SafetyCube

Determination of the number of serious road injuries

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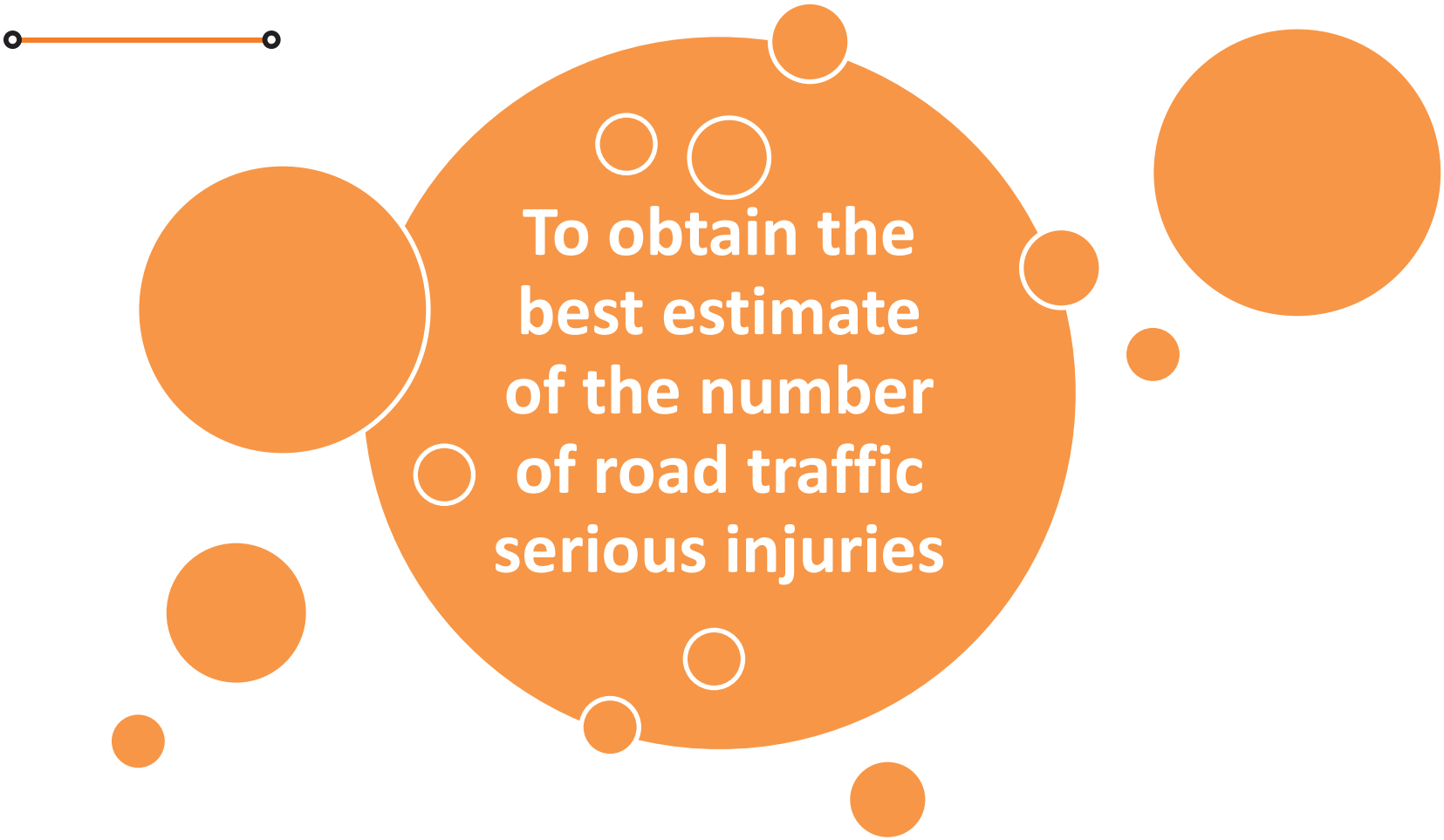
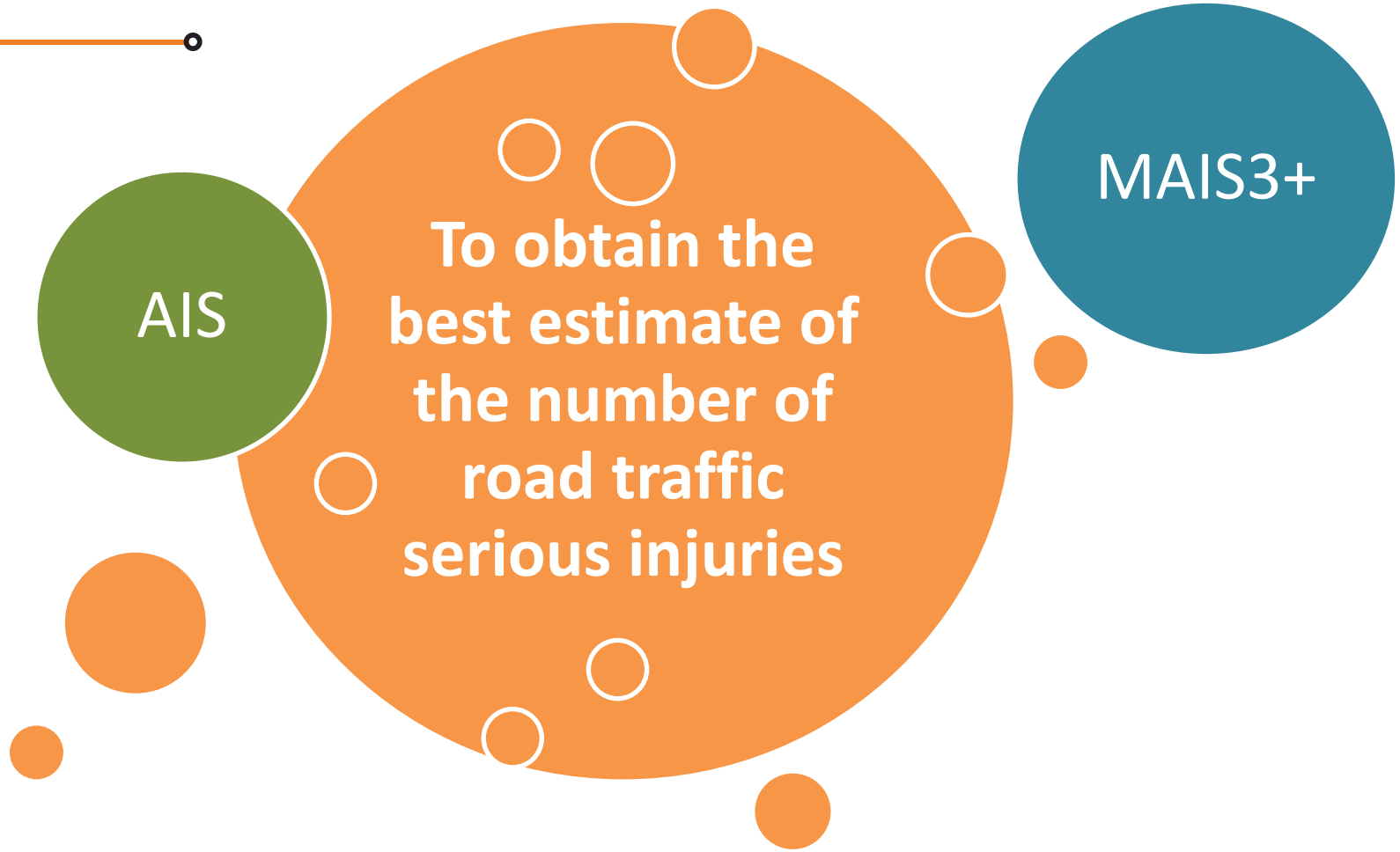
Method 2: use of hospital data

Aim


To obtain the best estimate of the number of road traffic serious injuries

Aim


AIS
To obtain the best estimate of the number of road traffic serious injuries
MAIS3+

How to derive the number of severe road traffic injuries (MAIS3+) using hospital data?

How can hospital data be accessed?

Which criteria should we use to select cases from hospital data?

How can MAIS been derived from hospital Data?

Methods

- 2 case studies
  - *1. Inclusion / exclusion Criteria*
    - *Hospital data from Spain and The Netherlands*
    - *ICD9 / ICD10*
  - *2. MAIS conversion tools*
    - *Data from The Netherlands, France, Slovenia, Spain, Austria, and Belgium*

Criteria for case selection

- What to do with:
  - *Hospital Fatalities*
  - *Readmissions*
  - *Scheduled*
  - *Outpatients & short admissions*
- Which injury codes?
- Which external causes?

In/exclusion criteria

How to treat deaths before and after 30 days

- If a person is admitted to hospital but finally dies within 30 days after the admission he/she should be accounted as a fatality.
- But if the person dies after 30 days, it should be counted as injured according to their severity

In/exclusion criteria

Include or not readmissions & scheduled admissions

- Exclude readmissions to avoid duplicates within a full calendar year (or within a month if it is not possible to identify through the full year)
- and exclude scheduled admissions when they is a second episode of a previous emergency injury but they are not defined as readmissions.

In/exclusion criteria

How to treat hospitalizations of 1 day or less / day treatment

- Include all traffic injury hospitalizations in the definition because, although they have such a short hospitalization, they might be transferred to other hospitals. They will be registered then as readmission or as a scheduled admission and not as an emergency. That means that it is unlikely to be duplicated.

In/exclusion criteria

Injury codes

- Include all cases with any injury diagnosis
  - ICD9CM: 800-999
  - ICD10: S00-T88

In/exclusion criteria

External causes

- Include external causes for road traffic injuries:
  - 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

Traffic Injuries
E810-819 Motor vehicle traffic accident
E826 Pedal cycle accident
E827 Animal-drawn vehicle accident
E828 Accident involving an animal being ridden
E829 Other road vehicle accident
E988.5 Injury by crashing of motor vehicle, undetermined whether accidentally or purposely inflicted

In/exclusion criteria

Additional information

- Missing Ecode
- **Accident compensation payer (Vehicle insurace company)**

Weighting factors

Including :	Spain	The Netherlands	Average
Deaths within 30 days	0.95	0.96	**0,95**
Readmissions	0.98	0.96	**0,97**
E929 - Late effects	0.99	1.00	1,00
E828 - Accident involving an animal being ridden	0.98	0.97	**0,97**
E820-825 – Non traffic transport injuries			

In/exclusion criteria

- **Include:**
  - **All injury diagnoses (ICD9CM: 800-999; ICD10: S00-T88)**
  - **External causes for road traffic injuries to include are: ICD9CM: E810-E819, E826, E827, E829, E988.5; ICD10: V01-89 for those codes for traffic injuries (on public roads)**

  - **Exclude:**
    - **Fatalities after 30 days**
    - **Readmissions/duplicate records**
    - **Crashes on non-public roads / Non traffic injuries**

Discussion
Including / excluding criteria

- Criteria? Missing criteria?
- Ecode underreporting ?
- Road traffic Injuries in non public roads?
- Weighting factors?

How to derive MAIS3+

- Direct coding vs conversion tools
- Versions AIS1990 / 1998 - AIS2005 / 2008
- Number of injuries per casualty
- Truncated injury codes

How to derive MAIS3+

- AIS 1990/1998
- AIS 2005/2008

- ICDmap90
- AGU
- DGT
- ICDpic
- ECIP
- AAAM9
- AAAM10

Conversion tools

How to derive MAIS3+

Versions AIS - Direct coding

- The difference between AIS1990 and AIS1998 can be neglected
- The difference between AIS2005 and AIS2008 can be neglected
- If injuries are coded in AIS1990-98 instead of AIS2005-08, the number of MAIS3+ casualties should be multiplied by a factor 0.9

How to derive MAIS3+

Conversion tools

- For **ICD9cm** the 4 tools investigated to derive the AIS or MAIS3+ do not make any significant change to the number of MAIS3+ casualties.
- For **ICD10** there seems to be only one tool available, as the AAAM10 mapping does not actually fit to the European coding practice (no clinical modification):
  - AAAM10 algorithm appears to
    - result in a clearly lower number of MAIS3+ casualties compared to direct coding
    - results in clearly lower numbers of MAIS3+ casualties compared to ECIP (30% to 40% lower)

How to derive MAIS3+

Consequence of using a limited number of injuries per casualty

- Apply the following weighted factors in cases where less than 4 injuries are taken into account for the determination of the number of MAIS3+ casualties
  - 1.3 in cases of 1 injury
  - 1.1 in cases of 2 injuries
  - 1.05 in cases of 3 injuries

	BE	NL	NL (ICD10 converted to ICD9cm)	ES	SUM	Average ICD9cm
	ICD9cm ICDpic	ICD9cm ICDmap90	ICD9cm ICDmap90	ICD9cm ICDpic	ICD9	(BE+NL+ES)/3
All	100%	100%	100%	100%	100%	
3	94%	98%	98%	94%	97%	95%
2	87%	95%	95%	88%	93%	90%
1	71%	85%	83%	77%	82%	78%

How to derive MAIS3+

Consequence of truncated injury codes

- Do not use the ICDpic tool in combination with truncated codes
- Use the following factors to correct for truncated codes:
  - 1.06 in case of ICDmap90 or DGT
  - 1.03 in case of ECIP
  - 1.11 in case of AAAM9

Estimated number of MAIS3+ casualties when using truncated codes compared to using full codes

		Using full codes	Using truncated codes	%	Factor
ES	ICDpic	8,274	2,108	25%	3.9
BE	ICDpic	19,143	3,949	21%	4.8
NL	ICDmap90	107,735	101,549	94%	1.06
	DGT	115,380	109,039	95%	1,06
	ICDpic	109,373	17,454	16%	6.3
	AAAM9	108,509	97,660	90%	1.11
NL	ECIP	14,519	14,071	97%	1.03
	AAAM10	8,480	12,123	143%	0.70

Deriving MAIS3+

- Multiply the number of MAIS3+ casualties by a factor 0.9 when injuries are coded in AIS1990 or AIS1998 instead of AIS2005 or AIS2008

- Adapt the conversion tables for the AAAM10 tool to better fit European needs. In the current state the AAAM10 tool results in a clear underestimation of the number of MAIS3+ casualties. Moreover, truncation results in an increase in the number of MAIS3+ casualties

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  - 1.3 in cases of 1 injury
  - 1.1 in cases of 2 injuries
  - 1.05 in cases of 3 injuries

- Do not use the ICDpic tool in combination with truncated codes
- Use the following factors to correct for truncated codes:
  - 1.06 in case of ICDmap90 or DGT
  - 1.03 in case of ECIP
  - 1.11 in case of AAAM9

Discussion
Deriving MAIS3+

- Recommending standard conversion tool?
- Weighting factors?
- Specific weighting factors by road user / age group?

Discussion
Including / excluding criteria

- Criteria? Missing criteria?
- Ecode underreporting ?
- Road traffic Injuries in non public roads?
- Weighting factors?

Distribution of Ecodes among traffic injuries, by severity. Hospital Discharge Register, Spain 2011

Traffic Injuries	MAIS0-2	MAIS3+	Total
No Ecode	5,241 (24.0%)	811 (9.1%)	6,054 (19.6%)
E810-819 Motor vehicle traffic accident	11,620 (53.2%)	6,438 (72.1%)	18,075 (58.7%)
E826 Pedal cycle accident	2,716 (12.4%)	1,018 (11.4%)	3,734 (12.1%)
E827 Animal-drawn vehicle accident	18 (0.1%)	7 (0.1%)	25 (0.1%)
E828 Accident involving an animal being ridden	450 (2.1%)	193 (2.2%)	644 (2.1%)
E829 Other road vehicle accident	80 (0.4%)	28 (0.3%)	108 (0.4%)
E929.0 Late effects	228 (1%)	8 (0.1%)	238 (0.8%)
E988.5 Injury by crashing of motor vehicle, undetermined whether accidentally or purposely inflicted	1 (0%)	3 (0%)	4 (0%)
Other Ecode	1,499 (6.9%)	421 (4.7%)	1,931 (6.3%)
Total	21,853	8,927	30,813