

e-Scooter Injuries

Jonathan Rupp, Ph.D.

INJURY PREVENTION RESEARCH CENTER AT EMORY (IPRCE)

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What are dockless electric scooters?



Bird 2



Spin



Razor



Ojo



Veo ride



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), IIHS 2020
 - 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 of crashes (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 initial e-scooter injury data from Grady Memorial Hospital
- Next steps



Hospital Injury Data - How could we identify e-scooter injuries?

- ICD 10 codes
 - Pre October 2020: Numerous non-specific codes for scooters; Most commonly V-codes (mechanism), often unbillable
 - Post October 2020: codes available for e-scooters:
 - **V00.09**: Pedestrian on foot injured in collision with other pedestrian conveyance
 - V00.181, V00.182, V00.188**: Accident on other rolling type pedestrian conveyance
 - V01-V06 (.09, .19, .99)**: Pedestrian with other conveyance injured in transportation collision
- 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



“Non powered” Scooter



“Mobility” 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)

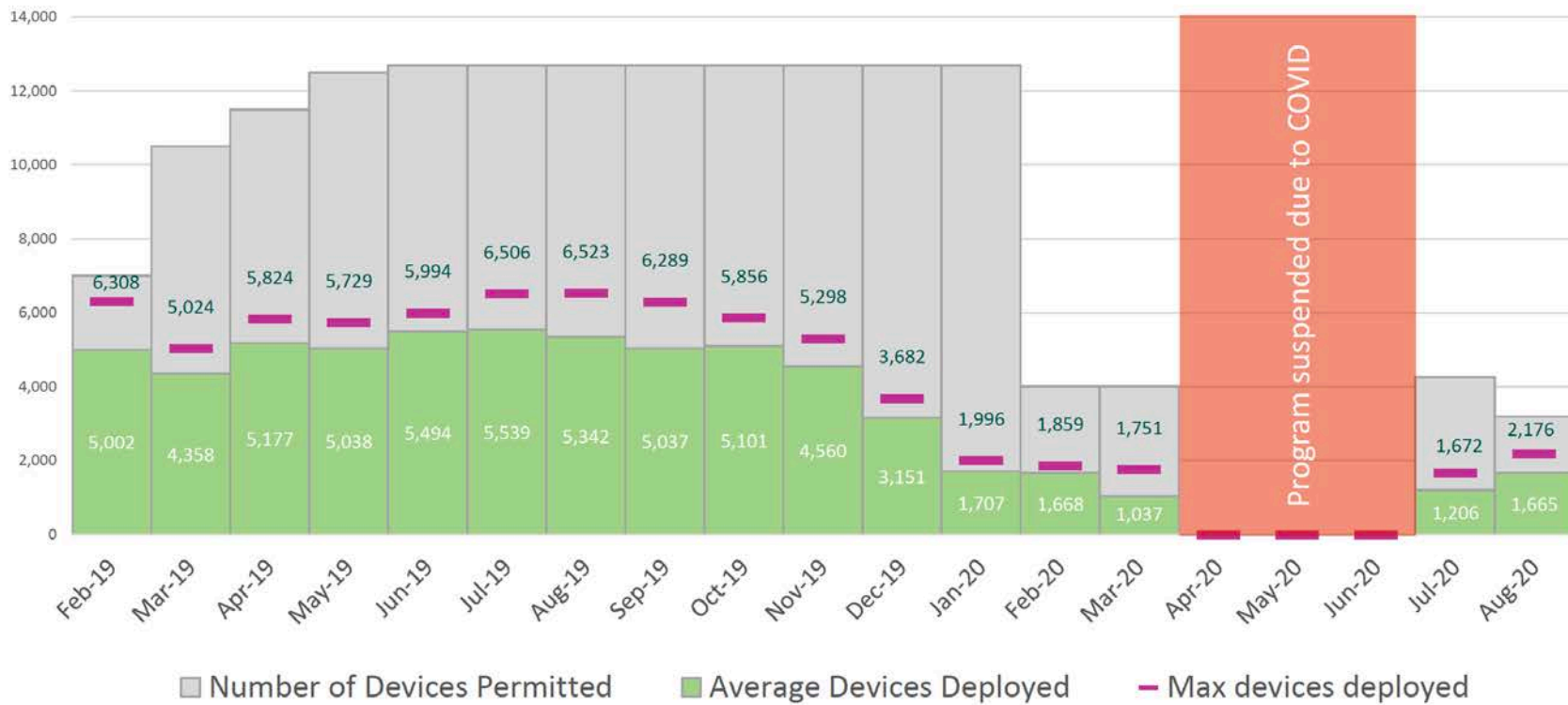


Our Approach

- Created **SCRATCH** injury registry (Scooter CRash And Trauma CoHort)
- Searched all ED notes from June 2018 – Aug. 2020 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...
- Included bicycle crashes as a possible control group



Number of Devices (e.g. Scooters) in the City of Atlanta

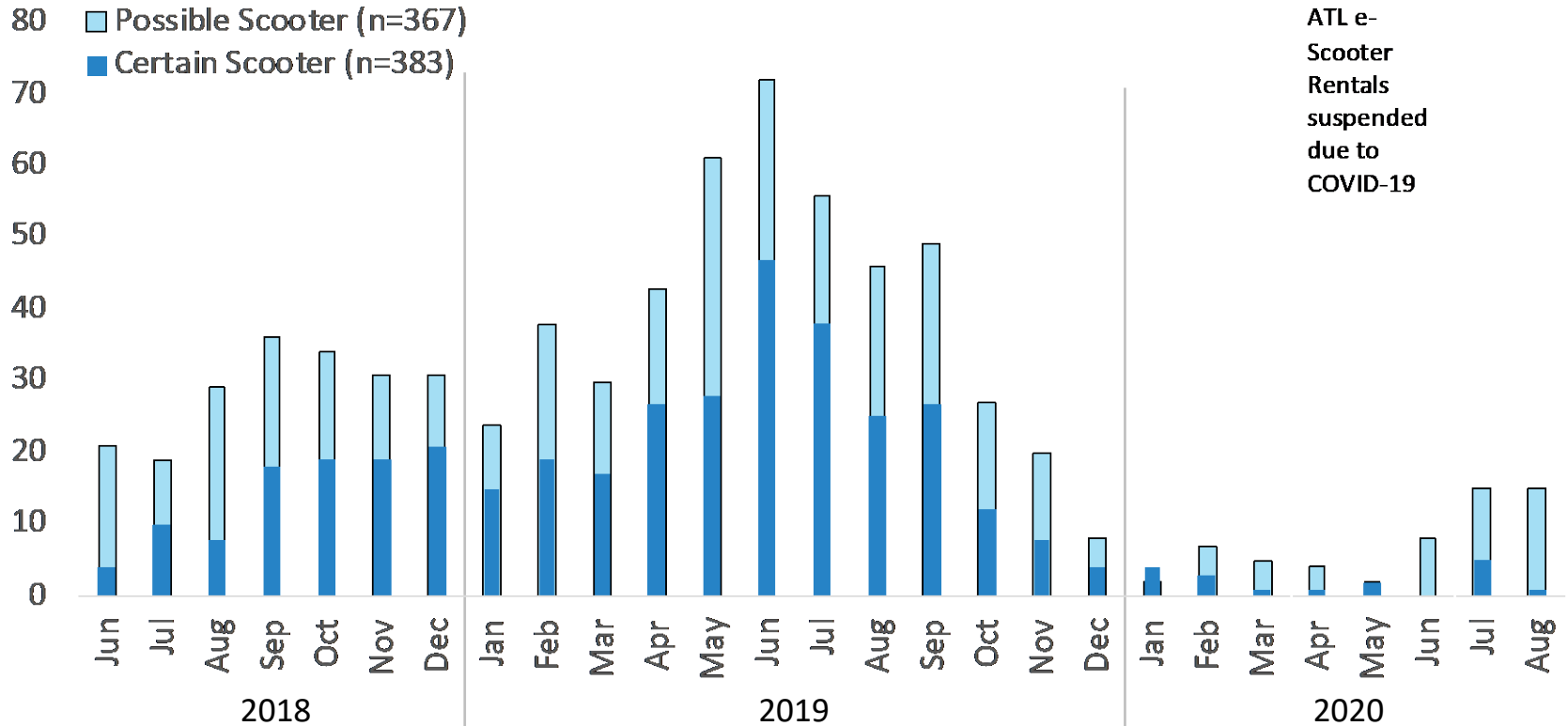


Source: Monthly Operator Reports, Office of Mobility Planning, As of Sept 15, 2020.

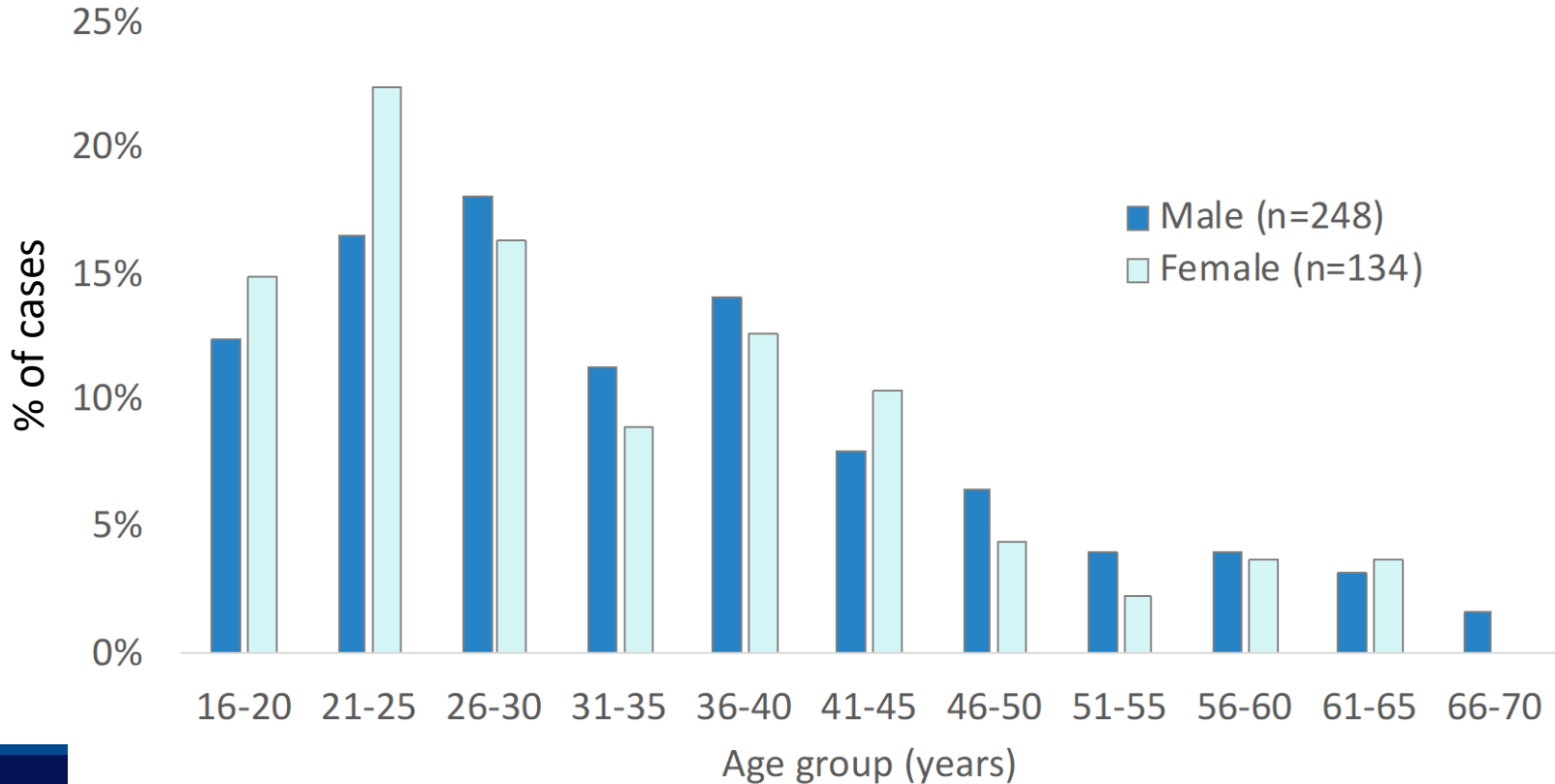
Note: Due to COVID-19, operators were not allowed to operate from March 23, 2020 until the new permit program. Some operators halted operations as early as March 1, 2020. The ATLDOT new program for SDMD Annual Permits started 07/01/2020.



Numbers of Patients with Injuries Associated with e-scooters by Month

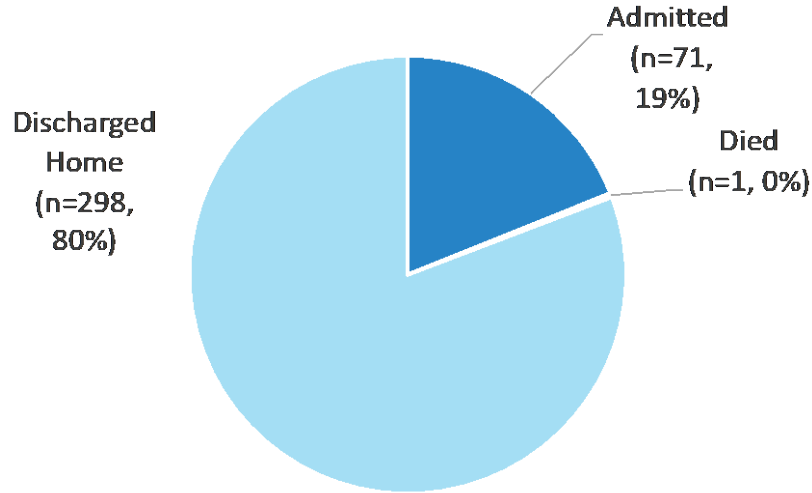


Age Distribution by Sex, Certain e-Scooter Injuries

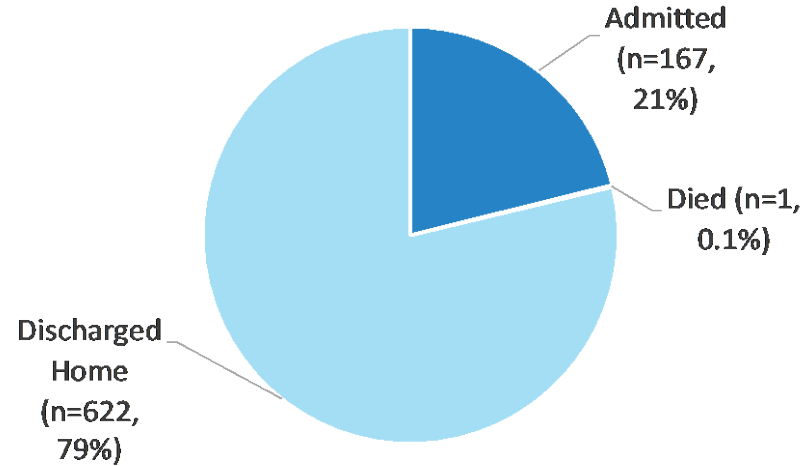


ED Disposition, Certain e-Scooter vs. Certain Bicycle

E-Scooter



Bicycle



Total Charges	
75 th %ile	\$ 25,889
median	\$ 9,749
25 th %ile	\$ 3,726

Total Charges	
75 th %ile	\$ 37,636
median	\$ 12,400
25 th %ile	\$ 4,052

Additional Findings, e-scooter crashes

- Built environment commonly noted (~17%)
- Mechanical issues (~4%)
- 16% Motor Vehicle Collision
- Helmets rarely used
- ETOH common (35% of 86 certain e-scooter riders tested had $\text{EtOH} \geq 0.08$ g/dL; 30% of all 160 certain and possible e-scooter riders)



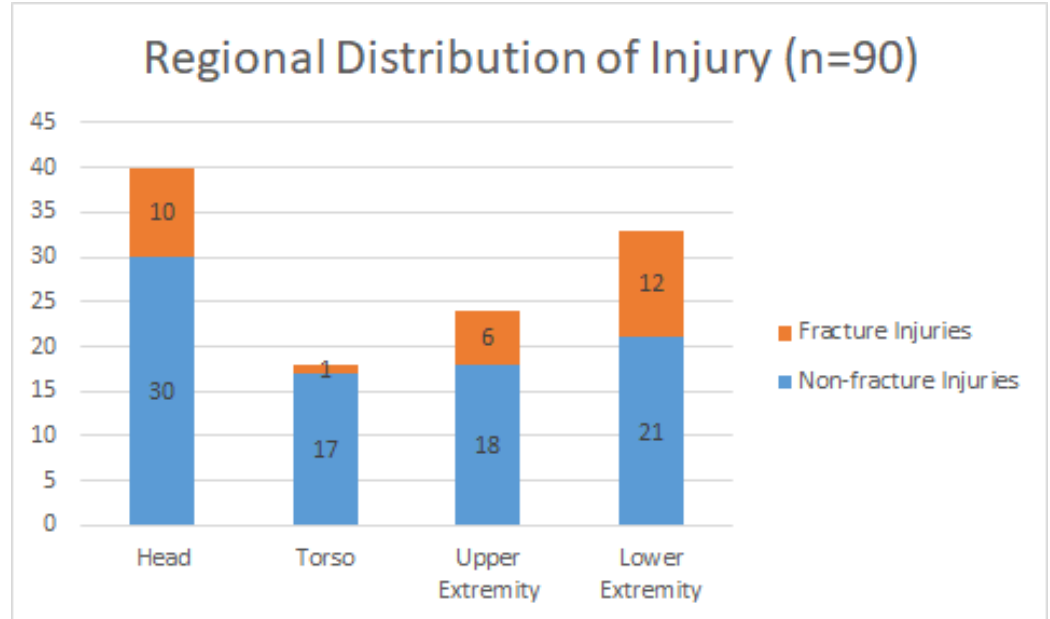
Additional Findings, continued

- Most common chief complaints, confirmed e-scooters (n=383)
 - Fall (32%),
 - Motorcycle crash (14%),
 - Trauma (10%),
 - Motor-vehicle crash (4%)
- Most common chief complaints, confirmed bicycles (n=812)
 - Bicycle Accident (23%),
 - Fall (12%),
 - Trauma (7%),
 - Pedestrian vs. Automobile (4%)



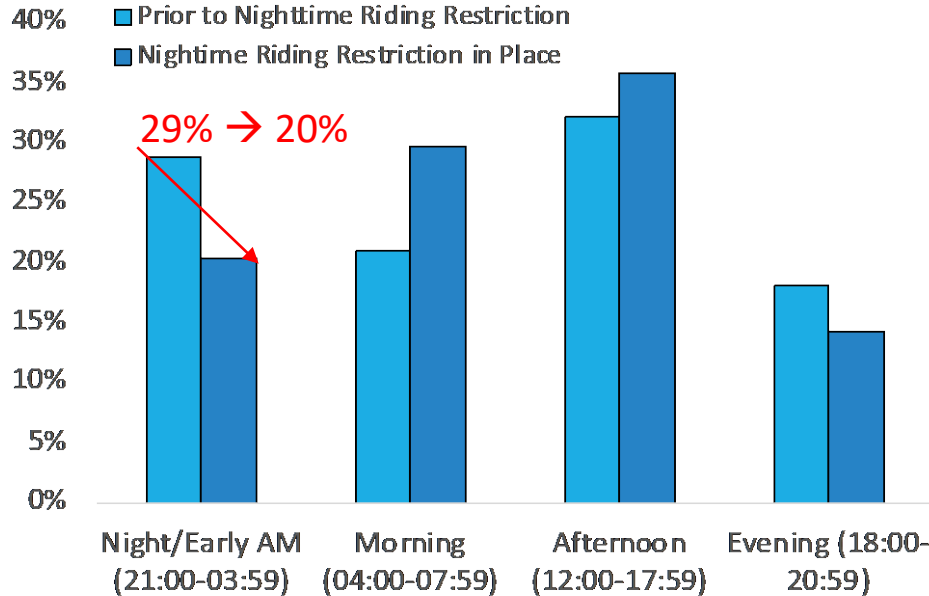
Injury Patterns (Subset Analysis from GMH NEISS)

- 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

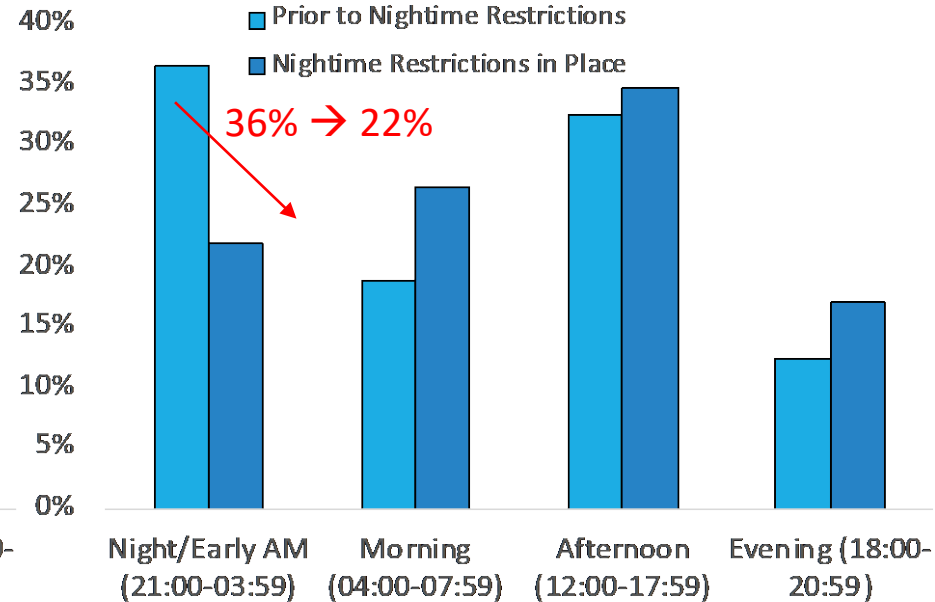


Effects of Restrictions Rentals from 21:00-03:59 on Time of Arrival to ED

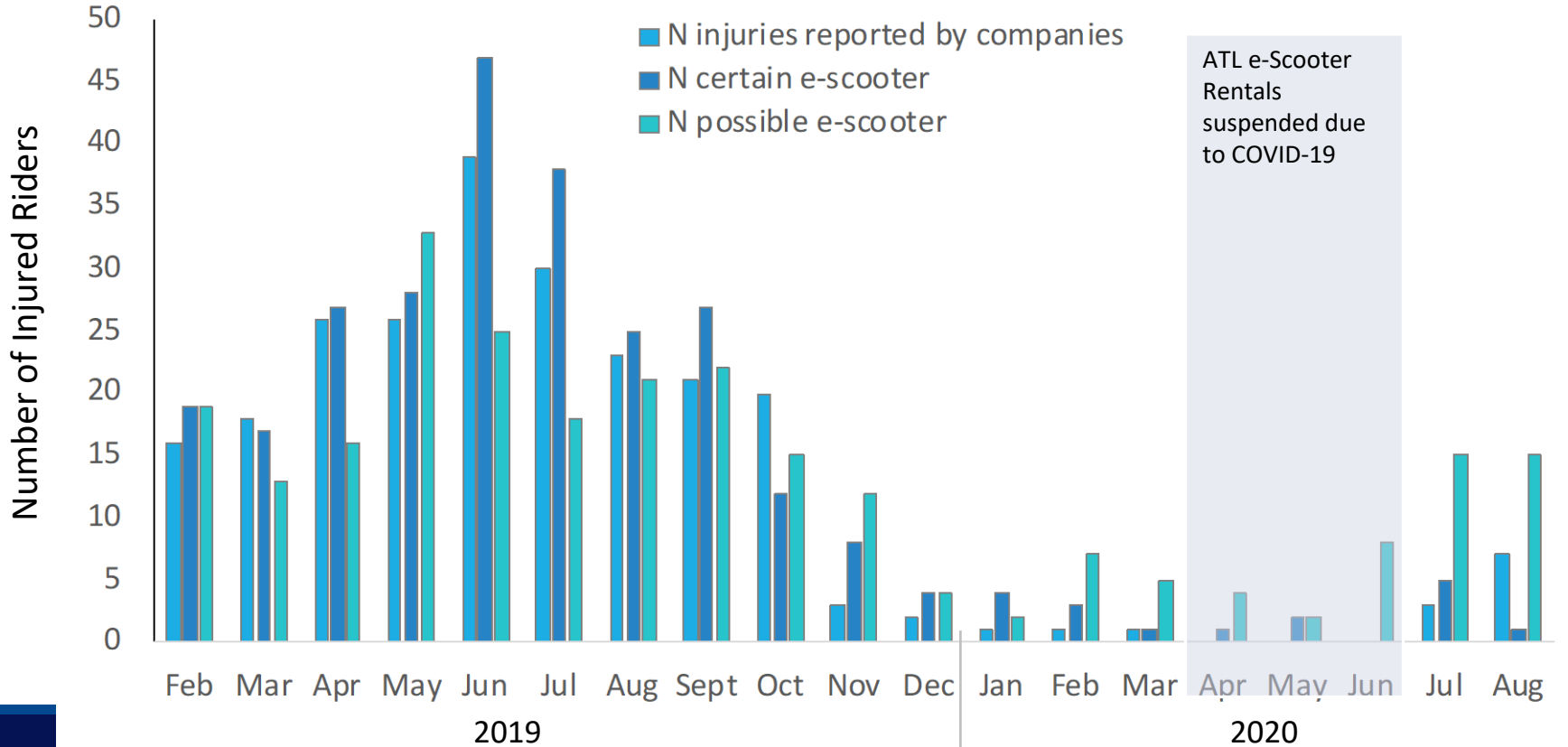
Certain e-Scooter



Possible e-Scooter



Operator Reported vs. GMH Data



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, travel behavior, role of built environment)
- Urgent care data
- Identify and implement injury prevention interventions
- Long-term→site based observational study



Questions?

Jonathan Rupp, Ph.D.

jrupp2@emory.edu