Collaborative Sciences Center for ROAD SAFETY

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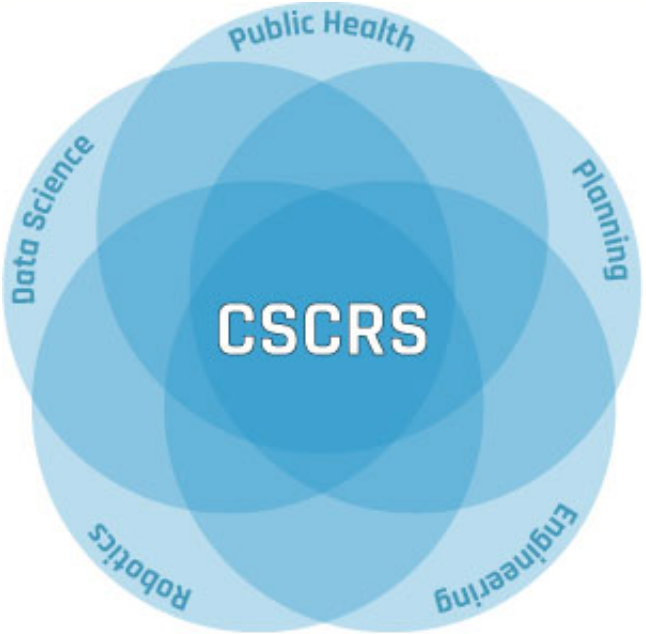
Dockless Electric Kick Scooter Systems: What we know and don't know

Presentation to the North Carolina
Executive Committee for Highway Safety

January 11, 2019

CSCRS: Who are we?



THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

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Berkeley UNIVERSITY OF CALIFORNIA

THE UNIVERSITY OF TENNESSEE KNOXVILLE

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)

E-scooter rideshare companies (as of 12-21-18)

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

E-scooters in North Carolina

- Charlotte
  - Lime (May 2018)
  - Bird (May 2018)
- Raleigh
  - Lime (Sept 2018)
  - Bird (Aug 2018)
- Greensboro
  - Bird (Aug 2018)
- Winston-Salem
  - Bird (Sept-Nov 2018)
- Cary/Morrisville
  - Bird (Oct 2018)

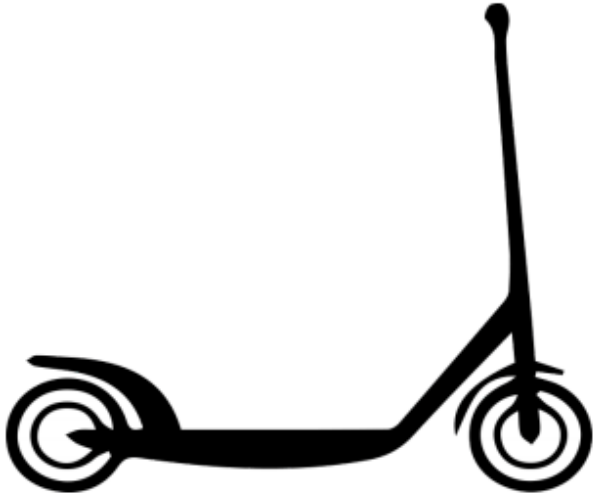
E-scooter key features

- Weight: 16-30 lbs
- Power source: Electric motor (250 watts) powered by lithium-ion battery
- Classified as a “personal conveyance” on NC DMV crash form 349
- Regulated by Consumer Product Safety Act, rather than DMV/NHTSA
- Maximum operating speed: 20 MPH (with some exceptions)
- Pay about $1 to unlock + 15 cents per minute to ride

Charlotte, NC E-scooter Usage Statistics

According to the Charlotte Department of Transportation (CDOT)

IN OCTOBER, THE AVERAGE E-SCOOTER USER...

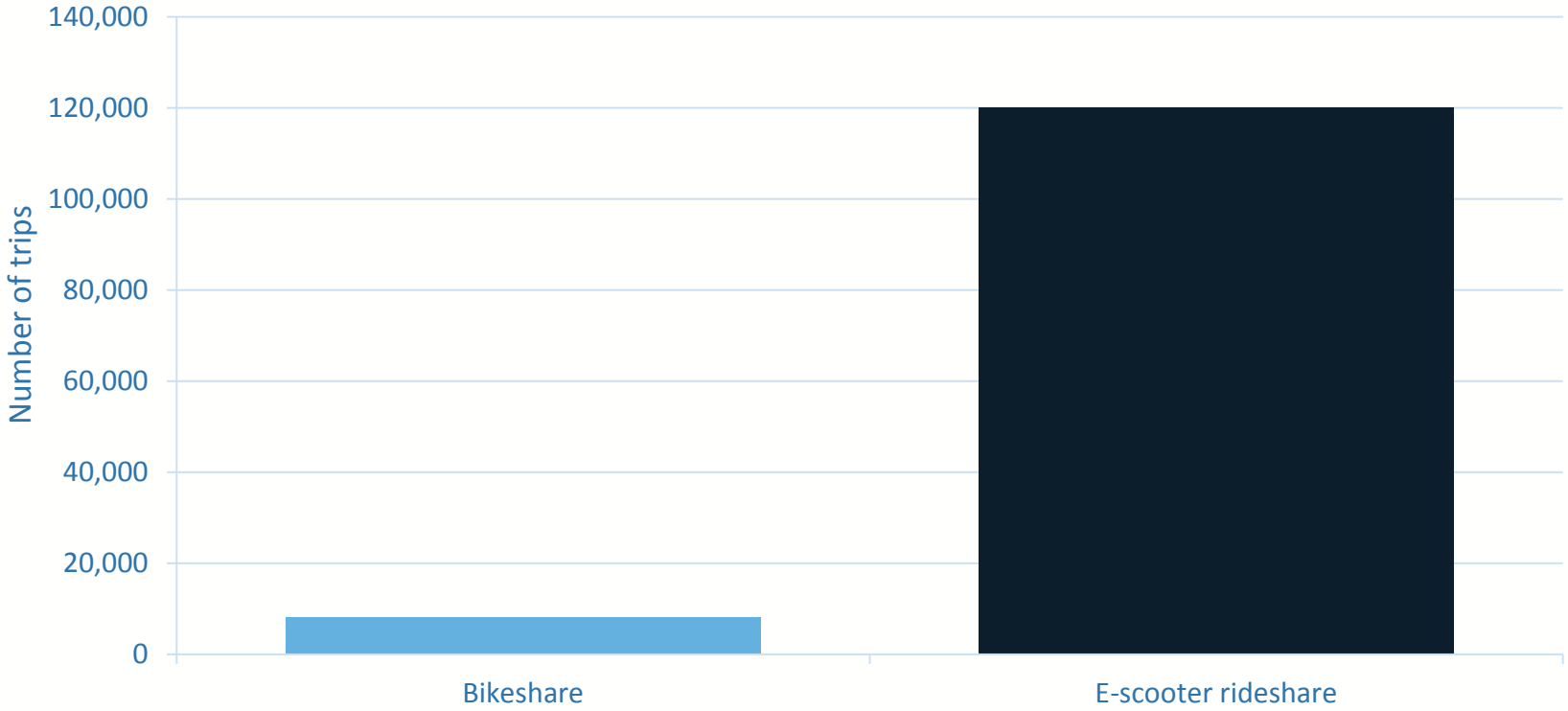


Took **1-3 trips**

Traveled **1.43 miles** per trip

Spent **13 minutes** scooting per trip

Number of Trips in October by Mobility Service in Charlotte, NC: CDOT, 2018

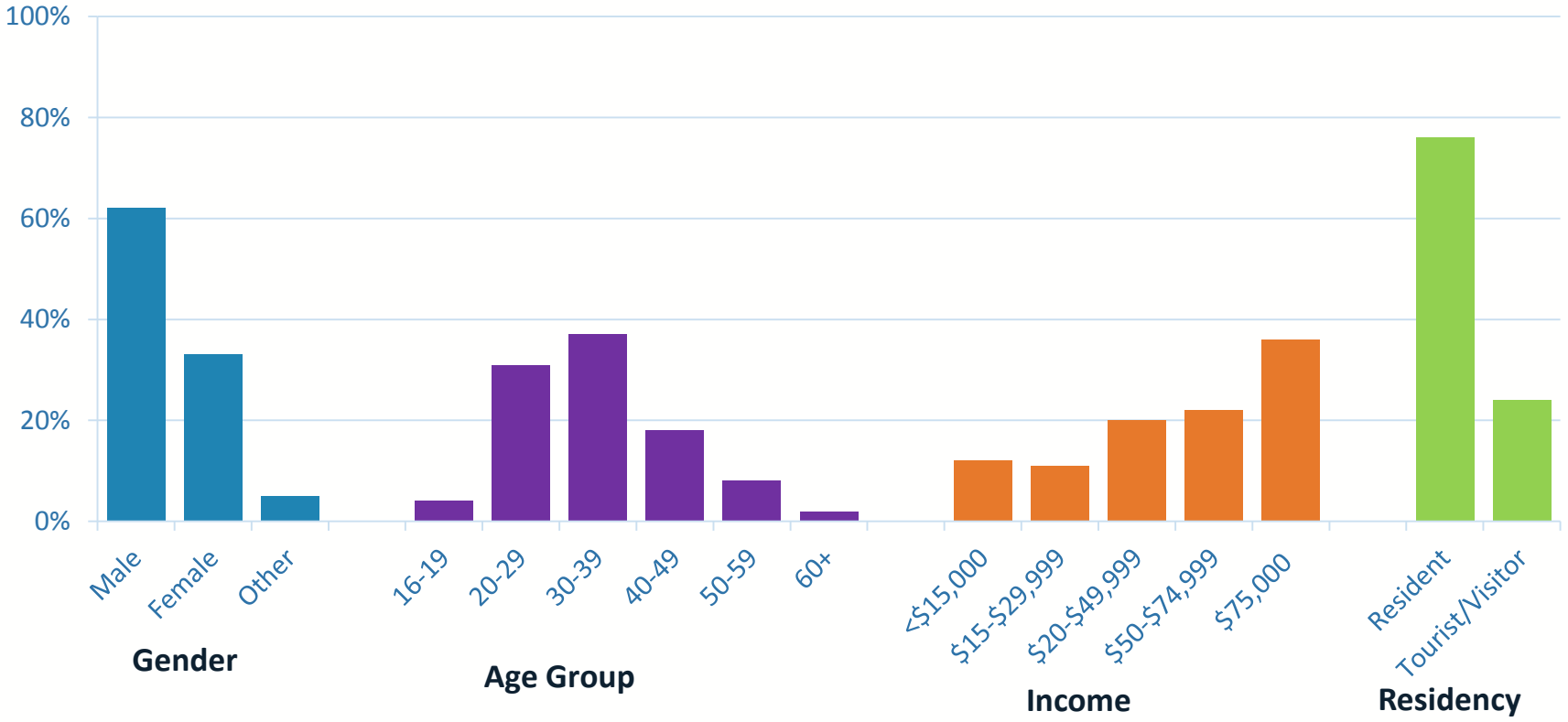


What do riders use e-scooters for?

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 e-scooter riders?



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) in congested urban areas
   - 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 support first-last mile travel and access to transit
   - E.g., RaleighDowntown Living Advocates' (DLA): "*E-scooters solve the "extra-mile" gap many residents face when using public transit and make downtown more accessible to residents."* (Indy Week, Sept 2018)

3. 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

4. May reduce inequities related to access to transportation
   - E.g., Bird/Lime provide reduced cost rides to people on federal assistance programs

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.

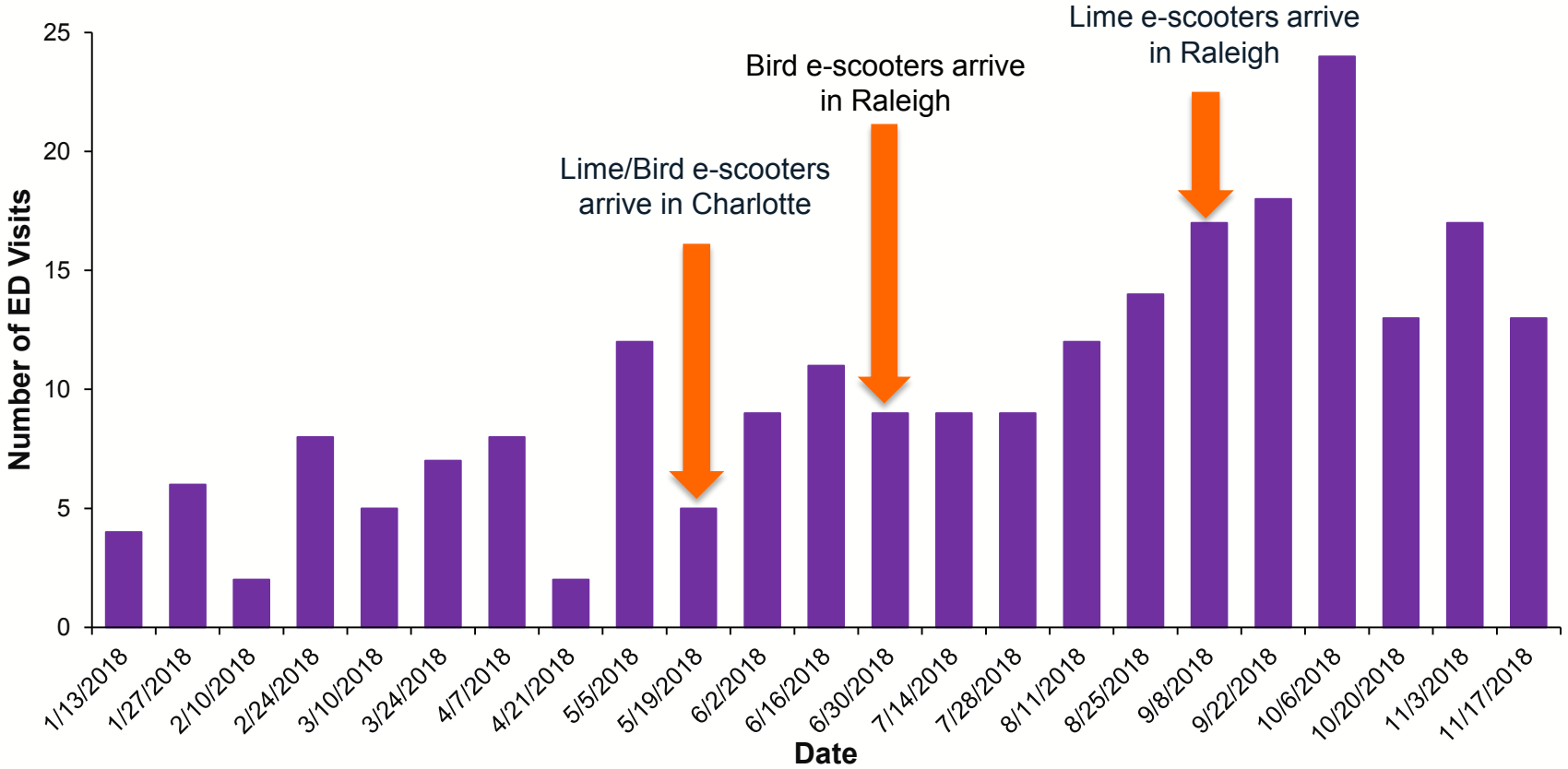
ER docs warn of **scooter** risk: 'Just because you can get on them ...
Indianapolis Star - Nov 13, 2018
"I couldn't give you any exact data, but I can definitely tell you that **electric scooter injuries** are on the rise. We're seeing more and more minor ...

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".

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

Possible E-Scooter Injuries: NC DETECT, Mecklenburg & Wake Counties, May – Oct. 2018*† (n=234 records)



Why is safety/risk so hard to measure?

- 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:

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.
†Prossible 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'.

Many unresolved and researchable issues

- How many trips are being taken and how is “exposure” changing?
- How are non-riders being impacted, beyond safety?
  - E.g., Accessibility concerns
- What factors are (most) contributing to risks?
  - Vehicle/app design
  - Rider safety behaviors or skill-level/training
  - Built environment and roadway conditions

How is safety currently being managed/addressed?

- City or State-led initiatives
  - Regulate who can provide service and where they can be operated
  - Provide public education

- Raleigh regulatory example:
  - Cap on # in city, per block, and where parked
  - Set when have to be picked up to be recharged and put back (10pm to 7am)
  - Riders must be 18+ and not ride on sidewalk

E-scooter regulations: CO versus CA versus NC

- 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 Strictland 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 Working group on consensus recommendations for injury surveillance
- CSCRS: Funding research to evaluate current practices in planning and regulation and safety
- Transportation Research Board (National Academies of Science): Committee on emerging technologies (coordinating other national level research interests), led by Dr. Chris Cherry
- CDC: Epidemic Intelligence Service (EIS) investigation in progress in Austin, TX
- Society for Automotive Engineers (SAE): Micro-mobility standards committee established

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.

Questions or ideas?

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