

Cycling-related Major Trauma in Ireland

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I. INTRODUCTION

Cycling as a means of transport or recreational activity is becoming increasingly popular in Ireland. The Central Statistics Office (CSO) reported that in 2016 there was a 43% increase in people cycling to work as compared to 2011 [1]. However, the greater number of cyclists may be leading to a greater number of bicycle-related trauma [2]. We reviewed the Trauma Audit and Research Network (TARN) database with the aim of providing an analysis of cycling-related major trauma in Ireland. A patient is eligible for inclusion in the TARN database if they sustain an injury resulting in admission to hospital for ≥ 3 days, admission to an intensive care (ICU) or a high-dependency unit (HDU), or death within 93 days [3-4]. Patient data are documented and entered remotely on the TARN database.

II. METHODS

We conducted a search of the TARN database to identify all patients who had attended any hospital in the Republic of Ireland with a cycling related injury from 1 January 2014 to 31 December 2016. Information including demographics, time of injury, Injury Severity Score (ISS), Glasgow coma score (GCS), probability of survival (Ps), helmet use, length of stay and ICU admission were extrapolated. We compared findings with patients who had a major trauma due to other mechanisms, unrelated to cycling.

III. INITIAL FINDINGS

During the study period, there were 9,312 cases recorded in the TARN database for Ireland and 410 (4.4%) were due to cycling-related major trauma. Patient characteristics of both groups are displayed in Table I.

TABLE I
PATIENT CHARACTERISTICS: BICYCLE TRAUMA VS NON-BICYCLE TRAUMA IN IRELAND

	Bicycle Trauma (n=410)	All Trauma (n=9312)
Age (years)	43.8 (31.0, 55.7)	58.9* (36.2, 76.0)
Sex (% Male)	79.0	58.0*
ISS	10 (9,20)	9* (9,17)
GCS on Arrival	15 (15, 15)	15* (15, 15)
Ps	99.4 (98.6, 99.78)	98.4* (94.3–99.5)
Survival (%)	97.1	94.5*

* Data shown are medians and IQR unless otherwise stated. Difference between Age, ISS, GCS, Ps * $p < 0.001$.

The mechanism of injury is shown in Fig. 1. A detailed mechanism of injury other than 'fall from bike' was undocumented for 172 cyclists (42.0%), which is a limitation of this retrospective study.

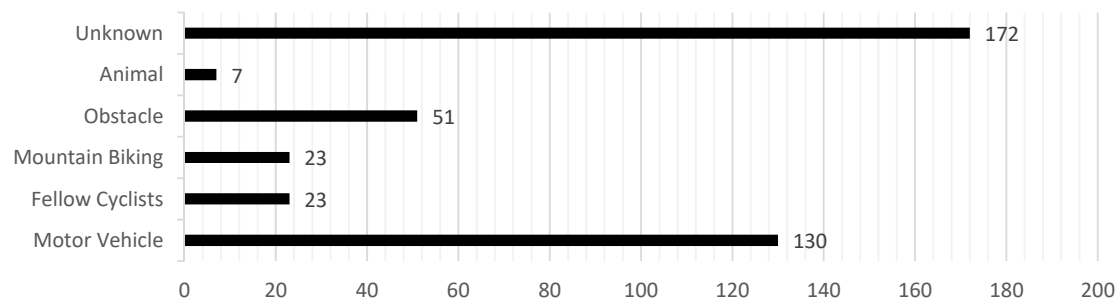


Fig. 1. Mechanism of Injury.

Figure 2 shows the most severely injured body region in bicycle trauma vs non-bicycle trauma. There were 130 head injuries (31.7%) reported in the bicycle trauma group, with a median Abbreviated Injury Scale (AIS) of 4 (3, 5). There were 12 mortalities (2.9%). The median age of the mortality group was 51.5 years (40.2, 69.4; range

13.8–83.7). The median ISS was 33 (27, 41.8), which was higher than the overall cycling group ($p<0.001$), and the median GCS was 4 (3, 9), which was lower than the overall group ($p<0.001$).

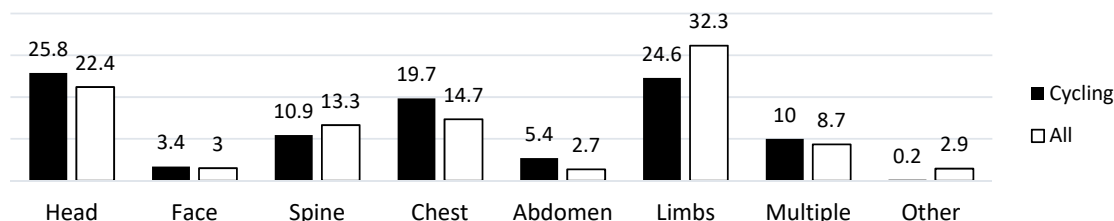


Fig. 2. Most severely injured body region. Bicycle Trauma vs All Trauma in Ireland (%).

Figure 3 shows the effect of helmet use on head injury outcome for bicycle trauma. There were 250 cases where helmet usage was recorded: 160 cyclists (64.0%) were wearing a helmet, of which 116 (72.5%) sustained no head injury. By contrast, 90 cyclists (36.0%) were not wearing a helmet, of which 43 (47.78%) sustained no head injury. A chi-square test was performed, and a significant relationship was found between helmet wearing and whether or not an injury occurred to the head ($X^2 (1, N = 250) = 15.2, p < 0.0001$), suggesting helmets are effective in preventing the occurrence of head injuries for cyclists involved in collisions with major trauma.

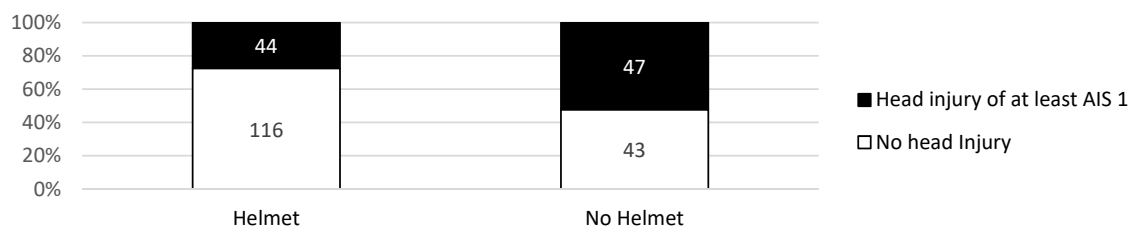


Fig. 3. Bar chart showing the effect of helmet use on head injury outcome for cyclists in TARN data.

A total of 81 cyclists (19.8%) were admitted to the ICU. The disposition characteristics for bicycle versus non-bicycle trauma are shown in Table II.

TABLE II
DISPOSITION CHARACTERISTICS: BICYCLE TRAUMA VS NON-BICYCLE TRAUMA IN IRELAND

	Bicycle Trauma	Non-Bicycle Trauma
LOS (Days)	6 (4,10)	9 (5, 17)*
ICU LOS (Days)	3 (1, 7)	3 (1, 8)*
Met by Trauma Team	14.8%	10.8%**
Time to CT (Hours)	2.7 (1.4, 8.2)	3.8 (1.6, 14.0)
Time to Theatre (Hours)	21.1 (13.8, 45.2)	25.8 (16.8, 54.9)

*Data shown are medians and IQR unless otherwise stated. Difference between LOS and ICU LOS * $p<0.001$. **Difference between trauma team * $p<0.05$.

IV. DISCUSSION

This study highlights that cycling trauma occurs in a younger cohort than the overall major trauma population, with the majority being males aged between 30 and 60 years. Cyclists have significantly higher injury severity scores than the overall population, but have a shorter LOS and lower ICU admission and mortality rates, which may possibly be attributed to less co-morbidities in this younger population. Helmets appear to have an effect on the occurrence of head injuries, and further research should include a regression analysis with age and gender, as well as look at the effect of helmets on the severity of head injury in terms of AIS level. The mechanisms of injury are varied and more research should be undertaken to investigate the velocity, collision profiles and factors predisposing to particular patterns of injury.

V. REFERENCES

- [1] Census, Commuting in Ireland, 2016.
- [2] Juhra, C., *et al.*, Injury, 2012.
- [3] Guly, C. M., *et al.*, *Emerg Med J*, 2006.
- [4] www.noca.ie/wp-content/uploads/2015/04/NOCA-MAJOR-TRAUMA-REPORT-2016.pdf.

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