



Using hospital data to understand serious injuries on Irish roads

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Content

Serious injuries on Irish roads

-  Serious injuries from An Garda Síochána (AGS) data
-  Introducing hospital data
-  Total of casualties in hospital and AGS data over 2014-2021
-  Characteristics of seriously injured pedal cyclists
-  Summary and future work

Background

Serious injuries in Ireland

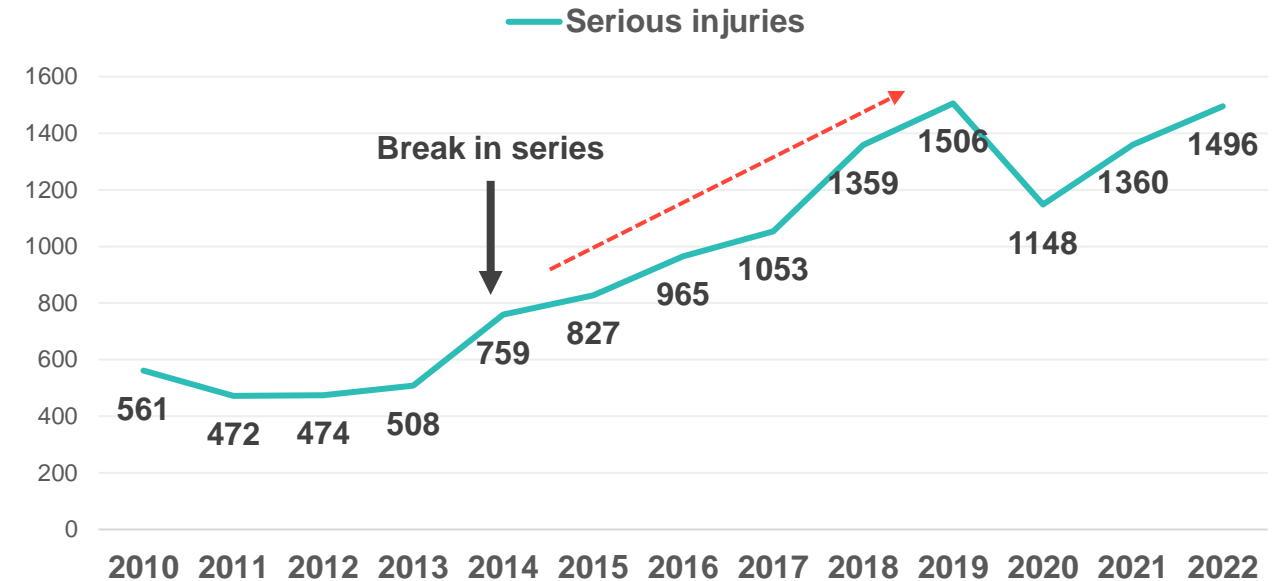
Current reporting



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- Updated procedure for recording serious injuries in Ireland by AGS since 2014 allowed to have more accurate figures
- AGS collision reports provide **critical information** to inform evidence-based road safety interventions
 - Collision location
 - Date and time
 - Road types
 - Collision scenarios



Definition of a serious injury:

An injury for which the person is **detained in hospital as an 'in-patient'**, or **has any of the following injuries** whether or not detained in hospital: fractures, concussions, internal injuries, crushing, severe cuts and lacerations, or severe general shock requiring medical treatment.

Serious injuries' reporting

The European context

- Reporting on serious injuries is complex
- The international evidence highlight limitations of reporting on serious injuries based only on police data
 - **Lack of harmonised definition** of a serious injury between countries, making international comparisons difficult
 - **Police record what is reported to them:** potential underreporting of crashes if they are not alerted
 - **Assessment of injury severity** is done by police member without medical training



Serious injuries' reporting

The European context

- To overcome limitations of current reporting, the European Commission requested Member States to report on serious injuries following a medical definition, the '**MAIS3+**' definition
 - Based on a validated trauma scoring scale (the Abbreviated Injury Scale, AIS)
 - Require access to hospital data

“The transport ministers will undertake to continue ... with the work towards:

*(i) reducing the number of serious injuries in road traffic collisions, and (ii) **reporting reliable and comparable data using a common definition based on the MAIS3+ trauma scale**”*

Valletta Declaration on Road Safety, 29 March 2017, Valletta



The MAIS3+ serious injuries project

Overview



RSA

Our Journey Towards Vision Zero

Ireland's Government Road Safety Strategy 2021-2030



An Roinn Iompair
Department of Transport

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- The current **Road Safety Strategy 2021-2030** includes specific actions to expand serious road injury reporting with hospital data, to better understand the incidence, cause, management, and outcomes of traumatic road injuries at a national level.

The MAIS3+ serious injuries project

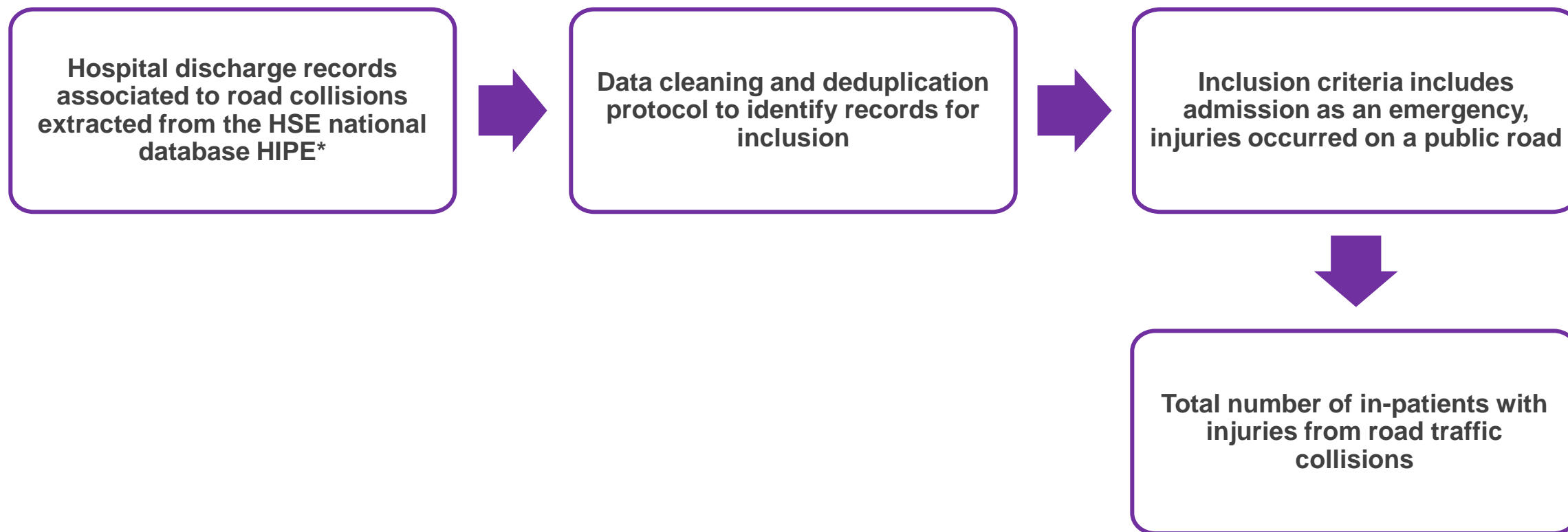
- **Primary goal** of reporting on MAIS3+ serious injuries to the EC
- **Greater understanding** of serious injury trends and characteristics in hospital discharge records (2014-2021)
- **Partnership** with the HSE National Health Intelligence Unit and Trinity College Dublin Department of Public Health & Primary Care
- **Comparison** of injury trends and characteristics in hospital data with AGS records, where possible.
- **Exploration** of other sources of data on serious injuries

Working with hospital data

How do we obtain the sample of injured in-patients



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* HIPE: Hospital In-Patient Enquiry database

Assessing injury severity in hospital data



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Use of the *Abbreviated Injury Scale (AIS)**

Translation from ICD-10-AM codes to AIS codes



AIS categories		Injury Severity
2-	1	Minor
	2	Moderate
3+	3	Serious
	4	Severe
	5	Critical
	6	Maximum

MAIS2- minor to moderate injury ('hospital moderate'):

A casualty who sustained one or more injuries with a maximum AIS score of 2 or less.

For instance:

- Fracture of first lumbar vertebra
- Contusion of hip
- Open wound of unspecified part of head

MAIS3+ serious injury ('hospital serious'):

A casualty who sustained at least one injury with a maximum AIS score of 3 or more.

For instance:

- Traumatic haemothorax
- Fractures: of shaft of femur, of base of skull
- Unspecified injury of cervical spinal cord

MAIS3+ is used to report on serious injuries to the European Commission

*Association for the Advancement of Automotive Medicine (2016). Abbreviated Injury Scale (c) 2005 Update 2008. (T. Gennarelli, & e. Woodzin, Eds.) Chicago, Illinois

Totals and trends

All hospitalised casualties and
AGS serious injuries

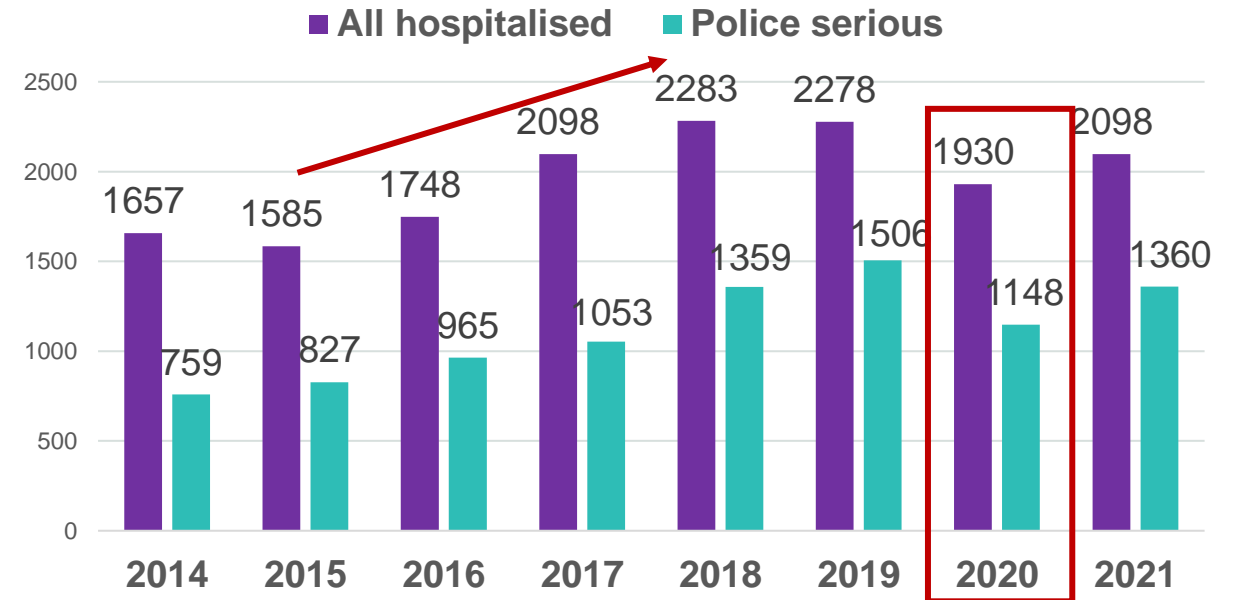
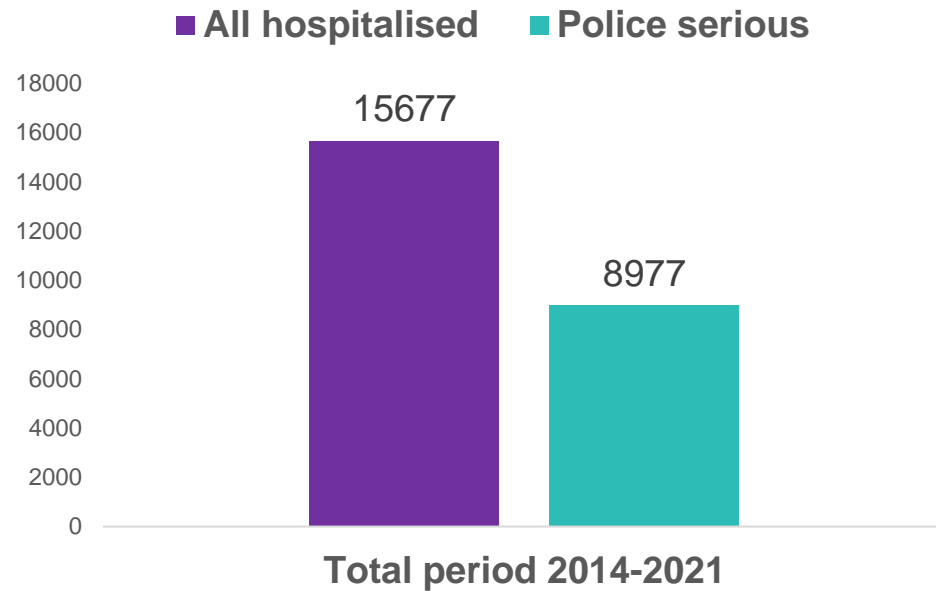
Period 2014-2021

Hospitalised casualties vs AGS serious injuries



All road user types (RUTs) – 2014-2021

- The number of injured casualties admitted to hospital as in-patients is almost 2 times higher than the number of seriously injured casualties recorded by AGS
- The number of hospitalised casualties and AGS serious injuries increased over the period, and declined in 2020.



AGS data is current as of 24 September 2023. Data for 2020 onwards is provisional and subject to change. 11

Hospitalised casualties vs AGS serious injuries



Definitions

Days spent at hospital as in-patients	% casualties
1 day or part of a day	36%
2 days or more	64%

Definition of a serious injury followed by AGS:

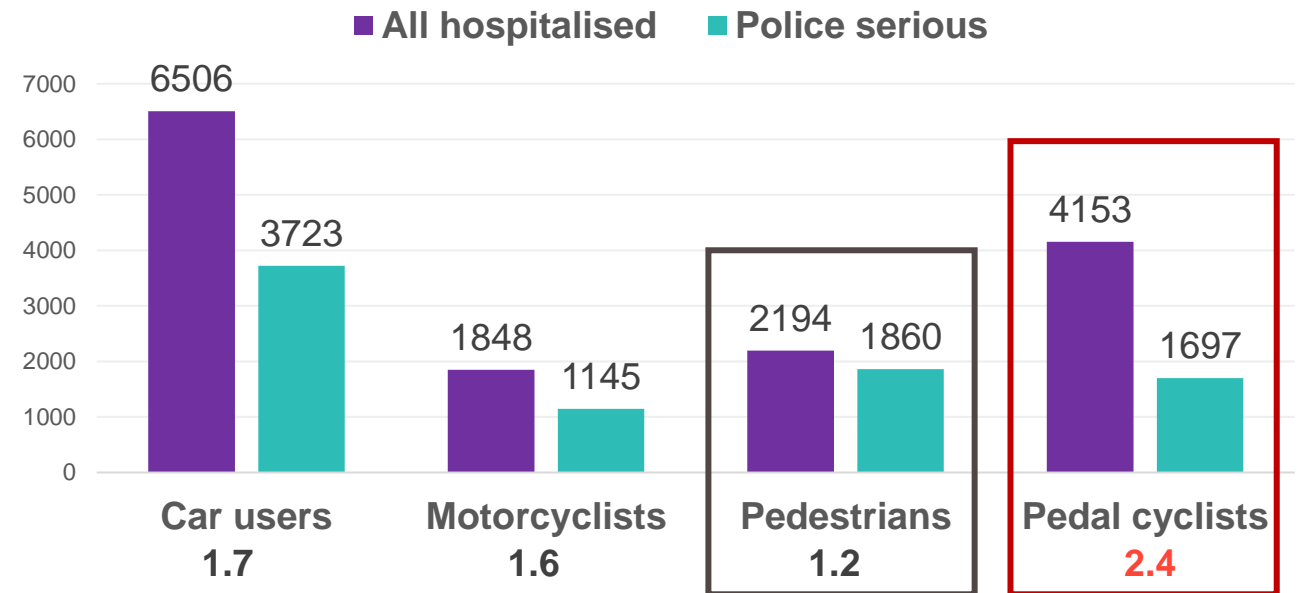
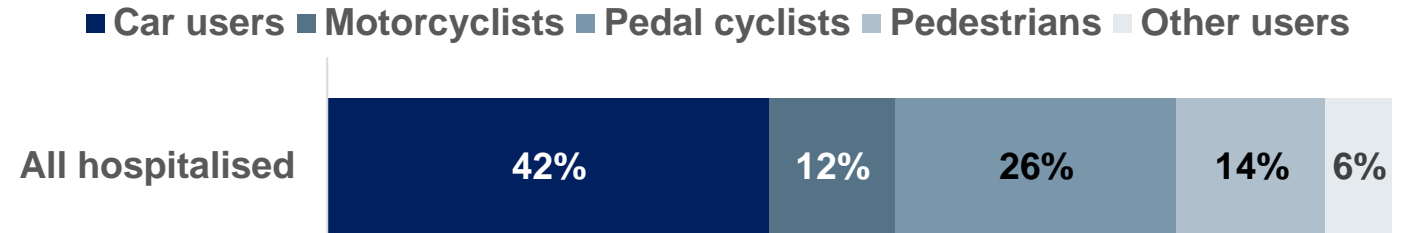
An injury for which the person is **detained in hospital as an 'in-patient'**, or **has any of the following injuries** whether or not detained in hospital: fractures, concussions, internal injuries, crushing, severe cuts and lacerations, or severe general shock requiring medical treatment.

All hospitalised casualties fall into the AGS definition of a serious injury, as they are all 'in-patients'.

Hospitalised casualties vs AGS serious injuries

Road user types – 2014-2021

- 42% hospitalised casualties were car users, and a 26% were pedal cyclists
- The number of hospitalised casualties was higher than the number of AGS serious injuries for each road user separately
- This difference seemed to be smaller for pedestrians and higher for pedal cyclists:
 - **There were between 2 and 3 hospitalised cyclists for each seriously injured cyclist recorded by AGS**



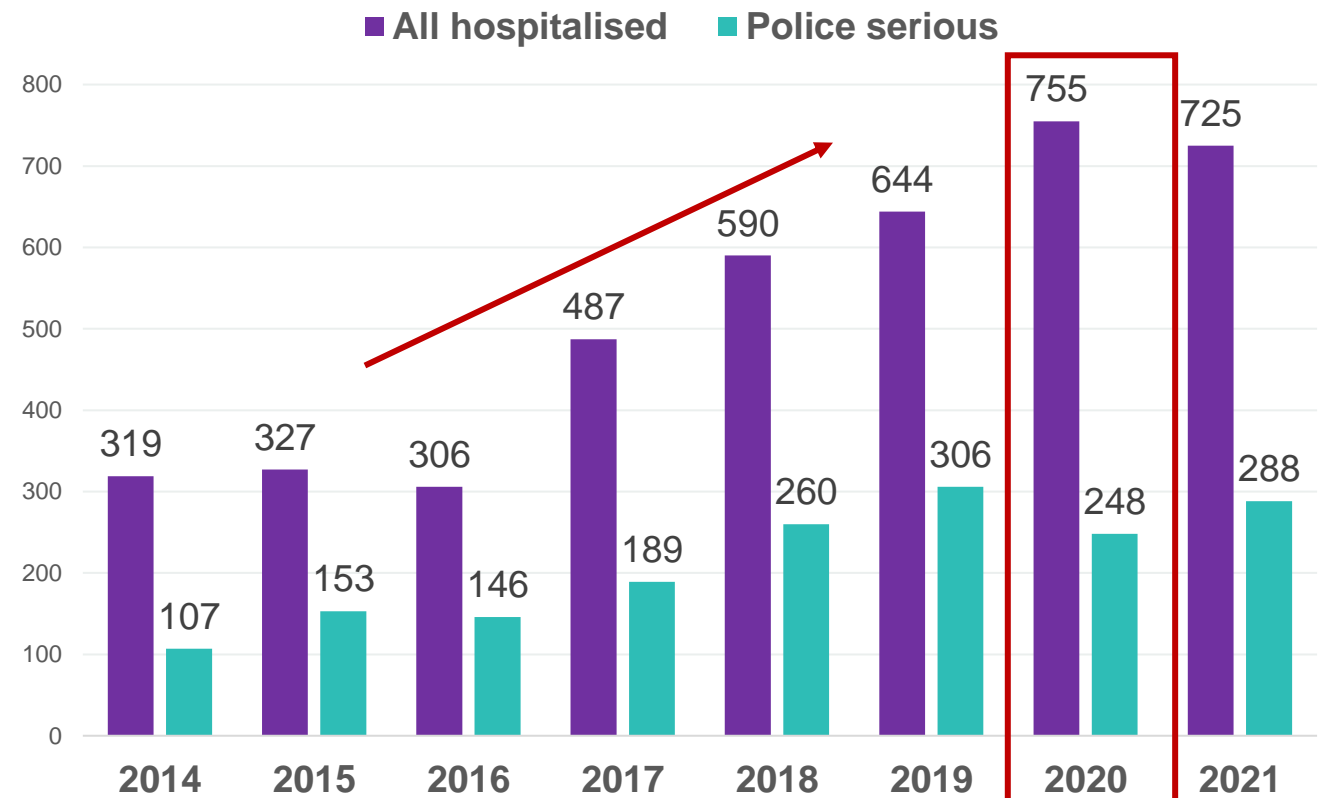
AGS data is current as of 24 September 2023. Data for 2020 onwards is provisional and subject to change. 13

Pedal cyclists



All hospitalised vs AGS seriously injured – 2014-2021

- The discrepancy between the number of cyclists in hospital and AGS records was observed each year
- In 2020, the number of AGS seriously injured cyclists declined but the number of hospitalised cyclists increased

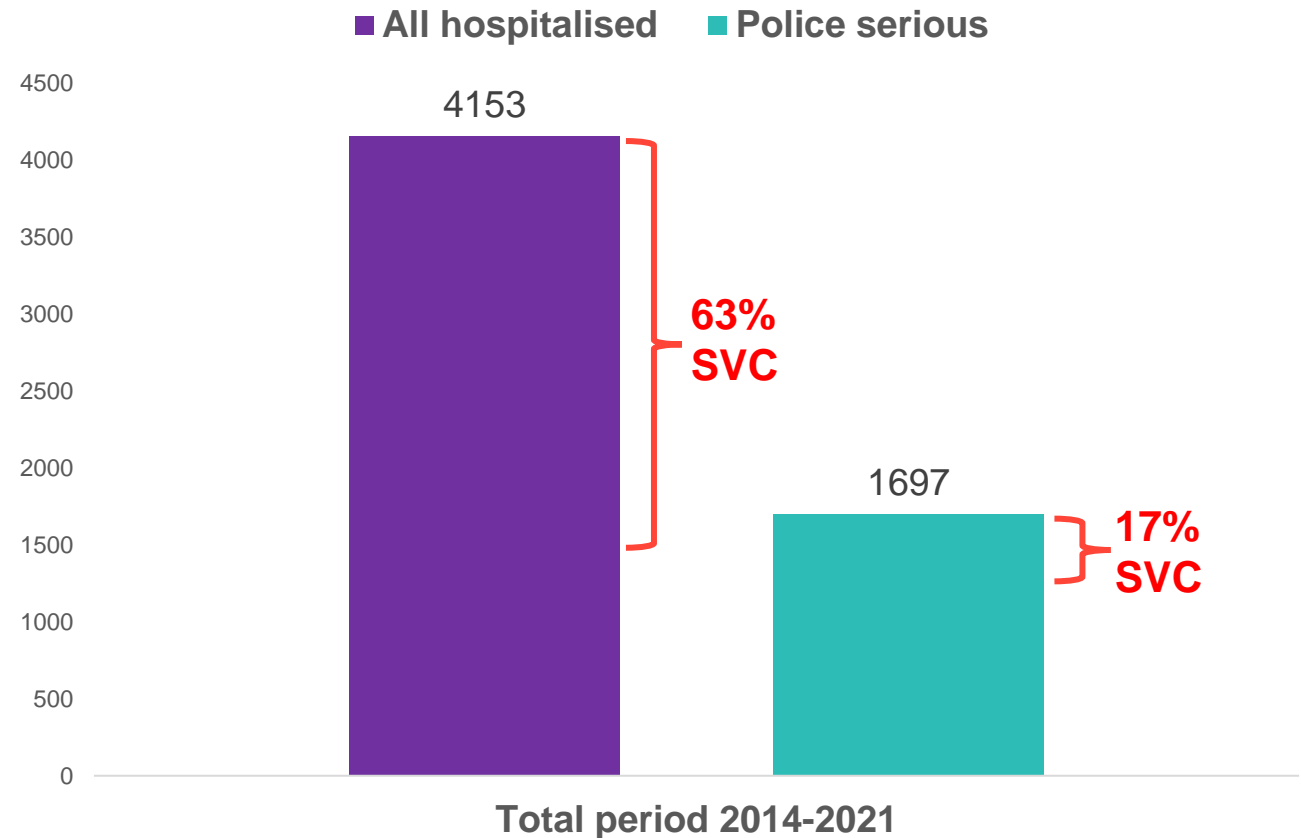


Pedal cyclists

All hospitalised vs AGS seriously injured – Total 2014-2021



- 63% of hospitalised cyclists were injured in **single vehicle collisions (SVC)** vs 17% of AGS serious injuries
- SVCs in hospital data increased over the period, even during 2020



What is a single-cyclist collision?



Definition and collision scenarios

- **Crash including one moving vehicle (the bicycle)**
- Most frequent **scenarios** (AGS data 2018-2022)*:
 - **Road surface** – oil, debris, potholes, wet surface, etc (14%)
 - **Lost control** – took sharp turn, lost balance, bicycle chain broke, braked suddenly, etc (13%)
 - Colliding with or (dis)mounting **Kerb/footpath** (10%)
 - **Avoiding another vehicle** (7%)
 - Collision with an **animal** or avoiding an animal (6%)
- **AGS recording less single-cyclist collisions may explain in part the overall underreporting of cyclists' injuries**

* Source: Cyclist spotlight report: fatalities and serious injuries (2018-2022), RSA Research Department.

Summary of totals and trends



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- As in other EU countries, a discrepancy between AGS and hospital records was observed in relation to the number of casualties recorded for each road user group.
- The total of hospitalised casualties over 2014-2021 was 15677, while the total of AGS recorded serious injuries was approximately half (8977).
- The AGS definition of a serious injury is broad, is not based on a medical assessment, and will include injuries not requiring admission to hospital.
- Hospital data includes all road users admitted to hospital following a road traffic collision, some of these collisions would not have been reported to AGS.
- The highest discrepancy between the two data sources was observed for pedal cyclists. The prevalence of single-cyclist collisions in hospital data is noteworthy and may explain this difference.
- The AIS scale and the methodology recommended by the EC provides us with a tool to analyse hospitalised casualties by severity of injury, in particular by MAIS3+.

MAIS3+ serious injuries in hospital data

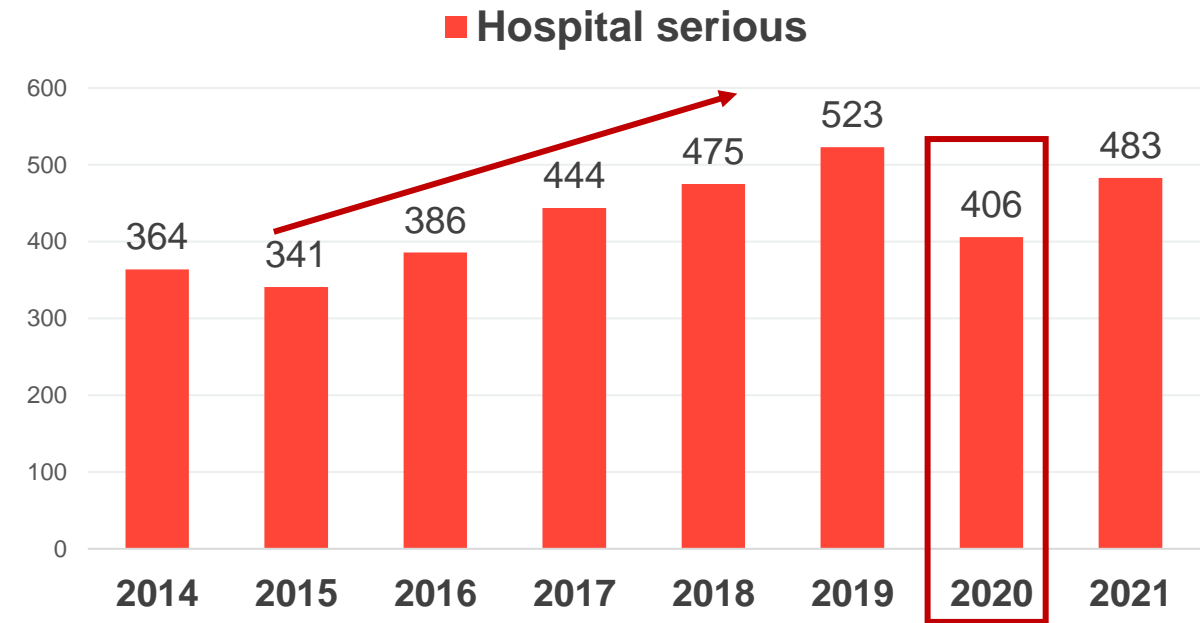
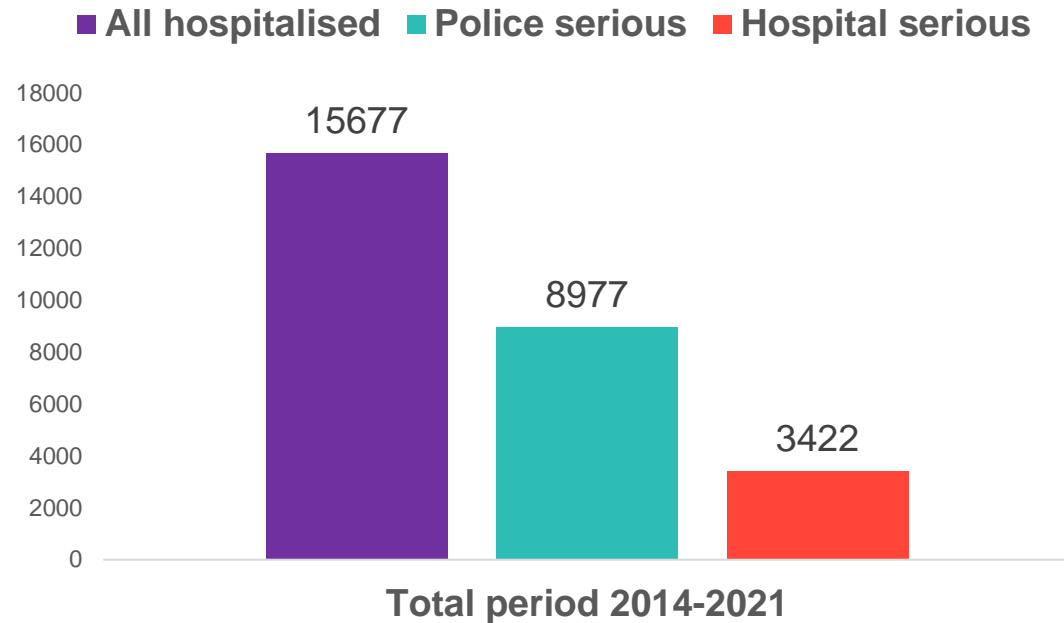
Period 2014-2021

MAIS3+ Serious injuries in hospital data



All road user types – 2014-2021

- 3,422 hospitalised casualties sustained MAIS3+ serious injuries (22% of total)
- The number of MAIS3+ serious injuries in hospital data increased over the period, and declined in 2020



MAIS3+ Serious injuries

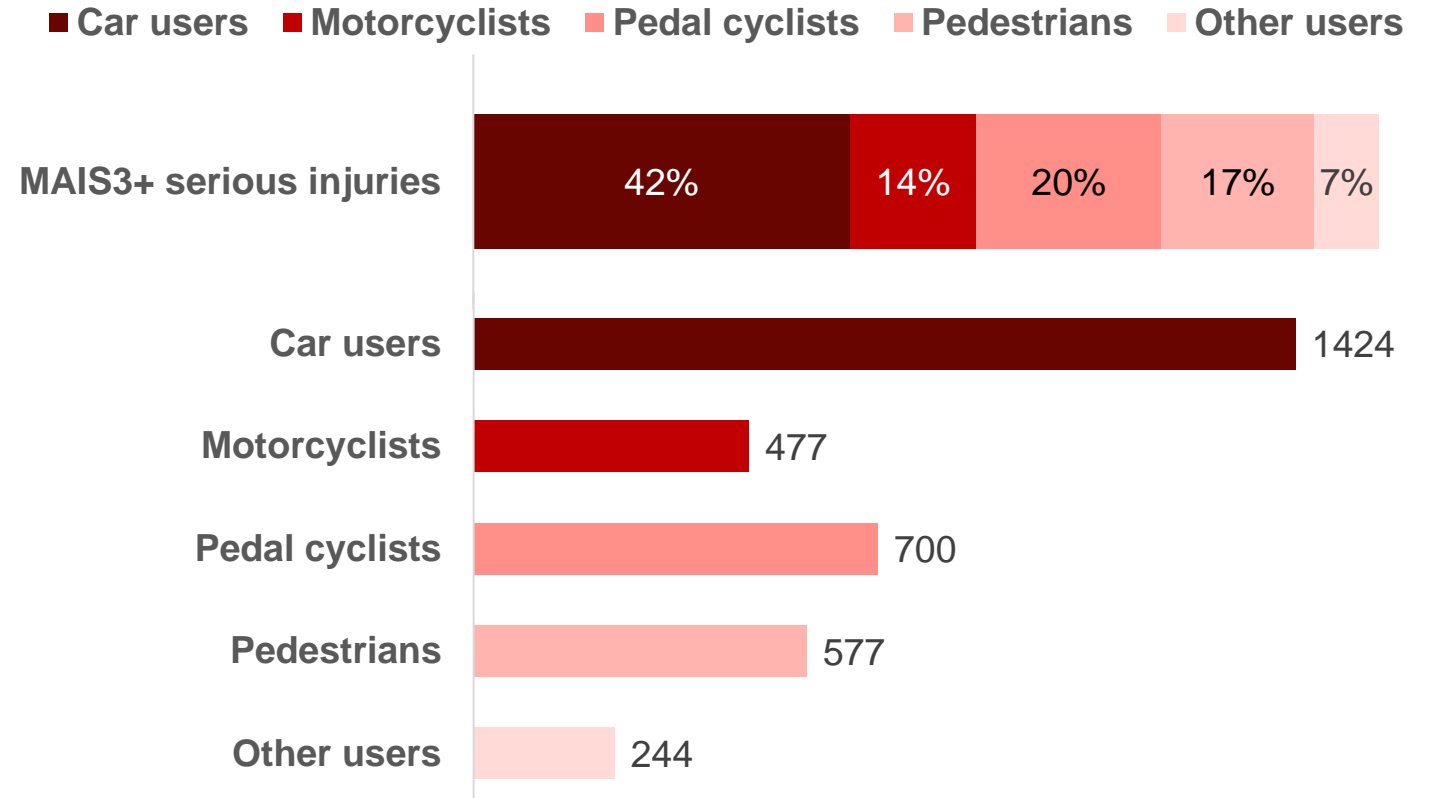
Road user types – Period 2014-2021



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- Of all casualties with MAIS3+ serious injuries in hospital:
 - 2 in 5 were car users (42%)
 - 1 in 5 were pedal cyclists (20%)



Serious injuries in Europe

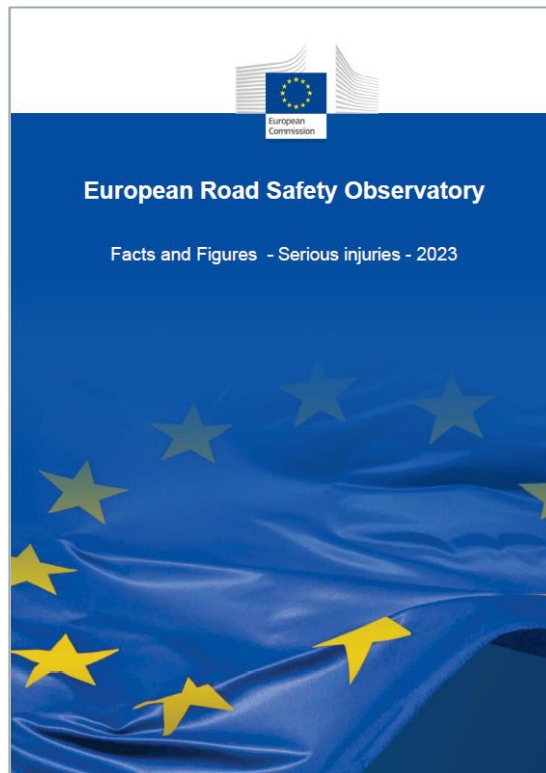
Using the MAIS3+ definition



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- We achieved our primary aim of reporting on MAIS3+ serious injuries to the European Commission



MAIS3+ serious injuries period 2018-2020

Country*	Average MAIS3+	MAIS3+ by 100,000 Population#
Netherlands	6,733	39
Belgium	3,508	31
Estonia	374	28
Italy	16,772	28
France	15,230	23
Portugal	2,217	22
Germany	14,605	18
Ireland	468	10
Lithuania	120	4

*Countries included in this analysis are those that provided MAIS3+ figures for the entire period 2018-2020. Source: European Road Safety Observatory, 2023.

#Based on the average population per country for the period 2018-2020. Source: Eurostat.

Characteristics of MAIS3+ seriously injured pedal cyclists

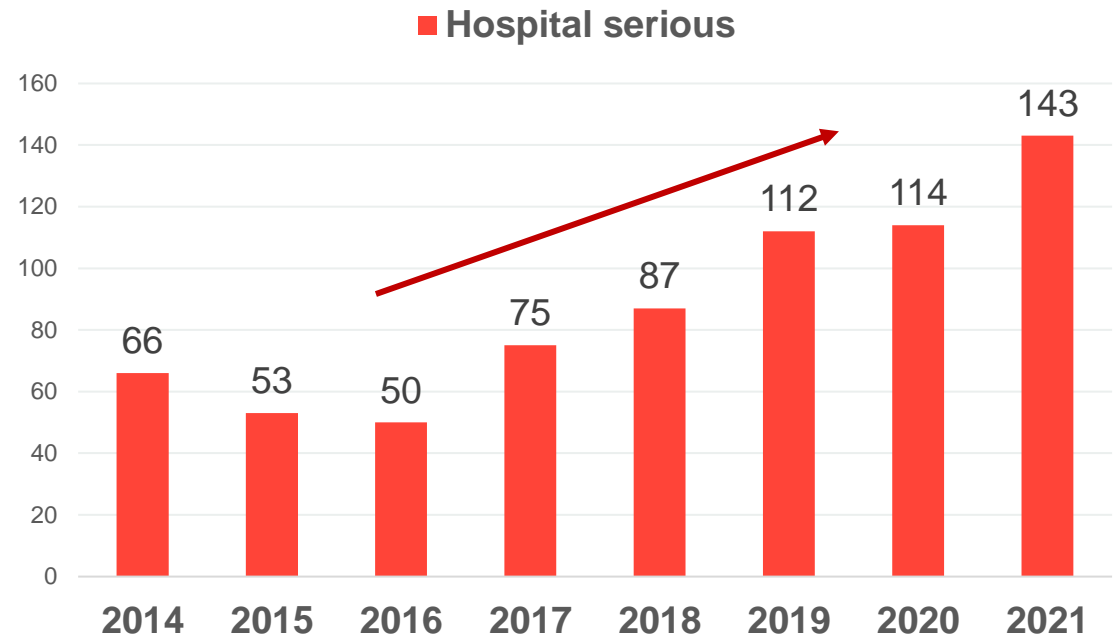
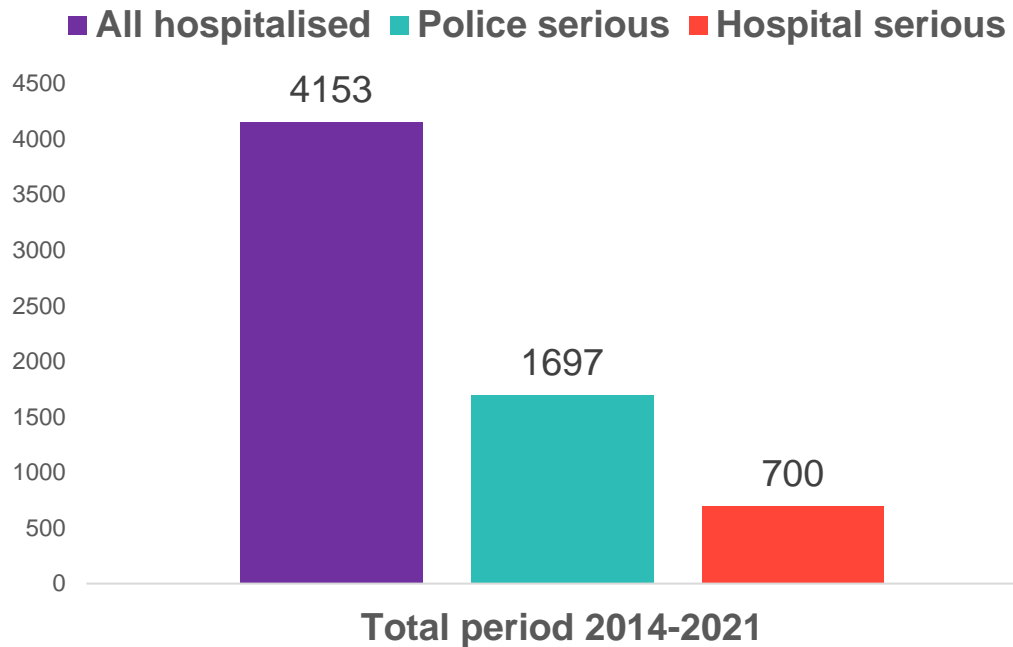
Hospital data

Period 2014-2021

Pedal cyclists

Total 2014-2021

- There were 700 hospitalised cyclists with MAIS3+ serious injuries
- There is an upwards trend in the number of hospitalised cyclists with MAIS3+ serious injuries over the period



Cyclists with MAIS3+ serious injuries



Characteristics – Total 2014-2021 – Hospital data

Gender

8 in 10 were males



Age

Almost 4 in 10 were aged 45-64 years

Hospital serious

0-24	19%
25-44	26%
45-64	38%
65+	17%

County

4 in 10 were County Dublin residents



Season

3 in 10 were admitted to hospital over Summer months



Day of week

19% were admitted to hospital on **Sundays**, and 15% on **Saturdays**

Time of day

Admission to hospital was more frequent after 4pm

MAIS3+

8am-4pm	18%
4pm-12am	48%
12am-8am	33%

Collision type

58% seriously injured in **single cyclist collisions**

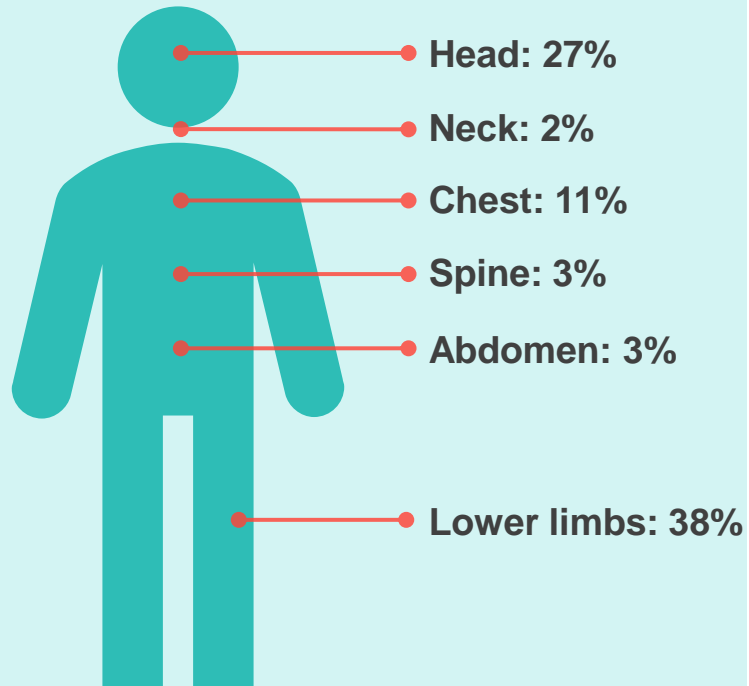


Cyclists with MAIS3+ serious injuries



Injuries – Total 2014-2021 – Hospital data

The most injured body part for cyclists with a single serious injury:



- Casualties may have a single or multiple serious injuries
- 83% of cyclists (n= 583) sustained a single serious injury, which is the most seriously injured body part for these casualties (shown on figure)
- 58% of serious head injuries were **intracranial injuries**, and 42% were fractures
- 78% of serious chest injuries were in **intra-thorax organs**, and 22% were fractures
- All spine injuries were injuries in the **spinal cord**
- All serious lower limb injuries were **fractures**
- 17% (n= 177) cyclists sustained **multiple serious injuries** in the same or in different body parts

Cyclists with MAIS3+ serious injuries



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Days at hospital and discharge destination – Total 2014-2021 – Hospital data



Days at hospital as in-patients:

- 27% of cyclists spent 2 days or less at hospital
- **51% spent 5 days or more at hospital**
- The mean length of stay at hospital was **10.13 days**
- 96/700 (14%) of cyclists were at the ICU. The mean length of stay at the ICU for these cyclists was 13.78 days



After discharge from hospital:

- **78% of cyclists were sent home**
- 16% were transferred to another hospital
- 2% were sent to a nursing home or long-term accommodation facility
- 1% were transferred to a rehabilitation facility after hospital discharge

Summary of MAIS3+ serious injuries in hospital data








	Car occupant	Motorcyclists	Pedal cyclists	Pedestrians
Two most seriously injured body parts (%)	Chest (30%)	Lower limbs (31%)	Lower limbs (38%)	Multiple (31%)
	Multiple (23%)	Multiple (30%)	Head (27%)	Lower limb/Head (28% each)
Mean number of days at hospital	17.22	13.68	10.13	18.61
Sent home at discharge (%)	61%	66%	78%	61%
Sent to another hospital (%)	29%	29%	16%	27%
Sent to nursing home / other long-term accommodation (%)	6%	1%	2%	10%
Sent to rehabilitation (%)	1%	<1%	1%	2%

Summary and Conclusions

In summary

MAIS3+ serious injuries in hospital data

- 
 Using hospital records we can accurately determine the number and severity of in-patient injuries using the AIS scoring scale.
- 
 The number of MAIS3+ serious injuries ranged from 364 in 2014 to a peak of 523 in 2019. In 2020, there was a reduction in line with the pandemic (406) but they increased again in 2021 to 483.
- 
 Hospital records provide important information on the casualty that is not available in AGS records (injury characteristics, clinical outcomes). It complements AGS data providing a more holistic understanding of serious injuries.
- 
 Cyclists accounted for 20% of all MAIS3+ seriously injured casualties in hospital data.
- 
 Seriously injured cyclists were **more frequently** males, 45 years or older, from Co Dublin, admitted to hospital in Summer or over the weekend, with an average length of stay of 10 days. They sustained serious lower limb or head injuries, and at discharge from hospital 16% of them were sent to another hospital for continued care.



Next steps

Reports and future research

- Publication of **reports** on serious injuries
 - Focus on MAIS3+ seriously injured casualties
 - Comparisons with AGS information where possible

List of reports	Period	Sources of data
<i>Pedal cyclists</i>	2014-2022	<ul style="list-style-type: none"> • Hospital discharge records (HIPE) • AGS collision data
<i>Pedestrians</i>		
<i>Motorcyclists</i>		
<i>Car occupants</i>		
<i>Other road users</i>		
<i>Young / Senior casualties</i>		

- Exploration of complementary data sources on serious injuries: the **Major Trauma Audit** database
 - Focused on the most severely injured casualties: major trauma is any injury with the potential to cause prolonged disability or death.
 - Collaboration with National Office of Clinical Audit (NOCA)



Acknowledgements

- RSA Research Department
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- NOCA Data Analytics team



NOCA National Office of
Clinical Audit
MTA Major Trauma
Audit



Thank you!



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NO ROAD DEATHS
OR SERIOUS INJURIES BY 2050