Orthopaedic-related trauma in e-hailing motorcycle drivers at a single centre in South Africa

Sanishan T Govender,* Grant I Connellan, Nokwanda S Ngcoya

Department of Orthopaedics, University of Pretoria, Tembisa Provincial Tertiary Hospital, Pretoria, South Africa

**Corresponding author: sanishangovender@gmail.com*

Citation: Govender ST, Connellan GI, Ngcoya NS. Orthopaedic-related trauma in e-hailing motorcycle drivers at a single centre in South Africa. SA Orthop J. 2024;23(2):82-85. http://dx.doi.org/10.17159/2309-8309/2024/v23n2a4

Editor: Dr Luan Nieuwoudt, University of KwaZulu-Natal, Durban, South Africa

Received: September 2023

Accepted: November 2023

Published: May 2024

Funding: No funding was received for this study.

Conflict of interest: The authors declare they have no conflicts of interest that are directly or indirectly related to the research.

Abstract

Background

Since the COVID-19 pandemic, there has been an increased usage of technologically based platforms throughout society. An example can be seen in the food and goods delivery industry, whereby e-hailing companies have shown a surge in both revenue and workforce. With this rise of e-hailing motorcycle drivers, a rise in road traffic accidents (RTAs) has also been noted. Our study set out to investigate the cumulative incidence of e-hailing motorcycle drivers sustaining orthopaedic-related trauma in comparison to the total number of orthopaedic trauma patients seen. The secondary aims included a treatment cost estimation as well as a qualification of the injuries sustained.

Methods

This was a prospective cross-sectional study conducted at a single centre, Tembisa Provincial Tertiary Hospital (TPTH), over a period of seven months. We included all e-hailing drivers using any form of motorcycle who experienced orthopaedic-related trauma while on duty. The cumulative incidence of the group was then determined. Lastly, a treatment cost estimation of the surgically managed group was generated and the injuries sustained were further qualified based on the type of injury, anatomical section injured, and management plan incurred.

Results

A total of 5 092 individuals experienced orthopaedic-related trauma, with 60 individuals being e-hailing motorcycle drivers who sustained injury while on duty. The cumulative incidence of the group was 118 per 10 000 patients over a seven-month period. A total estimated treatment cost of R2 781 941.70 was spent on the surgically managed group alone. Further analysis, in terms of injury qualification, revealed that 47 drivers experienced fractures or dislocations, with 34 of these injuries requiring surgical intervention. More extremity injuries were noted, with 28 injuries occurring to the upper limb and 34 injuries occurring to the lower limb.

Conclusion

Our study determined the cumulative incidence of orthopaedic-related trauma in e-hailing motorcycle drivers at TPTH. The injuries they sustained were further qualified and suggestive to be more high velocity in nature, involving mostly the extremities. The treatment cost analysis was found to be an underestimation, and a more detailed cost analysis is suggested to quantify the true burden of this group on the Gauteng Department of Health.

Level of evidence: Level 3

Keywords: e-hailing, motorcycle, orthopaedic trauma, incidence

Introduction

Since the COVID-19 pandemic, the use of technologically based platforms has increased throughout society. An example can be seen in the food and goods delivery industry, whereby e-hailing companies have shown a surge in both revenue and workforce, as seen in the United States of America.[1] South African society is not immune to this progression, with e-hailing services such as Uber Eats, Checkers Sixty60, Mr D, takealot, as well as others, showing a rise in the number of motorcycle drivers on our roads.[2] In accordance with the South African National Land Transport Amendment Bill, e-hailing services pertain to 'vehicles ... hailed or pre-booked using an e-hailing or technologically enabled application'.[3] This is a loose term which traditionally referred to the transportation of people, but can be used to refer to the transportation of food and goods, as these companies have diversified their scope of service.[4]

With this rise of e-hailing motorcycle drivers, a rise in road traffic accidents (RTAs) has also been noted, which has been proposed to have a multifactorial aetiology.[2] Extremes of weather, overworked patrons, alcohol abuse, declining infrastructure, and services conducted in areas of socioeconomic decay have been cited as the main contributing factors.[2] In South Africa, RTAs account for the second most common cause of trauma-related injury.[5] These injuries in and of themselves often affect the musculoskeletal system, resulting in the involvement of the orthopaedic surgeon.[6,7]

Therefore, with the increase in e-hailing motorcycle accidents, the inevitable rise in orthopaedic-related trauma has become apparent. This has led to a burden on the Gauteng Department of Health (provincial level), that requires quantification. Our study set out to investigate the cumulative incidence of e-hailing motorcycle drivers who sustain orthopaedic-related trauma in comparison to the total number of orthopaedic trauma patients seen. The secondary aims included a treatment cost estimation for this group based on a local study done by Thikhathali and Ngcelwane,[8] as well as a qualification of the injuries sustained.

Methods

This was a prospective cross-sectional study conducted at a single centre, Tembisa Provincial Tertiary Hospital (TPTH), from 1 July 2022 to 31 January 2023. Data consisting of patient diagnosis, mechanism of injury, occupation, management plan and total number seen, was transcribed daily from departmental call log sheets and then tabulated into a Microsoft® Excel spreadsheet, version 16.63 (© 2022 Microsoft. All rights reserved). Patient demographics and other identifying information was not required for the purposes of the study, hence a waiver of patient-informed consent documentation was granted by our institution's Ethics Committee.

The study population included all e-hailing drivers (as previously defined) using any form of motorcycle as a form of transportation, who sustain orthopaedic-related trauma while on duty within the TPTH drainage area. The study group was compared to the total number of trauma patients who presented to the orthopaedic department, regardless of cause, during the same study period.

To determine an estimated treatment cost, we referred to the recent study undertaken by Thikhathali and Ngcelwane, which was a retrospective single centre study conducted at Steve Biko Academic Hospital (SBAH) over a 12-month period.[8] They sought to determine the overall burden of managing patients with RTAs, both financially and with regard to resource utilisation. They employed a micro-costing (bottom-up) approach with regard to each of its study variables. The total treatment cost consisted of theatre time costs, implant costs, radiological costs, high care/ intensive care unit costs, as well as general hospital stay and rehabilitation costs.[8] There were limitations to their study as they did not consider the added costs from other departments on polytrauma patients and the cost of blood products and general consumables.[8] Irrespective of these limitations, the study showed an average cost of R92 731.39 per patient which we used as our reference point to calculate our treatment cost estimation.[8]

To qualify the injuries sustained, we tallied the number of soft tissue injuries in comparison to bony injuries (this included fractures and dislocations). We also analysed the anatomical section involved by dividing the location of injury into the four primary areas where the bulk of orthopaedic trauma surgery focused, namely, upper limb, lower limb, pelvis and spine. Finally, we divided the management strategy undertaken into conservative versus surgical, with conservative management encompassing all forms of treatment which could be undertaken without the need for hospital admission (reduction and casting, suturing, wound care). Surgical management was then further divided into wound debridement (including closure), open reduction internal fixation (ORIF), intramedullary nailing (IMN) and external fixation (ex-fix).

Results

During the study period of July 2022 to January 2023, 5 092 patients with orthopaedic-related trauma were assessed. Of these patients, 5 032 did not meet the inclusion criteria and were used as the comparator group. This left a total of 60 patients who met the inclusion criteria for statistical analysis. The frequency table (*Table I*) shows the number of e-hailing motorcycle drivers who sustained injury in comparison to the total number of orthopaedic patients, with a monthly breakdown. Of the incidents recorded, an overall average of 1% were e-hailing-related incidents, with a cumulative incidence of 118 per 10 000 cases over a seven-month period.

Table I: Frequency table of e-hailing drivers in comparison to total patients seen

Year	Month	Patients seen	Number of e-hailing	% e-hailing
2022	July	774	14	1.8%
	August	675	7	1.0%
	September	739	3	0.4%
	October	767	12	1.6%
	November	695	7	1.0%
	December	759	7	0.9%
2023	January	683	10	1.5%

Our study showed that more bony injuries were present, with a total of 47 e-hailing motorcycle drivers in comparison to the 13 who sustained soft tissue injuries. With regard to the anatomical section involved, the lower limb was the most injured, consisting of 34 injuries. A total of 28 drivers sustained upper limb injuries. Only two drivers sustained spinal injuries, and one driver sustained a pelvic injury. Of note, the total number of anatomical sections injured exceeded the total number of e-hailing motorcycle drivers who met the inclusion criteria. This is because five out of the total 60 e-hailing motorcycle drivers sustained multiple injuries involving more than one anatomical section. Further delineation of the types of injuries sustained to the lower limb and upper limb groups are shown in *Figure 1* and *Figure 2*, respectively.

In terms of the management strategy utilised, the conservatively managed group consisted of 31 injuries while the surgically managed group consisted of 34 injuries. The surgically managed group was further divided into 17 injuries being managed by ORIF, ten injuries being managed by IMN, four injuries being managed by debridement (including closure) and three injuries being managed with ex-fix. The total number of e-hailing motorcycle drivers who underwent surgical management and required admission

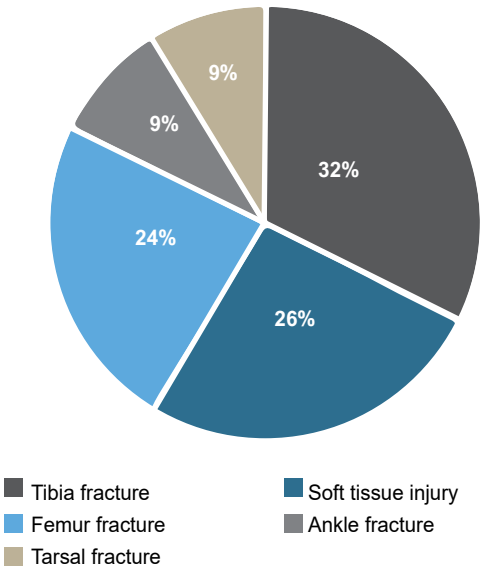

Figure 1. Delineation of injuries sustained to the lower limb

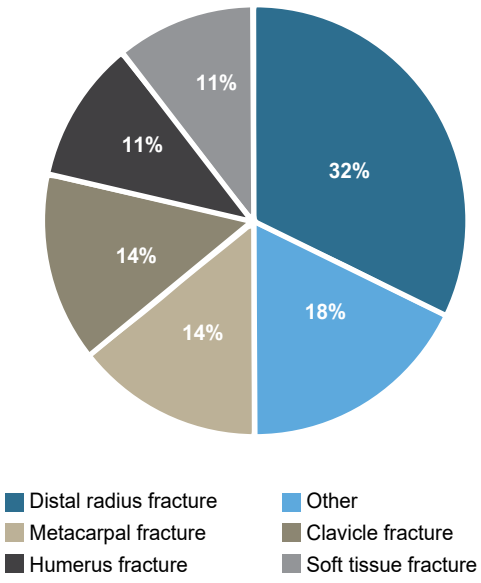

Figure 2. Delineation of injuries sustained to the upper limb

amounted to 30, as four drivers had two injuries each, which both required surgical management. A similar observation was made with the conservative group as one driver sustained injuries requiring conservative management of both, leaving a total number of 30 drivers in the conservatively managed group.

To estimate the treatment cost we used the cost calculated by Thikhathali and Ngcelwane, amounting to R92 731.39 per patient.[8] This was multiplied by the 30 drivers that required surgical management and were therefore admitted to the hospital. Based on the above, a total estimated treatment cost of R2 781 941.70 was spent on these surgically managed patients alone over the seven-month period.

Discussion

There has been a steady increase in e-hailing motorcycle drivers on South African roads since the arrival of COVID-19.[2] This has resulted in an unknown burden placed on the Gauteng Department of Health, which we sought to quantify. Our study's primary aim showed a cumulative incidence of 118 per 10 000 over a seven-month period. Since this study refers to such a specific target group, it is somewhat difficult to compare it to current literature. However, a study undertaken at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) published in 2022 consisting of a dataset examining general trauma statistics from 1 January 2005 until 31 December 2012 showed similar results.[9]

They conducted a retrospective review, gathering information on demographics, mechanism of injury, Injury Severity Score (ISS) and New Injury Severity Score (NISS).[9] From their results it was noted that a total of 18 087 patients experiencing trauma were reviewed over the study period. Of these patients, 259 trauma cases were due to motorbike crashes, contributing to 1.43% of all trauma cases.[9] This finding is in keeping with our study, which showed that e-hailing motorcycle drivers contributed to 1% of orthopaedic trauma cases at TPTH. There are, however, notable differences, as the CMJAH study takes into account all trauma, not just orthopaedic-related trauma, and the study was done over ten years ago. Since then, the number of motorcycles on our roads has steadily increased.[10] Our study also only takes into account e-hailing motorcycle drivers and not all motorbike crashes, as the CMJAH study does.

With reference to one of our secondary aims, determining a treatment cost estimation of the e-hailing motorcycle drivers, we estimated that a total of R2 781 941.70 was spent on the surgically managed drivers alone. This figure is based on the study done by Thikhathali and Ngcelwane,[8] which shares many similarities with the clinical setting at TPTH as both institutions provide a tertiary level of care in the Pretoria area of South Africa, use the same protocols and treatment plans, incur similar costs and pricing, and consider RTAs. It was, therefore, an excellent basis to estimate the overall treatment cost incurred by these e-hailing drivers on TPTH. There are, however, some important differences, as TPTH does not have a dedicated 24-hour orthopaedics theatre running, and the patient load differs from that of SBAH. These two combined factors could have led to longer patient waiting times for operation at our centre, which incurs a greater overall hospital cost.

Our estimated treatment cost does not include the costs associated with the 30 e-hailing motorcycle drivers who underwent conservative management, nor does it consider the cost of follow-up, general consumable costs and the prolonged patient stay costs of the surgically managed group. Therefore, it is an underestimation of the actual total cost incurred. Nevertheless, we still compared this estimated treatment cost to the 2022/2023 Gauteng Department of Health budget to quantify the burden. The budget showed that R59 426 398 000 was allocated to the Gauteng Department of Health while R21 068 239 000 was allocated to central hospitals in Gauteng.[11] Of these totals, the surgically managed e-hailing drivers contributed to 0.0047% of the provincial budget and 0.013% of the central hospitals budget for Gauteng.[11] These figures directly showcase the cost and burden on the Gauteng Department of Health.

In order to qualify the extent of the orthopaedic-related trauma, we examined three other variables closely. The first variable was whether the injury was soft tissue in nature or bony (fractures and dislocations). From interpretation of the data collected, more e-hailing motorcycle drivers sustained bony injuries in comparison to soft tissue injuries. We speculated that this was due to the high velocity nature of the accidents resulting in a greater force imposed on tissue leading to more severe injuries.[12]

Thereafter, the anatomical section of injury was assessed. It was made apparent that a relatively even distribution of upper limb and lower limb injuries occurred. The data showed that extremity injuries (upper limb and lower limb injuries) were also the main two anatomical sections involved. We speculated that this was due to the lack of safety measures of motorcycles to avoid extremity injuries.[13] The lower limb group consisted mainly of fractures to the long bones (*Figure 1*) consistent with high energy forces involved.[13] The upper limb, in comparison, consisted mainly of fractures (*Figure 2*) with injury patterns consistent with a mechanism of injury due to direct blows or drivers bracing for impact.[12] The final variable looked at the management plan of the patients. The conservatively managed group was higher than what we initially expected. This could be in part because at TPTH, the orthopaedic department often opts for conservative management due to resource and time constraints. If these constraints were not present, perhaps the surgically managed group and the treatment cost of this group would have been even higher.

Limitations of the study were that it was a single centre study. A possible underestimation of the true incidence may have occurred whereby patient particulars could not be identified due to language barriers and medical obstruction to communication (intubated or confused patients). The study period of seven months was also short in duration, and the cost analysis was based on the study done by Thikhathali and Ngcelwane, which itself had its own limitations.

Conclusion

In conclusion, our study determined the cumulative incidence of orthopaedic-related trauma in e-hailing motorcycle drivers

at TPTH. The injuries that they sustained were further qualified and found to be more high velocity in nature, involving mostly the extremities. The treatment cost analysis was found to be an underestimation, and a more detailed cost analysis is suggested to quantify the true burden on the Gauteng Department of Health. We also recommend that further studies of this nature be done, to gather more information on the e-hailing motorcycle drivers and create awareness of a possible future problem.

Ethics statement

The authors declare that this submission is in accordance with the principles laid down by the Responsible Research Publication Position Statements as developed at the 2nd World Conference on Research Integrity in Singapore, 2010.
Prior to the commencement of the study, ethical approval was obtained from the following ethical review board: The Research Ethics Committee, Faculty Health Sciences, University of Pretoria (375/2022). All procedures were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Informed written consent was not obtained from all patients for being included in the study as the need for written consent was waived by our institution's Ethics Committee.

Declaration

The authors declare authorship of this article and that they have followed sound scientific research practice. This research is original and does not transgress plagiarism policies.

Author contributions

STG: study conceptualisation, study design, data capture, data analysis, manuscript preparation, manuscript revision
GIC: study design, data capture, data analysis, manuscript preparation
NSN: study conceptualisation, study design, manuscript preparation

ORCID

Govender ST https://orcid.org/0009-0008-2969-8947
Connellan GI https://orcid.org/0000-0001-5705-7882
Ngcoya NS https://orcid.org/0000-0001-7122-0287

References

1. Lin R. The effects of Covid-19 on the online food delivery industry. In: Proceedings of the 2021 3rd International Conference on Economic Management and Cultural Industry (ICEMCI 2021). Paris, France: Atlantis Press, 2021.
2. Asher-Schapiro KH. Risks for South Africa's food couriers surge during the pandemic. https://www.context.news/socioeconomic-inclusion/long-read/risks-for-south-africas-food-couriers-surge-during-the-pandemic?utm_source=news-trust&utm_medium=redirect&utm_campaign=context&utm_content=article (date last accessed 07 November 2023)
3. South Africa. National Land Transport Amendment Bill, B7D-2016.
4. Smith LT. Assessing the adoption and utilisation of e-hailing services: The case of Cape Town, South Africa. [dissertation] Stellenbosch University. 2020.
5. Saggie J. Trauma: South Africa's other epidemic. SAMJ. 2013;103:589-90.
6. Parkinson F, Kent S, Aldous C, et al. Road traffic crashes in South Africa: the burden of injury to a regional trauma centre. S Afr Med J. 2013;103(11):850-52.
7. Stinner DJ, Edwards D. Surgical management of musculoskeletal trauma. Surg Clin North Am. 2017;97(5):1119-31.
8. Thikhathali ND, Ngcelwane MV. The burden of road traffic accident-related trauma to orthopaedic healthcare and resource utilisation at a South African tertiary hospital: a cost analysis study. SA Orthop J. 2022;21(4):217-22.
9. Pswarayi R, Moeng MS. Trauma patients at risk of in-hospital mortality. J Surg Case Rep. 2022;5(5). https://doi.org/10.31579/2690-1897/125
10. Droppa D. Mzansi's motorcycle sales get a boost from e-commerce. https://www.timeslive.co.za/motoring/news/2023-08-21-mzansis-motorcycle-sales-get-a-boost-from-e-commerce/# (date last accessed 07 November 2023)
11. Gauteng Department of Health. Committee oversight report on the 2022/2023 Gauteng Department of Health budget vote 4. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjGyLiNtbGCAxWSYEEAHVH-AIUQFnoECCMQAQ&url=https%3A%2F%2Fwww.gpl.gov.za%2Fwp-content%2Fuploads%2F2022%2F05%2FATC-178-Health-Committee-Ovesight-Report-on-the-Budget-Vote-4-Report-on-the-Department-for-2022.23.docx&usg=AOvVaw3wwpz2HZomvJv2ceg056L7&opi=89978449 (date last accessed 07 November 2023)
12. Egol KA, Koval KJ, Zuckerman JD. Handbook of fractures. Philadelphia: Wolters Kluwer. 2020.
13. Peden M, World Health Organization. World report on road traffic injury prevention: information kit. Geneva, Switzerland: World Health Organization. 2004.