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Impact of a National Lockdown on Cycling Injuries

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Abstract

Introduction

The Sars-CoV-2 pandemic led to a national lockdown in Ireland from March 12th to June 7th, 2020. The present study aimed to assess the change in the pattern of cycling attendances to an Irish ED during a pandemic.

Methods

This is a retrospective before-and-after study carried out at a university hospital ED. We compared cycling attendances during Lockdown (LD) (13th March-7th June 2020) with Pre-Lockdown (PLD) (January 1st-March 12th, 2020). Furthermore, we also compared lockdown to an historical control period during the equivalent dates in 2019 (i.e. March 13th-June 7th, 2019)

Results

There were 151 cycling attendances during LD, 122 in PLD and 164 during the control period. The number of cyclists presenting during "rush hour traffic" in the LD period was 30 (19.9%) versus 42 (34.4%) during PLD ($p<0.05$) and 51 (31.1%) during the control period ($p<0.05$). During LD, 8 (5.3%) collisions involved a motor vehicle compared to 26 (21.3%) in PLD ($p<0.05$) and 43 (26.2%) during the control period ($p<0.05$).

Conclusion

Lockdown did not result in increased cycling attendances to this ED. The patients who did sustain a cycling-related injury during lockdown were less likely to have collided with a motor vehicle compared to the control period. The reduction in motor vehicle collisions could be attributed to less traffic congestion and highlights the potential benefits of road-user segregation.

Keywords: Cycling trauma, COVD-19, injury, bicycle, road traffic collisions, road-user segregation, lockdown.

Introduction

A global pandemic was declared on the 11th of March 2020 with countries around the world implementing a variety of physical distancing interventions to prevent community transmission of Sars-CoV-2 [1, 2]. These measures included school and workplace closures, community contact tracing, social distancing and case isolation in order to flatten the curve of the pandemic and reduce the duration of the outbreak [3, 4].

The COVID-19 pandemic reached Ireland on February 29th and within three weeks, cases had been identified in every county. On March 12th, the government implemented physical distancing interventions resulting in closure of schools, colleges, childcare facilities, cultural institutions, and the cancellation of large gatherings. On March 27th, further lockdown measures were introduced including a ban on all non-essential travel and contact with people outside of the home. These measures were kept in place until June 7th.

The lockdown presented significant alterations to daily life in Ireland among which, was a reduction in the number of people commuting to work with the Central Statistics Office (CSO) reporting that there were 70% less cars on the road for the lockdown period when compared with the same period for the previous year [5]. This period of lockdown also resulted in more people exercising in Ireland, with Sport Ireland reporting an additional 500,000 walkers, 450,000 runners and 220,000 cyclists when compared to 2019, with an overall decrease in inactivity of 8% in adults [6]. It would seem plausible therefore, that an increase in cyclists and a decrease in motor vehicles sharing the road could potentially lead to less collisions and result in a morbidity and mortality reduction.

The aim of this study was to examine the impact of a lockdown because of a global pandemic on cycling-related attendances to an Emergency Department (ED) and to report any differences in mechanism of injury, injury severity and mortality.

Methods

This is a retrospective before-and-after study carried out at an urban university hospital ED with an annual census of almost 60,000 attendances in 2019. We compared cycling-related attendances during Lockdown (LD) (13th March-7th June 2020) with Pre-Lockdown (PLD) (January 1st-March 12th, 2020). Furthermore, we also compared LD to an historical control period without physical distancing during the equivalent dates to LD in 2019 (i.e. March 13th-June 7th, 2019). The LD period was longer than PLD (87 days versus 70), so per-day figures are reported where appropriate. Maxims®, the ED information system, was interrogated for triage records with the keywords “bike”, “cycling”, “cycle”, “cyclist”, “biking”, “bicycle” and derivates thereof, including potential misspellings. Medical records were analysed for data including demographics, mechanism of injury, mode of attendance, disposition, injuries sustained and mortality. The most severely injured body region was determined by the practitioner’s documentation in the notes, and the final diagnosis attributed to each patient. Time of attendance was split into three distinct time periods: 0800-1559, 1600-2359 and 0000-0759. Rush-hour traffic was defined as the hours between 0700-0900 and 1600-1900 from Monday to Friday.

Means with standard deviations are reported for continuous variables with a normal distribution and compared using students t-test. Chi-square tests were used to determine associations between categorical variables and age group or outcome with a continuity correction being applied for 2 × 2 tables. For data analysis, we used Statistical Package for Social Sciences (SPSS version 26, IBM, USA). A p-value less than 0.05 was considered statistically significant.

Results

Demographics

There were 151 cycling-related presentations during LD (1.7 per day), 122 in PLD (1.7 per day) and 164 during the control period (1.9 per day). The baseline patient characteristics are displayed in Table 1. There was no difference in the mode of attendance for the study periods, with 34% of cyclists attending via ambulance in LD (n=51) and PLD (n=41) and 35% via ambulance in the control period (n=57). The number of cyclists presenting during "rush hour traffic" in the LD period was 30 (19.9%) versus 42 (34.4%) during PLD (p<0.05) and 51 (31.1%) during the control period (p<0.05).

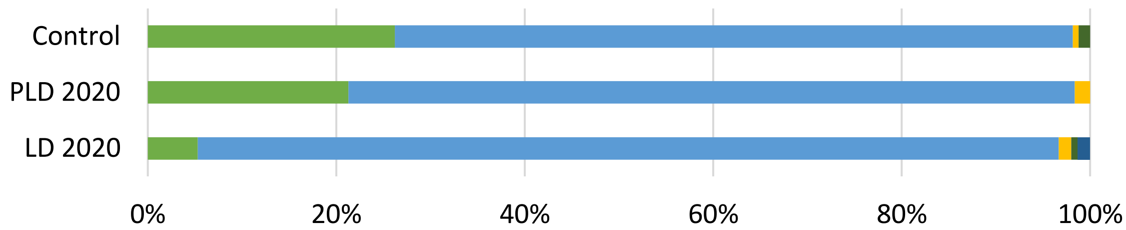
Table 1. Patient Characteristics (LD, PLD and Control).

	LD (n=151)	PLD (n=122)	Control (n=164)	P Value
Gender (% Male)	68.9	68.0	73.8	p=0.87
Age (years)	41.2 (SD 15.7) Range 14-76	38.2 (SD 13.1) Range 16-76	37.1 (SD 14.5) Range 14-77	p=0.09
Time of Arrival (%)	1600-2359 (50.3%, n=76)	0800-1559 (51.6%, n=63)	1600-2359 (43.3%, n=71)	p<0.05

Mechanism of Injury

During LD, 138/151 (91.4%) collisions were isolated cyclist collisions compared to 94/122 (77.0%) during PLD (p<0.05) and 118/164 (71.9%) during the control period (p<0.05). During LD, 8 (5.3%) collisions involved a motor vehicle compared to 26 (21.3%) in PLD (p<0.05) and 43 (26.2%) during the control period (p<0.05).

The mechanisms of injury for each study period are displayed in Figure 1 (Next Page).



	LD 2020	PLD 2020	Control
Motor Vehicle	8	26	43
Isolated	138	94	118
Pedestrian	2	2	1
Animal	1	0	2
Fellow Cyclists	2	0	0

Figure 1. Mechanism of injury for the study periods.

Injury

The most severely injured body regions for each period are displayed in Figure 2. The upper limb was most commonly injured for all time periods, but more cyclists sustained upper limb injuries in LD (n=83) than in PLD (n=52) ($p<0.05$) and the control period (n=63) ($p<0.05$).

Head injury was identified at triage as the main body part injured in LD (n=30, 19.9%) which was lower than PLD (n=38, 31.1%) ($p<0.05$) and the control period in 2019 (n=50, 30.5%) ($p<0.05$). A CT scan of the head was performed for 17.2% of patients (n=26) during LD versus 13.9% of patients (n=17) during PLD and 16.5% of patients (n=27) during the control period ($p=0.45$). There were 2 patients who had head injuries with abbreviated injury scale (AIS) scores above 3 during LD versus 8 patients in the control period ($p=0.06$) versus zero patients during PLD ($p=0.2$).

There were no significant differences noted between the proportion of injuries to any of the other body regions.

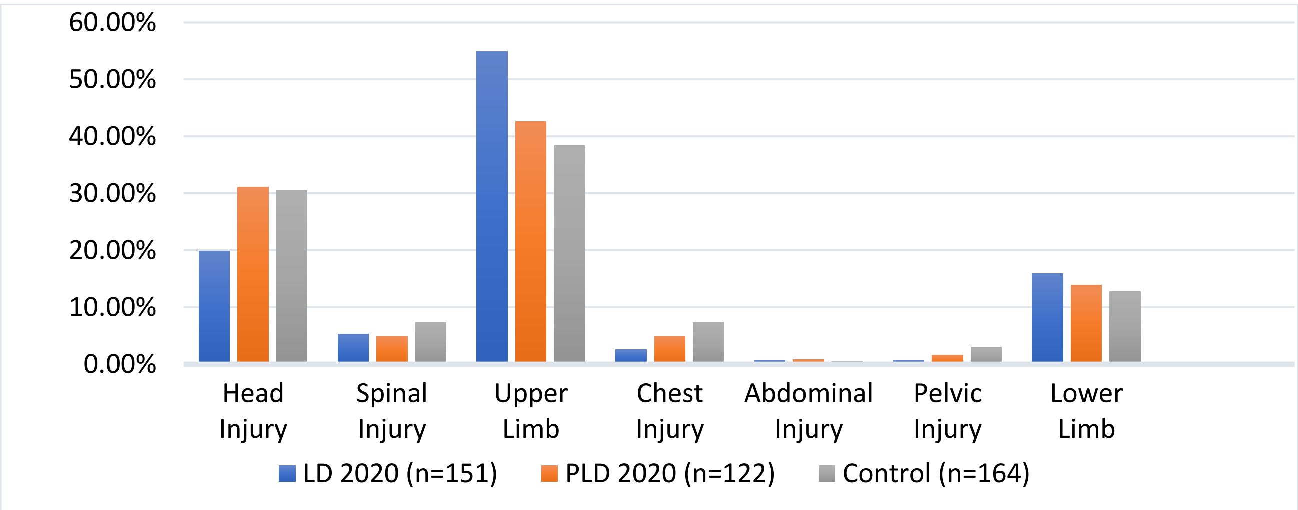


Figure 2. Most severely injured body region (%) for LD, PLD and Control.

Disposition

The admission rate for LD was 16.6% (n=25) versus 8.7% (n=13) during PLD (p=0.05). An operative procedure was performed on 18.5% (n=28) of cyclists in LD versus 10.6% (n=13) in PLD (p=0.06) and 6.7% (n=11) in the control period (p<0.05). The sites of surgery are shown in Table 2. No patients were admitted to ICU during PLD or LD while 1 patient was admitted during the control period. There were no mortalities during PLD or LD and there was 1 mortality in the control period.

Table 2. Operative Procedure Sites (LD, PLD and Control)*.

LD 2020 (n=28)	PLD 2020 (n=13)	Control (n=11)
Wrist (n=14)	Wrist (n=4)	Tibial plateau (n=3)
Femur (n=3)	Neck of femur (n=2)	Wrist (=2)
Ankle (n=2)	Olecranon (n=2)	Olecranon (n=2)
Metacarpal/phalanx (n=2)	Ankle (n=2)	Elbow dislocation (n=1)
Olecranon (n=2)	Humerus (n=1)	Thoracotomy for chest injuries (n=1)
Clavicle (n=1)	Facial wounds (n=1)	Ankle (n=1)
Paravertebral block for chest injury (n=1)	Acromion (n=1)	
Tibial plateau ORIF (n=1)		
AC dislocation (n=1)		
Neck of femur (n=1)		

**injuries are fractures unless otherwise specified*

Discussion

This is the first study to examine the effect of a global pandemic on ED presentations of cycling related injuries. While it was reported nationally that the numbers of cyclists increased during the COVID-19 lockdown, the numbers of cycling-related presentations to this hospital was not significantly higher or lower than PLD or the control period.

Given the closure of sports clubs, gyms and outdoor playing facilities, the increase in numbers cycling could be attributed to people seeking alternative means of exercise. Cycling shops in Ireland widely reported that sales increased substantially during the initial stages of the lockdown period [7]. The increase in the number of cyclists may also be attributed to people avoiding public transport due to the various government guidelines restricting the number of people using public transport and people minimising their risk of infection [8].

Most attendances during LD were outside of normal working hours, which could be explained by people cycling after their working day for recreational purposes. This could also explain why LD had significantly less attendances during the rush-hour period than PLD or the control. However, it may be the case that there were cyclists on the roads during the rush-hour period in LD, but the reduction in traffic on roads resulted in a safer environment for cyclists, and subsequently less collisions and less ED attendances.

This study found that there were fewer collisions with a motor vehicle and proportionately more isolated cyclist collisions in LD than PLD and the control period. It has been established previously that one in four cycling presentations that present to hospital occur as a result of motor vehicle collisions and one in five of these collisions happen during rush hour traffic [9]. International literature has shown that dedicated bicycle lanes, separation of road users and enhanced cycling infrastructure result in less collisions, less hospital attendances and less mortalities from cycling injuries [10-12]. There was a significant reduction in motor vehicles on roads in Dublin during lockdown. This may have contributed to the decrease in the number of cyclists presenting to ED because of a collision with a motor vehicle.

Single (or isolated) cyclist collisions have been shown to be an under-studied cause of cycling injuries and mechanisms including potholes, “loss of control events” and technical issues can be contributory towards collisions [9, 13]. These cyclists may sustain severe injuries also, and while less motor vehicle collisions will likely result in less severe injuries, an isolated fall from a bike can result in significant injuries requiring imaging, surgery or potentially ICU admission. However, when a cyclist has a collision with a motor vehicle, the injuries tend to be more significant and have a higher morbidity and mortality [14, 15]. Our findings would support the suggestion that segregation of road users and improved cycling infrastructure could potentially result in a morbidity and mortality reduction.

There were significantly less head injuries and significantly more upper limb injuries sustained during LD. Previous studies have shown that cyclists who collide with motor vehicles are more likely to sustain more significant injuries, including head injuries [14, 15]. It could therefore be hypothesised that due to the lower incidence of motor vehicle collisions in this study during LD, that less patients sustained significant head injuries as a result. However, there was no difference regarding the frequency of CT scans of the head or incidence of AIS3 head injuries between the different time periods. The higher numbers of upper limb injuries during LD may be explained by the increased number of isolated cyclist collisions, with the injured party using their upper limb to protect themselves when they fall. These injuries can be severe and, in this study, accounted for 71.4% of the operative procedures performed during LD. There were significantly more procedures performed during LD than PLD or the control period, and this was likely as a direct result of the increased number of upper limb injuries in the LD period. The numbers of mortalities and ICU admissions were very low in this single-centre study and showed no difference to the control periods. It is possible that a larger multicentre study over a longer period would show a difference in these outcomes.

Lockdown secondary to the COVID-19 global pandemic did not result in increased numbers of patients presenting to hospital with cycling-related injuries in our institution. The patients who did sustain a cycling-related injury during lockdown were less likely to have collided with a motor vehicle and were less likely to have sustained a head injury compared to the control period. The reduction in motor vehicle collisions may be attributed to less traffic congestion and highlights the potential benefit of segregating road users when implementing safety strategies for cycling.

Declaration of Conflicts of Interest:
The authors declare no conflicts of interest.

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