical features may be different depending on a particular member state. In general, firefighters often point out several areas that may pose a challenge to rescue teams. These include continuous changes in vehicle structure and design, airbags, alternative fuel vehicles, additional vehicle modifications, and the amount and variety of vehicles on Europe's roads. Research has shown that the rescue of injured persons from a vehicle takes longer the more recent the vehicle is.<sup>72</sup>

#### 4.5. Pre-hospital treatment

Once the FRS have found the best way of safely extracting vehicle occupants, EMS are hopefully on site to take over care of the casualty and provide first aid and pre-hospital care. The prehospital care is the start of a continuum of care that forms the trauma chain. Each link must work well for a patient to attain an optimal outcome. However, there is often controversy about optimal prehospital care because good evidence is lacking.<sup>73</sup>



**First aid** is help consisting of life-saving actions provided to an injured person until full, professional medical treatment is available. The role of the EMS is to provide first aid and pre-hospital care to the road users involved in a road collision in order to mitigate the consequences.



**Pre-hospital care** means giving the injured adequate care at the incident site and securing him/her before transfer to hospital.<sup>74</sup> In some cases, FRS may be required to provide first aid to the casualties if they were the first ones to reach the scene and the EMS has not arrived by the time the casualty has been removed from the damaged vehicle. For this reason, some European countries require FRS staff to undergo first-aid training. However, the ability of FRS to provide medical aid is usually limited to first aid and stabilisation of the patient.



The main task for EMS is to take care of road collision casualties after they have been safely removed from a wrecked vehicle. To the extent possible, during triage and pre-transportation, all patients should be kept warm and appropriately immobilised, provided comfort and pain control, and then removed as soon as transport is available.<sup>75</sup> When offering assistance at a collision scene, safety of the EMS should always be the first priority.<sup>76</sup>

Some casualties, especially if involved in a minor collision, might not need to be taken to a hospital. Those are either not injured at all or with light injuries. Such road users may be treated on the spot and released immediately after.<sup>77</sup>



It is important to stress that all of the steps described above should be done as quickly as possible. For the moment, there is not a unified way of measuring and evaluating all the procedures undertaken by emergency workers in different member states of the EU. As experts in the field point out, it remains rather difficult to compare results and even more difficult to identify best practice for the moment.<sup>78</sup>

<sup>71</sup> Eicher, C., C. (April 2010), The On-Board Rescue Sheet: Helping the rescuers, [goo.gl/C9Dqwj](http://goo.gl/C9Dqwj).

<sup>72</sup> Ibid.

<sup>73</sup> Coats, T. J., Davies, G. (2002), Prehospital care for road traffic casualties. *BMJ : British Medical Journal*. 324(7346), page 1135-8, [goo.gl/nCunVP](http://goo.gl/nCunVP).

<sup>74</sup> Björnstig, U. (2004), Pre-hospital emergency care in Sweden: with special emphasis on care of traffic victims, page 27, [goo.gl/55Sa1E](http://goo.gl/55Sa1E).

<sup>75</sup> EMS World (31.05.2005), Triage at a Major Incident, [goo.gl/DXHckX](http://goo.gl/DXHckX).

<sup>76</sup> Coats, T. J., Davies, G. (2002), Prehospital care for road traffic casualties. *BMJ : British Medical Journal*. 324(7346), page 1135-8, [goo.gl/nCunVP](http://goo.gl/nCunVP).

<sup>77</sup> However, this practice may be different in different Member States, depending on the level of ambulance personnel attending the scene. While a well-trained, experienced paramedic would be authorised to take such as decision, others, such as emergency medical technician, may not be allowed to do that.

<sup>78</sup> Castrén, M., Karlsten, R., Lippert, F. et al. (November 2008). Recommended guidelines for reporting on emergency medical dispatch when conducting research in emergency medicine: the Utstein style. *Resuscitation*, Vol. 79 (2), page 194, [goo.gl/9fB2sL](http://goo.gl/9fB2sL).

## 5. PATIENT TRANSFER TO A MEDICAL FACILITY

Casualties are not transferred to a medical facility after every road collision. However, it is expected that in the majority of road traffic collisions, vehicle occupants or other road users sustain injury and require further medical treatment. This section examines patient transport in cases where it is required.



The transport of the patient is the last step in the chain of post-collision response before handing the patient to a medical facility. It is important to stress that all of the steps described in the text above should be done within an hour after the collision has occurred.

**Golden hour** is the first hour after a collision. It is crucial to a person's survival and for limiting the extent of the injuries.

The concept of the golden hour means that severely and critically ill patients should be under definitive treatment at the appropriate facility within one hour after the injury event to not compromise the outcome. Those alive after a collision will have a chance of survival if they are professionally treated immediately. Thus, the time for alarm/dispatch, for initial EMS care, extrication at a collision scene and transport to hospital, becomes a critical factor in road traffic trauma management.

### 5.1. Transport of the patient

In many countries the percentage of preventable prehospital deaths is estimated to be up to 30%.<sup>79</sup> At least one third of these potentially preventable deaths occur prior to arrival at hospital, and over half occur at the hospital during the initial resuscitation phase.<sup>80</sup> Critically ill patients have a high risk of morbidity and mortality during transport.<sup>81</sup>

When deciding to transport an injured patient, there are risks, and appropriate mitigation must be in place, particularly if primary transfer to a major trauma centre involves bypassing a nearer facility. Those who undertake medical transfers should have access to guidelines.<sup>82</sup>

**Primary transfer**  
(also known as **scene transfer**)  
is the movement of the patient from the scene of the collision to a hospital.<sup>83</sup>



**Secondary transfer**  
(also known as **interfacility transfer**)  
is the movement of patients from one facility to another.<sup>84</sup>



To achieve the best possible outcome for the people injured in the road collision, it is important that the patient is transported directly to the best equipped trauma center that can provide definitive care, reducing the number of interhospital transfers. The patient is usually "packaged" for transport with a hard cervical collar, head blocks, limb splints if required, and body splint such as a scoop stretcher or a vacuum mattress.<sup>85</sup> It is common practice that patients are transported with a spinal immobilisation. If the EMS services have a medical doctor on board, they can provide advanced medical care on the scene and during transport to the hospital. The level of care afforded to a patient at this stage of transport is much debated and varies around the world.<sup>86</sup>

<sup>79</sup> Coats, T. J., Davies, G. (2002), Prehospital care for road traffic casualties. *BMJ : British Medical Journal.* 324(7346), page 1135-8, [goo.gl/nCunVP](http://goo.gl/nCunVP).

<sup>80</sup> Sánchez-Mangas, R., García-Ferrer, A., De Juan, A., Martín Arroyo, A. (2010), The probability of death in road traffic accidents. How important is a quick medical response? *Accident Analysis and Prevention* 42, page 1048-1056.

<sup>81</sup> Dunn, M. J. G., Gwinnutt C. L., Gray A. J. (2007), Critical care in the emergency department: patient transfer. *Emergency Medicine Journal* 24(1), page 40, [goo.gl/nnZwmB](http://goo.gl/nnZwmB).

<sup>82</sup> Davies, G., Chesters, A. (2015), Transport of the trauma patient. *British Journal of Anaesthesia* 115(1), page 36, [goo.gl/dFhcPd](http://goo.gl/dFhcPd).

<sup>83</sup> Ibid.

<sup>84</sup> Ibid.

<sup>85</sup> Coats, T. J., Davies, G. (2002), Prehospital care for road traffic casualties. *BMJ : British Medical Journal.* 324(7346), page 1135-8, [goo.gl/nCunVP](http://goo.gl/nCunVP).

<sup>86</sup> Davies, G., Chesters, A. (2015), Transport of the trauma patient. *British Journal of Anaesthesia* 115(1), page 33-7, [goo.gl/dFhcPd](http://goo.gl/dFhcPd).



**Advanced trauma life support (ATLS)** is a protocol for managing trauma victims and designed to maximise management in the first (“golden”) hour after trauma and ensure an optimal long-term outcome. ATLS is usually performed by a team, with one team member securing the airway, another inserting venous cannula and another exposing the patient. The team leader should constantly repeat the protocol in further assessments to stabilise the patient, and plan for further management or definitive care.<sup>87</sup>



**International Trauma Life Support (ITLS)**, formerly known as **BTLS, (Basic Trauma Life Support)** is an international organisation dedicated to the prevention of mortality and disability from injuries through education in emergency care of trauma patients.<sup>88</sup> ITLS is a continuing education course for emergency medical providers to develop the skills of rapid initial assessment, management of life-threatening injuries, and early transport of the traumatised patient to the most appropriate facility.

The idea behind BTLS is that medical staff involved should think and act similarly in emergency care. The term “basic” life support does not mean that advanced procedures are not performed; it was defined as such to distinguish the first interventions made in the prehospital scene from more “advanced” surgical procedures used in hospital patients with severe trauma.<sup>89</sup>

There are different ways of transporting patients, depending on availability, the type of injury, prevailing weather and daylight conditions, distance, and terrain. Whatever platform, the crew background and training of the transporting staff must be appropriate to manage any ongoing or predicted clinical needs of the patient.<sup>90</sup> It is important to stress that a dynamic risk assessment on an individual patient basis may deliver the best results.<sup>91</sup> Despite the need for fast transport, it is important to stress that the road safety of the crew, patient as well as other road users should not be compromised. In some cases, transfer can be provided by a helicopter air ambulance. However, rules for dispatching such services may differ from one country to another and depend on a number of other circumstances.

During the transport, it is important to have a basic set of tools and mechanical solutions that can be used. Resources such as oxygen, drugs, and intravenous fluids are not infinite in the prehospital environment. Likewise, equipment and batteries can fail. Whatever the platform chosen for the transport, the principal rule is that the level of care should not deteriorate for the period of transfer.<sup>92</sup>

Therefore, monitoring and treatment need to continue throughout this time.<sup>93</sup> It is inevitable that, in some cases, as a consequence of major changes in the condition of the patient during the transport, the scheduled admitting hospital may be changed. However, the ambulance dispatching centre can transfer information between the hospital and the ambulance unit and find the best solution for the patient’s condition. In many cases, the staff have the possibility of direct communication via a radio system called TETRA, facilitating the coordination between different actors in the chain of emergency care.

<sup>87</sup> Mosby’s Medical Dictionary (2009), Advanced Trauma Life Support, [goo.gl/QC4TXu](http://goo.gl/QC4TXu).

<sup>88</sup> Requena A., et al. (27.01.2015), Emergencias : International Trauma Life Support (ITLS) training through the Spanish Society of Emergency Medicine (SEMES): 10 years’ experience with the SEMES-ITLS program, [goo.gl/ZGY8as](http://goo.gl/ZGY8as).

<sup>89</sup> Ibid.

<sup>90</sup> Davies, G., Chesters, A. (2015), Transport of the trauma patient. *British Journal of Anaesthesia* 115(1), page 33-7, [goo.gl/dFhcPd](http://goo.gl/dFhcPd).

<sup>91</sup> Ibid.

<sup>92</sup> Ibid.

<sup>93</sup> Coats, T. J., Davies, G. (2002), Prehospital care for road traffic casualties. *BMJ : British Medical Journal*. 324(7346), page 1135-8, [goo.gl/nCunVP](http://goo.gl/nCunVP).

## 5.2. Vehicles used for transport of injured patients

Different types of vehicles are used for transport of patients in the EU. CEN 1789:2007 is a European Union standard for ambulances and medical transportation vehicles.<sup>94</sup> However, compliance by EU Member States is only voluntary. Degrees to which the EU28 apply the standard vary.



*“This standard specifies requirements for the design, testing, performance and equipping of road ambulances used for the transport and care of patients. It contains requirements for the patient’s compartment.”<sup>95</sup>*

“It is applicable to road ambulances capable of transporting at least one person on a stretcher. Requirements are specified for categories of road ambulances based in increasing order of the level of treatment that can be carried out. These are the patient transport ambulance (types A1, A2), the emergency ambulance (type B) and the mobile intensive care unit (type C). This European standard gives general requirements for medical devices carried in road ambulances and used therein and outside hospitals and clinics in situations where the ambient conditions can differ from normal indoor conditions.”<sup>96</sup>



In some cases, helicopter transport can be used to cover large distances from remote areas, to avoid congested roads, or to increase the choice of hospital to which a patient can be transported.<sup>97</sup> The network of medical helicopters and how it functions can differ from one country to another.

## 5.3. Handover of the patient to hospital

Handing over the patient and relevant information about him/her to the next care provider is of crucial importance in the emergency/rescue chain following a road collision. Some information about the patient may seem obvious to the EMS crew who attended the scene of a collision but new to someone who has taken over at a hospital. Sharing of information is of utmost importance. The general principle is that the patient should be admitted to a destination capable of delivering whichever intervention the patient is deemed to require.<sup>98</sup>



Once the casualty is transported to a medical facility, another round of triage takes place lasting approximately 90 seconds, during which a quick evaluation of the state of the casualty is done in order to provide appropriate treatment.<sup>99</sup>

Evidence from developed countries indicates that properly coordinated early rescue and retrieval systems together with appropriate early, in-hospital trauma management may prevent up to 30% of post incident road collision deaths.<sup>100</sup>

<sup>94</sup> European Committee for Standardisation (31.03.2015), Medical vehicles and their equipment - Road ambulances, [goo.gl/z3dt5k](http://goo.gl/z3dt5k).

<sup>95</sup> Ibid.

<sup>96</sup> Ibid.

<sup>97</sup> Coats, T. J., Davies, G. (2002), Prehospital care for road traffic casualties. *BMJ : British Medical Journal*. 324(7346), page 1135-8, [goo.gl/nCunVP](http://goo.gl/nCunVP).

<sup>98</sup> Davies, G., Chesters, A. (2015), Transport of the trauma patient. *British Journal of Anaesthesia* 115(1), page 36, [goo.gl/dFhcPd](http://goo.gl/dFhcPd).

<sup>99</sup> Visser, L. S., Montejano, A. S., Grossman, V. G. A. (2015), Fast Facts for the Triage Nurse: An Orientation and Care Guide in a Nutshell, page 39, [goo.gl/u1qCN8](http://goo.gl/u1qCN8).

<sup>100</sup> Hussain, L. M., Redmond, A. D. (23.04.1999), Are pre-hospital deaths from accidental injury preventable? *BMJ: British Medical Journal*, 308(6936): page 1077–1080, [goo.gl/4CAhvw](http://goo.gl/4CAhvw).

# CONCLUSIONS

For complex reasons, society seems to accept a lower standard of safety from road use compared with other forms of transport.<sup>101</sup> Road collisions and resulting injuries and road deaths are not often recognised as a public health issue. Improving post-collision response and emergency care provided to the victims just after the collision could have a significant impact on recovery, reducing costs for those directly affected as well as for society at large. In order to achieve better outcomes, a holistic view on communication, cooperation and training within, and between, all parties involved from the first announcement of the collision to the provision of final trauma care is needed.

Despite the slow but continuous progress in road safety across Europe, achieving Vision Zero of no road deaths by 2050 remains a challenge for Europe. Improvements in road safety have slowed in recent years. In many countries, a lot has been done to prevent road collisions happening. Now it is time for appropriate measures to be put in place in order to mitigate the devastating impact of the road collisions that do occur.

Further research into post-collision response and emergency care is needed as well as improved statistics and data collection on road collisions and their consequences, such as type of injuries, profile of victims, and the like. Moreover, it is advised to monitor post-collision response and emergency care in order to achieve best possible outcomes by developing indicators that could clarify where exactly in the emergency/rescue chain could be improved. In order to do so, systematic data collection on all levels will be needed.

The Revive project aims to produce recommendations for possible future action and policy. These will be developed in a report to be published in the project's concluding stages.

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<sup>101</sup> Coats, T. J., Davies, G. (2002), Prehospital care for road traffic casualties. *BMJ : British Medical Journal*. 324(7346), page 1135-8, [goo.gl/nCunVP](https://doi.org/10.1136/bmj.324.7346.1135).

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