

# Electric scooters: a quick way to get to the emergency department?

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## Key points

Alerts the reader to evidence of an increasing frequency of dentofacial injuries related to electric scooters in the UK.

Alerts the reader to the relative severity of these injuries, in which more complex trauma may accompany dentoalveolar trauma. This is relevant for clinicians in primary care to consider if patients present there first.

Provides advice aimed at minimising injuries, which clinicians can consider for themselves, as well as informing their patients, in order to aid injury prevention/health promotion.

## Abstract

**Introduction** Electric scooters (e-scooters) are rife but are yet to be legalised in the UK. The aim of this paper was to investigate whether there had been an increase in the number of e-scooter injuries referred to the oral and maxillofacial surgery (OMFS) service at our unit. We present here what is, to our knowledge, the largest dataset regarding e-scooter-related injuries in the UK.

**Method** A double cohort study in which details of patients sustaining e-scooter-related injuries that were referred to the OMFS department were collected, prospectively, for a 16-week period in 2020 (investigation period). This was compared with data collected, retrospectively, from the emergency department (ED) referral database for the same date range in 2019 (control period).

**Results** In the investigation period, 12/649 referrals to OMFS from the ED were for e-scooter-related injuries. There were eight male patients and four female patients with a mean age of 35 years (interquartile range 24–48). Of these, only one patient was wearing a helmet and 8/12 had consumed alcohol. Head and neck injuries sustained included avulsed teeth, mandibular and midface fractures, skull fractures, facial lacerations and cervical spine injuries. One patient died as a result of their injuries. During the control period, 2/997 ED referrals to OMFS were for e-scooter-related injuries (12/649 versus 2/997; Fisher's exact test  $p < 0.001$ ).

**Conclusion** There was a significant rise in e-scooter-related injuries seen at our major trauma unit compared with 2019. We recommend that e-scooters are subject to at least the same requirements in safety equipment and sobriety as bicycles and that their top speed is limited to 12.5 mph. We hope that these measures will allow the benefits of this technology to be enjoyed while reducing associated morbidity and mortality.

## Introduction

At the time of writing, electric scooter (e-scooter) use in the UK remains illegal anywhere but on private land or as part of a rental scheme. However, use of these vehicles is widespread and proliferating and there are calls from members of Parliament for them

to be swiftly legalised<sup>1</sup> in order to decongest the roads and minimise crowding on public transport during the ongoing COVID-19 pandemic. In spite of the legal restrictions, e-scooters sales have soared.<sup>2</sup>

Despite their impending legalisation, there is a dearth of UK-specific data related to e-scooter use. At our major trauma unit, we appeared to be seeing a rise in craniofacial injuries related to this form of transportation. The aim of this paper was to investigate whether there had been a true increase in the number of e-scooter injuries referred to the oral and maxillofacial surgery (OMFS) service at our unit. We present here what is, to our knowledge, the largest dataset regarding e-scooter-related injuries in the UK.

## Method

This was a double cohort-design study. Details of patients sustaining e-scooter-related injuries that were referred to the OMFS department were collected, prospectively, for a 16-week convenience period from 11 May to 31 August 2020 (investigation period), the start of which corresponded with the easing of 'lockdown' rules following the first COVID-19 wave. This was compared with data collected, retrospectively, from the emergency department (ED) referral database, for the same date range in 2019 (control period). Inclusion criteria were: patients sustaining injuries requiring referral for OMFS specialist input; and mechanism of injury related to being the rider of an electric scooter.

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Patients of all ages were included in the study. Statistical analysis was carried out using IBM SPSS Statistics for Windows (version 20.0, IBM Corp, Armonk, NY, USA). Fisher's exact test was used to assess the significance of differences between groups. Probabilities of <0.05 were accepted as significant.

## Results

In the investigation period (2020), there were 649 ED referrals to OMFS. Of these, 12 were patients with e-scooter-related injuries (eight male patients and four female patients, mean age 35 years [interquartile range 24–48]). Of these, only one patient was wearing a helmet and 8/12 had consumed alcohol. Head and neck injuries sustained included avulsed teeth, mandibular and midface fractures, skull fractures, facial lacerations, and cervical spine injuries. One patient died as a result of their injuries.

In comparison, during the control period (2019), there were 997 ED referrals to OMFS. In this period, two patients were referred with e-scooter-related injuries (12/649 versus 2/997; Fisher's exact test  $p < 0.001$ ), a 28-year-old man and a 32-year-old man, both of whom had sustained midface fractures and facial lacerations. Neither were wearing a helmet and both had consumed alcohol.

## Discussion

At our major trauma centre OMFS unit, we saw a significant rise in injuries resulting from e-scooter use as we emerged from the lockdown related to the first COVID-19 wave in May 2020. In the four weeks subsequent to the easing of lockdown, we previously reported an average of one e-scooter-associated injury referral per week,<sup>3</sup> which was the first published UK data. The data we present in this paper confirm that the frequency of referrals for e-scooter-related craniofacial injuries has increased, compared with the same period in the preceding year.

While e-scooter use is well-established in a range of countries, it is also becoming increasingly well-established is the literature reporting the injuries associated with their use. Our results are in agreement with papers from Germany,<sup>4</sup> Vienna,<sup>5</sup> the USA,<sup>6,7</sup> Singapore,<sup>8</sup> New Zealand<sup>9,10</sup> and Australia,<sup>11</sup> which show an association between e-scooter use, intoxication, lack of helmet wear and significant injury, with a predilection for the craniofacial region.<sup>7,12,13,14,15</sup> While e-scooters

may ease pressure on transport systems, they have been shown to transfer some of this pressure to healthcare systems<sup>4,6,9,10,11,15,16,17,18,19</sup> and many countries have been forced to tighten their regulations in response to this. While there have been a number of publications reporting e-scooter-related morbidity from other countries, UK data have been lacking.

E-scooters are attractive to both individuals and policymakers for a number of reasons: they are a low-cost, environmentally friendly, compact, convenient and relatively fast way to travel in cities. E-scooters in rental trials in the UK have been limited to a maximum speed of 15.5 mph, but privately owned e-scooters may travel as fast as 30 mph. Indeed, one of the patients injured in the post-lockdown period admitted to removing the speed limiter from his e-scooter. Maximum speed is especially important because velocity is the factor with the largest effect on the kinetic energy available for injury when falling from an e-scooter. For instance, for a 70 kg person riding on an e-scooter, a 20% reduction in speed from 15.5 mph to 12.5 mph results in a 35% reduction in available kinetic energy.

There are several important differences between e-scooters and bicycles, including rider position, centre of gravity, sensitivity of steering and likelihood of coming to a sudden stop (for example, with small diameter wheels hitting a curb, pothole, or road debris).<sup>20,21</sup> These factors, combined with the lack of helmet wear and prevalence of alcohol consumption, may underlie the relatively high severity of injuries seen in e-scooter riders.

Limitations of this study include that the control period data were collected retrospectively, in contrast to the prospective investigation period data. It is possible that results in the investigation period are subject to bias, as this period fell in the immediate post-lockdown phase after the first COVID-19 wave and consequently, this may underrepresent the true picture due to people being cautious about returning to normality. Our results are from a major trauma centre in a large city, but we believe that the findings are generalisable to other cities in the UK.

## Conclusions

There was a significant rise in e-scooter-related injuries seen at our major trauma unit in 2020 compared with the same period in 2019. If this trend continues unchecked, e-scooter-related injuries are ultimately likely to contribute a

significant additional burden of trauma to both primary and secondary care services. In the e-scooter-related patients that we treated, alcohol consumption was common, while helmet use was rare. Legislation is urgently needed and we recommend subjecting e-scooters to at least the same requirements in safety equipment and sobriety as bicycles, that their use on pavements remains illegal and that their top speed is limited to 12.5 mph. We hope that these measures will allow the benefits of this technology to be enjoyed while reducing associated morbidity and mortality.

### Ethics declarations

*This study was registered as a service evaluation of treatment of facial trauma at King's College Hospital by the Oral and Maxillofacial Trauma Department during the COVID-19 lockdown period (DENT044-20). This was an observational study and did not require ethical approval according to the NHS Health Research Authority.*

### Author contributions

*Thomas Pepper conceived the study, conducted statistical analysis and drafted and revised the manuscript. Matthew Barker, Delia Smyth and Matthew Kingham collected data and drafted the manuscript. Radhika Dua conceived the study and drafted the manuscript. Kathleen Fan conceived the study, supervised the project and drafted and revised the manuscript.*

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