Progress in MAIS3+ Serious Injuries Data Collection

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The SafetyCube Project

Funded by the European Commission under the Horizon 2020 research framework programme.

- Coordinator: Pete Thomas, Loughborough University
- Start: May 2015
- Finish: April 2018
- 17 partners from 12 EU countries

- The SafetyCube DSS objective is to provide the European and Global road safety community a user friendly, web-based, interactive Decision Support Tool to properly substantiate their road safety decisions for the actions, measures, programmes, policies and strategies to be implemented at local, regional, national, European and international level.
Serious Traffic Injuries in the EU

- According to the European Commission’s estimates, about **135,000 people sustain serious road traffic injuries** on EU roads per year.
- On average there are **5 serious injuries for each road fatality** in the EU.
- In EU countries, more than half of all serious injuries occur **inside built-up areas**.
- **45%** of all seriously injured persons are **vulnerable road users** (pedestrians, cyclists, powered two-wheeler drivers).
- The **young and the elderly** are over-represented among the seriously injured in road crashes and especially the elderly pedestrians.
- Serious injuries are **more costly to society** because of long-time rehabilitation and healthcare needs.
Data Collection Background

- Reducing the number of serious traffic injuries is one of the **key priorities** in the road safety programme 2011-2020 of the European Commission (EC, 2010).
- In January 2013, the High Level Group on Road Safety, representing all EU Member States, established the **definition of serious traffic injuries** as road casualties with an injury level of MAIS ≥ 3.
- The High Level Group identified **three main ways** Member States can collect data on serious traffic injuries (MAIS ≥ 3):
  - by applying a correction factor on police data,
  - by using hospital data alone and
  - by using linked police and hospital data.
- Currently, EU member states use **different procedures to determine the number of MAIS ≥ 3 traffic injuries**, dependent on the available data.
- The **impact** of this heterogeneity on final estimations is unknown.
Objectives

• Describe the **current state of collection** of data on serious traffic injuries across Europe.

• Provide **practical guidelines** for the estimation of the number of serious traffic injuries for each of the three ways identified by the High Level Group.

• Examine how the estimated number of serious traffic injuries is affected by **differences in methodology**.
Methods I

The practical guidelines for the determination of the number of serious traffic injuries were developed using:

- A **survey** carried out to experts in the 28 EU Member States and 3 EFTA countries
- **Current practices and experiences** from a number of countries
- Specific **analysis** to the same data for different procedures were applied
Methods II

Current practices and experiences from a number of countries

Methods to apply correction factors using data from Belgium, France and Austria

Methods to derive MAIS, using data from Spain, Belgium, the Netherlands and Germany

Inclusion and exclusion criteria using Hospital data & sensitivity analysis

Record linkage with data from France, the Netherlands and Slovenia
Results

State of data collection on serious traffic injuries across Europe (June 2016)

- Only **17 of the 26**: MAIS ≥ 3 estimates to DG-MOVE.
- **Difficulties to get access** to hospital discharge data.
- **9** hospital data, **2** corrections to police data, and **4** record linkage of police and hospital data. **France** and **Germany** apply a combination.
- The ratio of MAIS ≥ 3 casualties / fatalities **differs considerably between these countries**, from 0.6 MAIS ≥ 3 in Poland to 13.2 MAIS ≥ 3 in the Netherlands.

<table>
<thead>
<tr>
<th>Country</th>
<th>MAIS ≥ 3 estimations already delivered or soon available?</th>
<th>For which years are MAIS ≥ 3 data available?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>yes (2016)</td>
<td>2014</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>no</td>
<td>-</td>
</tr>
<tr>
<td>Croatia</td>
<td>no</td>
<td>-</td>
</tr>
<tr>
<td>Cyprus</td>
<td>yes</td>
<td>-</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>yes</td>
<td>2014</td>
</tr>
<tr>
<td>Denmark</td>
<td>no</td>
<td>-</td>
</tr>
<tr>
<td>Estonia</td>
<td>No (possibly from 2017)</td>
<td>-</td>
</tr>
<tr>
<td>France</td>
<td>yes (preliminary figures)</td>
<td>2006-2012</td>
</tr>
<tr>
<td>Germany</td>
<td>yes (2015)</td>
<td>2014</td>
</tr>
<tr>
<td>Greece</td>
<td>no</td>
<td>-</td>
</tr>
<tr>
<td>Hungary</td>
<td>no</td>
<td>-</td>
</tr>
<tr>
<td>Italy</td>
<td>yes (2015)</td>
<td>2012-2014</td>
</tr>
<tr>
<td>Latvia</td>
<td>no</td>
<td>-</td>
</tr>
<tr>
<td>Lithuania*</td>
<td>no</td>
<td>-</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>no</td>
<td>-</td>
</tr>
<tr>
<td>Malta*</td>
<td>no</td>
<td>-</td>
</tr>
<tr>
<td>Poland</td>
<td>yes (2015)</td>
<td>2013</td>
</tr>
<tr>
<td>Portugal</td>
<td>yes (2015)</td>
<td>2010-2014</td>
</tr>
<tr>
<td>Romania*</td>
<td>no</td>
<td>-</td>
</tr>
<tr>
<td>Slovakia</td>
<td>no</td>
<td>-</td>
</tr>
<tr>
<td>Spain</td>
<td>yes (2016)</td>
<td>2000-2014</td>
</tr>
<tr>
<td>Sweden*</td>
<td>yes</td>
<td>2014-2015</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>yes (2016)</td>
<td>1999-2011 (soon up to 2015)</td>
</tr>
<tr>
<td>Iceland</td>
<td>no</td>
<td>-</td>
</tr>
<tr>
<td>Norway</td>
<td>no</td>
<td>-</td>
</tr>
<tr>
<td>Switzerland</td>
<td>yes (2016)</td>
<td>2011-2014</td>
</tr>
</tbody>
</table>

*no detailed information on methodology yet available
Source: SafetyCube questionnaire, information by DG-MOVE (CARE Expert Group).
Results

Applying correction on police data

WHEN:

- In case there is no hospital data for the entire country and/or every year
- In case hospital data becomes available at too late stage

HOW:

- Use a sample of hospital data (previous years and/or part of the country)
- Derive and apply multiple correction factors
- Update correction factors on a regular basis
Results
Using of hospital data (I)

WHEN:

- In case hospital data of good enough quality is available and record linkage with police data is not available

HOW:

Select patients with **external causes for road traffic injuries** (public road): ICD9CM: E810-E819, E826, E827, E829, E988.5; ICD10: V01-89 for those codes for traffic injuries and/or weighting -correcting for non-public road-for non-traffic injury codes

Exclude hospitalized fatalities within 30 days

Exclude readmissions (as well as scheduled admissions when they are a second episode of a previous emergency injury)

Select all cases with any **injury diagnosis** (ICD9CM: 800-999; ICD10: S00-T88; AIS injury)

In case of ICD coded injuries, **assess the severity (AIS)** of each injury using a ICD to AIS recoding tool (e.g. ICDpic, AAAM, ECIP/Navarra)
Other issues to consider with hospital data

**External causes** (E/V-codes) may be missing or misspecified for many casualties. Compensate for these missing E-codes by using information from additional sources.

Traffic Crashes happening on public roads should be selected (country specific weighting factor).

**Different versions of AIS**: multiplied by a factor 0.89 when injuries are coded in AIS1990 or AIS1998 instead of AIS2005 or AIS2008

ICD to AIS recoding tool applied. Current version of the AAAM10 (2016) tool results in a clear underestimation of the number of MAIS3+ casualties and the tool is not able to deal with truncated codes

**Limited number of injuries**: can result in an underestimation.
Weighting factors: 1.28 in case of 1 injury, 1.11 in case of 2 injuries, 1.05 in case of 3 injuries

**ICD codes** are truncated leads to a less reliable selection of MAIS3+ casualties. Not use ICDpic and AAAM10 tools. Weighting: 1.06 in case of ICDmap90 or DGT, 1.03 in case of ECIP, 1.11 in case of AAAM9
Results
Applying record linkage

**WHEN:**
- In case the selection of MAIS3+ road traffic casualties is problematic (missing Ecodes)

**HOW:**

Link hospital and police (and possibly other sources) on the basis of variables that are common to in both data sources.

Ideally, linkage is based on a unique personal identification number (deterministic linkage), but this is rarely available for privacy reasons.

When deterministic linkage is not possible, probabilistic or distance based linkage is recommend.

Once the linkage is completed, the number of serious traffic casualties recorded in hospital data but not identified as such can be estimated using the capture-recapture method.
Methods Comparison

- The **method applied influences** the estimated number of MAIS ≥ 3 casualties.
- **Linked data** is the most reliable method to estimate the number of MAIS ≥ 3 casualties, followed by hospital data alone.
- Each method is subject to **limitations**. The number of serious injury casualties identified should be considered an estimate.
- The biggest limitation for all methods is the **quality of the data** being used.
Conclusions

• All three methods for estimating the number of serious traffic injuries have both advantages and limitations. Which method(s) to choose will depend on the context and constraints of each individual country.

• Attempts should be made to access data of the highest quality possible.

• Further harmonisation of methods over the next years is desirable in order to ensure that the estimated numbers of MAIS ≥ 3 road traffic injuries are comparable across Europe.

• At a European level institutional collaboration with Eurostat, WHO and DG-MOVE would improve reporting serious road traffic injuries in Europe.
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http://www.safetycube-project.eu/
Thank you
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