



Dockless Electric Kick Scooter Systems: What we know and don't know

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What are we talking about today?

Not a “motor scooter”



Nor a “mobility scooter”



But an “electric kick/standing scooter” or “e-scooter”



More specifically: Dockless electric kick scooter rental systems (DESS)



Current (Dec. 21, 2018) e-scooter rideshare companies



Map of U.S. cities with DESS – as of Dec. 21, 2018



What do riders use e-scooters for?

Trip Purpose	Percent of Respondents
Fun/recreational riding	28%
Commuting to work	18%
To access social/entertainment destinations	14%
To access restaurants	11%
To perform errands/access shopping	10%

Results from Portland Bureau of Transportation Survey (Oct 2018)



What do we know about DESS impacts?

1. May decrease vehicle trips taken/vehicle miles traveled (VMT)
E.g., Results from Portland Bureau of Transportation Survey (Oct 2018): 34% of respondents said that if they hadn't taken an e-scooter, they would have driven a personal car (19%) or hailed a taxi/Uber/Lyft (15%)
2. May reduce inequities related to access to transportation
E.g., Bird/Lime provide reduced cost rides to people on federal assistance programs
3. May support access to transit (first-last mile issue)
4. May encourage public-private partnerships and infrastructure investment
E.g., Bird has pledged \$1 per scooter/day to help cities build protected bike lanes and other improvements



What are the unresolved safety concerns?



E-scooters captivated IU students. But more than 75 have been hurt so ...
Indiana Daily Student - 19 hours ago
Senior Brian Sweeney fractured his left wrist and elbow after falling off a Lime scooter going 20 miles per hour Oct. 25. He had to wear a brace ...



E-scooter accidents, injuries on the rise across Denver

FOX31 Denver - Dec 5, 2018

In Denver, Swedish Medical Center estimates it treats as many as 20 people a week from **e-scooter accidents**, mostly for head injuries.



ER docs warn of scooter risk: 'Just because you can get on them ...

Indianapolis Star - Nov 13, 2018

"I couldn't give you any exact data, but I can definitely tell you that **electric scooter injuries** are on the rise. We're seeing more and more minor ...



US man dies after crashing Lime scooter into tree

Newshub - Nov 25, 2018

US man **dies** after crashing Lime scooter into tree ... at Lumino, and said use of **electric scooters** on footpaths is "fraught with potential for injury".



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Different data sources tell different stories about the nature of injuries

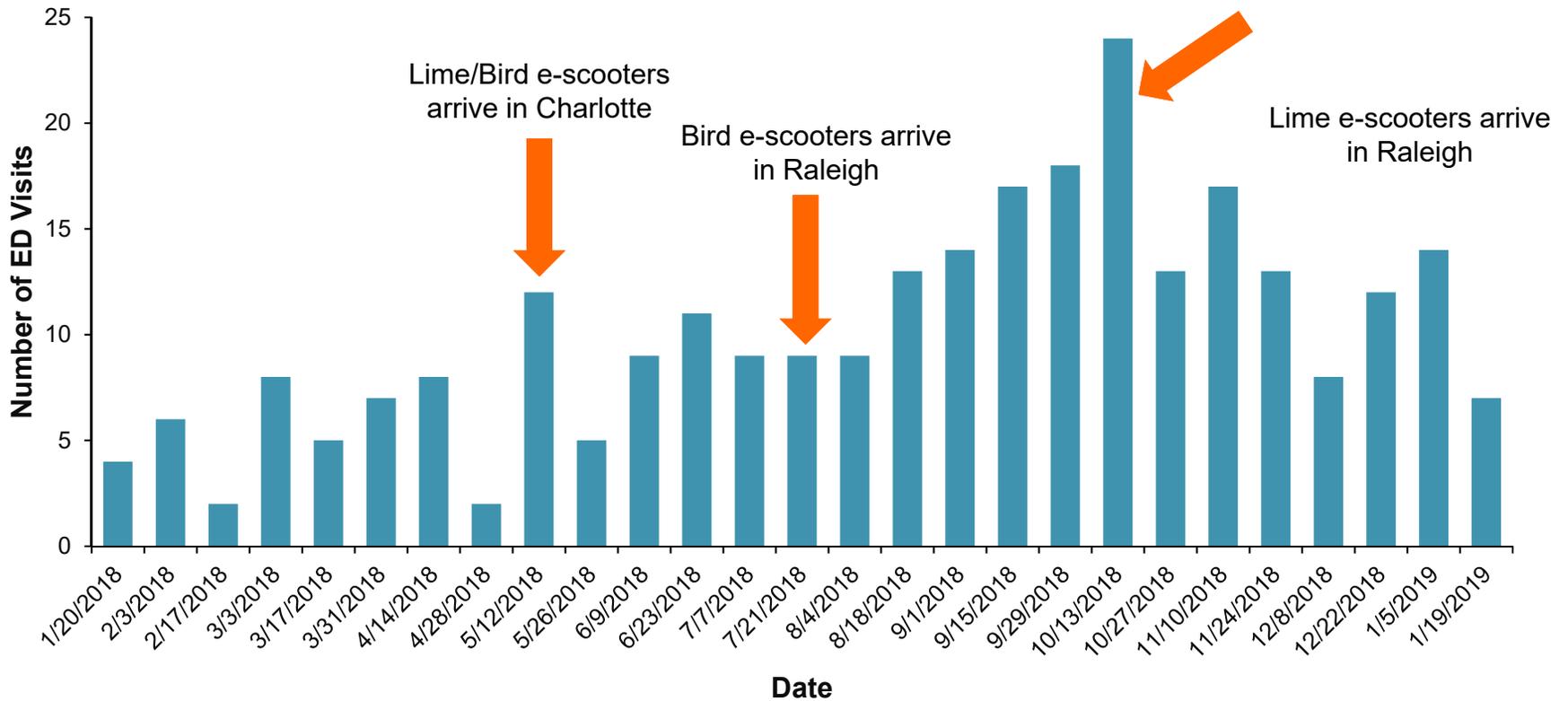
- Trauma registry data:
biased to very serious events
- Media:
sometimes report on extreme cases
- ED data:
lower/upper extremity injuries,
mild to moderate
- Police:
receive some complaints;
crashes not involving MVCs
not captured



FOX 46 - Woman spotted riding scooter on I-77 in Charlotte, NC



Possible E-Scooter Injuries: NC DETECT, Mecklenburg & Wake Counties, January 2018 – January 2019 (n=276 records)



Probable E-Scooter Injuries: NC DETECT, May – Oct. 2018*† (n=16 records)

Riders				
Age	Transport Mode	Chief Complaint	Dx Codes	Disposition
30-39	Walk-in following transport via public transportation	Bird Scooter Accident	F10.920 - ALCOHOL USE, UNSPECIFIED WITH INTOXICATION, UNCOMPLICATED; S00.81XA - ABRASION OF OTHER PART OF HEAD, INITIAL ENCOUNTER *-* V00.831A - FALL FROM MOTORIZED MOBILITY SCOOTER , INITIAL ENCOUNTER *-* S40.012A - CONTUSION OF LEFT SHOULDER, INITIAL ENCOUNTER	Discharged
20-29	Walk-in following transport via private transportation	Pt fell off a lime scooter on and drove down a flight of stairs at 17 mph. No helmet , no head injury. Road rash bilateral.	S20.211A - CONTUSION OF RIGHT FRONT WALL OF THORAX, INITIAL ENCOUNTER *-* V28.0XXA - MOTORCYCLE DRIVER INJURED IN NONCOLLISION TRANSPORT ACCIDENT IN NONTRAFFIC ACCIDENT, INITIAL ENCOUNTER *-* S20.212A - CONTUSION OF LEFT FRONT WALL OF THORAX, INITIAL ENCOUNTER *-* S60.512D - ABRASION OF LEFT HAND, SUBSEQUENT ENCOUNTER	Discharged
10-19	Walk-in following transport via private transportation	Pt arrives to ED with complaints of injury to his right lower leg. Patient reports that he was on an electric scooter and landed really strange.	S82.421A - DISPLACED TRANSVERSE FRACTURE OF SHAFT OF RIGHT FIBULA, INITIAL ENCOUNTER FOR CLOSED FRACTURE *-* W19.XXXA - UNSPECIFIED FALL , INITIAL ENCOUNTER	Discharged
Bystanders				
<10	Walk-in following transport via private transportation	Patient was on his bike, swerved to miss an electric scooter and fell in to ditch on to left arm.	S42.412A - DISPLACED SIMPLE SUPRACONDYLAR FRACTURE WITHOUT INTERCONDYLAR FRACTURE OF LEFT HUMERUS, INITIAL ENCOUNTER FOR CLOSED FRACTURE *-* V18.0XXA - PEDAL CYCLE DRIVER INJURED IN NONCOLLISION TRANSPORT ACCIDENT IN NONTRAFFIC ACCIDENT, INITIAL ENCOUNTER	Admitted

*The examples provided have been significantly altered to protect patient anonymity – these examples are for illustrative purposes only.

†Probable e-scooter injuries were identified using the following free text definition: "BIRD" & "SCOOTER", "LIME" & "SCOOTER", "ELECTRIC" & "SCOOTER".



Possible E-Scooter Injuries: NC DETECT, May – Oct. 2018*† (n=16 records)

Riders				
Age	Transport Mode	Chief Complaint	Dx Codes	Disposition
20-29	Walk-in following transport via private transportation	Right elbow pain after trying to jump a curb on a scooter .	S52.124A - NONDISPLACED FRACTURE OF HEAD OF RIGHT RADIUS, INITIAL ENCOUNTER FOR CLOSED FRACTURE *-* W10.1XXA - FALL (ON)(FROM) SIDEWALK CURB , INITIAL ENCOUNTER	Discharged
20-29	Ground ambulance	Pt reports that she could not make the scooter stop; pt reports jumping off the scooter and landing on her knees	S80.212A - ABRASION, LEFT KNEE, INITIAL ENCOUNTER *-* S80.211A - ABRASION, RIGHT KNEE, INITIAL ENCOUNTER *-* V00.831A - FALL FROM MOTORIZED MOBILITY SCOOTER , INITIAL ENCOUNTER	Discharged
False Positive (?)				
60-69	Ground ambulance	Was riding scooter and hit curb and fell of bike .	F17.210 - NICOTINE DEPENDENCE, CIGARETTES, UNCOMPLICATED *-* UNSPECIFIED FRACTURE OF SHAFT OF LEFT FIBULA, INITIAL ENCOUNTER FOR CLOSED FRACTURE *-* V89.2XXA - PERSON INJURED IN UNSPECIFIED MOTOR-VEHICLE ACCIDENT , TRAFFIC, INITIAL ENCOUNTER*-* M79.605 - PAIN IN LEFT LEG	Discharged

*The examples provided have been significantly altered to protect patient anonymity – these examples are for illustrative purposes only.

†Possible e-scooter injuries were identified using the following free text/ICD-10-CM definition: 'SCOOTER', 'SCOTTER', 'V00.141A', 'V00.141D', 'V00.142A', 'V00.142D', 'V00.148A', 'V00.148D', 'V00.831A', 'V00.831D', 'V00.832A', 'V00.832D', 'V00.838A', 'V00.838D', 'W05.1XXA', 'W05.1XXD', 'W05.2XXA', or 'W05.2XXD'.



Injury contributing factors (reported or speculated)

- Device malfunction
 - Vandalism
 - Wear or poor maintenance
 - Software or battery glitches/bugs
- Operator errors
 - Balance and steering
 - Braking/acceleration
 - Distraction or impairment
- Roadway design
 - Obstacles in the path
 - Lack of safe, protected facilities



Image source: David Dudley/CityLab



Many research needs/questions

- For product users and also bystanders
- For policy makers and regulators
- For city planners/engineers
- For compliance officers
- For law enforcement



Image source: Elizabeth Hilton, FHWA



Research challenges related to injury surveillance

- Difficult to identify injuries using existing injury surveillance system (especially non-severe ones)
 - Emergency department case definitions (using ICD-10 codes) currently used will also capture:



Addressing injury surveillance challenges

- UNC-HSRC staff identified a group of national stakeholders to discuss e-scooter (and other micro-mobility device) injury surveillance and prevention
- Held a one-hour call on February 1, 2019
- Forty-four participants representing >25 separate organizations



National stakeholder organizations (not an exhaustive list)

Field	Organization
Public Health	<ul style="list-style-type: none">• CDC• NC DPH• San Francisco DPH• Austin Travis County Division of Epidemiology and Public Health Preparedness
Medicine	<ul style="list-style-type: none">• American College of Surgeons• American College of Emergency Physicians• Zuckerberg SF General Hospital and Trauma Center
Transportation	<ul style="list-style-type: none">• National Highway Traffic Administration• Federal Highway Administration• City of Austin, Transportation Department
Academia	<ul style="list-style-type: none">• UNC Highway Safety Research Center• University of Maryland School of Medicine, National Study Center for Trauma and Emergency Medical Systems



Feedback from other jurisdictions: barriers

- ICD-10-CM coding is a nationwide problem
- Operator data undercounts events
 - “People do not call Lime when they crash” (Baltimore DOT)
 - Consumer Reports study: Bird/Lime reported 470 crashes; hospitals reported 1,500
 - Some crashes/injuries involve privately-owned devices
- Need a revised injury severity scale
 - Current methods, such as Injury Severity Score (ISS), are difficult to implement and interpret
- Need guidance for the calculation of rates
 - To compare e-scooter injury rates to other forms of active transportation



Feedback from other jurisdictions: possible solutions

- Instruct coders/clinicians to use a subset of ICD-10-CM codes or keywords to flag records of persons injured in e-scooter crashes
 - Post visual aids in hospitals to assist healthcare workers
 - Align public health initiatives with law enforcement/transportation initiatives (Vision Zero SF)

How to Classify New Modes of Transportation

What we're doing: BPHM and SFPHD are working to better capture and track injuries involving newer vehicle types and methods of transportation access (e.g. vehicle sharing programs and app-assisted ride hail) to inform injury prevention measures.

The ask: Pre-hospital and ER staff collect crucial information about collisions that patients may not be able to report themselves. To assist, we ask that you include any of the following terms that may apply to a collision in the narrative description. Sample images are included for clarity.

Electric bicycle (or e-bicycle, e-bike)	
Powered standup scooter (or e-scooter)	
Moped or motor-driven cycle	
Electric skateboard (or e-skateboard)	
Hoverboard, electric unicycle, other electrically motorized board	
Segway-type vehicle	
Ride-hail vehicle, Transportation Network Company car (TNCs; e.g. Uber, Lyft)	
Autonomous vehicle	

Please refer questions to sharon.robinet@sfphd.org
Version 12/12/2018

 VISION ZERO SF



Feedback from other jurisdictions: possible solutions

- Be flexible with syndromic surveillance approaches
 - Revise queries as new information and technologies emerge
 - Limit queries to persons 16-44 years of age to reduce number of false positives (Multnomah Co. DPH)



Feedback from other jurisdictions: possible solutions

- Explore new sources of data
 - US Consumer Product Safety Commission (US CPSC) National Electronic Injury Surveillance System (NEISS)
 - NEISS does not have a specific code for e-scooters, but contains codes for scooters and other subcategories
 - Significant increase in the number of “scooter”-related injuries starting in 2014 (Pacific Institute for Research and Evaluation)



Next steps

- Continue sharing information among stakeholder group members
- Collaborate on proposing new ICD-10-CM codes for e-scooters and other micro-mobility devices
 - Deadline for submitting a proposal to the ICD-10-CM Coordination and Maintenance Committee is July 2019
 - Proposals for a new code should include:
 1. Description of the code(s)/change(s) being requested
 2. Rationale for why the new code/change is needed (including clinical relevancy)
 3. Supporting clinical references and related literature.
- Identify future opportunities for collaboration and research



E-scooter regulations: CO versus CA versus NC (as of 2018)

- According to the Denver, CO Department of Public Works, e-scooters are considered “toy vehicles” and *prohibited* from bike lanes and roadways

On the other hand...

- According to CA statute, e-scooters are *prohibited* from sidewalks
- In NC, e-scooters are *currently* allowed on sidewalks (must yield to pedestrians) and in roadways (e.g., bike lanes, etc.)



How is safety currently being managed/addressed?

- Industry-led initiatives

- Improvements to scooter design (3rd model – braking, handling) and safety equipment
- Restrictions on user age; some “training” available
 - E.g., SKIP Scooter Safety Video: <https://youtu.be/5Lie8emsAw>
- Safety advisory boards
 - E.g., Former NHTSA chief David Strickland now overseeing Bird AB
- Helmet dispensing programs
 - E.g., pay price of postage to get helmet after a confirmed customer



How is safety currently being managed/addressed?

- Research initiatives

- Obtain/review different sources of health outcome data
 - Industry-provided data, medical, police, etc.
- Create better surveillance case definitions and encourage common use
 - Add more terms/exclusions
 - Encourage hospitals to “flag” e-scooter-related patient encounters
 - Make recommendations for ICD-10-CM updates for e-scooter injury mechanism codes
- Obtain exposure data and research travel behavior, trends, and outcomes
- Partner with industry, government, and other stakeholders



Who else is working on this issue?

- NC/National Working group on consensus recommendations for injury surveillance
- PBIC and CSCRS: Funding scans and research to evaluate current practices in planning and regulation and safety
- LEVER Research Consortium
- TRB sub-committee on emerging technologies
- CDC: Epidemic Intelligence Service (EIS) investigation
- Society for Automotive Engineers (SAE): Micro-mobility standards



NC DETECT Data Attribution & Disclaimer

Data Attribution & Disclaimer: NC DETECT is a statewide public health syndromic surveillance system, funded by the NC DPH Federal Public Health Emergency Preparedness Grant and managed through collaboration between NC DPH and UNC-CH Department of Emergency Medicine's CCHI. The NC DETECT Data Oversight Committee does not take responsibility for the scientific validity or accuracy of methodology, results, statistical analyses, or conclusions presented.



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Questions or interest in collaborating?

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