



Brief Report

Emergency department visits for electric scooter-related injuries after introduction of an urban rental program



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ABSTRACT

Background: Providers in Salt Lake City emergency departments (EDs) anecdotally noted a significant number of electronic scooter (e-scooter)-related injuries since the launch of e-scooter rentals in the downtown area in June 2018. The aim of this study was to quantify and characterize these injuries.

Methods: We reviewed the electronic medical records of the University of Utah ED and the Salt Lake Regional Medical Center ED. Using a broad keyword search for “scooter,” we examined all notes for ED visits between June 15–November 15, 2017, and June 15–November 15, 2018, and identified e-scooter related injuries. The 2017 data pre-dated the launch of the e-scooter share programs in Salt Lake City and served as a control period. **Results:** We noted 8 scooter-related injuries in 2017 and 50 in 2018. Injury types from the 2018 period included: major head injury (8%); major musculoskeletal injury (36%); minor head injury (12%); minor musculoskeletal injury (34%); and superficial soft tissue injury (40%). 24% of patients presented via ambulance and 6% presented as a trauma activation. 16% of patients required hospital admission and 14% had an injury requiring operative repair. 16% reported alcohol intoxication and none of the patients reported wearing a helmet at the time of the injury.

Conclusion: Since the launch of e-scooter share programs in Salt Lake City, we have seen a substantial increase in e-scooter related trauma in our EDs. Of particular note is the number of patients with major head injuries and major musculoskeletal injuries.

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1. Introduction

Modes of transportation in the United States continue to evolve with our advancing technology and desire to find more economical and environmentally conscious mediums of traveling in cities. Perhaps none more evident of this are the “dockless e-scooter share” electric scooters (e-scooters) that have appeared on the sidewalks and streets of over 100 cities in 20+ states. [1] While safety regulations between these e-scooter companies and city officials who grant their business licenses appear to have been discussed, there are a growing number of reports from around the country highlighting the numerous injuries that have occurred while riding e-scooters. [2–5]

Physicians in Salt Lake City emergency departments (EDs) noted a significant number of e-scooter-related injuries since the launch of e-scooters in the downtown area in June 2018. We suspect that emergency departments around the country are witnessing a similar pattern of ED visits related to e-scooter accidents. We hypothesized that our

investigation would reveal an increase in the number of e-scooter related injuries presenting to urban EDs after the launch of the dockless e-scooter share companies in Salt Lake City. The aim of this study was to quantify and characterize the nature of these injuries.

2. Methods

We conducted a retrospective review of the electronic medical record at the University of Utah Hospital Emergency Department and Salt Lake Regional Medical Center Emergency Department to evaluate patients presenting to the emergency department with e-scooter related injuries between June 15–November 15, 2017, as well as June 15–November 15, 2018. The 2017 time period pre-dated the launch of e-scooter share programs in Salt Lake City and served as a control arm of our study. We recognized that e-scooters existed prior to the launch of area rental programs and used this 2017 period as a baseline for scooter-related injuries prior to the wider availability through rental programs.

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Table 1
Patient presentation characteristics during the 2018 study period

Characteristic	Average/% of total
Female gender	50%
Age	34 years (range: 18–72)
Arrival via ambulance	24%
Trauma activation	6%
Alcohol intoxication	16%
Helmet use	0%

approximately 50,000 patient visits per year. Salt Lake Regional Medical Center is an urban community emergency department located in downtown Salt Lake City with approximately 10,000 patient visits per year.

We queried ED records of the University of Utah Hospital and Salt Lake Regional Medical Center for patients who presented to the ED during the two study periods of June 15–November 15, 2017, and June 15–November 15, 2018, by searching for occurrences of the word “scooter” within any text note generated during the ED encounter. We did not utilize billing codes (International Classification of Diseases, Tenth Revision, Clinical Modification – ICD-10-CM) typically used to identify patients in retrospective studies due to the lack of e-scooter accident codes within ICD-10-CM.

The lead study investigators (AB, CM, TM), then reviewed individual records generated through the broad search, including ED Triage Notes, ED Provider Notes, History and Physicals, Consult Notes, and Discharge Summaries. We excluded encounters that had been flagged due to the use of the term “scooter” but which involved knee scooters, mobility scooters, Rascal© scooters, mopeds, motorcycles, and non-motorized foot powered scooters (i.e. Razor©).

We calculated the total number of e-scooter related ED visits at each institution for both study time periods. For patient encounters that met the inclusion criteria in the 2018 time period, we collected basic patient demographic data as well as details of the injury. We analyzed the data utilizing descriptive statistics, with data presented utilizing percentages for categorical variables and means for continuous variables (STATA v. 12.0, StataCorp, College Station, TX).

The primary study outcome was the number of ED visits related to e-scooter related trauma during the two study periods. Our secondary outcomes included: type and location of injury or injuries, whether the patient was helmeted, whether the patient reported being intoxicated at the time of the accident, the location of the accident (sidewalk, bike lane, road, etc.), the patient’s disposition from the ED (home,

admitted to the hospital, taken to the operating room), whether the patient’s visit triggered a trauma activation, means of patient arrival (private vehicle versus ambulance), and the type of e-scooter involved in the accident (privately owned, rental, or not reported).

3. Results

During the 2017 study period, eight e-scooter related visits presented to the two EDs. During the 2018 study period, 50 e-scooter related visits presented to the EDs: 13 at Salt Lake Regional Medical Center and 37 at the University of Utah Hospital. Half of patients injured during the 2018 study period were female, with an age range of 18–72 years old and an average age of 34 years. (Table 1)

Injury types included: major head injury (skull fracture and intracranial hemorrhage) 4 patients (8%); major musculoskeletal injury (fractures and dislocations): 18 patients (36%); minor head injury (closed head injury/concussion) 6 patients (12%); minor musculoskeletal injury (sprains and strains): 17 patients (34%); and superficial soft tissue injury (abrasions, hematomas, and lacerations): 20 patients (40%). Fourteen patients (28%) presented with multiple injury types and thus received more than one classification. (Fig. 1).

Twelve patients (24%) arrived to the ED via ambulance. Three patients (6%) were designated as trauma activations and had mobilization of all of the associated personnel and resources. Eight patients (16%) required hospital admission and 7 patients (14%) had an injury requiring operative repair. (Table 1).

Twenty-two (44%) patients reported that the accident occurred on a sidewalk. Eight patients (16%) reported alcohol intoxication at the time of the accident, and none of the patients reported wearing a helmet at the time of the injury. One patient (2%) reported that the e-scooter was privately owned and was not a rental e-scooter. (Table 1).

4. Limitations

Limitations of this study include its retrospective design, single city (though multi-center) patient population, and its limited study period. Due to its retrospective nature, this study relied on the accuracy and completeness of the electronic medical record. As e-scooter related injuries are a relatively new phenomenon in the ED we were not able to reliably use billing codes (International Classification of Diseases, Tenth Revision, Clinical Modification – ICD-10-CM) typically used to identify patients in retrospective studies. Instead we performed a string search for “scooter” for every note associated with an ED encounter during

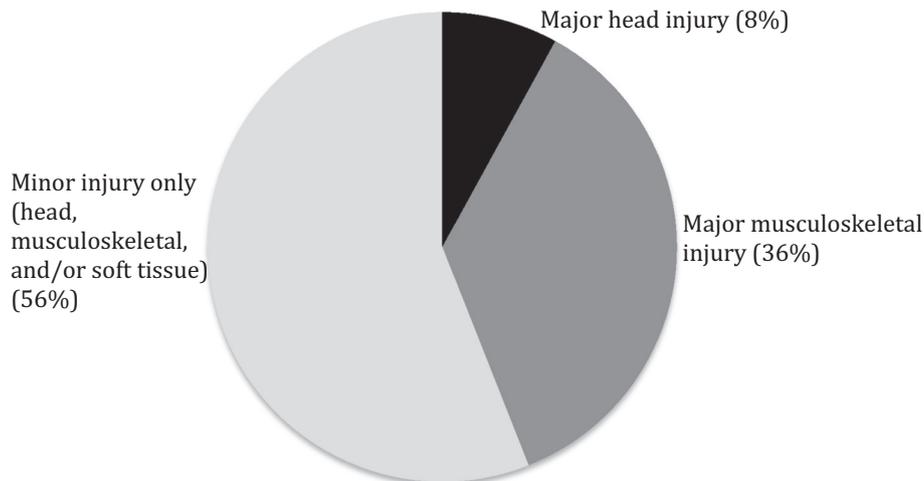


Fig. 1. Injury types during the 2018 study period.

the study periods. Using this method, we feel we were able to accurately measure our primary outcome.

Collecting complete information on some of our secondary outcomes was more limited by the retrospective nature of the study. In particular, we were limited by provider documentation when evaluating whether the patient was wearing a helmet, whether the patient was intoxicated, the location of the accident, and whether the e-scooter was a rental versus a personally owned e-scooter.

Also limiting this study was its single city patient population. Though the study involved two centers, they both serve the downtown Salt Lake City area. City characteristics are an important consideration when attempting to generalize the results of this study. For example, city population, population density, city layout, topography, availability of sidewalks, availability of bike lines, robust public transportation system, and weather could all affect the incidence of e-scooter related trauma.

Lastly, this study was limited by a five-month study period. The decision to limit our evaluation to give months was multifactorial. Given the ever-increasing presence of e-scooters in our city and around the country we felt a public health/safety responsibility to provide a timely (even if limited) evaluation of e-scooter related trauma seen at our institutions. Additionally, given cold, snowy conditions during the winter months in Salt Lake City we anticipated a significant decrease in e-scooter usage following our study period. We even speculated that the fleet of scooters may be removed during the winter months by their respective companies. This of course means that the incidence we witnessed during our 5-month period cannot be extrapolated to create an expected annual incidence of e-scooter related trauma in Salt Lake City. In more temperate climates (i.e. California, Texas, etc.) we expect that e-scooter use remains more consistent throughout the year.

5. Discussion

Since the launch of e-scooter share programs in Salt Lake City, we have seen a 625% increase in e-scooter related trauma in our EDs. The total number of e-scooter related trauma in our city is probably under-represented in this study as many patients likely present to urgent care clinics or primary care clinics as witnessed on the University of Texas at Austin campus where 110 scooter-related injuries were treated at the on-campus primary care clinic in a 3-month period. [5] We suspect that EDS around the country in cities with similar scooter share programs are witnessing a similar pattern of ED visits related to e-scooter accidents. This hypothesis has been borne out in recent studies and publications which have also observed a significant number of e-scooter related traumas. [2-6]

Of note, we saw a large number of patients with major/minor head injuries and no patients reported helmet use. Our findings do not appear to be unique; a similarly designed study out of UCLA Medical Center also reported 100 head injuries (40.2%) with only 4.4% of the total 249 patients wearing a helmet. Lack of helmet use was again observed in 94.3% of riders during a public observation component of this study. [3]

These findings are particularly troubling given what the medical community has learned about the short- and long-term sequelae of head trauma (even “minor”) in the last decade. While e-scooter user agreements and their respective companies publicly encourage helmet use, recently passed legislation in California allows riders over 18 years old to ride without wearing a helmet. [7,8] Also concerning is that 22 (44%) of the accidents in our study reportedly occurred on sidewalks which are prohibited from e-scooter use in Salt Lake City. In the

observational component of the UCLA study, 26.4% of riders were riding on sidewalks. [3]

In conclusion, our study demonstrates a significant increase in e-scooter related trauma since the launch of dockless e-scooters in Salt Lake City. These injuries included a substantial percentage of head injuries and major orthopedic injuries. We anticipate a growing number of e-scooter related trauma in our EDs and around the country as e-scooter use continues to increase.

Meetings

Presented at the Annual Meeting of the Society for Academic Emergency Medicine, May 14–17, 2019, Las Vegas, NV.

Grants

None.

Conflicts of interest

None of the authors has any conflicts of interest to report.

Author contributions

AB and TM conceived the study. CC was responsible data collection, data analysis and data organization at Salt Lake Regional Medical Center. MN, JS, and MC were responsible for data collection at the University of Utah. AB and TM were responsible for data analysis and data organization at the University of Utah. AB drafted the manuscript, and all authors contributed substantially to its revision. TM takes responsibility for the paper as a whole.

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