E-scooter Injury and Policy

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INJURY PREVENTION RESEARCH CENTER AT EMORY (IPRCE)
BROWN BAG LECTURE SERIES
# About Injury

## 10 Leading Causes of Death by Age Group, United States - 2017

<table>
<thead>
<tr>
<th>Rank</th>
<th>1-4</th>
<th>5-9</th>
<th>10-14</th>
<th>15-24</th>
<th>25-34</th>
<th>35-44</th>
<th>45-54</th>
<th>55-64</th>
<th>65+</th>
<th>Total</th>
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<tbody>
<tr>
<td>1</td>
<td>Congenital Anomalies</td>
<td>4,560</td>
<td>Unintentional Injury</td>
<td>1,267</td>
<td>Unintentional Injury</td>
<td>718</td>
<td>Unintentional Injury</td>
<td>800</td>
<td>Unintentional Injury</td>
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<td>2</td>
<td>Short Gestation</td>
<td>3,749</td>
<td>Congenital Anomalies</td>
<td>424</td>
<td>Malignant Neoplasms</td>
<td>418</td>
<td>Suicide</td>
<td>547</td>
<td>Suicide</td>
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<td>3</td>
<td>Maternal Pregnancy Comp.</td>
<td>1,422</td>
<td>Malignant Neoplasms</td>
<td>325</td>
<td>Congenital Anomalies</td>
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<td>437</td>
<td>Homicide</td>
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<td>SIDS</td>
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<td>Homicide</td>
<td>203</td>
<td>Homicide</td>
<td>154</td>
<td>Congenital Anomalies</td>
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<td>Malignant Neoplasms</td>
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<tr>
<td>5</td>
<td>Unintentional Injury</td>
<td>1,317</td>
<td>Heart Disease</td>
<td>127</td>
<td>Heart Disease</td>
<td>75</td>
<td>Homicide</td>
<td>178</td>
<td>Heart Disease</td>
<td>913</td>
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<td>6</td>
<td>Sudden Infant Death Syndrome</td>
<td>813</td>
<td>Influenza &amp; Pneumonia</td>
<td>104</td>
<td>Influenza &amp; Pneumonia</td>
<td>62</td>
<td>Heart Disease</td>
<td>104</td>
<td>Congenital Anomalies</td>
<td>355</td>
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<tr>
<td>7</td>
<td>Bacterial Sepsis</td>
<td>592</td>
<td>Sepsis</td>
<td>60</td>
<td>Chronic Low Respiratory Disease</td>
<td>59</td>
<td>Chronic Low Respiratory Disease</td>
<td>75</td>
<td>Diabetes Mellitus</td>
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<td>8</td>
<td>Septicemia</td>
<td>419</td>
<td>Septicemia</td>
<td>19</td>
<td>Cerebrovascular Disease</td>
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<td>Cerebrovascular Disease</td>
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<tr>
<td>9</td>
<td>Septicemia</td>
<td>411</td>
<td>Septicemia</td>
<td>33</td>
<td>Septicemia</td>
<td>51</td>
<td>Chronic Low Respiratory Disease</td>
<td>158</td>
<td>HIV</td>
<td>513</td>
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<td>10</td>
<td>Neonatal Hemorrhage</td>
<td>379</td>
<td>Perinatal Period</td>
<td>42</td>
<td>Benign Neoplasms</td>
<td>31</td>
<td>Benign Neoplasms</td>
<td>31</td>
<td>Benign Neoplasms</td>
<td>31</td>
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</tbody>
</table>

*Data Source: National Vital Statistics System, National Center for Health Statistics. CDC.*

Produced by: National Center for Injury Prevention and Control, CDC using WISQARS®.®

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revention Research at Emory
Injury Deaths by Intent, 2018

Unintentional: 69.5%
Suicide: 20.1%
Homicide: 7.8%
Undetermined: 2.3%
Mechanisms of Injury Death

- Firearms: 24.3%
- Motor Vehicle, Traffic: 21.4%
- Drug Poisoning: 20.3%
- Fall: 10.8%
- Suffocation: 8.4%
- Unspecified: 3.8%
- Drowning: 2%
- Fire: 1.8%
- Other: 4%
- Non Drug Poisoning: 1.6%
- Cutting/Pierce: 1.1%
About IPRCE

- Transportation Injury
- Opioid Overdose
- Violence
- TBI
- Falls

IPRCE
Injuries Associated with Shared Electric Dockless Micromobility Devices

Jonathan D. Rupp, Daniel T. Wu, Olivia Zoph, Bjorn Anderson, Lauren A. Hudak

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IPRCE BROWN BAG LECTURE
What are dockless electric micro-mobility devices?
US e-Scooter and e-Bike Deployments, 2.14.20

~352 deployments from 20 companies (14 e-scooter, 4 e-bike, 2 both)

Banned in 31 cities

Source: smartcitiesdive.com
GA e-Scooter and e-Bike Deployments, 2.14.20

Metro ATL: Bird, Jump, Spin, Wheelz, Gotcha*

Banned in Alpharetta, Athens, Columbus, Lilburn, Marietta, Smyna, Tucker, Woodstock

Source: smartcitiesdive.com
Atlanta Timeline

- **Bird**: 5/18
- **Jump, Lyft, Bolt**: 12/18
- **Nine Providers**: 11,650 Permits
- **1/19 City of ATL Regs**
- **8/19 ATL Night-time ban**
- **Lime, Bolt, Lyft, Gotcha exit market**: 11/19-12/19
E-scooter Injury—Data Sources

- NEISS Analyses through 2017 (Bressler et al. 2019, Aizpuru et al. 2019)

- Hospital records
  - ED data: Trivedi et al. 2019 (UCLA hospitals, Sept 2017-Aug 2018, 249 patients, data from EMR); Badeau et al. 2019 (U. Utah, June-Nov 2018, 50 pts)
  - Trauma registry analyses (Kobayashi et al. 2019)

- In-Depth Studies of Deployments
  - CDC/City of Austin DPH (Sept-Nov 2018, 190 patients, data from EMR+follow up survey)
  - PBOT 2018 (pilot deployment, July-Nov 2018)
E-scooter injury—What do we know?

- Injured riders are more likely to be male (50%-60% depending on the study)
- Helmet Use (<10% from field observations, <5% from hospital data)
- Alcohol Impairment (ED: 5%-16% EtOH>0.08g/dL, much higher in trauma data)
- First time riders at higher risk (~1/3 of injuries associated with first trip)
- Time of crash (39% of injuries and 28% of trips were between 6pm and 6am)
- Vehicle Involvement (10% to 12.5%)
- Injured Body Regions (ED data: head, UX, LX most prevalent)
Some Unanswered Questions

- Location (spatial factors, type)
- Behavioral factors influencing injurious events (helmet use, riding behavior as f(environment)…)
- Interventions (will more bike lanes help? Use of parking areas, how to address impairment, discounted rates for safe behaviors…)
- Device characteristics that influence safety
- Effective policy (e.g., ATL nighttime ban, how to incentivize operators, speed limits…)
- Equity issues (can e-scooters expand mobility options for underserved communities)
Objectives

• Describe how hospitals currently identify and record mechanisms of injuries
• Describe the challenges specific to identifying electric scooter injuries
• Share Grady’s initial e-micromobility (scooter) injury data
• Next steps
Hospital Injury Data - How could we identify e-scooter injuries?

- ICD 10 codes
  - Numerous non-specific codes for scooters
  - Most commonly V-codes (mechanism), often unbillable
- Trauma registry data
  - Skewed towards seriously injured cases (admissions)
- Chart reviews
  - The term “Scooter” is not defined or used consistently
Challenges - What are we looking for?

“Motorized” Scooter

“Mobility” Scooter

“Non powered” Scooter

“Segway” Scooter
Challenges - What's in a Name?

- Scooter
- Electric Scooter
- Standing Scooter
- Dockless Scooter
- Motorized Scooter
- Micro-Mobility Scooter
- Brand name
  (Bird/Lime/Lyft/Jump/Bolt/Boaz/Wheels/Spin/Gotcha)
Our Approach

• Created **SCRATCH** injury registry (**Scooter CRash And Trauma CoHort**)

• Searched all ED notes from June 2018 – Sept 2019 for key words (i.e. – scooter, eScooter, company name, etc.)

• Manual chart review to confirm case involved a standup electric scooter
  - Classified Not e-scooter/Certain/Possible
  - Coded helmet use
  - Coded mechanism (MVC, fall on roadway, fall of roadway, fall unknown location, struck by, struck against, other, unk.)

• Extracted demographics, labs, notes, diagnoses (ED/hospital), charges, LOS…
Age Distribution by Sex

Age Distribution, Confirmed e-Scooters

- Female (n=121)
- Male (n=220)

65% male
ED Disposition

Patient Disposition

- Admitted (n=64, 19%)
- Died (n=1, 0%)
- Discharged Home (n=273, 81%)
Additional Findings

- Built environment commonly noted (~18%)
- Mechanical issues (~5%)
- 16% Motor Vehicle Collision
- Helmets rarely used
- ETOH common (27% of 158 pts tested had EtOH≥0.08 g/dL)
Additional Findings, continued

• Most common chief complaints (58 total over 337 patients):
  o Fall (32%),
  o Motorcycle crash (14%),
  o Trauma (10%),
  o Motor-vehicle crash (4%)
Financial Distribution

DISTRIBUTION OF CHARGES BY PAYER TYPE, CONFMIRMED E-SCOOTERS (N=341)

- **Self-Pay**: 37%
- **Commercial**: 42%
- **Medicare**: 7%
- **Medicaid (All)**: 14%

Median Charge for all possible and certain cases: $9,584
Injury Patterns (Subset Analysis from GMH NEISS)

- 44% of patients had head injuries (included face)
- 37% had lower extremity injuries
- Severe ankle injuries most common (10/12)
- Of UE injuries, distal are more common than proximal
Operator Reported vs. GMH Data

Operator vs. GMH Data, 2019

- N Injuries Reported by Companies
- GMH Certain e-Scooter
- GMH total
How to complete the injury picture

- Hospital data will identify the most severe injuries
- Urgent Care Centers
- Student Health Centers at local Universities
- Robust rider feedback
Next Steps

• In-Depth analysis of SCRATCH data

• Engage patients prospectively for better data collection (obtain accident related factors like helmet use, EtOH, travel behavior, role of built environment)

• Urgent care data

• Identify and implement injury prevention interventions

• Long-term site based observational study