Serious injuries in pedal cyclists in hospital and An Garda Síochána data

Period 2014-2022

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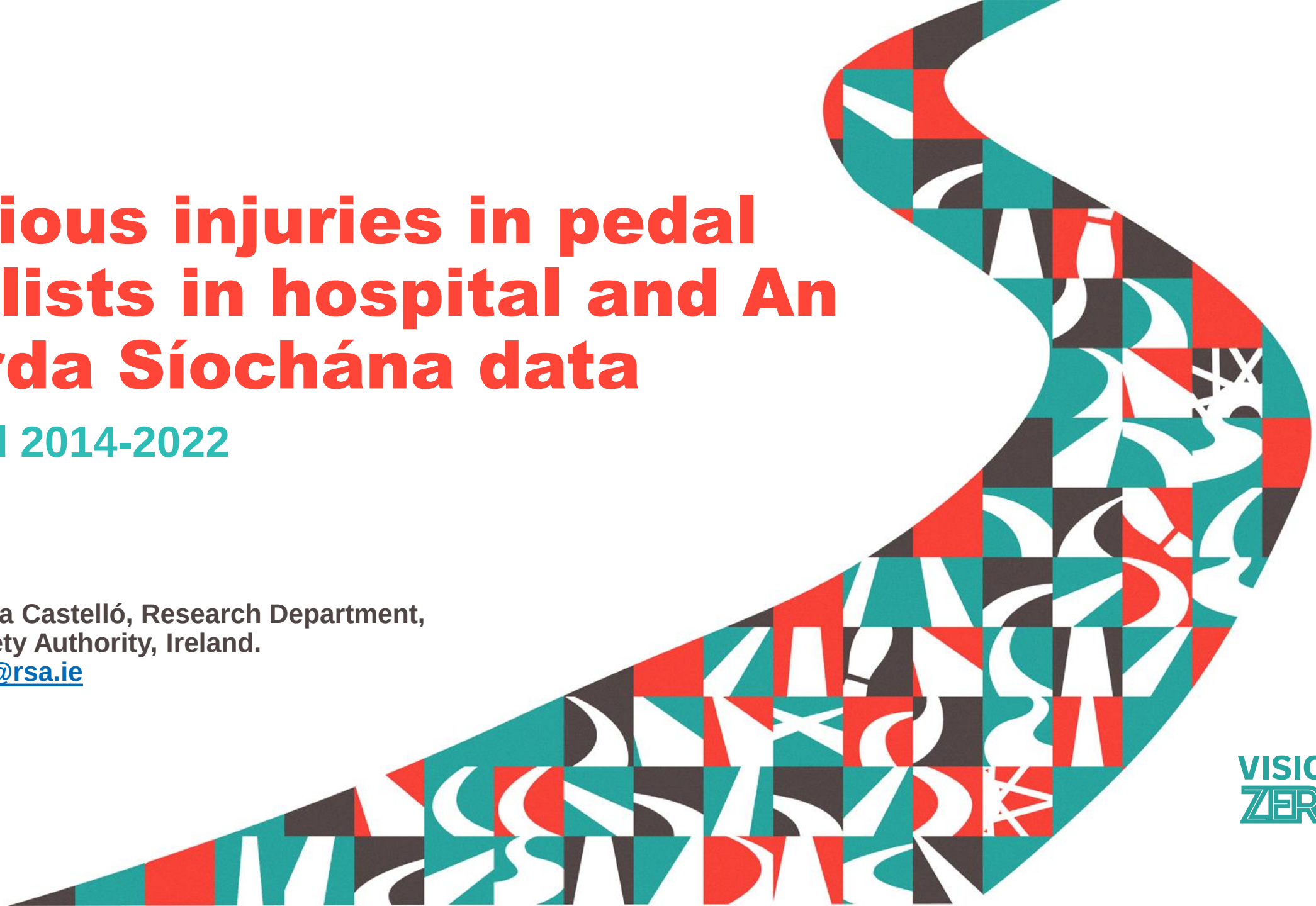


VISION ZERO

Background

- This report provides an overview of serious injuries among cyclists over 2014-2022.
- The EC has requested all EU Member States to report on serious injuries using hospital data, to complement police data on serious injuries. It is internationally acknowledged that police data alone will understate the number of serious injuries from road traffic collisions; therefore it is important that both sources of data are reported in Ireland to provide a holistic picture of the serious injury problem.
- This report is the first of a series of reports on serious injuries in Ireland over the same period.
- For the preparation of this report series, two sources of data were used:
  - **Hospital records** from the **Hospital In-Patient Enquiry (HIPE) database**, and
  - **Collision records** from the **Irish Road Traffic Collision database**, transferred from An Garda Síochána (AGS) to the RSA.
- The HIPE database is managed by the HSE and includes demographic and clinical information on casualties admitted to acute hospitals in Ireland.
- AGS information is provisional and subject to change. This means that AGS serious injury numbers presented here may change at a later date when new information becomes available.
- Details on the **methodology** that we use to report on serious injuries from hospital data can be found in a separate report: "*Serious injuries data in Ireland. Methodology report*".

Definitions of injury

Hospital data

- We follow a medical definition of a serious injury, based on an international validated injury severity scoring scale, the **Abbreviated Injury Scale (AIS)***.
- The AIS scale allows to assign an injury severity score between 1 (minor) to 6 (critical) to each hospitalised casualty.
- A casualty may have one or more injuries recorded in their hospital chart. We first assign an AIS score to each injury, and then determine the maximum AIS score assigned to each casualty.
- **Seriously injured casualties are those with at least one injury with a maximum AIS score of 3 or more (MAIS3+).**
- Casualties with a maximum AIS score of 2 or less (**MAIS2-**) are defined as having injuries of minor-to-moderate severity.
- We add the number of casualties having MAIS3+ and MAIS2- scores to obtain the total number of **hospitalised casualties**.
- Please see "*Serious injuries data in Ireland. Methodology report*" for more details on the definitions of injury.

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

Definitions of injury

An Garda Siochána data

- The definition of a serious injury followed by AGS is as follows:
  - A serious injury is 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'.
- Please see "*Serious injuries data in Ireland. Methodology report*" for more details.

Report Outline

- **Trends**
- **Characteristics of all hospitalised cyclists (2014-2022) and comparison with AGS serious injuries**
  - Demographics: age and gender
  - County
  - Collision type
  - Characteristics of injuries sustained, length of stay at hospital, and discharge destination (hospital data only)
- **Characteristics of MAIS3+ cyclists in hospital records (2014-2022)**
  - Demographics: age and gender
  - Month, Day of week and Time of day of admission to hospital
  - County of residence
  - Collision type
  - Characteristics of injuries sustained, length of stay at hospital, and discharge destination

All hospitalised and AGS serious injuries

2014-2022

Summary of results

All hospitalised cyclists and AGS serious injuries – 2014-2022

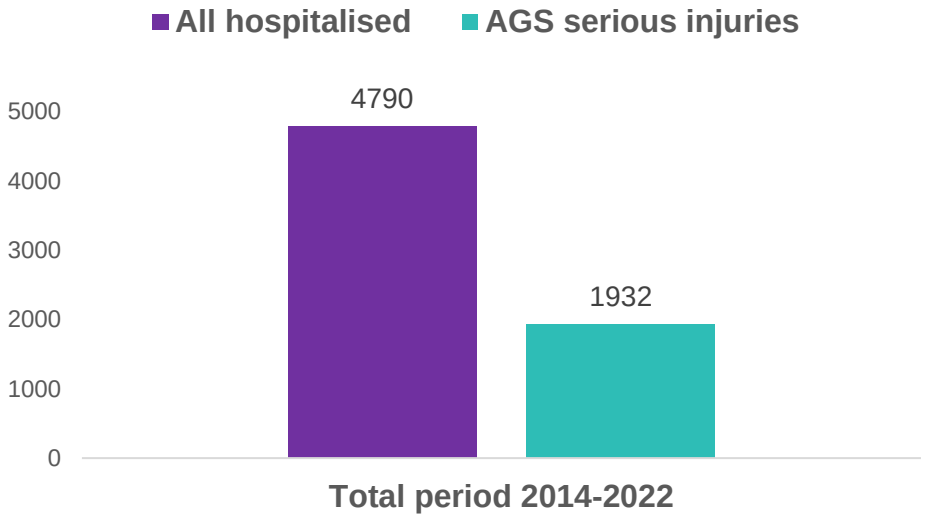
- The total of hospitalised cyclists over 2014-2022 was 4790, while the total of AGS recorded serious injuries was 1932.
- This discrepancy between data sources is in line with international evidence showing that using police data alone understates the number of serious injuries from road traffic collisions in general, and of cyclist injuries in particular.
- There may be multiple factors explaining the discrepancy in the total number of cyclists recorded in each data source.
- For instance, hospital data includes all cyclists admitted to hospital following a road traffic collision*, and some of these collisions would not have been reported to AGS. Besides, 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.
- The prevalence of single-cyclist collisions in hospital data is noteworthy and may also contribute to explain this difference.
- Hospitalised cyclists were more frequently males, aged 35-54 years, and residents of County Dublin. Seriously injured cyclists in AGS records had similar characteristics but were more frequently aged 25-44 years.
- Over half of hospitalised cyclists sustained at least one upper limb injury, this was the most common type of injury sustained.

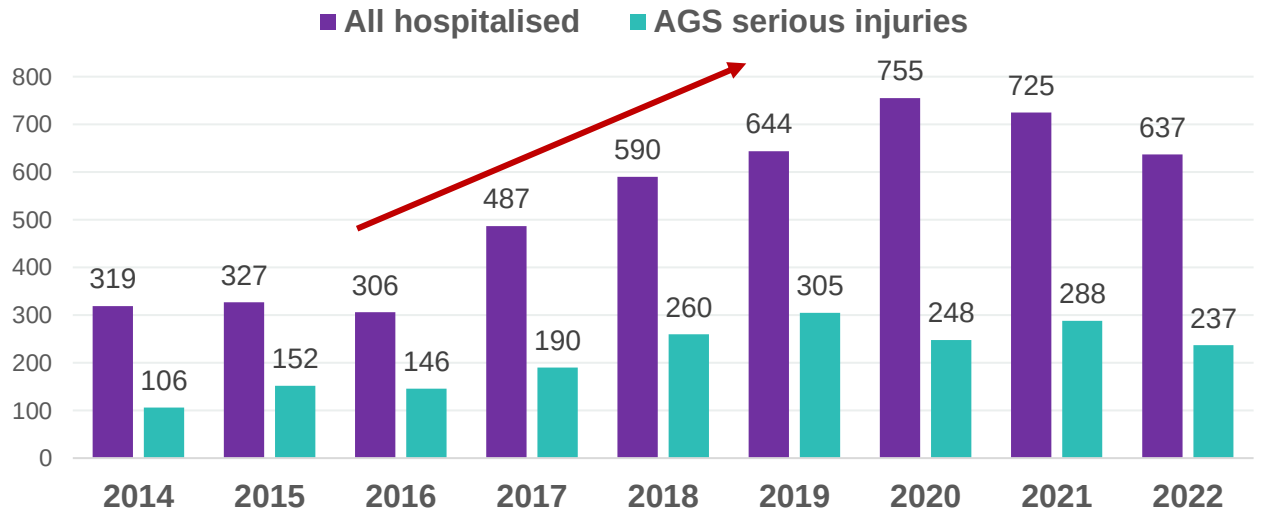
* Please see "*Serious injuries data in Ireland. Methodology report*" for more information on inclusion and exclusion criteria.

Total and trends

All hospitalised and AGS serious injuries – 2014-2022

- Over 2014-2022, a total of 4,790 cyclists were admitted to hospital as in-patients with injuries from road traffic collisions. Over the same period, AGS statistics indicated that 1,932 cyclists were seriously injured.
- There was a marked increase in the number of injured cyclists in both hospital and AGS records over the period.
- The discrepancy in the number of records in hospital and AGS statistics was observed throughout all the years under study. This may be explained by the fact that some casualties recorded in hospital data would not have been reported to AGS. In addition, 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.



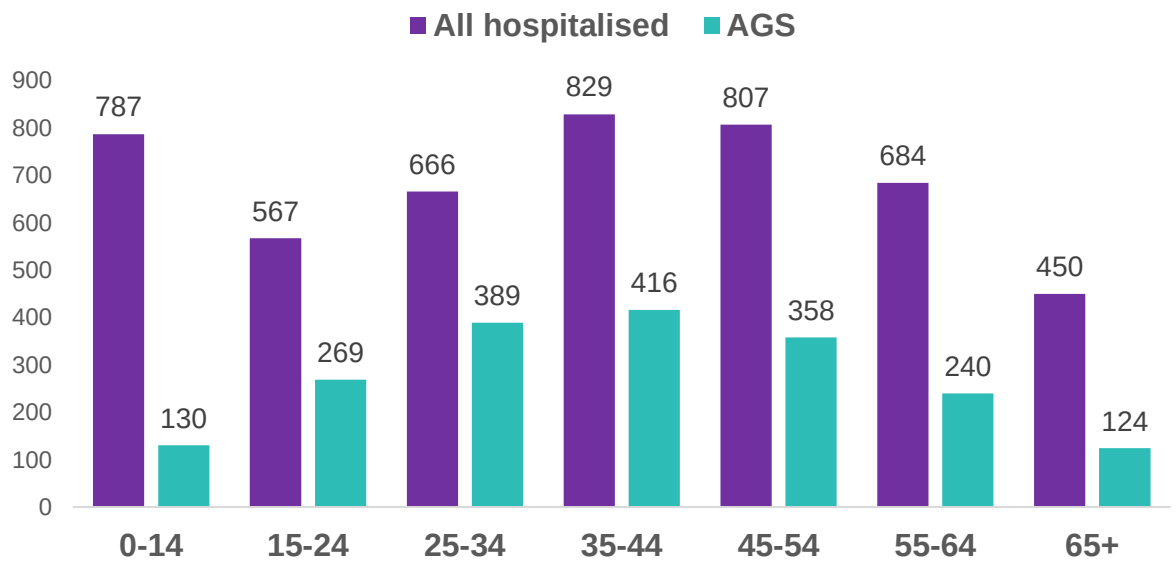


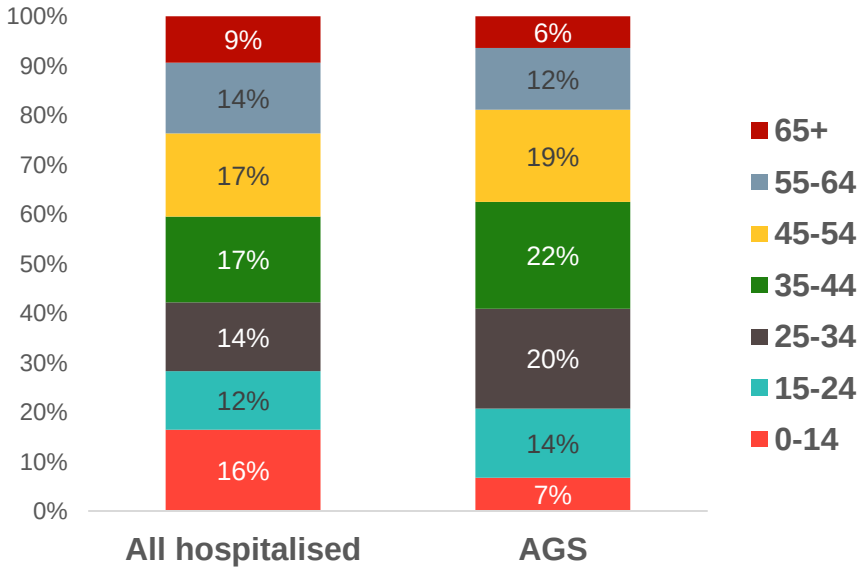
AGS data is current as of 20 October 2023. Data for 2020 onwards is provisional and subject to change.

Age

All hospitalised and AGS serious injuries – 2014-2022

- 34% of hospitalised cyclists were aged 35-54 years. In AGS records, 42% of seriously injured cyclists were aged 25-44 years
- The number of injured cyclists was 6.1 times higher in hospital than in AGS records for those aged 0-14 years, and 3.6 times higher for those aged 65+ years.





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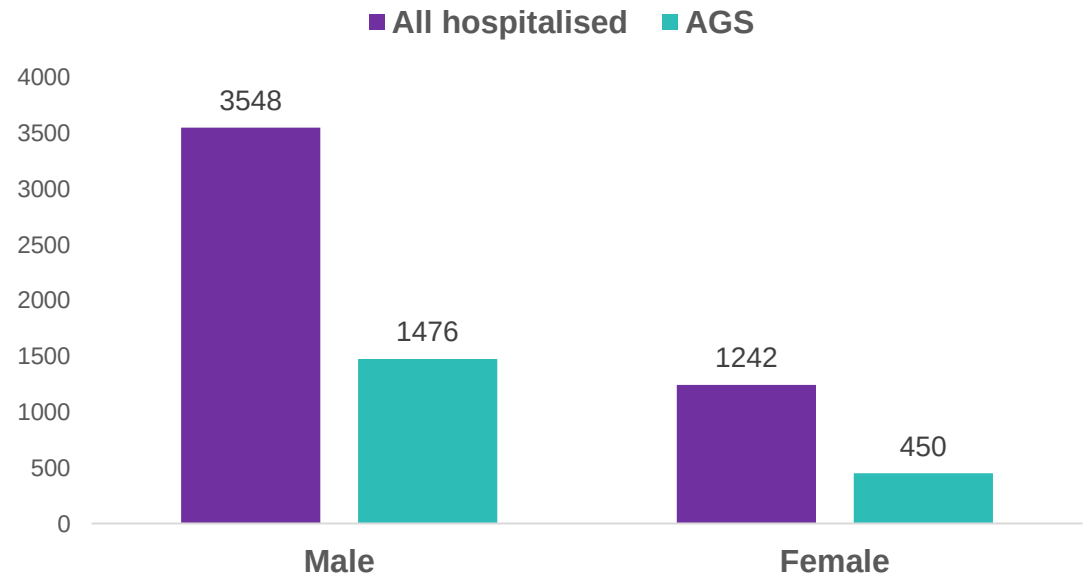
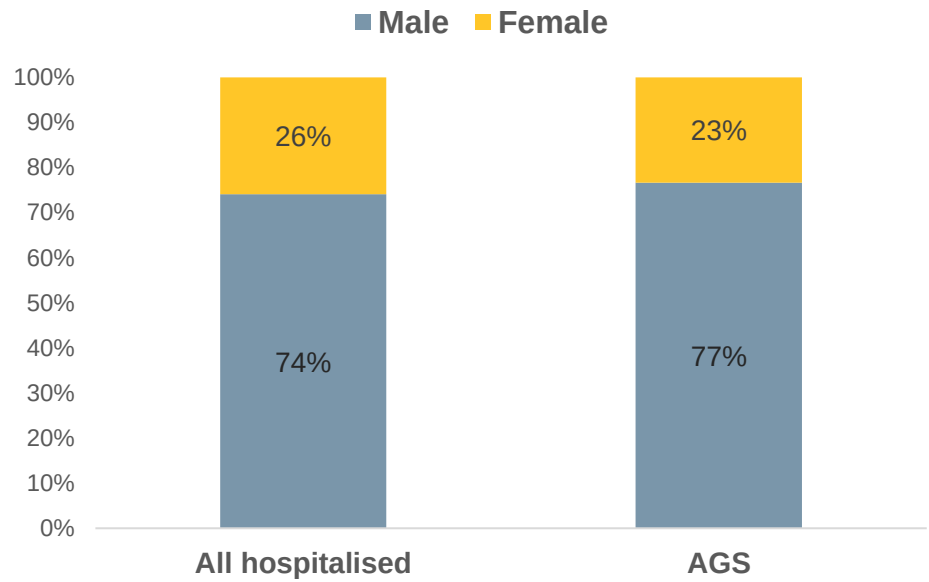
Gender

All hospitalised and AGS serious injuries – 2014-2022

- Over 70% of cyclists recorded in both hospital and AGS data were males.
- The share of males was higher in all age groups.





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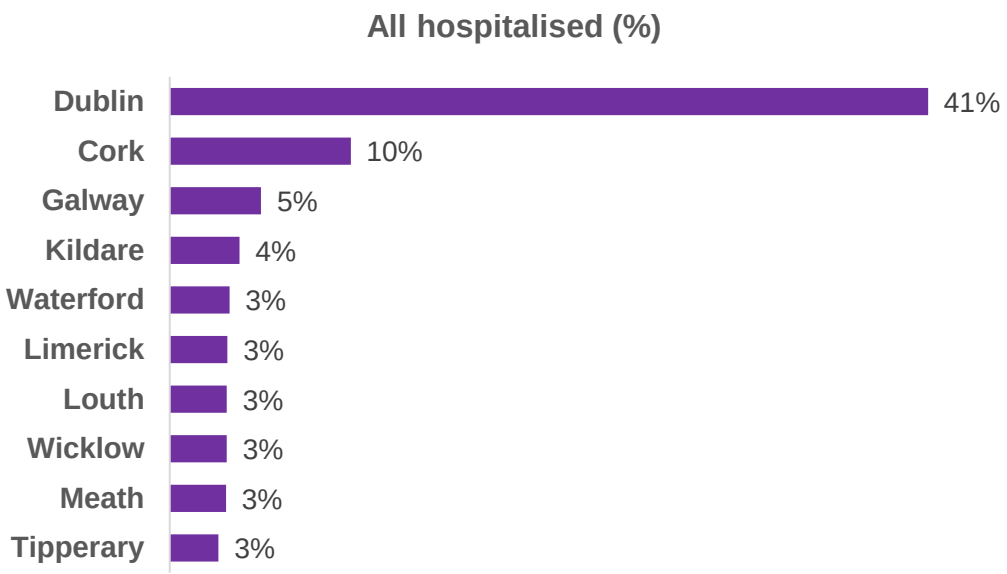
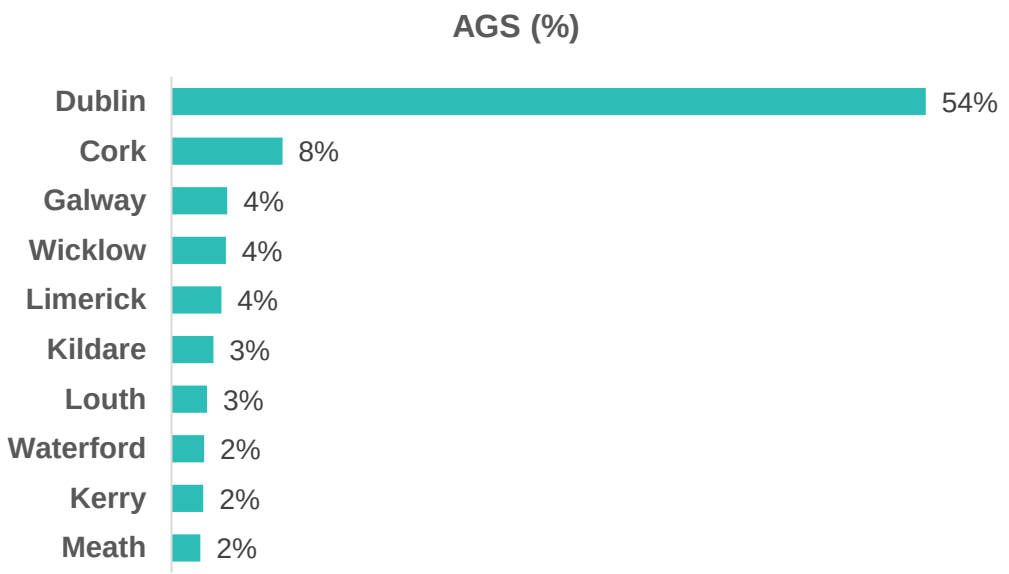
County

All hospitalised and AGS serious injuries – 2014-2022

- Dublin was the county with the highest number of hospitalised cyclists (1944) and AGS serious injuries (1040), followed by Cork and Galway.
- In hospital data, the county indicates the residence of the casualty, whereas in AGS records it refers to the location of the collision.





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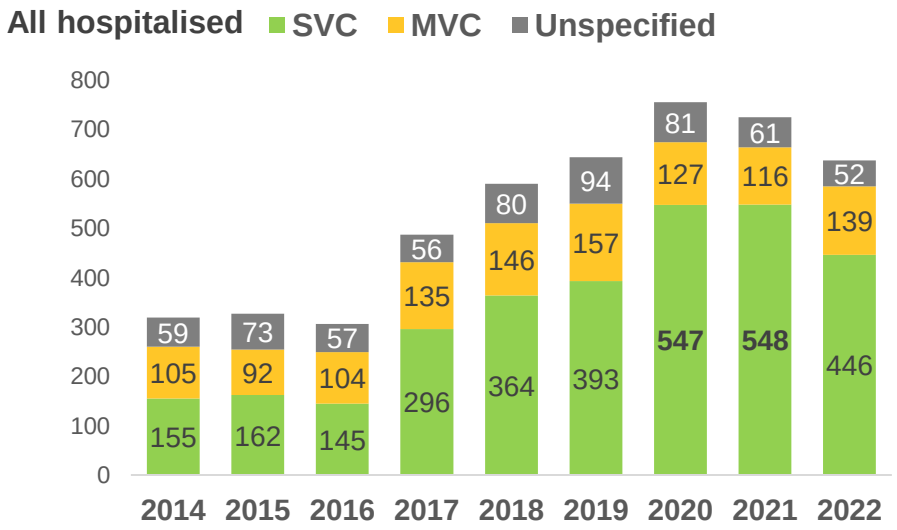
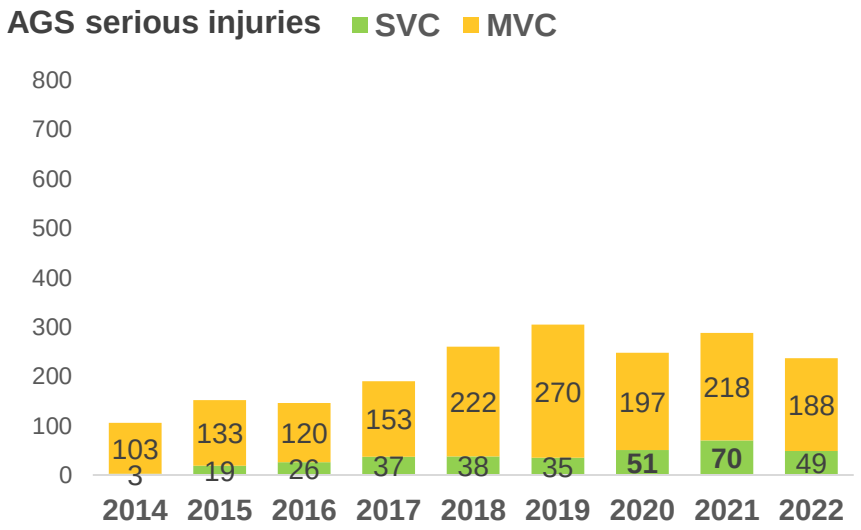
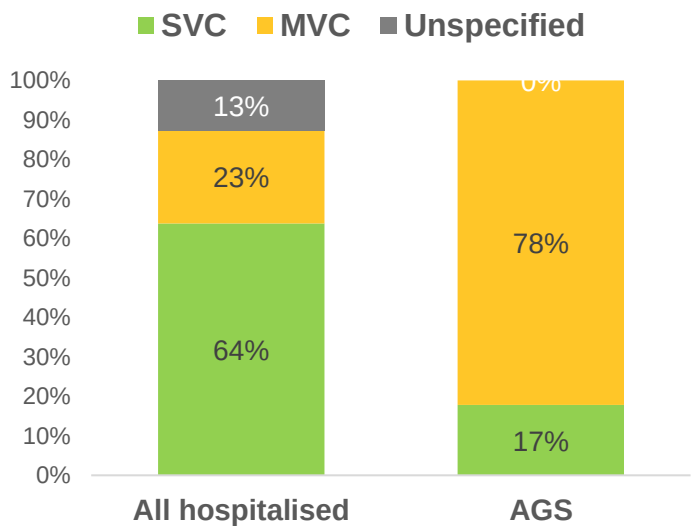
Collision type

All hospitalised and AGS serious injuries – 2014-2022

- 64% of hospitalised cyclists were injured in single-vehicle collisions (SVC), whereas 78% of AGS seriously injured cyclists were injured in multi-vehicle collisions (MVC).
- A SVC is a crash including one moving vehicle (the bike). Frequent scenarios for SVC according to AGS data (2018-2022) were an interaction of the bike with the road surface, the loss of control of the bike, a collision with a kerb/footpath, or avoidance of another vehicle.
- The number of cyclists injured in SVC was the highest in 2020-2021, in both datasets.
- 85% of MVC in AGS records were collisions with a car, truck or van (n=1304). This difference in the proportion of SVC may also contribute to explain the discrepancy in the number of cyclists in each data source.







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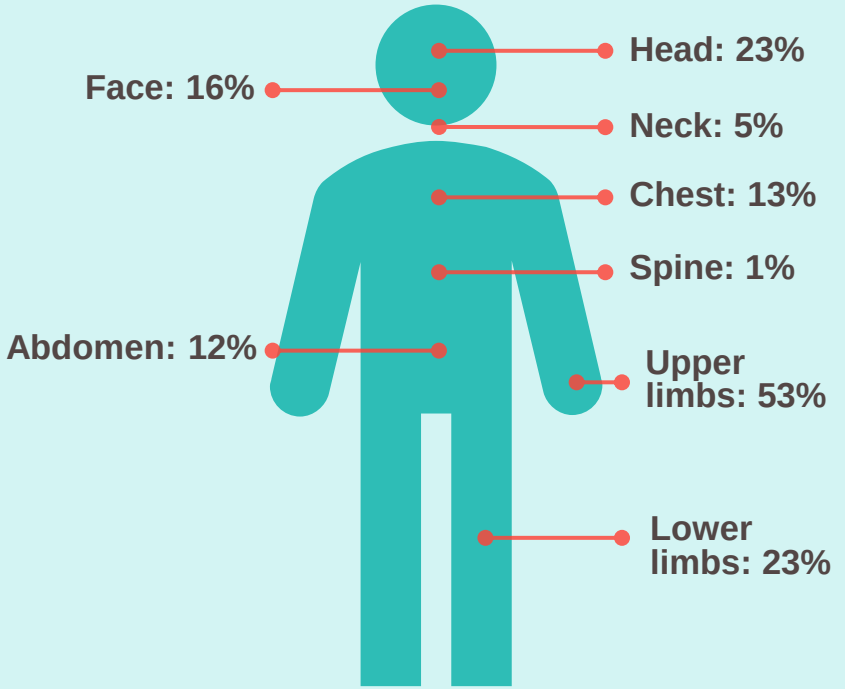
Injuries sustained*

All hospitalised – 2014-2022

Body part where at least one injury was sustained (% Yes)



- Casualties may have sustained a single or multiple injuries of any severity.
- 50% of hospitalised cyclists sustained one injury.
- The other half of casualties sustained 2 or more injuries in the same or in different body parts.
  - The mean number of injuries for these cyclists was of 4.41, with a minimum of 2 and a maximum of 22 injuries.
  - 55% of hospitalised cyclists with multiple injuries sustained 3 or more injuries in the same or in different body parts.
- Upper limb injuries were fractures (86%), open wounds (12%) and superficial injuries (7%).
- Lower limb injuries were fractures (67%), open wounds (22%) and superficial (16%)
- Half of head injuries were brain injuries (51%), 34% were open wounds, 22% fractures, and 18% superficial injuries.

* Based on information from the ICD-10-AM injury codes recorded for each casualty in HIPE. Percentages represent the proportion of casualties with an injury or injury type in each body part.

Length of stay at hospital

All hospitalised – 2014-2022

- 47% of hospitalised cyclists stayed 1 day or less at hospital as in-patients.

All hospitalised cyclists		
Number of days	**All (4790)**	**%**
1 day or less	2240	47%
2 days	866	18%
3 to 4 days	738	15%
5 days or more	946	20%
Mean (SD)	3.98 (11.76)	
Stayed at ICU 1+ days (% yes)	183 (4%)	
Mean LOS at ICU (SD)	10.11 (21.13)	

Destination at discharge

All hospitalised – 2014-2022

- At discharge from hospital, 91% of hospitalised cyclists were sent home and 7% were transferred to another hospital for continued care.

All hospitalised cyclists		
Destination	**All (4790)**	**%**
Home	4365	91%
Nursing home or other long-term accommodation	45	1%
Transfer to rehabilitation facility	8	<1%
Transfer to hospital	319	7%
Other	53	1%

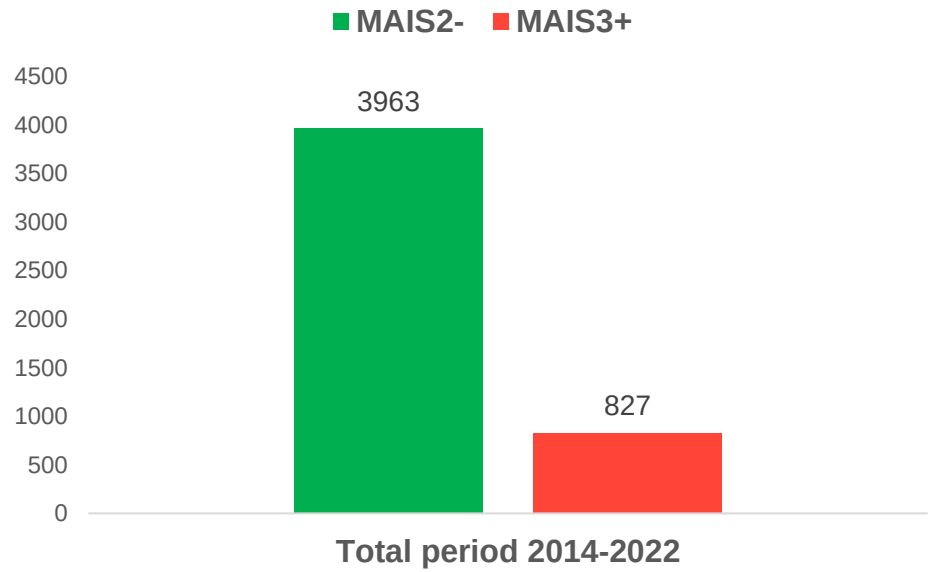
Injury severity

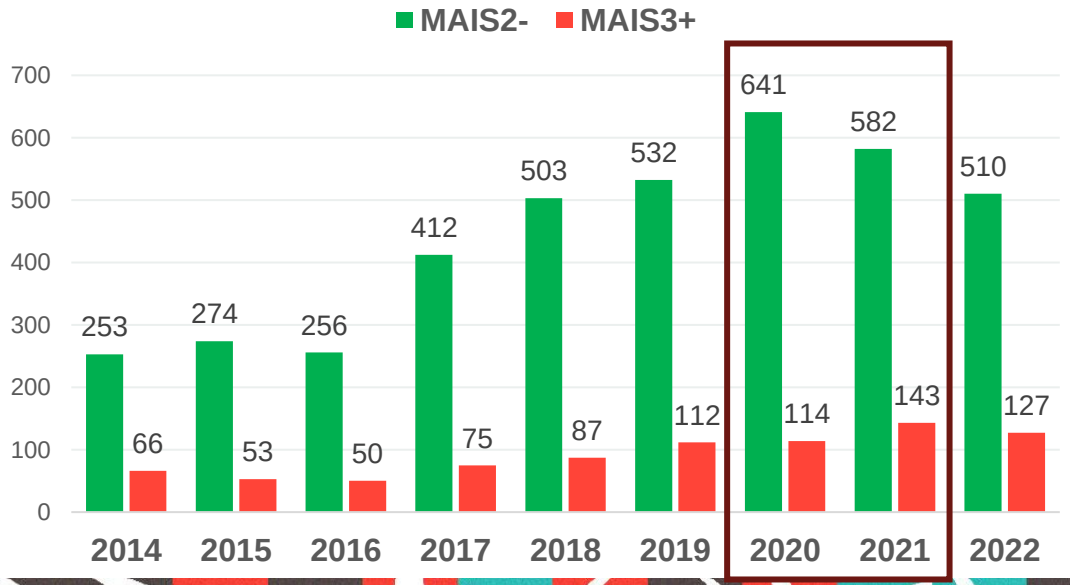
2014-2022 – Hospital data

Total and trend

MAIS2- and MAIS3+ cyclists – 2014-2022

- We assigned an injury severity score to all hospitalised cyclists (4,790) using the AIS scale and determined the maximum score, to know the number of casualties who sustained clinically serious injuries (see "*Serious injuries data in Ireland. Methodology report*").
- 83% of all hospitalised casualties (3063) sustained MAIS2- injuries (minor to moderate severity), and 17% of hospitalised casualties (827) sustained MAIS3+ injuries (serious injuries).
- The number of MAIS2- and MAIS3+ injuries increased over the period, and was the highest over 2020-2021.





Characteristics of MAIS3+ Cyclists

2014-2022

Summary of results

MAIS3+ cyclists – 2014-2022

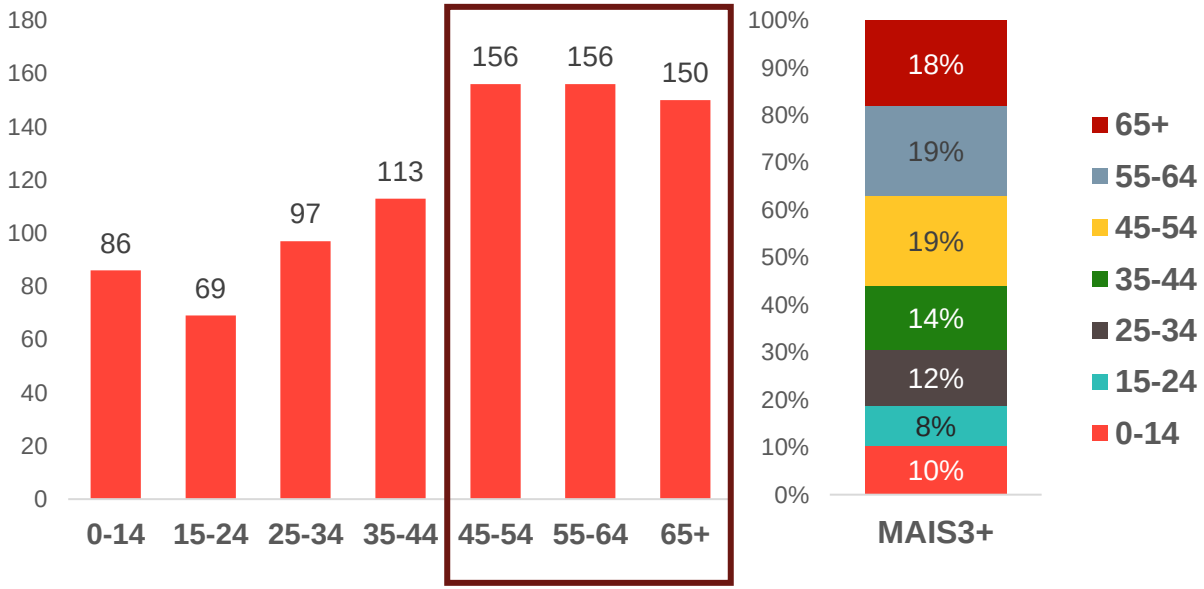
- 17% of all hospitalised cyclists sustained MAIS3+ injuries, these being the clinically most serious injuries among hospitalised casualties.
- Of the years under study, the highest number of MAIS3+ cyclists admitted to hospital was recorded in 2021 (143).
- MAIS3+ cyclists were more frequently males, 45 years or older, residents in Co Dublin, admitted to hospital in Summer or over the weekend, with an average length of stay of 10.77 days.
- They were more frequently involved in single-vehicle collisions, sustained serious lower limb or head injuries, and were sent home at discharge from hospital, although 16% were sent to another hospital for continued care.
- MAIS3+ cyclists involved in single-cyclist collisions sustained more frequently a single serious injury in the lower limbs, whereas those involved in multi-vehicle collisions sustained more frequently multiple serious injuries in the same or different body parts.
- MAIS3+ cyclists aged 65+ years were more frequently in hospital as in-patients for 5 days or more.

* Please see "*Serious injuries data in Ireland. Methodology report*" for more information on inclusion and exclusion criteria.

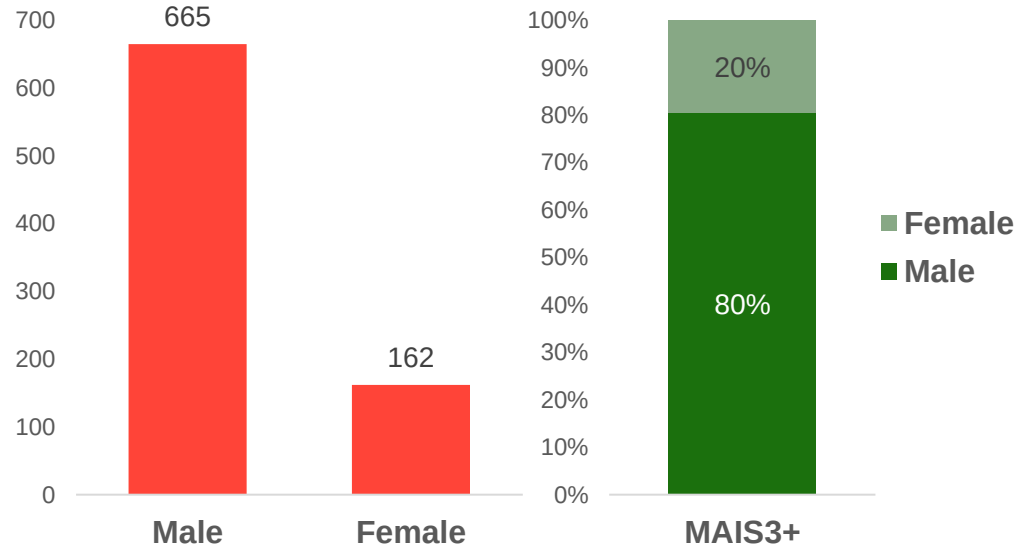
Age and gender

MAIS3+ cyclists – 2014-2022

- Over half of MAIS3+ cyclists in hospital records were aged 45 years or more.



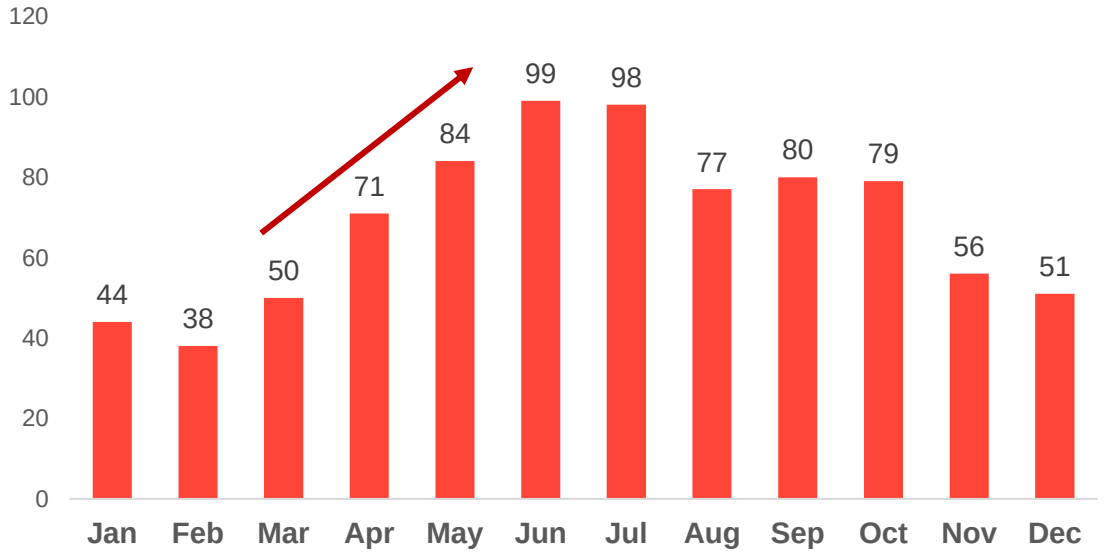
- 80% of MAIS3+ cyclists in hospital records were males
- The share of males was the highest in all the age groups.

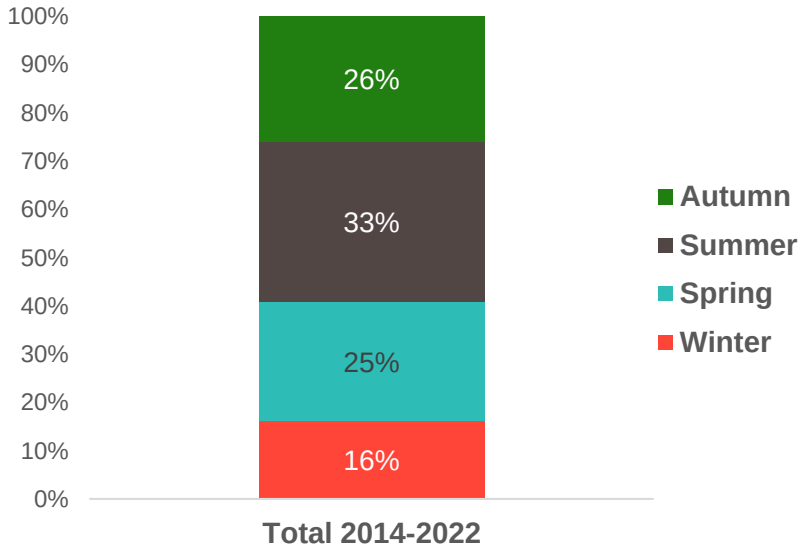


Month of hospital admission

MAIS3+ cyclists – 2014-2022

- The number of MAIS3+ cyclists admitted to hospital started to increase over Spring, being the highest in June and July.
- Summer was the season with the highest share of admissions to hospital.

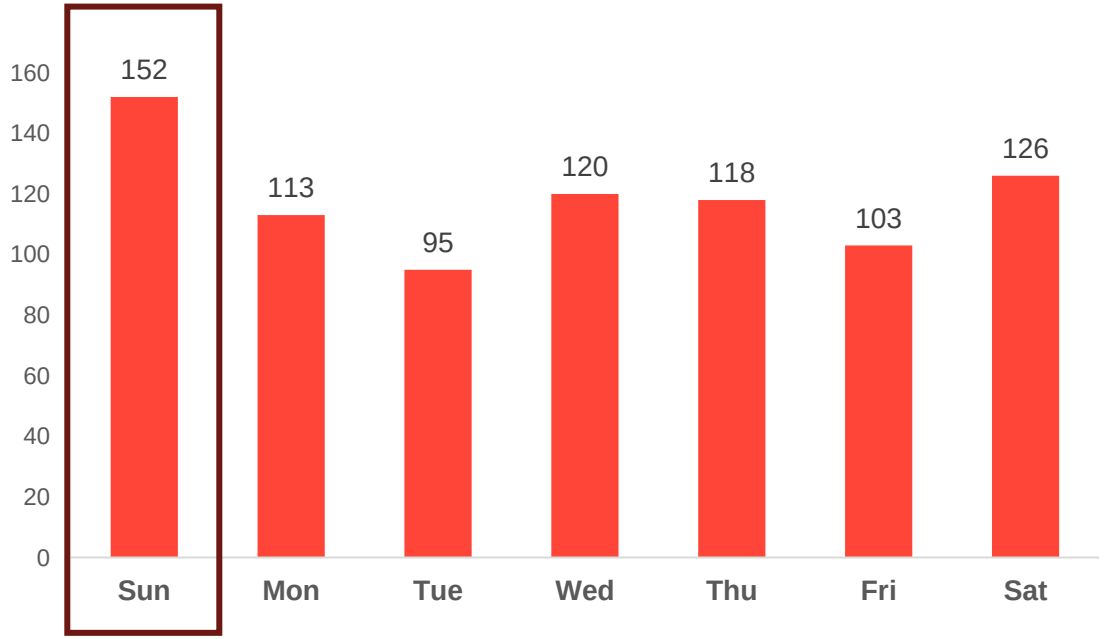


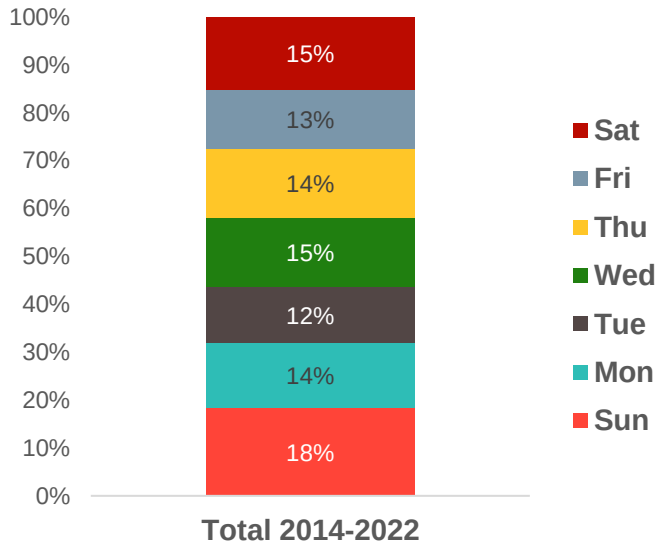


Day of hospital admission

MAIS3+ cyclists – 2014-2022

- Sundays had the highest number and share of MAIS3+ admissions to hospital.

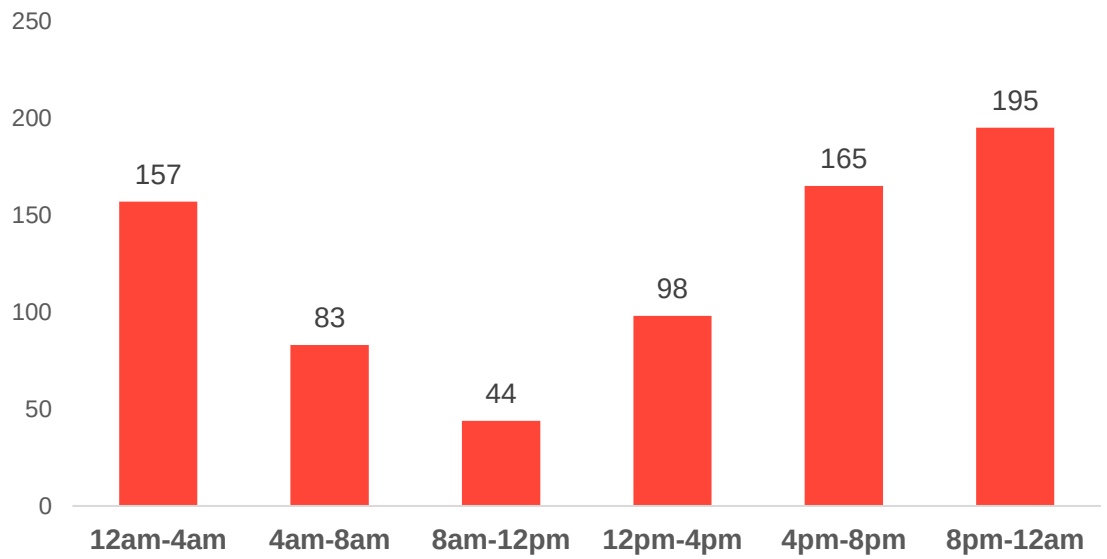


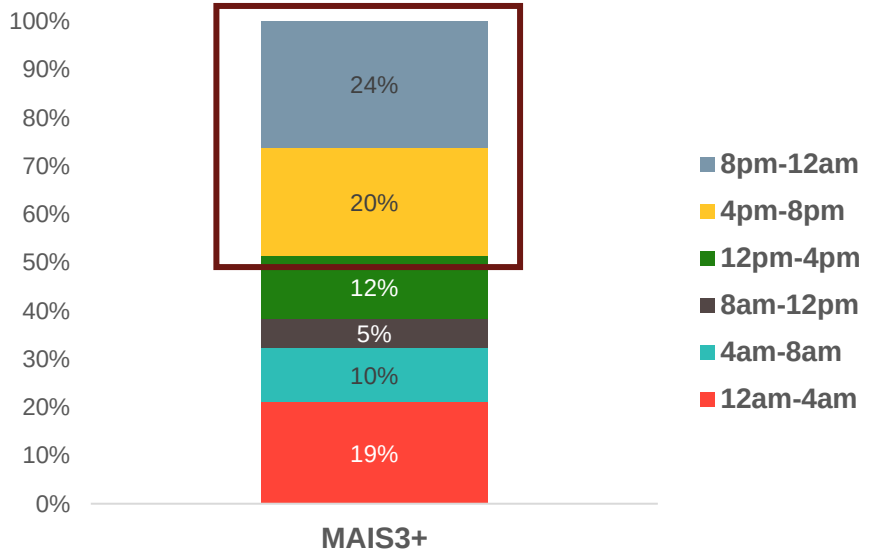


Time of hospital admission

MAIS3+ cyclists – 2014-2022

- Overall, hospital admissions were more frequent after 4pm.
- 24% of MAIS3+ cyclists were admitted to hospital between 8pm-12am.

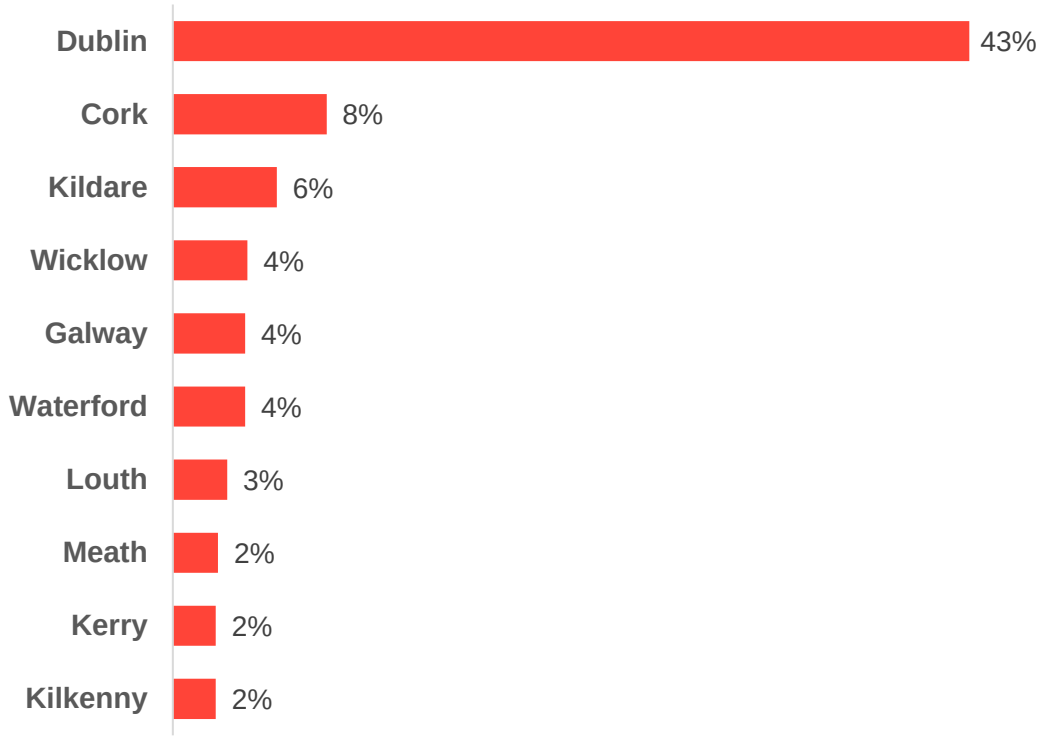




County of residence

MAIS3+ cyclists – 2014-2022

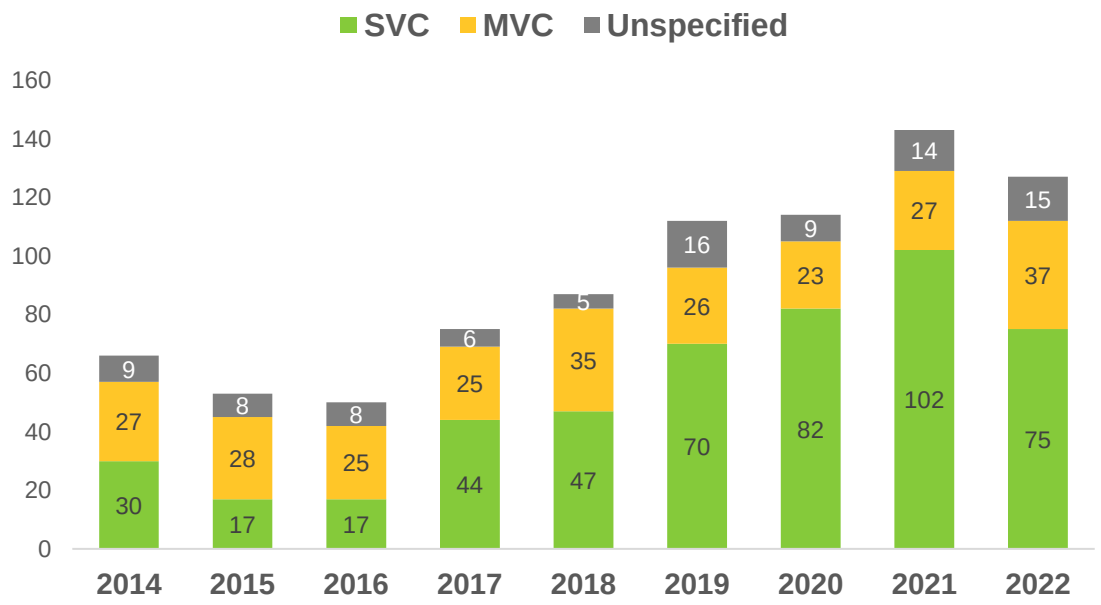
- 43% of MAIS3+ cyclists (352) were County Dublin residents.

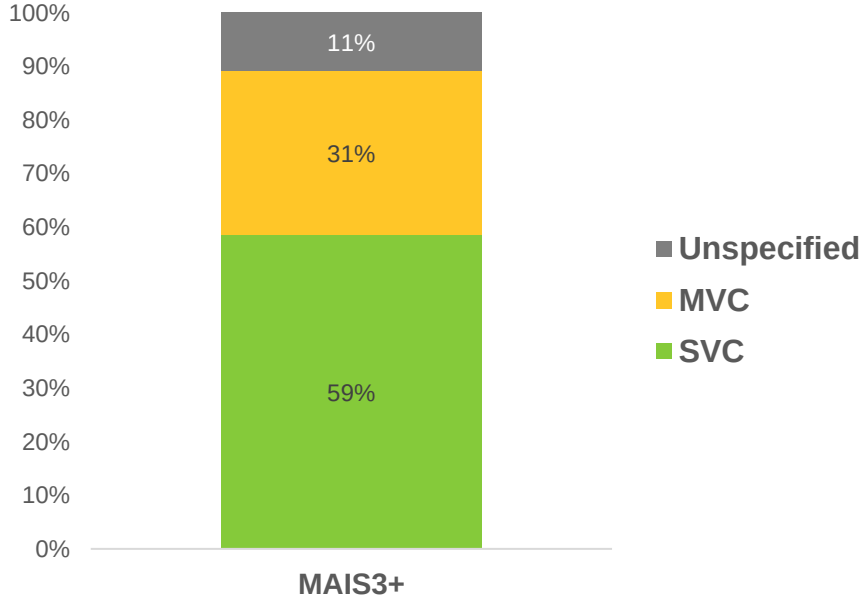


Collision type

MAIS3+ cyclists – 2014-2022

- There were 484 MAIS3+ cyclists injured in SVC. The number of MAIS3+ cyclists injured in SVC increased over the years, from 17 in 2016 to 102 in 2021.
- 253 MAIS3+ were injured in MVC. 76% of these cyclists were in a collision with a car, truck or van.

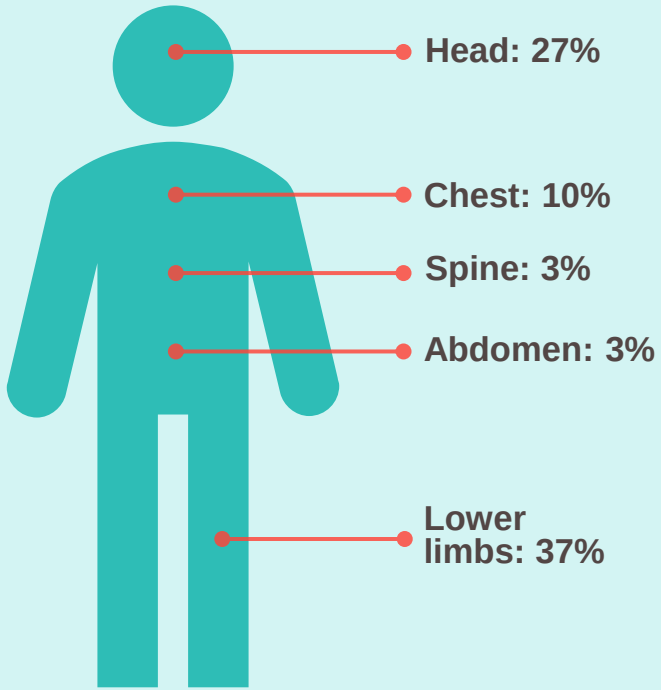




Injuries sustained

MAIS3+ cyclists – 2014-2022

Share per body part for cyclists with a single serious injury:



- Casualties may have sustained a single or multiple serious injuries.
- 82% of cyclists sustained a **single serious injury** (see graph in the left).
  - 59% of head injuries were serious brain injuries, and 41% were serious fractures
  - 80% of chest injuries were serious injuries in internal chest organs
  - 19% of abdomen injuries were serious injuries in abdominal organs
  - All lower limb injuries were serious fractures.
- 18% sustained **multiple serious injuries** in the same or in different body parts.
  - The mean number of injuries among cyclists with multiple serious injuries was 2.38, with a minimum of 2 and a maximum of 5 injuries.

* Based on information from the ICD-10-AM injury codes recorded for each casualty in HIPE.

Injuries sustained

MAIS3+ cyclists – 2014-2022

MAIS3+ cyclists				Collision type (n)		Age (n)			
	Body part	All (827)	%	SVC (484)	MVC (253)	0-24 (155)	25-44 (210)	45-64 (312)	65+ (150)
Single serious injury	Head	226	27%	27%	28%	43%	29%	24%	15%
	Chest	85	10%	8%	13%	5%	10%	16%	5%
	Lower limbs	308	37%	44%	26%	25%	28%	37%	63%
	Other	59	7%	8%	6%	6%	9%	7%	6%
Multiple serious injuries		149	18%	12%	27%	21%	24%	16%	11%

- The share of cyclists with multiple serious injuries was 27% for those injured in MVC.
- 43% of cyclists aged 24 years or less sustained a single serious injury in the head.
- Older casualties had a higher share of single injuries in the lower limbs.

Length of stay at hospital

MAIS3+ cyclists – 2014-2022

MAIS3+ cyclists (n)			Collision type (n)		Age (n)			
Number of days	**All (827)**	**%**	**SVC (484)**	**MVC (253)**	**0-24 (155)**	**25-44 (210)**	**45-64 (312)**	**65+ (150)**
1 day or less	113	14%	13%	12%	17%	18%	14%	4%
2 days	105	13%	15%	8%	17%	16%	12%	5%
3 to 4 days	182	22%	22%	22%	27%	23%	24%	11%
5 days or more	427	52%	50%	58%	38%	43%	51%	79%
Mean (SD)	10.77 (25.30)		7.56 (12.96)	17.81 (40.22)	10.82 (28.24)	10.15 (29.53)	9.90 (21.69)	13.43 (22.57)
Stayed at ICU 1+ days (% yes)	15%		9%	26%	18%	13%	12%	19%
Mean LOS at ICU (SD)	13.14 (25.23)		9.73 (20.67)	16.38 (29.57)	12.36 (24.1)	15.00 (30.92)	12.21 (13.19)	13.32 (32.73)

- 52% of MAIS3+ cyclists stayed 5 days or more at hospital as in-patients
  - The share of cyclists staying 5+ days was the smallest for cyclists aged up to 24 years, and the highest for cyclists aged 65+ years.

Destination at discharge

MAIS3+ cyclists – 2014-2022

MAIS3+ cyclists (n)			Collision type (n)		Age (n)			
Destination	**All (827)**	**%**	**SVC (484)**	**MVC (253)**	**0-24 (155)**	**25-44 (210)**	**45-64 (312)**	**65+ (150)**
Home	650	79%	81%	75%	85%	83%	80%	62%
Nursing home or other long-term accommodation	20	2%	3%	*	-	*	*	11%
Transfer to rehabilitation facility	8	1%	*	*	*	*	*	*
Transfer to hospital	131	16%	14%	20%	13%	12%	16%	23%
Other	18	2%	~	2%	*	4%	2%	*

***** denotes 5 cases or less per cell. **-** indicates absence of cases in a cell. ~ indicates that further suppression is necessary to ensure that cells with 5 or less cases are not disclosed.

- 79% of MAIS3+ cyclists were sent home and 16% were transferred to another hospital at discharge.
  - The share of casualties being sent home declined with age, whereas the share of cyclists being transferred to another hospital increased with age.

Serious injuries among cyclists in hospital and AGS records

2014-2022

The findings presented in this report will inform evidence-based interventions to promote cyclists' safety and prevent serious injuries.

Acknowledgements

- Members of the MAIS3+ project Board:
  - Dr Howard Johnson, National Health Intelligence Unit, Health Service Executive (HSE).
  - Dr Fionnuala Donohue, National Health Intelligence Unit, HSE.
  - Prof Noel McCarthy, Department of Public Health & Primary Care, Trinity College Dublin.
  - Ms Velma Burns, Research Manager, RSA.
  - Ms Sharon Heffernan, Statistician, RSA.
- RSA Research Department.

Serious injuries in pedal cyclists in hospital and An Garda Síochána data

Period 2014-2022

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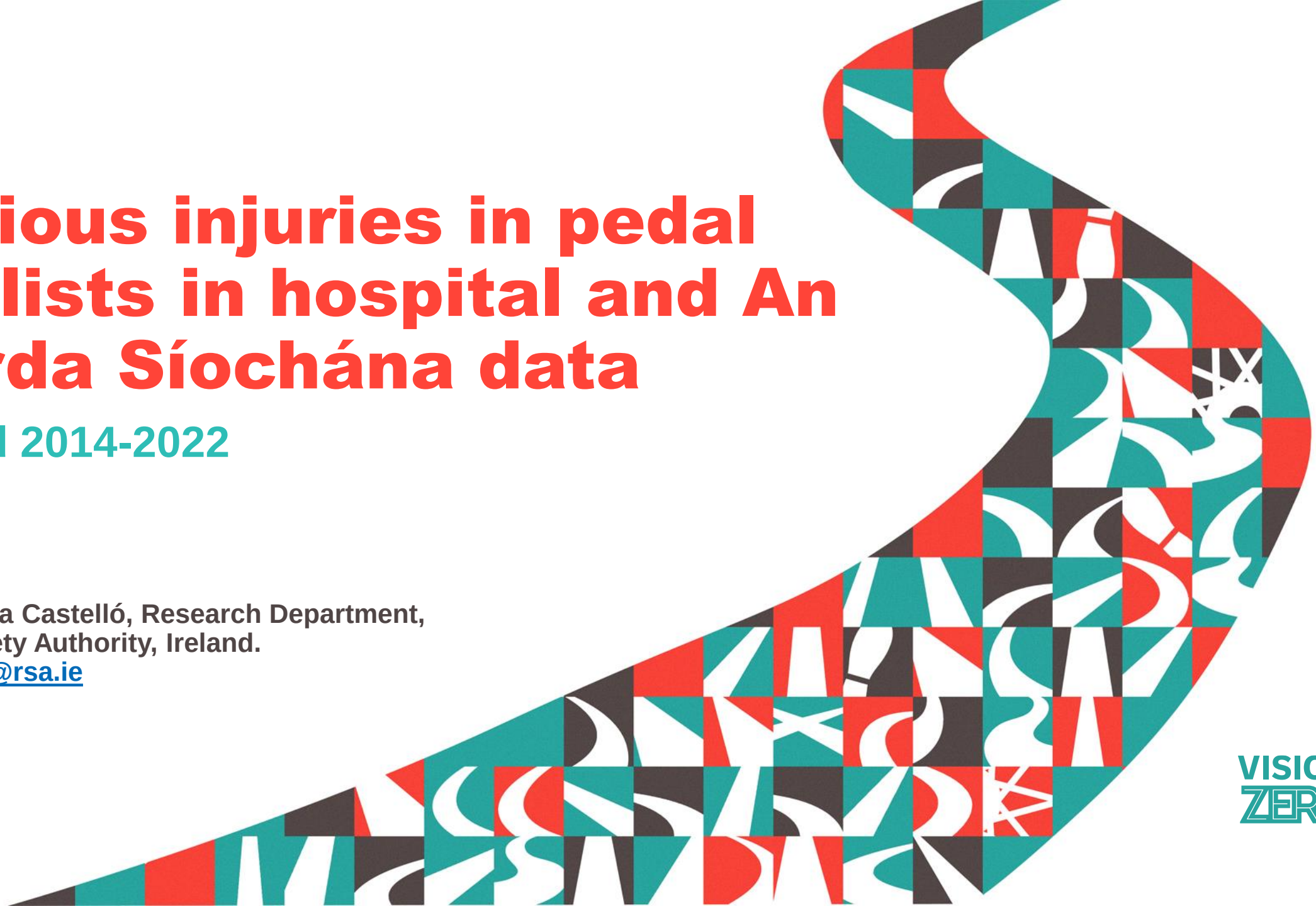

VISION ZERO