

#### Measuring and Standardizing Micromobility Injury Data Across NYC Health + Hospitals: Current Trends & Future Directions

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#### **Disclosures**

#### None



#### **National Estimates**

- E-bikes, E-scooters, hoverboards
- 448,600 ED visits related to micromobility products
- Linear increase in injuries and fatalities between 2017 and 2022
- E-bikes, E-scooters account for the majority of injuries



#### Micromobility Products-Related Deaths, Injuries, and Hazard Patterns: 2017–2023

September 2024

James Tark

Directorate for Epidemiology

Division of Hazard Analysis

This report was prepared by the CPSC staff. It has not been reviewed or approved by, and may not necessarily reflect the views of, the Commission.



U.S. Consumer Product Safety Commission. (2023). *Micromobility products: Related deaths, injuries, and hazard patterns (2017–2023)*. U.S. Consumer Product Safety Commission. <u>https://www.cpsc.gov/s3fs-public/Micromobility-Products-Related-Deaths-Injuries-and-Hazard-Patterns</u> 2017-2023.pdf?VersionId=HGl0mSi3LLA.JNaqxzMjvj XYSQhSHgH



#### **National Estimates**

Figure 2.1: Estimated ED Visits Associated with Micromobility Products by Year



Source: NEISS, U.S. Consumer Product Safety Commission, 2017-2023.

\*E-bike estimates are part of micromobility estimates. Data points for 2018 through 2021 are represented by the average for 2018-2021 as an intermediate dotted line since they do not meet the reporting criteria for NEISS.

U.S. Consumer Product Safety Commission. (2023). *Micromobility products: Related deaths, injuries, and hazard patterns (2017–2023)*. U.S. Consumer Product Safety Commission. <u>https://www.cpsc.gov/s3fs-public/Micromobility-Products-Related-Deaths-Injuries-and-Hazard-Patterns\_2017-2023.pdf?VersionId=HGI0mSi3LLA.JNaqxzMjvj\_XYSQhSHgH</u>



### What about local data?



### **NYC Trauma Centers**

- Level 1 Trauma Centers: 13
- Level 2 Trauma Centers: 5



NYC Health + Hospitals: approx. 50% NYC trauma volume

- Bellevue
- Elmhurst
- Harlem
- Jacobi
- Kings County
- Lincoln



## **Data Source**

Trauma registry



- All admitted injured patients
  - No data on treat and release from ED
- ICD-10 coding used to describe mechanism of injury



# **Micromobility Categories**

- Rider collision types:
  - Category 1: E-bike or similar



- Category 2: Stand-up E-scooter or similar
- Category 3: Motorcyclist, ATV, dirt bike, or similar
- Category 4: Pedal cyclist
- Category 5: Pedestrian injured in collision with micromobility device



## **Results – 3 Centers Reporting 2024**

| Category                       | Jan-24 | Feb-24 | Mar-24 | Apr-24 | May-24 | Jun-24 | Jul-24* | 2024YTD |
|--------------------------------|--------|--------|--------|--------|--------|--------|---------|---------|
| Cat 1-E-bike or similar rider  | 5      | 13     | 14     | 10     | 21     | 18     | 16      | 97      |
| Cat 2-Stand up e-scooter rider | 1      | 4      | 4      | 6      | 9      | 11     | 12      | 47      |
| Cat 3-Motorcyclist or similar  | 22     | 25     | 36     | 36     | 41     | 51     | 27      | 238     |
| Cat 4-Pedal cyclist            | 10     | 20     | 12     | 23     | 21     | 43     | 19      | 148     |
| Cat 5- Pedestrian              | 1      | 2      | 3      | 2      | 6      | 9      | 10      | 33      |
| All Categories                 | 39     | 64     | 69     | 77     | 98     | 132    | 84      | 563     |

\*July-24 data from only 3 centers

#### Digging into Bellevue data

- Jan 2023 Aug 2024
  - Total: 228 admissions
     Cat 1-3 and Cat 5 (excluded Cat 4)
  - Average age: 39.5 years





#### Injury Severity Score

- Overall score for poly-trauma based on composite score
  - Value: 0-75
- Total ISS
  - Mild: <9</p>
  - Moderate: 9-15
  - Severe: 16-24
  - Critical: <u>></u>25

| Regions                                | AIS | AIS meaning           |
|--|-----|-----------------------|
| Head, neck and C-spine                 | 1   | Minor                 |
| Face including nose, mouth, eyes, ears | 2   | Moderate              |
| Thorax, thoracic spine, diaphragm      | 3   | Serious               |
| Abdomen and lumbar spine               | 4   | Severe                |
| Extremities including pelvis           | 5   | Critical              |
| External soft tissue injury            | 6   | Maximal (untreatable) |

Calculate AIS for most severely injured body part in each region. ISS is calculated as sum of square of AIS for the 3 most injured body regions. Maximum score is 75. If any body region is assigned a 6, the overall ISS is automatically 75. Legend: AIS – abbreviated injury scale

Da Luz MD MSc, Luis. (2015). Catecholamines as Independent Predictors of Outcome in Moderate and Severe Traumatic Brain Injury (TBI). The COMA-TBI Study. 10.13140/RG.2.1.1740.7602.



### **Bellevue Admissions 2023 – Aug 2024**

- ISS Range: 1 75
- Median ISS: 10
  - Riders: 10
  - Pedestrians Struck : 10



29% have at least severe injury burden (ISS >15)
 10.9% have critical injury burden (ISS > 25)





ISS: Category 5



ISS: Category 3



#### **Percent Injury Severity by Category**



#### **Percent Injury Severity by Category**





### **Mortalities**

- 10 mortalities = 4.4%
  - Cat 1: 4
  - Cat 2: 1
  - Cat 3: 3
  - Cat 5: 2

Median survival in this group <1 day</p>



### Bellevue Admissions Length of Stay



- Micromobility Riders (Cat 1-3)
  - Median LOS: 4 days
- Pedestrians struck by micromobility (Cat 5)
  - Median LOS: 4 days
- All severe and critically injured
  - Median LOS (excluding deceased): 8 days [Range: 1-63 d]



#### Digging into Bellevue: Geographic Data

| Category                          | 2023 | Jan-Aug 2024 |
|-----------------------------------|------|--------------|
| Cat 1-E-bike or similar<br>rider  | 26   | 15           |
| Cat 2-Stand up e-scooter<br>rider | 18   | 17           |
| Cat 3-Motorcyclist or similar     | 60   | 38           |

\*Some cases have unknown injury zip codes and are not shown on map





#### Digging into Bellevue Data: Pedestrians Struck by Micromobility

| Category                 | 2023 | Jan-Aug 2024 |
|--------------------------|------|--------------|
| Cat 5- Pedestrian struck |      |              |
| by device (pedal bikes   |      |              |
| included, no cars)       | 38   | 16           |

\*Some cases have unknown injury zip codes and are not shown on map





# Findings

- Motorcyclist or similar device rider (Cat 3): most likely to have injuries requiring hospitalization
- Seasonal trend in warmer months
- Fewer pedestrian injuries in 2024 than anticipated



## Limitations

- Only hospital admissions
- Retrospective chart review
- Missing data points
- Relies on entry info



## **Challenges with data measurement**



November 14, 2022

Safety Research Report SRR-22-01

Micromobility: Data Challenges Associated with Assessing the Prevalence and Risk of Electric Scooter and Electric Bicycle Fatalities and Injuries

- Lack of reliable and complete data and coding
- Lack of trip data
- Recommendations:
  - Add e-bike/scooter device codes to police data
  - Add e-bike codes to injury data
  - Collect trip data

National Transportation Safety Board. (2022). *Safety recommendation report: SRR-22/01* (NTSB/SRR-22/01). National Transportation Safety Board. https://www.ntsb.gov/safety/safety-studies/Documents/SRR2201.pdf



### **Future Directions**

- Standardize coding of of device type in medical record
- Increase participation across centers
- Stratification of data by injury severity and injury type
- Geomapping of injuries by severity and type



Trauma & Emergency Medicine Micromobility Identification & Documentation Guide

SmartPhrase-EMICROMOBILITY









#### Motorcycles:



#### Scooters and mopeds:







#### **Micromobility Documentation**

- ≻ Identify Device
  - Show pictogram to Patient or EMS. Document device name and • code
  - Option for "other/device not pictured" with textbox. •
- **Document Patient's Role** >
  - Operator •
  - Passenger •
  - Pedestrian
- Document Mechanism of injury
  - Fall off device
  - Device vs. stationary object
  - Device vs. moving vehicle
  - Pedestrian struck by device •
- ≻ Document helmet use
  - Yes
  - No Unknown •
  - N/A (Pedestrian, etc)
- Document ownership
- Personally owned •
- Ride share
- Unknown •
- Used for Deliveries
  - Yes
  - No •
  - Unknown

#### **Efforts to Improve Data Collection**

- Piloting pictogram of devices
- Coding in medical record
- Challenges:
  - Difficult in busy EDs
  - Types of devices change rapidly
  - Standardizing beyond NYC H+H

#### **Prospective Patient Interview Study**

- Multi-institutional
- Type of incident
- Patient demographics
- Operating device
- User vs pedestrian
- Reason for device usage: personal vs professional
- Traffic information
- Safety equipment
- Medical data points



#### NYC **HEALTH+** HOSPITALS

| MICROM  | OBILITY SAFET   | Y NYC   | art ar   | Study #  | _          |
|---|---|---|--|--|------------|
| COMPLETE SHADED (i.e.<br>AREAS ON ALL 1<br>Please put completed form<br>NYC" lockbox in             | , prospective data)<br>PAGES!!!<br>in "Road Safety<br>EICU.                 | Patient Name:<br>MR #<br>Trauma Name:<br>Date of Visit:       |  |  |            |
| Inclusion Criteria: All injur   | ed micromobility use  | ers brought to BHC  | or NYU LH Brook  | lyn (including transfer                                    | s)         |
| <b>Data accumulated from:</b><br>(check all that apply)   | <ul> <li>Patient</li> <li>Scene witness</li> <li>Other surrogate</li> </ul> | □ NY<br>□ Me<br>te (specify):                                 | (PD<br>edical Record   | □ FDNY<br>□ EMT/Param                                      | edics      |
| Patient brought in by:<br>(check all that apply)  | □ EMT/Paramed<br>□ Transferred fr   | dics 🛛 NYPD<br>om:  | □ Walk-in  |  |            |
| Patient was (check one):  | □ Admitted  | □ Not admitt  | ted Died   | in ED  |            |
| Patient was transferred (ch   | eck one): 🗆 N   | o 🗆 Yes, f  | from:  |  |            |
| Incident was:  versus p versus motor vehicle (run fall from device [due to Unknown                  | edestrian 🗆 ve<br>over vs struck)<br>  pothole/other road                   | ersus other micromo<br>defect □ object in 1                   | bility user □ ve<br>road □ ice/snow  | ersus stationary object                                    |            |
| Age:  |   |   |  |  |            |
| Gender: 🗆 Male  | □ Female □  | Nonbinary   | Prefer not to say  | □ Other  |            |
| Race: American Indian Native Hawaiian Ethnicity: Not Hispanic                                       | or Alaskan Native<br>or Other Pacific Isla<br>or Latino   Mexi              | ☐ Asian ☐ Bla<br>ander ☐ White<br>ican, Mexican Amer          | ck or African Am<br>ican, Chicano/a  | erican<br>□ Puerto Rican                                   |            |
| Cuban Othe  | r Hispanic, Latino, c   | or Spanish Origin   |  |  |            |
| Payment Source:  N M  | one ☐ Medic<br>ilitary ☐ Medica   | are   | surance 🗆 Wor  | kers Comp  |            |
| Zip code (home address):  | 🛛 Unk   | nown 🛛 Outside  | USA 🗆 No fix   | ed address (undomicile                                     | ed)        |
| Hearing Loss/ Deficit:<br>Visual Loss/ Deficit:<br>Distracting Factor:<br>(exclude drugs & alcohol) | No No None Electronic dev Music   | Unknown   | Yes → legally de<br>Yes → legally bl<br>pply):<br>phone □ both ee<br>(scrolling □ Ce | eaf: No Di<br>lind: No Di<br>urphones)<br>Il phone-talking | Yes<br>Yes |
| Contributing Medical Con  | dition: None  | □ Unl<br>heck all that apply):<br>Seizure □ Ir<br>Syncope □ D | known<br>ntoxication<br>Dementia   | l Drugs<br>l Other   |            |



FORM needs to be completed.



**OTHER DEVICE:** (write-in)



## Thank you

- Margaret Ewen Bellevue Trauma Program Manager
- **Julia Burstein** Bellevue Trauma Injury Prevention Coordinator
- Bellevue Trauma Surgery Division

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