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Road casualties and their injuries

Thematic File Road Safety N°15

Federal Public Service
Mobility and Transport

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Nuyttens, N., Stipdonk, H. & van Schagen, I. (2018) Themadossier verkeersveiligheid nr. 15. Verkeersgewonden en hun letsels. Brussel, België: Vias institute – Kenniscentrum Verkeersveiligheid

Includes an English summary

Summary

This thematic file focuses on people who are seriously injured in road accidents and their injuries. The following **themes** are covered: definitions of serious injuries in road accidents, methodologies used in calculating the various indicators for people who are seriously injured in road accidents, the number and changes in the number of the seriously injured in the EU and in Belgium, the nature of serious injuries in road accidents, factors and measures to reduce the severity of injuries, and, finally, the treatment of serious injuries at the hospital. The long-term effects of traffic accidents on those injured (psychological, socioeconomic, etc.) and on society in general are dealt with in a different thematic file, namely theme report nº 10 "Human impact of traffic accidents" (Meunier, 2017).

Until 2010, people seriously injured in road accidents (or the seriously injured) were defined exclusively as being seriously injured if they spent at least **24 hours in hospital** as the result of their injuries. From this definition, therefore, people with minor injuries are all other people who did not die from their injuries. Although the distinction between seriously injured and slightly injured is based on a criterion related to hospitalization, the number of people who are seriously injured and those with minor injuries in most EU member states is not based on hospital data, but on police data; the estimates of the severity of injuries are based on the observations of the police officers charged with registering the accident. For this reason, on the account of the weak relationship between time spent in the hospital and the severity of the injuries, the misclassification, and above all underreporting, a different indicator, **MAIS3+ road injuries**, was put forward in 2013 by the European Commission. In proposing the new indicator, the European Commission's intention was not to replace the old indicator for seriously injured people with this new indicator. For the time being, both indicators will continue to exist in parallel with each other.

The "MAIS3+ road injuries" indicator has a number of **advantages** over the old indicator: (1) MAIS3+ is a more reliable measurement for the severity of injuries than length of time spent in hospital, (2) the severity of injuries is not defined by police officers, but by medically trained staff in hospitals, and (3) in most EU member states, there is less underreporting in hospital data than in police data. This latter point also means that the MAIS3+ indicator provides a more accurate reflection of the actual proportion of vulnerable road users and those 65 or older in the total number of people injured on the road. Indeed, their share tends to be underestimated based on police data.

At the moment, though, the "MAIS3+ indicator" also has a number of **disadvantages**. One of the main ones is that there is no uniform way of calculating the number of MAIS3+ road injuries. The European Commission proposes three methods of calculating the number of MAIS3+ road injuries: (1) the application of adjustment factors victims of road accidents in the police data, (2) the use of hospital data, and (3) the linking of hospital and police data. This latter method would provide the best results, but it is only applied in a minority of EU member states; in Belgium, the first two methods are used, but not the last. Each of the three methods produces a different number of MAIS3+ road injuries; there are also numerous ways of "operationalizing" each method, which leads to slightly different results. An additional disadvantage is that in some countries also hospital data underestimate the number of people suffering injuries in road accidents. This "underreporting" can vary from country to country. The different methods for calculating the number of MAIS3+ road injuries mean that there is a relatively low level of **comparability** of MAIS3+ road accident injuries between the EU member states and countries outside the EU. A series of recommendations have been made from the European SafetyCube project for making the calculation methods uniform.

Despite the current disadvantages of the MAIS3+ indicator, **the advantages outweigh the disadvantages**. In most countries, there are significantly more serious road injuries in hospital data than serious road injuries in police data. In Belgium, for example, for each seriously injured recorded in police data, there are approximately 2.5 seriously injured found in hospital data (according to the definition of one night in hospital). This shows that injuries from road accidents are underestimated far less in hospital data than in police data. In addition, the comparability between the EU member states will increase as soon as the SafetyCube recommendations are applied and as more countries switch to linking hospital and police data.

The European Commission estimated the number of MAIS3+ road injuries in 2015 in the **EU** at **135,000**. In **Belgium**, the number of MAIS3+ road injuries in 2011 was approximately **3,300**. This number for Belgium is based on the second method of calculation proposed by the European Commission (i.e. using hospital data).

At the European Union level, there are currently no figures available about **changes** in the number of MAIS3+ road injuries. As far as Belgium is concerned, there was an increase of 6.4% in the number of MAIS3+ road injuries between 2005 and 2011. The total number of hospitalized road victims in hospital data decreased slightly between 2005 and 2011 by 1.4%. The number of serious injuries recorded by the police between these two years fell considerable by 15.2%. To sum up, changes to the number of serious injuries differ greatly, depending on the definition used and the source of the data. These different trends are probably caused by differences in data quality and completeness.

Both international and Belgian research shows that certain categories of road users **more likely to have a MAIS3+ severity score** than others. This is the case for **seniors** and **motorized two-wheelers**. On average cyclists are less likely to suffer MAIS3+ injuries.

Research from the Netherlands shows that more than half of the young people (0-15 years of age) and 45 and over with MAIS2+ injuries were involved in an accident **where there was no motorized vehicle**. These are mainly accidents involving one bicycle (in other words, no one else was involved) or accidents between cyclists, or between cyclists and pedestrians. Based on the Belgian figures, we can see that a majority of people aged 0-15 and over 60, who spent at least one night in hospital, were **cyclists**. This is far more than is suggested in the police data, and this illustrates the level of **underregistration** for this type of transport in the police data.

According to a Belgian study of people admitted to hospital with injuries suffered in a road accident (during the period 2004-2011), internal head injuries (e.g. concussion) and fractures of the lower and upper limbs were the most common **injury types**. Of these three types of injury, fractures to the lower limbs were the most serious on average: in 42% of cases, the MAIS severity score was 3 or more. Internal injuries to the thorax (68% are MAIS3+) and fractures of the skull (86% are MAIS3+) are two other types of injury that occur less often, but they were more serious on average.

Fractures to the lower limbs are a frequent injury type among cyclists admitted to hospital, but because fractures to the upper limbs are usually not very severe (6% are MAIS3+) this injury type is not frequent among *MAIS3+* cyclists admitted to hospital. A recent study of MAIS3+ road injuries admitted to the hospital in various European countries shows that injuries occur most often in one **area of the body** – the lower limbs – among all categories of road users. Depending on the means of transport and the country studied, this is the area of the body with the most injuries, ranging from 15% to 45% of MAIS3+ road injuries admitted to the hospital. The head is also an area of the body that is injured often among pedestrians, cyclists, and car passengers. It is less frequent among motorcyclists, approximately 10% of cases this is the area of the body. Finally, the thorax is the third area of the body most often injured among MAIS3+ road injuries; it is much more frequent among car passengers and motorcyclists than pedestrians and cyclists.

The **factors** that affect the severity of road injuries are very diverse. Of course, the speed at impact is a crucial factor. Other factors that play a role are the mode of transport, the features of the vehicles involved (e.g. their mass, active and passive safety features), behaviour (e.g. wearing a helmet, wearing a seatbelt, correct use of child seats, excessive speed, alcohol), and the nature of the infrastructure (e.g. how 'forgiving' are the roads themselves). The age of people suffering injuries in road accidents is also an important determinant for the severity of the injury. For instance, a 75-year-old passenger in a motor vehicle is three times more likely to die than an 18-year-old with the same collision impact.

Good **measures** are those that positively influence the factors listed above, which affect the severity of injury. Speed limits need to be suited to the type of road, the nature of the road users, and the potential conflicts between the different types of road users on that road. If an accident should occur, the degree to which the road is forgiving can limit the severity of injuries. Road users need to be encouraged to wear seatbelts and use child seats correctly. They also need to obey other behaviour-based rules in the Highway Code in order to reduce the chance of an accident occurring, as well as the seriousness of injury as much as possible. Cyclists need to be informed about the safety effects of wearing a cycling helmet.

The following **policy-related and/or research-related conclusions** can be drawn from this report:

- At the moment, hospital data do not provide the perfect way of calculating the number of serious road injuries. Ideally, in the future, all EU member states will move towards linking hospital and police data; this provides the best approach to the number of MAIS3+ injuries, and it will also increase the level of comparability between EU member states.

- In general, the aim is to improve the registration of all road accident victims. The chance of achieving a good-quality improvement will be increased if all partners – especially the police, hospitals, federal and regional government departments and research institutions – in road safety work together.
- The Belgian data in this thematic report dates back to 2011. An analysis of more recent data is needed to check that the findings from the past are still applicable.
- MAIS3+ is a "stricter indicator" for serious road injuries than people injured in road accidents who are admitted to hospital or serious injuries recorded by the police, the old indicator. The use of the MAIS3+ indicator results in a lower number of serious road injuries than the old indicator. If one day the new indicator is implemented as the official indicator in Belgian or European reporting, then this will cause a fall in the number of reported serious road injuries.
- Despite the current deficiencies in the calculation of the number of road injuries admitted to hospital and MAIS3+ road injuries admitted to hospital, there is sufficient proof from abroad and at home, that certain groups are significantly underestimated in police data such as seniors and vulnerable road users. Various studies also show that in the group of people injured in road accidents and admitted to hospital there is a greater likelihood of MAIS3+ injuries among seniors and motorcyclists. Hence, policy does not have to wait for perfectly calculated indicators to be in place for it to be adapted accordingly. Policy recommendations to reduce the number of deaths and injuries among vulnerable road users and seniors are included in the following thematic files of Vias institute (can be retrieved on the website): thematic file pedestrians, thematic file cyclists, thematic file motorized two-wheelers, thematic file seniors.

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