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DATA TO ACTION

Electric Scooter-Related Injury

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Disclosure

The contents of this presentation were developed under the grant from the Washington State Traffic Safety Commission

What we know

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Systematic review

OPEN ACCESS

Injury patterns and circumstances associated with electric scooter collisions: a scoping review

Manish Toofany,[1] Sasha Mohsenian,[2] Leona K Shum,[3] Herbert Chan,[3,4] Jeffrey R Brubacher [3,4]

- 01/2010-12/2020 (all published 2019-2020)
  - 28 peer-reviewed studies
  - 9 grey literature (conference proceedings, government reports)
- Countries:
  - USA (24), Canada
  - New Zealand (4), Australia (2),
  - Finland, Denmark, Germany, France
  - South Korea, Singapore
- Data source:
  - Medical charts,
  - National Electronic Injury Surveillance System (NEISS),
  - Interviews

- Summary
  - ~ **90% single road user events**: falls, collisions with objects, excessive speed, unfavorable road conditions.
  - Non-riders:
    - struck by an e-scooter,
    - tripping over a stationary e-scooter
  - ~ **5% helmeted**
  - ~ 68% unhelmeted
  - ~ 28% unknown helmet use
  - ~ **13% - 48% were associated with alcohol**
  - Injuries – **Head**, upper extremities, and lower extremities
- Suggestion: **Collecting standardized data**
  - ICD-10 codes, ISS, AIS
  - injury circumstances: Time of day, road infrastructure, involvement of other road users, contributory factors

What we know

Review

A comprehensive review of current trends in e-scooter associated injuries, associated outcomes, and effective interventions: Towards establishing sustainable prevention interventions

Sanjan Kumar [a], Philip Lee [b], Ruth Zagales [c], Zackary Yates [a], Minna Haddadi [d], Jacob Strouse [e], Tracy Zito [f,g], Adel Elkbuli [f,g,*]

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- 7/10/2014-7/10/2024: 39 peer-reviewed studies **in the United States**.
- **Trends:** E-scooter injuries have **increased**, particularly after the introduction of e-scooter sharing programs
- Compared to traditional MV with 0.9 injuries/million miles traveled, the associated injury rate of **e-scooters is 180/million miles traveled**
- **Annual cost: $6.6 - $35.5 million**
- Explored **Interventions** to prevent e-scooter-related injuries
  - Limiting speeds
  - Removing e-scooter accessibility

- Injury summary
  - 45% in the pediatric population (**age <18**)
  - Injuries in **males** are more than in females
  - The most common injury: **fractures, head, and extremities**
  - **70-80% falls,**
  - Primary locations: **sidewalk, street**
  - Intoxication, Alcohol intoxication doubles the odds of injury severity
    - 1-17% **drug** intoxication,
    - 5-74% **alcohol** intoxication.
  - **0-30% helmeted**
  - 4-100% hospitalizations

- Current legislation, inconsistent from state to state:
  - Helmet requirements
  - Minimum age requirements
  - Maximum speed limits
  - Restrictions on the location of use
- Recommendations for future legislation
  - Protected lanes
  - Ban on e-scooter operation under the influence of drugs/alcohol
  - Every state implements helmet laws
  - Age restrictions
  - Maximum speed limits of 12-15 mph

E-scooter injuries in Seattle

- Data: UW Medicine Electronic Health Records 2018-2023
  - Emergency departments ★
    - Harborview Medical Center
    - UWMC – Montlake,
    - UWMC – Northwest
  - Five urgent care centers and 25 primary clinics (as of 12/31/2024) ●

- E-scooter injury-related medical encounters
  - Potential cases - Using ICD-10-CM codes
  - Confirmed cases - Manually reviewed the medical charts

- Regular Bike (pedal power) injury-related medical encounters -Using ICD-10-CM codes

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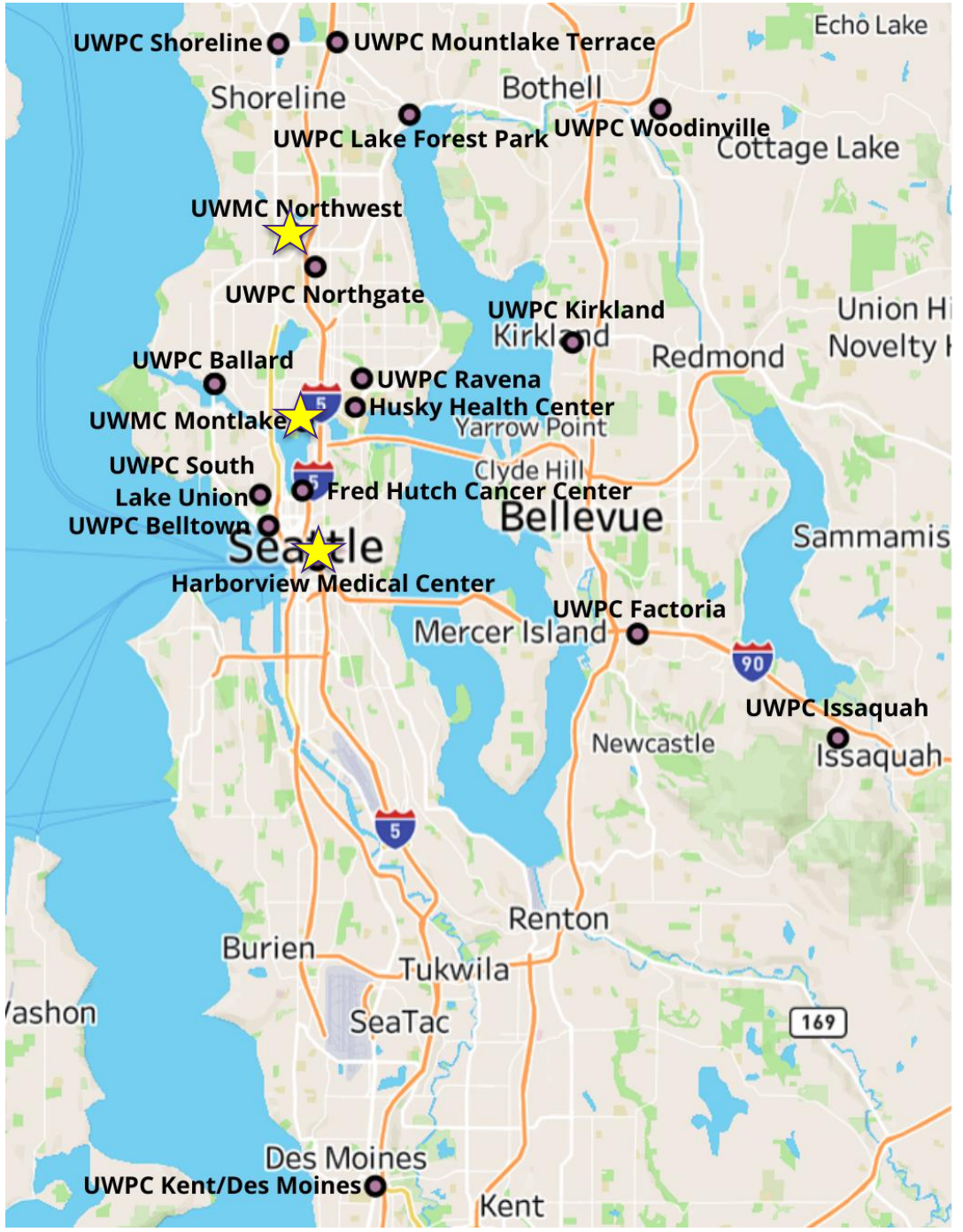

What about E-scooter injuries in Seattle?

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✓

Segway - Ninebot F2 Electric Scooter W/...

Bird Electric Scooter 300-Wat...

✗

Razor Kick Scooter - Red

Metro Mobility M1 Lite...

Micromobility Modes, New Codes!

Categorizing injuries related to emerging transportation.

e-Scooters

Keyword for Chief Complaint:
e-scooter + Brand
(Bird, Gotcha, Jump, Lime, Spin, Razor, etc.)

Other Devices

Keywords for Chief Complaint:
e-skateboard, e-hoverboard, Segway®, e-unicycle

A rider on a micromobility device falls on or strikes

a pedestrian	a stationary object or the ground
Pedestrian on foot injured in collision with standing micromobility conveyance	Accident with standing micromobility pedestrian conveyance
V00.03 (.031, .038)	**V00.84 (.841, .842, .848)**

A rider on a micromobility device is struck by

a non-motorized vehicle (e.g. bicycle)	**V01 and V06 (.03, .13, .93)**
a motorized vehicle (e.g. car, bus)	**V02, V03, V04 (.03, .13, .93)**
a railway train	**V05 (.03, .13, 93)**

For a full list of codes, visit https://go.unc.edu/ICD10CM

Collaborative Sciences Center for ROAD SAFETY

Questions? Contact BeInjuryFreeNC@dhhs.nc.gov

NC DEPARTMENT OF HEALTH AND HUMAN SERVICES
Division of Public Health

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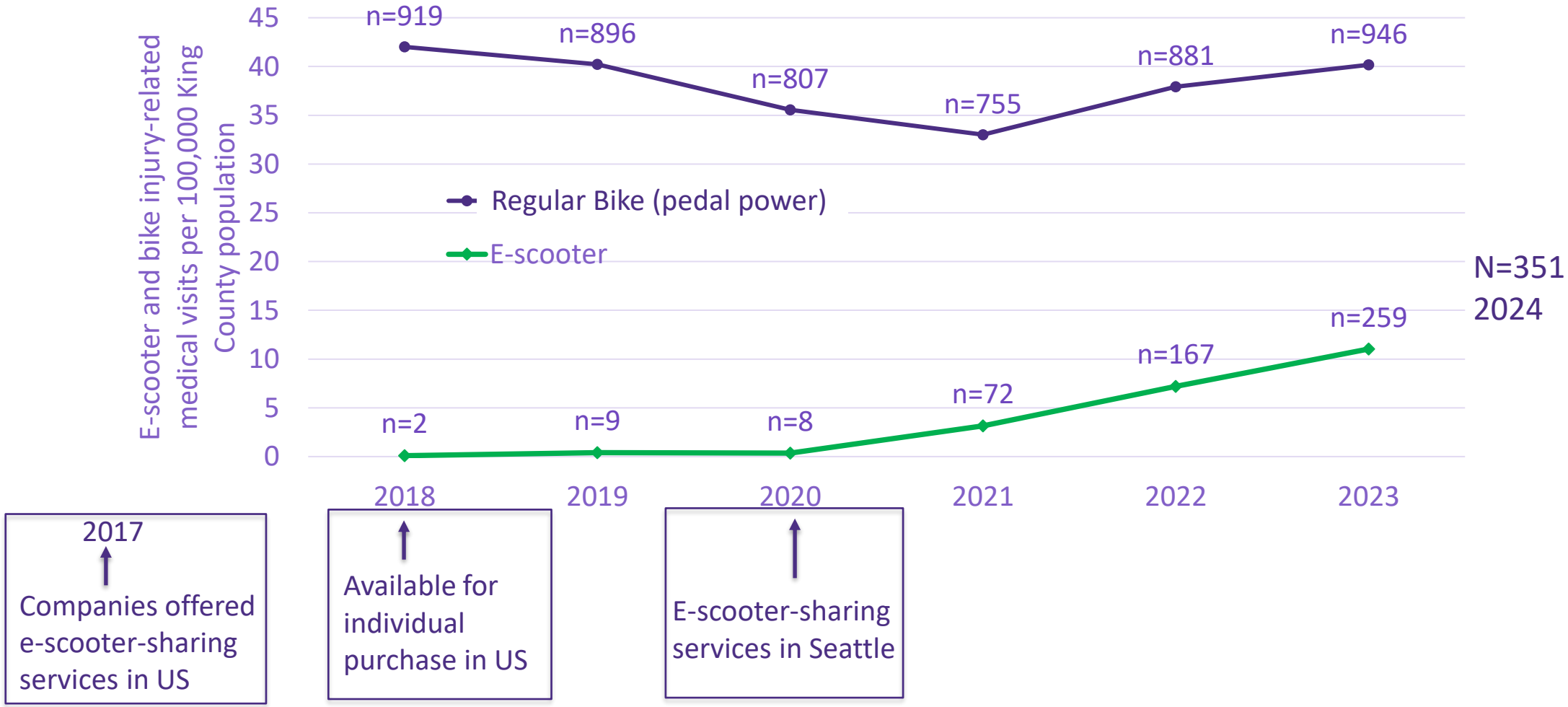
Results – Trends

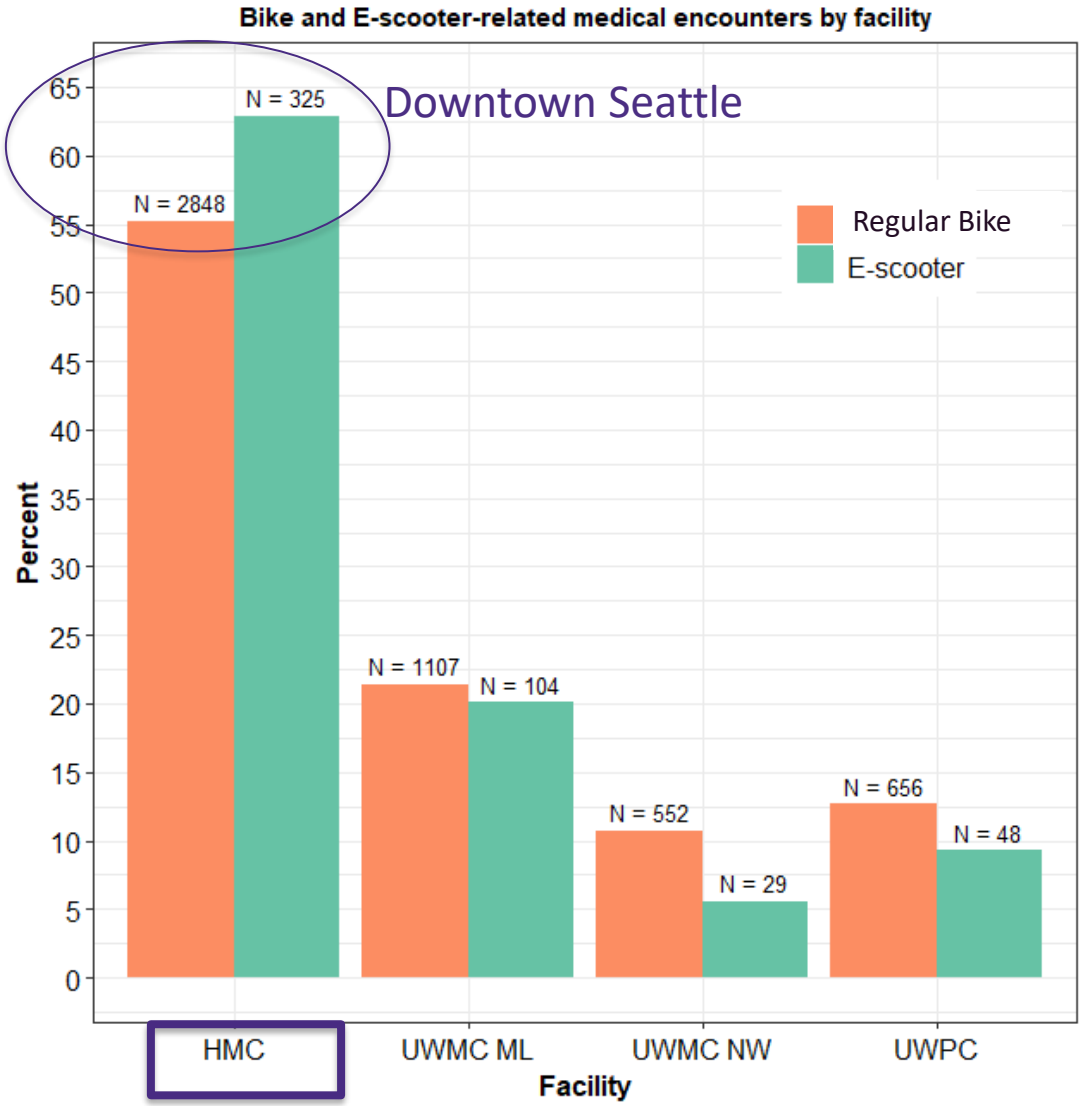
Number of E-scooter injury-related medical visits increased.

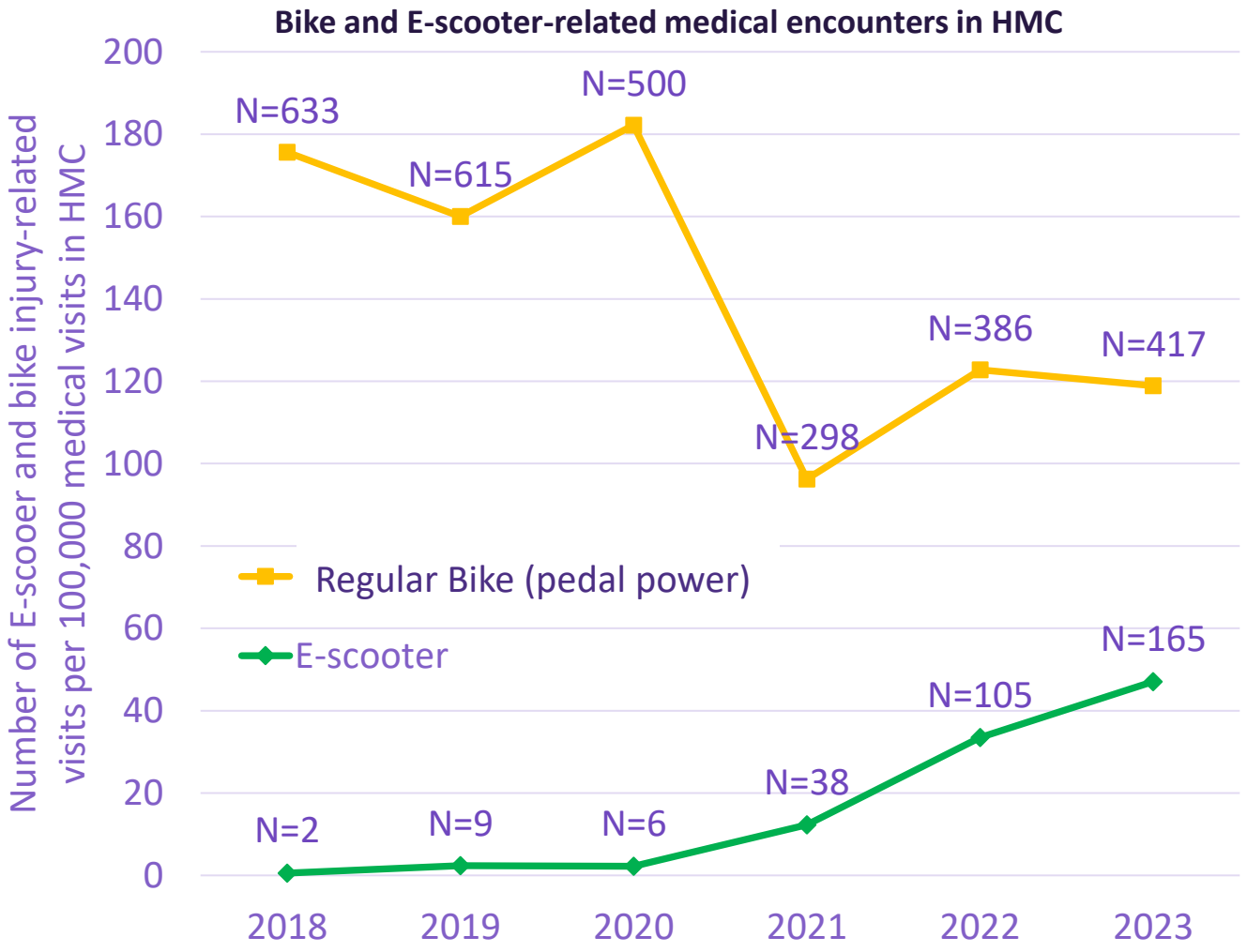
Rate of E-scooter injury-related medical visits/100,000 King County population increased.



Results – Where

50%+ of the medical visits were in HMC; Rate of E-scooter injury-related medical visits/100,000 medical visits in HMC increased





Results – Who

More than half of the injuries were in males and were aged 25-44 years

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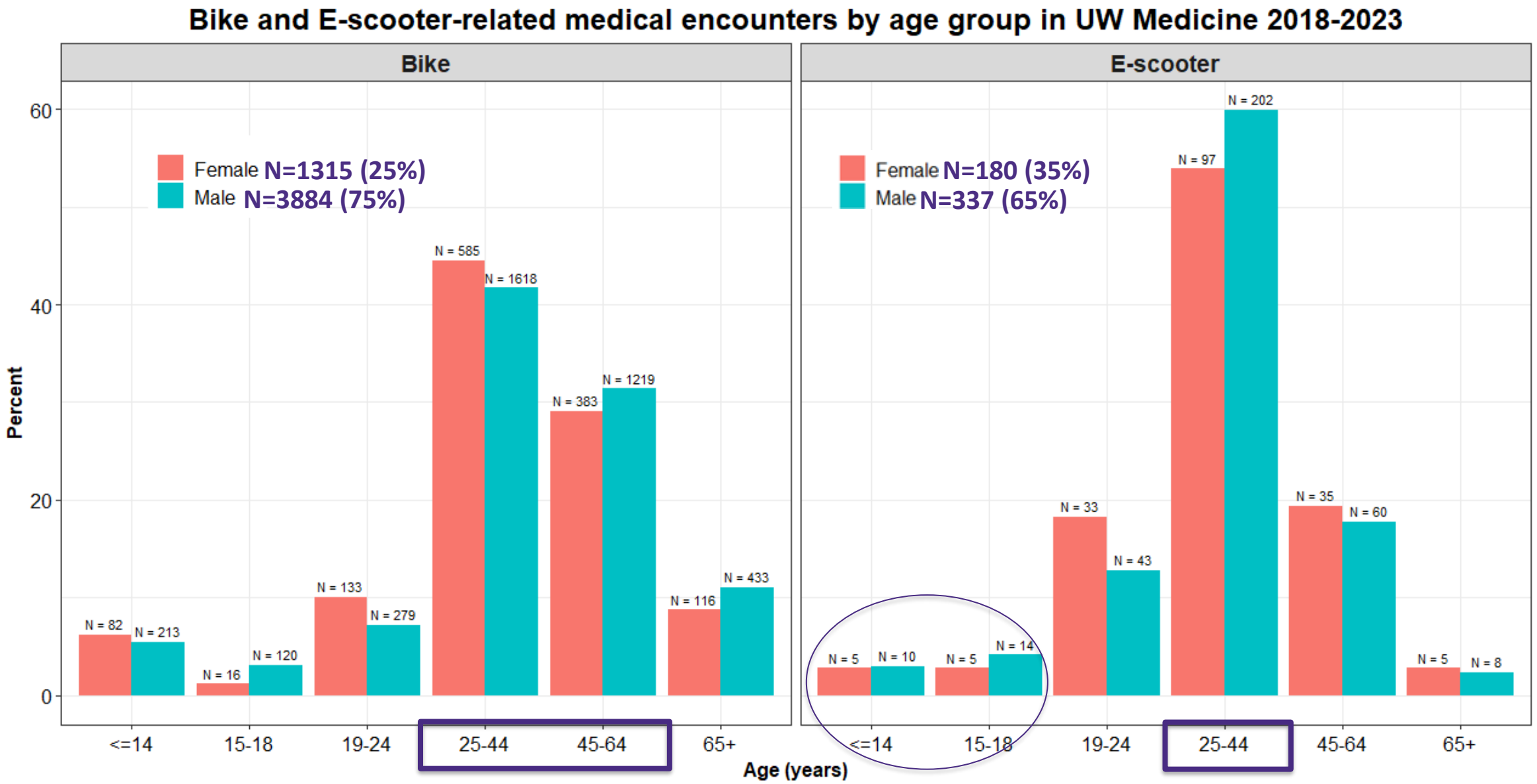

Results (Emergency visits only) – When

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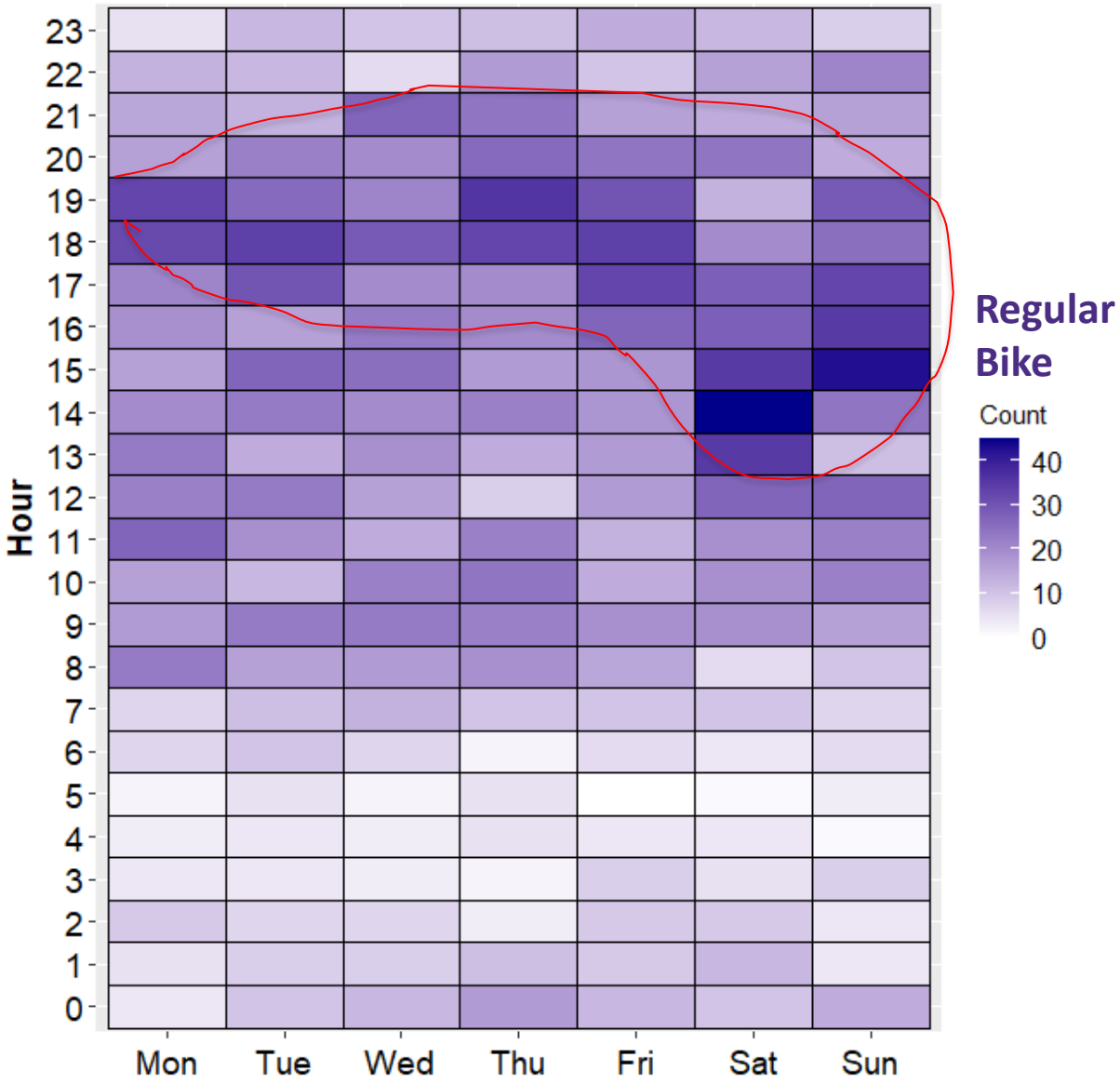

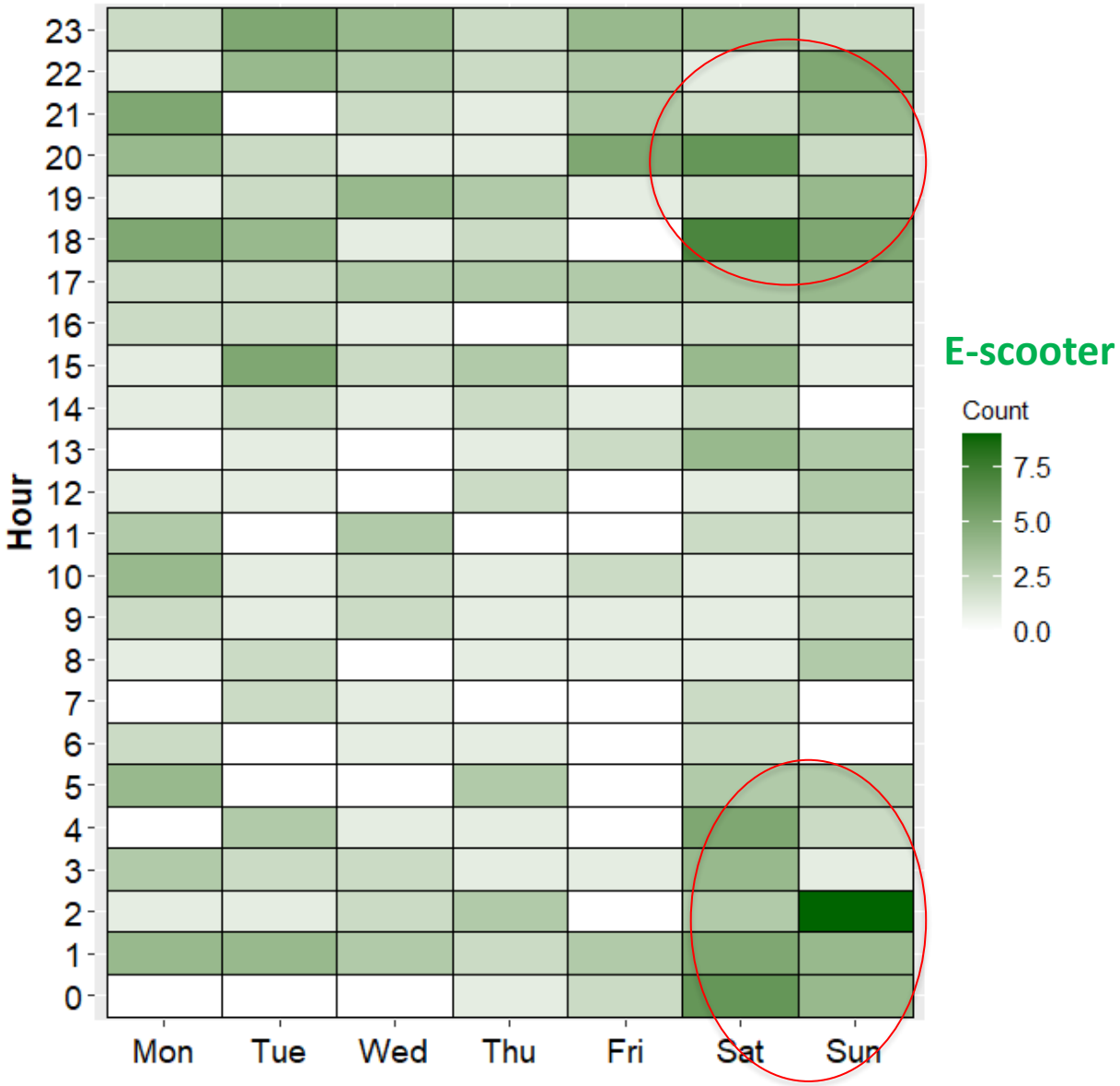

Results – How

Injury mechanism	E-scooter (N=517)
Fall	416 (80.5%)
Collision with motor vehicle in traffic accident	58 (11.2%)

	Overall (N=517)
Helmet	
Yes	44 (8.5%)
No	215 (41.6%)
Unknown	258 (49.9%)
Alcohol	
Yes	124 (24.0%)
No	42 (8.1%)
Unknown	351 (67.9%)
Substances	
Yes	24 (4.6%)
No	60 (11.6%)
Unknown	433 (83.8%)
Rental scooter	
Yes	121 (23.4%)
No	7 (1.4%)
Unknown	389 (75.2%)

	E-scooter (N=517)
Nature of injury	
Fracture	231 (44.7%)
Dislocation	24 (4.6%)
Contusion	181 (35.0%)
Open wound	126 (24.4%)
Organ	85 (16.4%)
Other*	204 (39.5%)
Body region of injury	
Extremity	307 (59.4%)
Head & neck &TBI	242 (46.8%)
Torso	95 (18.4%)
Spine/back	19 (3.7%)
Other	48 (9.3%)

Data: Harborview Medical Center Trauma Registry

Results

- n= 229 cases, mean age 35.5 years
- 70% were male
- 76% were White
- 13% were Hispanic
- 83% did not use helmets
- 11% were not Washingtonians
- 42% had Medicaid health insurance
- 6 cases (3 patients) were repeat injuries
- 3 patients died
- Total charges $16.5 million with an average of $96,000/ patient.

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Results

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- 80% (180 cases) were tested for alcohol
  - 40% (72 out of 180 cases) were alcohol positive
    - 56 cases had an alcohol level >= 80 mg/dL
- 38% (88 cases) were tested for substance use
  - 53% (47 out of 88 cases) had positive toxicology results

Cocaine	10 (21.3%)
Meth	15 (31.9%)
Marijuana	29 (61.7%)
Opiates	6 (12.8%)
multi-drug	10 (21.3%)

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Results

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Detailed Cause of injury	
Accelerated quickly/ swerving/ lost balance	(18.8%)
Fall from standing escooter	(0.9%)
Riding into curb/ pothole/ stationary object/ streetcar railing	(34.9%)
→ Struck by MVC	(19.2%)
Struck MVC or another scooter	(10.0%)
Unclear in medical notes	(16.1%)

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Data: Harborview Medical Center Trauma Registry

Locations of E-scooter Injuries in Seattle

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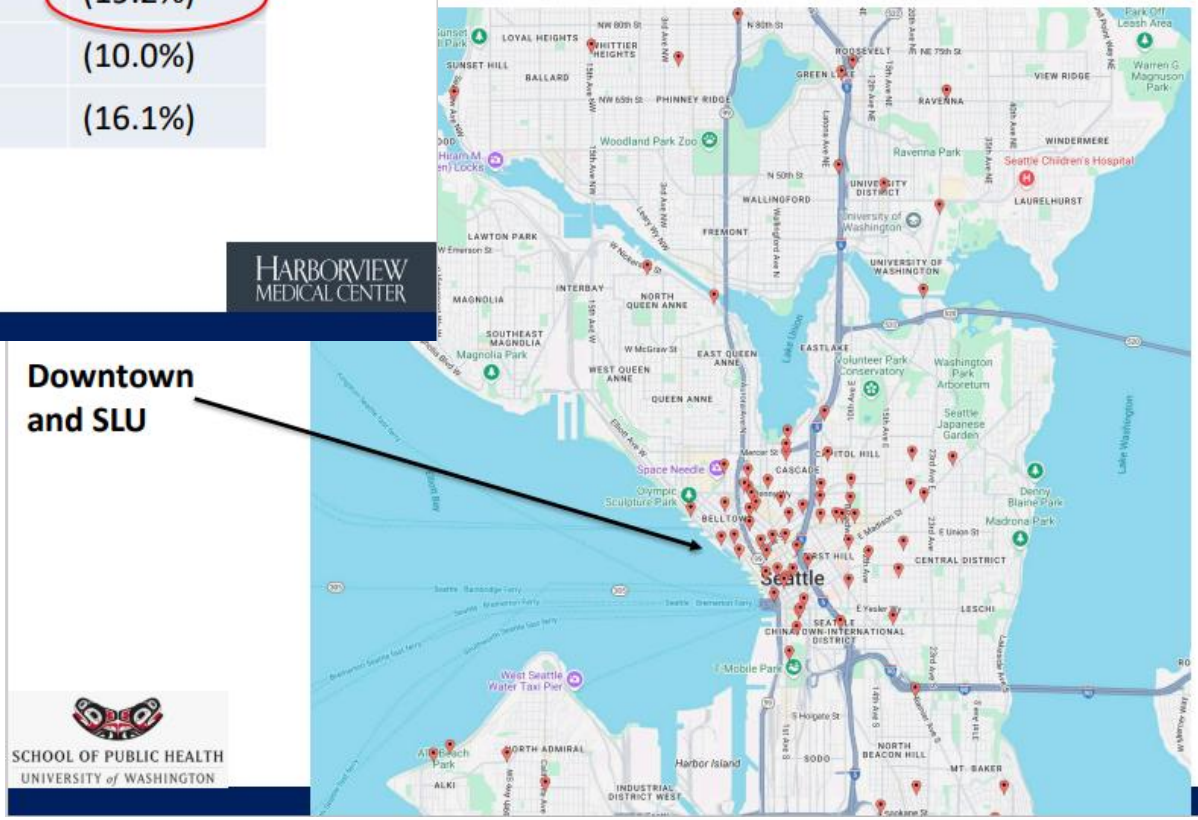

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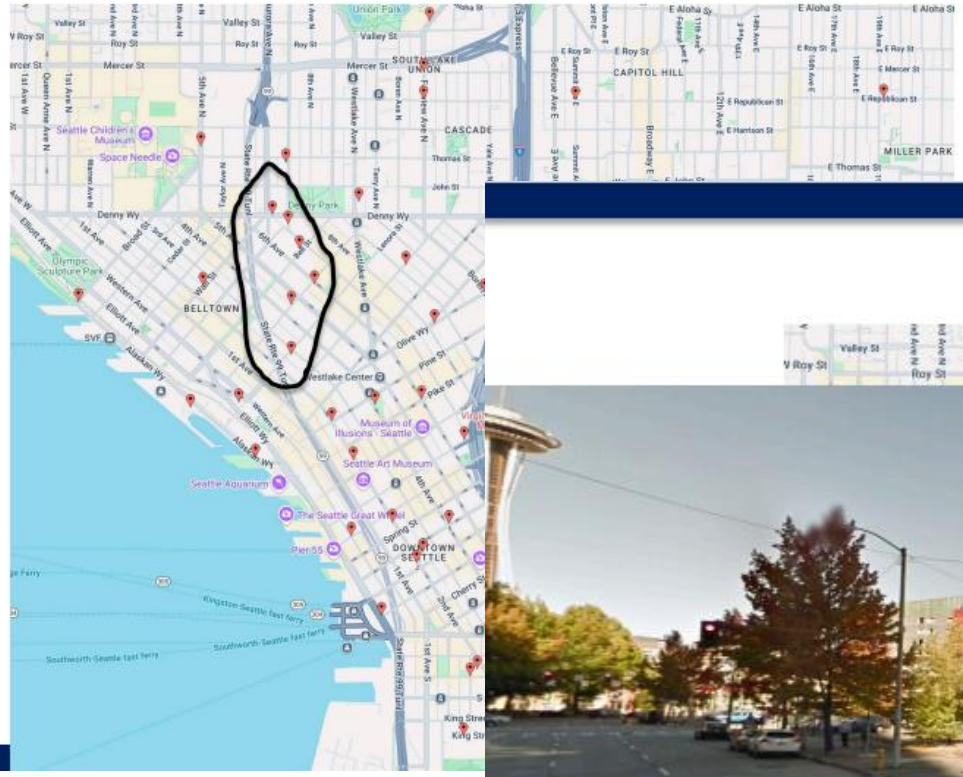

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Data: Harborview Medical Center Trauma Registry

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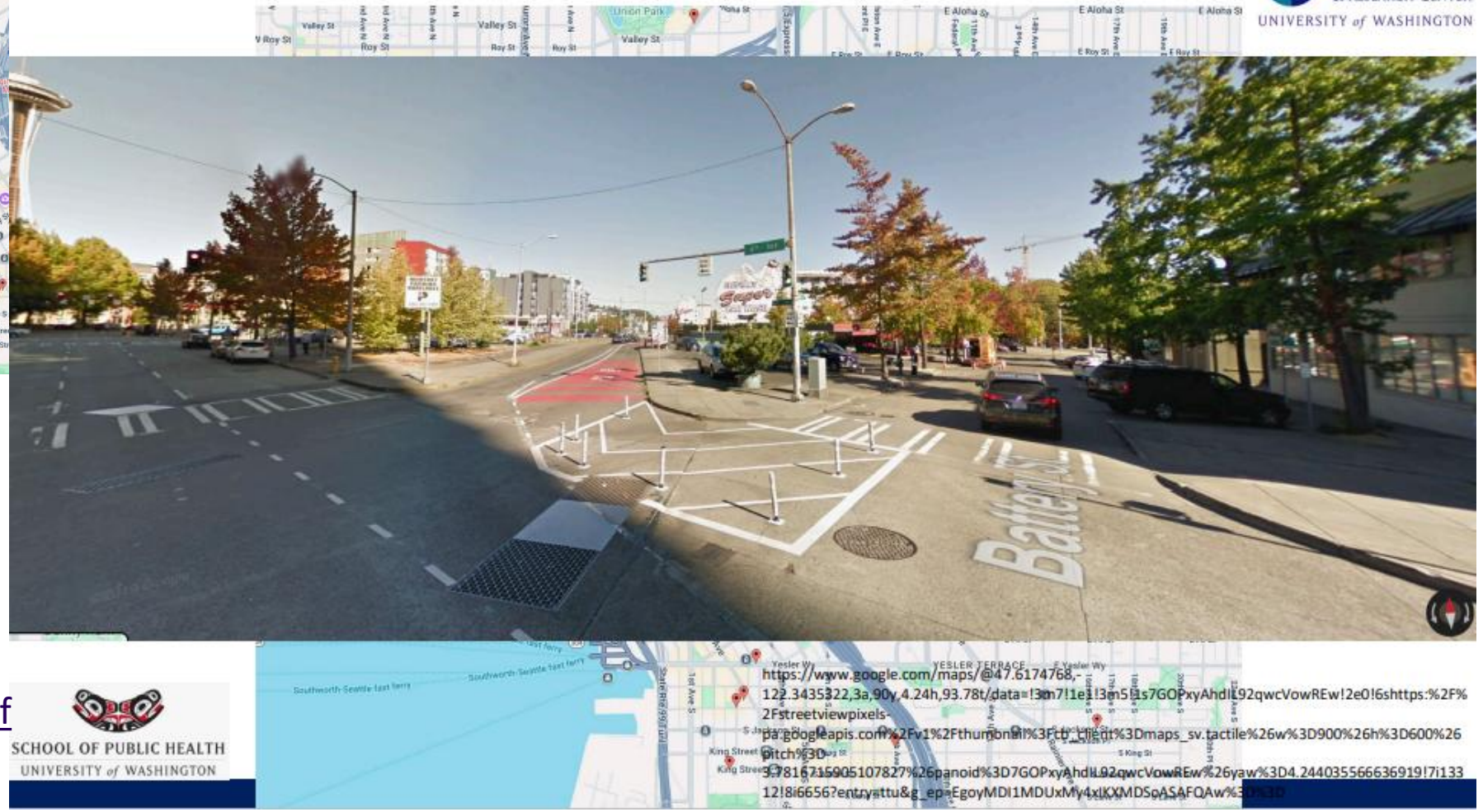

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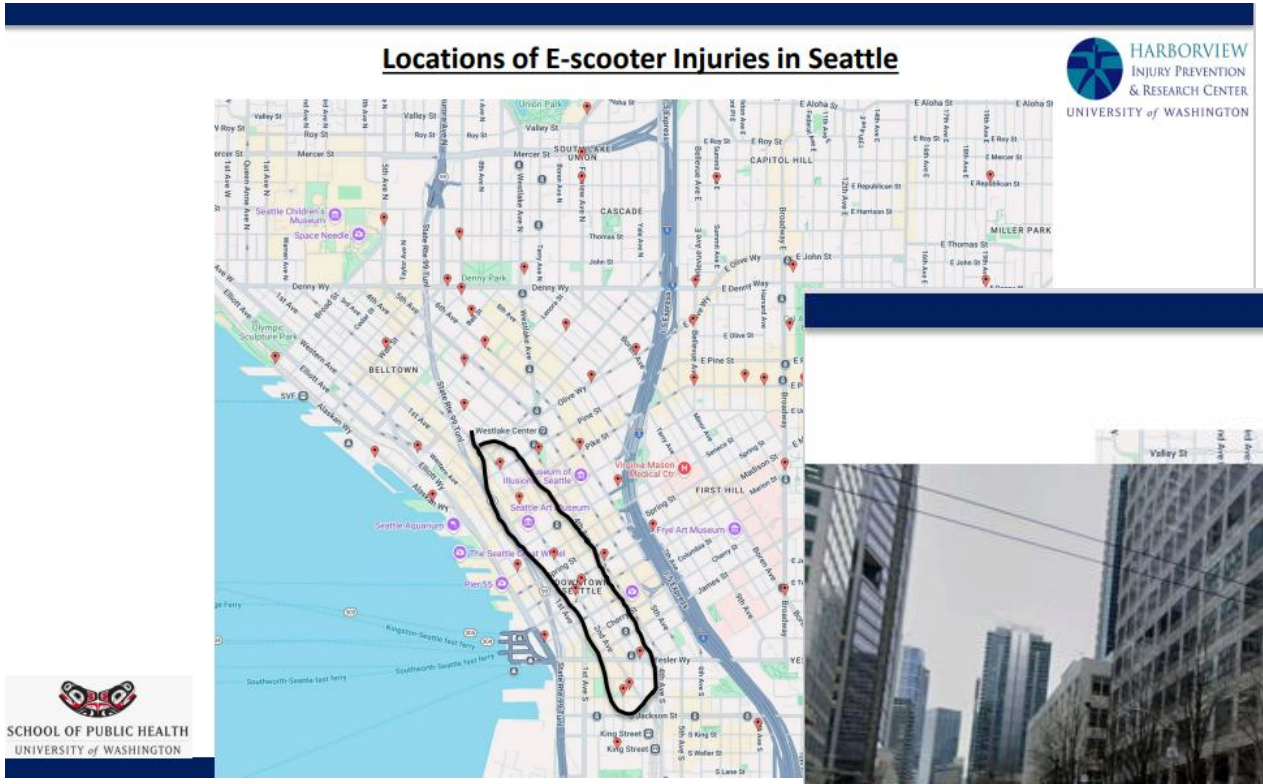

Data: Harborview Medical Center Trauma Registry

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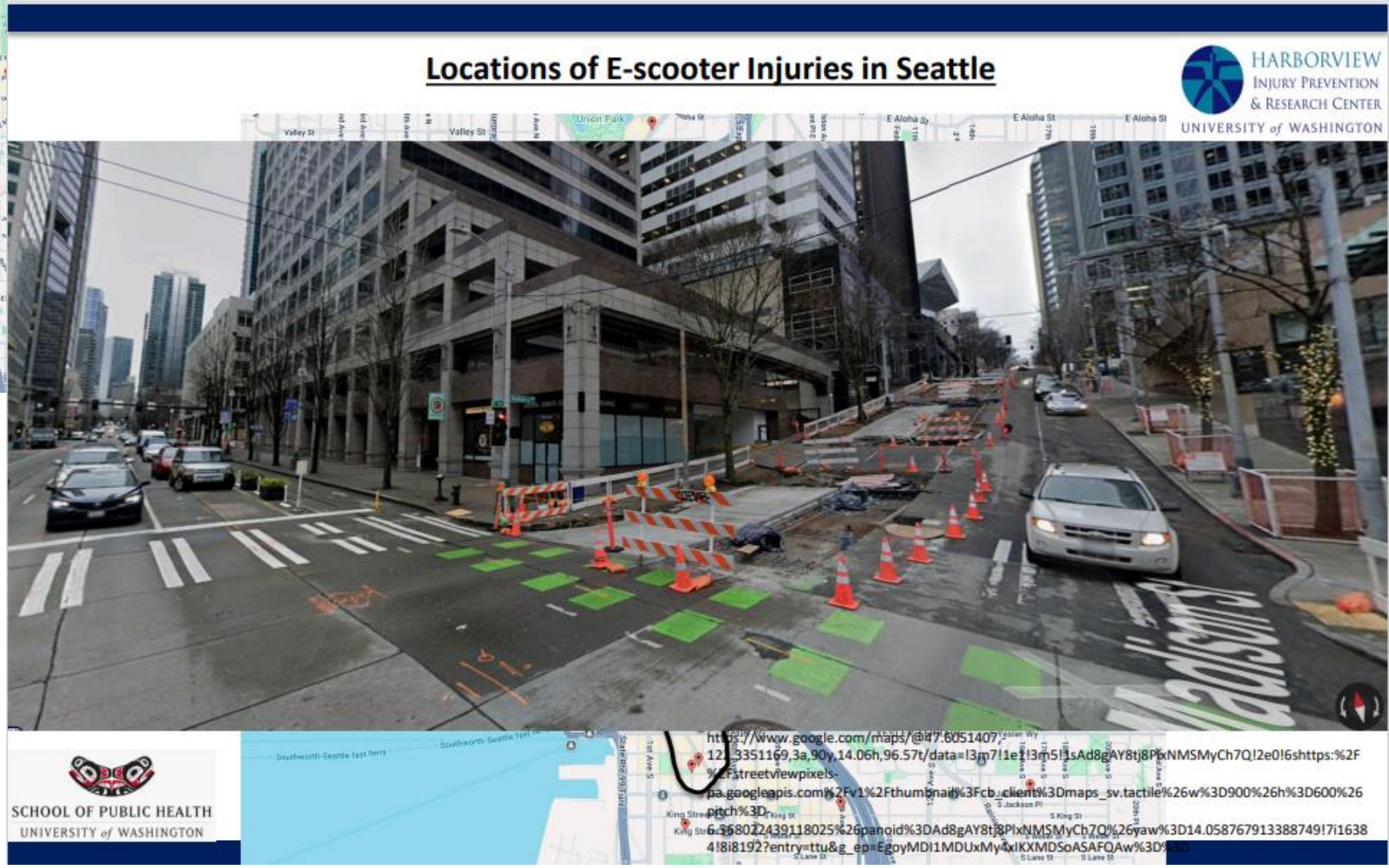

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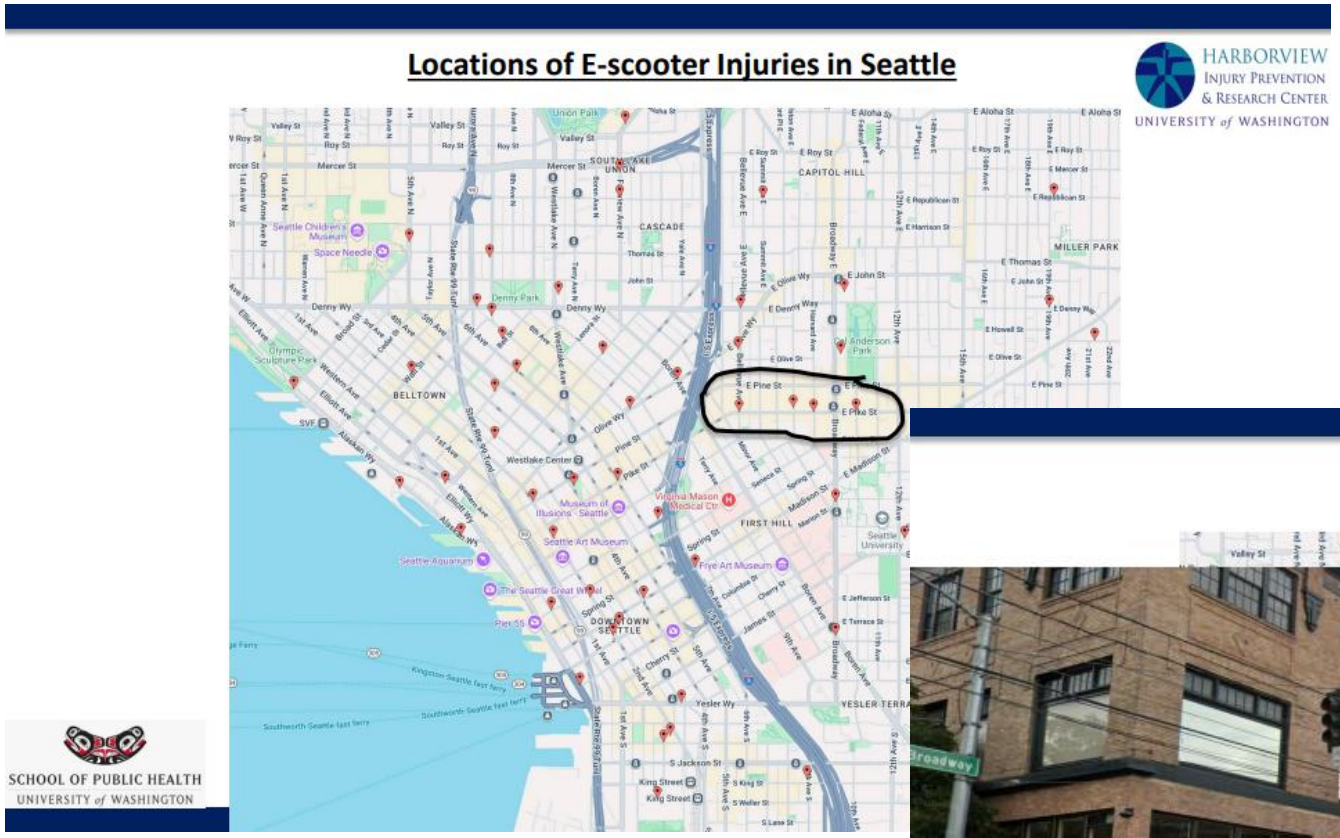

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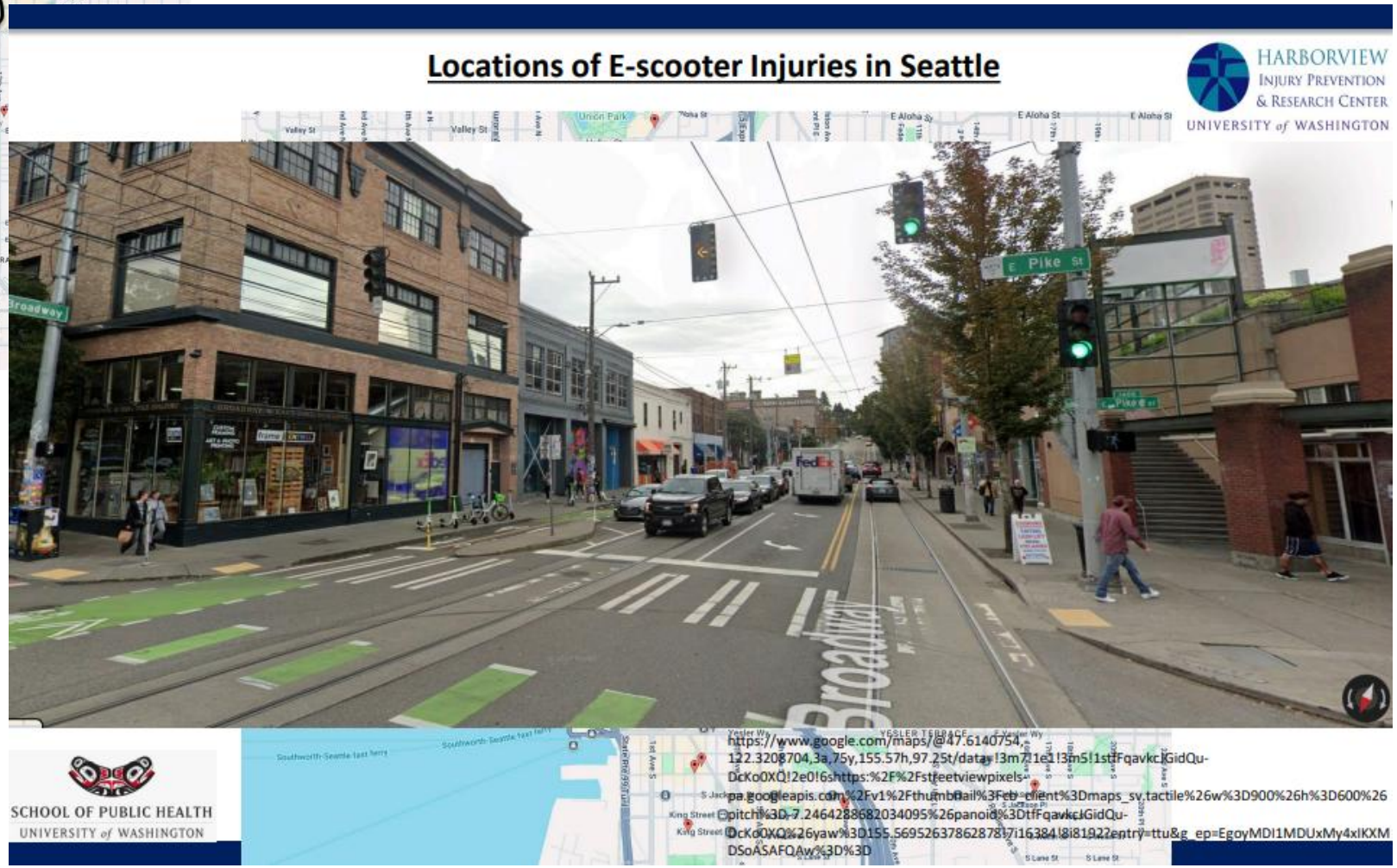

Lead author: Dr. Austin Gaal

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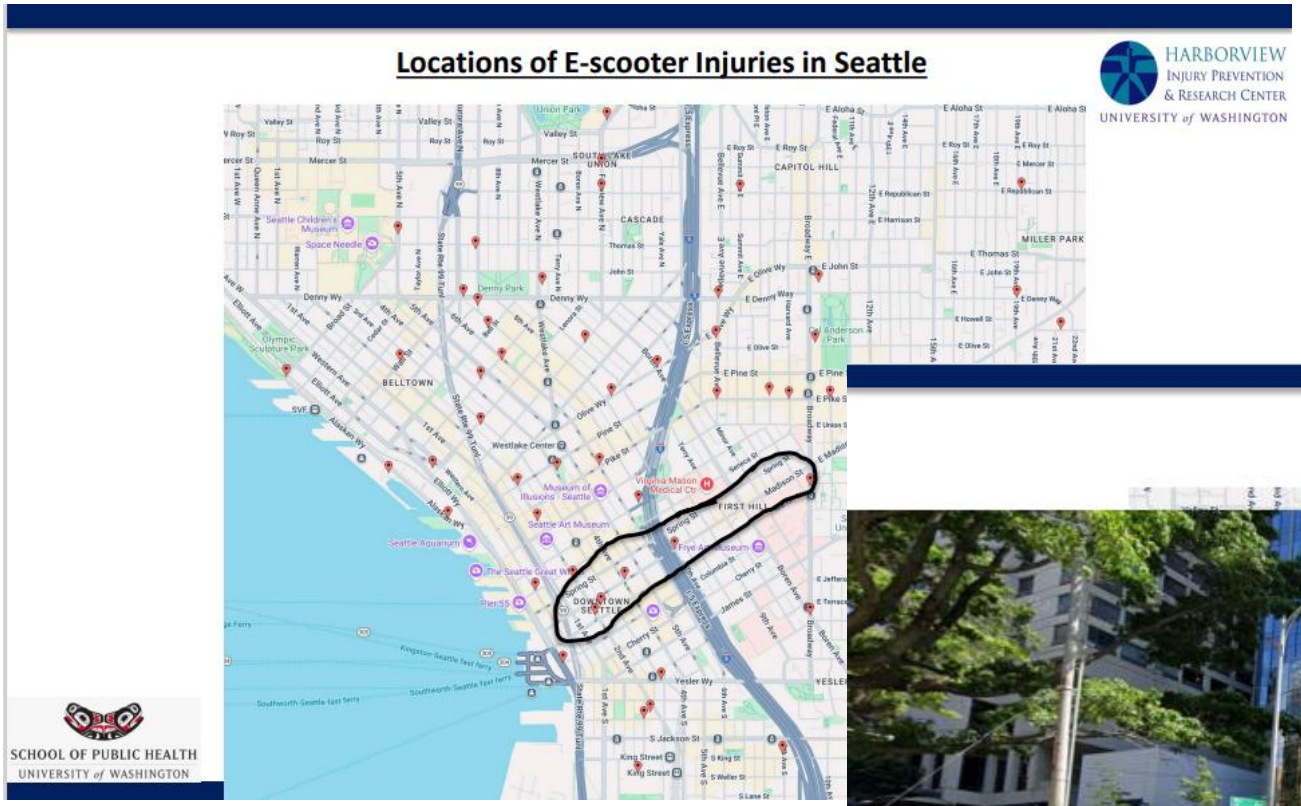

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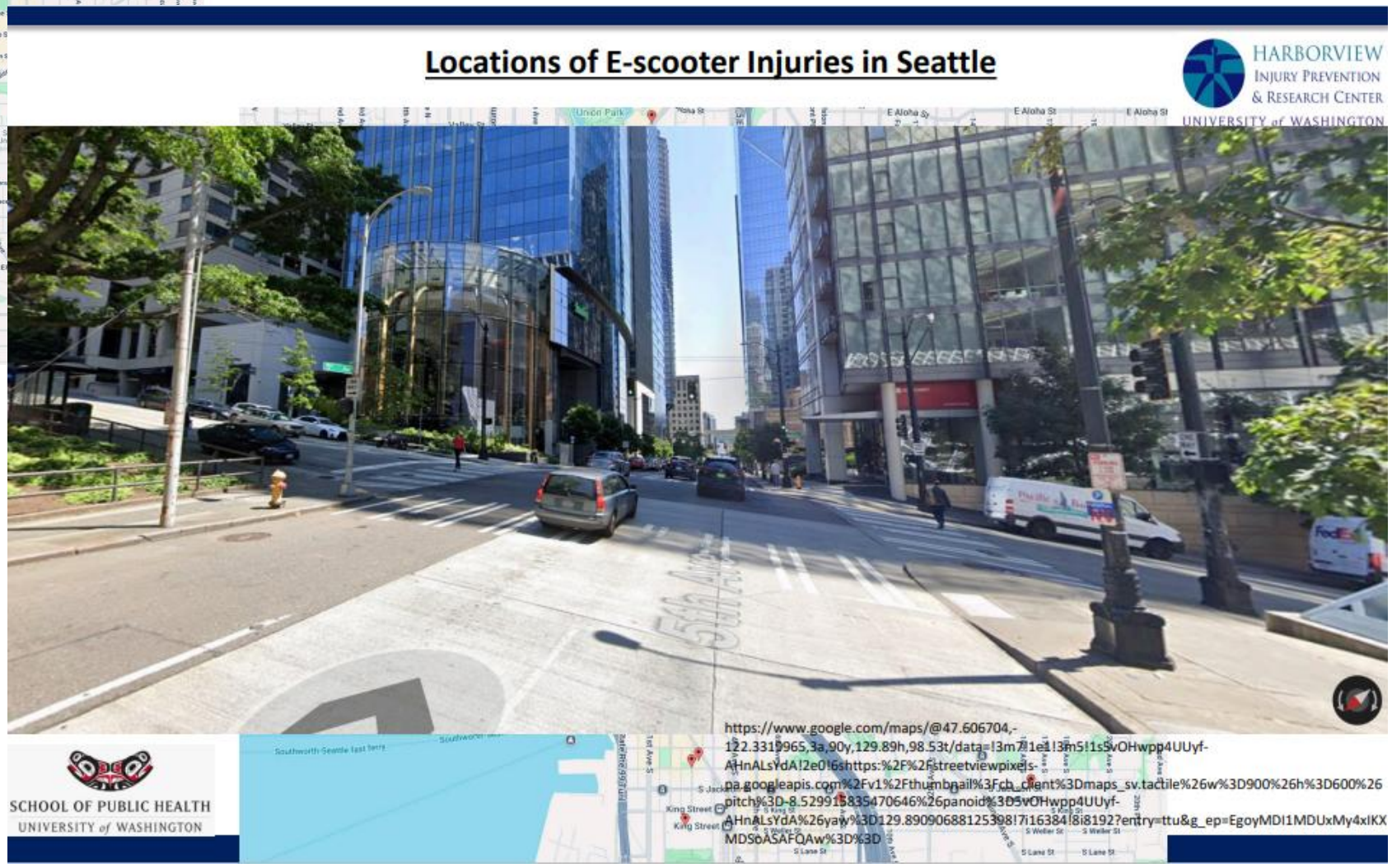

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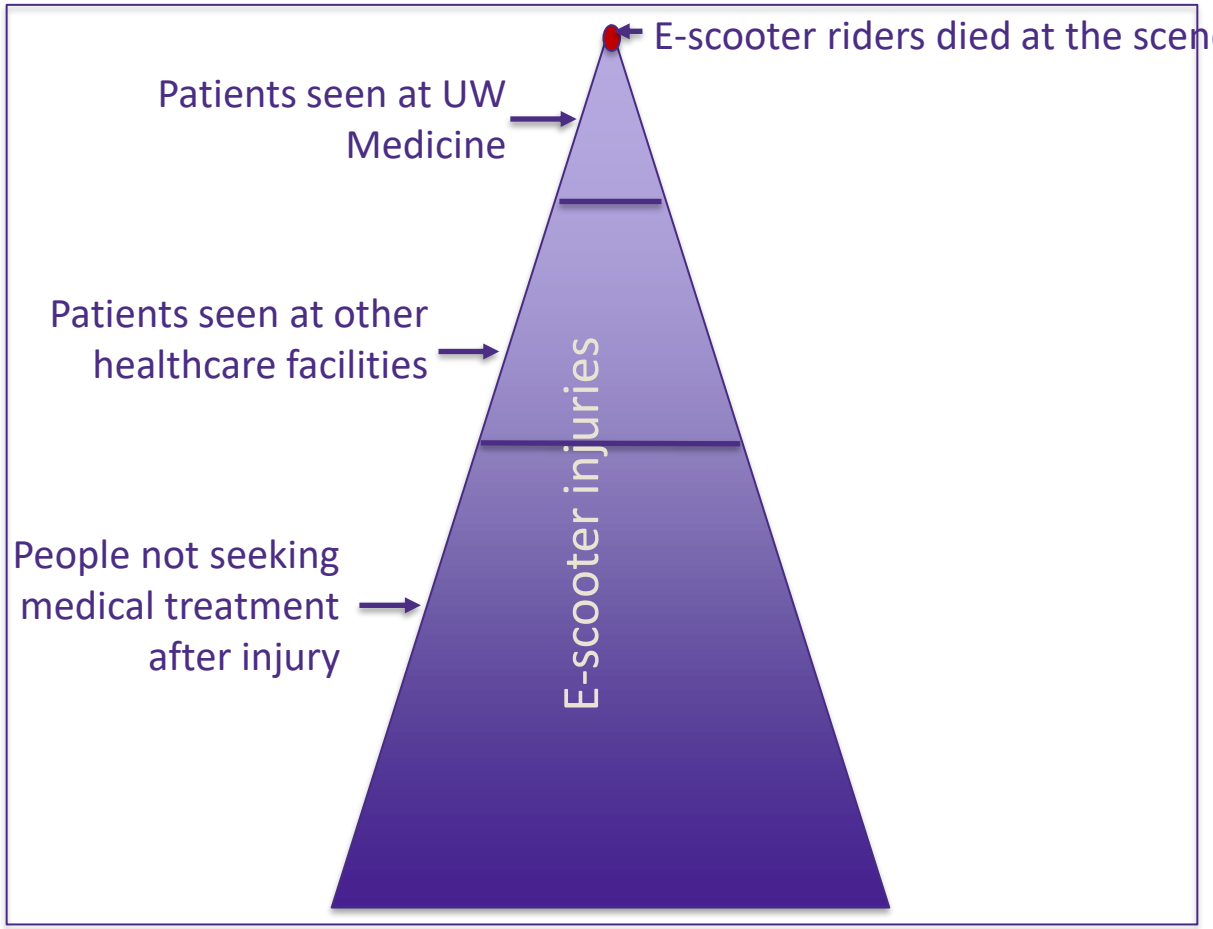
Limitations



Data to Action

WA TRAFFIC SAFETY COMMISSION

Staci Hoff, Ph.D.
Research Director, WTSC

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eScooter Related Injury Study Impact

- **Cooper Jones Active Transportation Safety Council (CJATSC), a group responsible for making recommendations to the legislature for preventing fatal and serious injuries to active transportation users.**
  - **Revise existing active transportation facility design standards—or develop new ones if needed—to accommodate emerging e-micromobility devices.**
  - **Develop and implement statewide traffic safety education programs on laws affecting vulnerable road users, including people using e-micromobility devices—for traffic engineers, judges, prosecutors, law enforcement, and especially new recruits.**
  - **Modernize statewide driver education curricula to incorporate guidance on safely interacting with emerging micromobility device types.**
  - **Implement statewide traffic safety education programming specifically for e-micromobility device users.**

eScooter Related Injury Study Impact

> CJATSC Recommendations (cont.)

- Conduct research on emerging active transportation devices to develop evidence-based policies, safe and consistent use standards, and infrastructure guidelines tailored to device characteristics. This research should draw on crash data, human factors, and best practices to guide municipalities, roadway users, and law enforcement while enhancing traffic safety.
- Conduct comprehensive research to conceptualize serious and fatal e-micromobility device crashes relative to other traffic crashes. Incorporate data from hospital records and other relevant sources to establish a baseline and track trends over time.

Next Steps

- **Improve the use of e-micromobility ICD-10 codes in health care settings**

- **Epidemiological study of eScooter/eBike injury using WA state health records (EMS, ED, Inpatient/Outpatient, Trauma, Death)**
  - **Identify and implement data quality improvements**

- **Update the WA State Police Traffic Collision Report (PTCR) to clearly identify the type of devices involved in crashes.**

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> **Questions? xdegrauw@uw.edu; shoff@wtsc.wa.gov**