Health and Transportation Partnerships: Integrating Health Data into Transportation Planning

PBIC Health + Transportation Webinar Series, Part 3

Ann Dellinger  Centers for Disease Control and Prevention
Leslie Meehan  Tennessee Department of Public Health
Katie Harmon  University of North Carolina Highway Safety Research Center
Shamsi Soltani  San Francisco Department of Public Health
Housekeeping

- Submit your questions
- Webinar archive: www.pedbikeinfo.org/webinars
- Certificates and professional development hours
- Follow-up email later today
- Review previous episodes and sign up for upcoming sessions
Health and Transportation

Oct. 13: Confronting Power and Privilege for Equity
Oct. 15: Agency Structures for Collaboration
Oct. 22: Integrating Health Data
Oct. 27: Planning and Prioritizing Projects
Oct. 28: Bringing Health to Transportation Policy

#PBICWebinar
Transportation and health intersect in many ways
Series Motivation

⇒ How are health and equity defined within the transportation community?
⇒ How can transportation practices impact health?
⇒ In what ways are transportation agencies considering health in current practices?
⇒ What partnerships, research, and other resources are needed to improve practice?
Pathways to Health

- Improving access to opportunities and services
- Providing opportunities for physical activity
- Mitigating human exposure to environmental risks (air and noise pollution)
- Preventing injuries and improving safety
- Supporting resiliency to disaster and extreme weather events
- Promoting community connectedness and vitality
Meet the Panel

Ann Dellinger
Centers for Disease Control and Prevention

Leslie Meehan
Tennessee Department of Public Health

Katie Harmon
UNC Highway Safety Research Center

Shamsi Soltani
San Francisco Department of Public Health
CDC:
Public Health
Injury Prevention
Data, Burden
Applied Science
Evaluation
Strategic, Impact

Ann Dellinger, PhD, MPH
Chief: Applied Sciences Branch
Division of Injury Prevention
National Center for Injury Prevention & Control
amd1@cdc.gov
Before we get started...Chris Kochtitzky

kind wise generous
inspiration caring calm passionate champion
joyful humor dedicated
connector smiling mentor
supportive

CDC Foundation Memorial Fund-bridging urban planning and public health
Everyone, everywhere, every day—safe and free from injuries and violence.
Transportation Safety Team Priority Areas

- Restraints
- Older Adult Mobility
- Impaired Driving
- Data Linkage
What is the LINCS Guide?

- Helps states start or expand their data linkage program
- Presents key components of successful linkage programs and explains each step of the process.
- LINCS is based on:
  - Best practices and lessons learned from successful linkage programs
  - Updated environmental scans for data linkage research, methods, and tools
  - State data linkage pilot efforts

https://www.cdc.gov/motorvehiclesafety/linkage/index.html
National Governors Association: Data Linkage Learning Labs

- CDC partnered with NGA for two Data Linkage Learning Labs
  - Help states develop strategies to improve the access, sharing, analysis, and linkage of transportation, public safety, and medical data to strengthen crash response and inform decision-making.

- Maryland
  - Colorado, Connecticut, Louisiana, Maryland, Minnesota, Utah, Washington

- Utah
  - Illinois, Kentucky, Tennessee, Vermont, and Virginia
▪ 2019 Supplemental Funding to CO, IL, MA, and NC state health departments for motor vehicle crash data linkage

▪ Year 1: using data linkage methods and software to combine traffic and health data and evaluating the quality of the linkages

▪ Year 2: using the linked data to identify risk and protective factors and outcomes of non-fatal MVC injuries
Using Linked Data: NCIPC Extramural Research

- Funding to 4 institutions to probabilistically link hospital and crash data for analysis to better understand motor vehicle crash outcomes in older adults.
  - Utah, Maryland, Kentucky, and Ohio

- Recipients assessed older adult MVC injuries, factors related to injury severity, and costs.

- Research will complete this year
The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
Building Bridges
Our Streets Should be Public Assets

Limited sidewalks

No bicycle lanes

Fast food, not fresh food

Predatory lending

Signs and electrical wires
The Role of Transportation

Obesity Prevalence and Vehicle Miles Travelled (VMT) per year in the U.S., 1960–2016

- Adult Obesity
- VMT (in millions of miles)
Nashville Area MPO

Home to 1.7 million
1.3 million growth in Middle Tennessee 20 yrs
**Policy: Public Opinion**

1st choice: improve and expand mass transit options

2nd choice: make communities more walkable & bike-friendly

3rd choice: build new or widen existing roadways
Policy based on Public Opinion

#1
A Bold, New Vision for Mass Transit

#2
Support for Active Transportation & Walkable Communities

#3
Preservation & Enhancement of Strategic Roadways
2040 Roadway Projects Scoring Criteria – 100 points

- Quality Growth and Sustainable Development – 15pts
- Multi-Modal Options – 15pts
- Health & Environment – 15pts
- Safety & Security – 20pts
- Congestion Management – 15pts
- System Preservation & Enhancement – 10pts
- State & Local Support/ Investment – 5pts
- Freight & Goods Movement – 5pts
Health Priority Areas

There is a strong link between the lack of physical activity and health (e.g. heart disease, obesity, and other chronic conditions).

Research has also shown certain population groups have a higher disparity. These groups include:
Evaluation Tools

- Bicycle and Pedestrian Levels of Service
- Bicycle and Pedestrian Latent Demand
- Congested Roadways
- Bicycle and Pedestrian Crashes
- Health Priority Areas
Composite Bike/Ped Priority Areas
Funding: STP Investment Strategy

- **70% - Roadway projects that improve health**
- **15% - Active Transportation Program**
  - Sidewalks, bicycle lanes, greenways, transit stops; education, enforcement and encouragement
- **10% Mass Transit Program**
  - Combined with FTA funds to help implement regional vision for mass transit
- **5% Regional ITS and Systems Operations**
  - Using technology to manage traffic
Result: Increased Physical Activity

Active Transportation Projects:

- 2030 Regional Tran Plan: 2%
- 2035 Regional Tran Plan: 67%
- 2040 Regional Tran Plan: 77%

2009 to 2014 Miles of:
- Sidewalks: 57% increase
- Bikeways: 19% increase
- Greenways: 36% increase
Household Travel Survey

Transportation, Physical Activity and Health Data Collection and Analysis

Middle Tennessee Transportation and Health Study

Welcome! The Middle Tennessee Transportation and Health Study is sponsored by the Nashville Metropolitan Planning Organization, the Clarksville Urbanized Area Metropolitan Planning Organization, and the Tennessee Department of Transportation. If you have received a participation letter, please Start Here to begin the survey.

Every day, thousands of people move through the middle Tennessee region—in cars, on buses, by foot, or by bike. To plan for the projects of tomorrow, we need to understand how you travel today. Your participation in this important survey will help improve the future of transportation for all of us.

Partnering with both CDC and US Department of Transportation
Updated Health Priority Areas

Based on Transportation and Health Study

**Health Priority Areas**
3 out of 4:
- Poverty
- Unemployment
- Carless Household
- Aging (over age 65)
<table>
<thead>
<tr>
<th>Physical Activity</th>
<th>Air Pollution</th>
<th>Collisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischemic Heart Disease</td>
<td>Respiratory Infections</td>
<td>Auto</td>
</tr>
<tr>
<td>Depression</td>
<td>Cardiovascular Disease</td>
<td>Bicycle</td>
</tr>
<tr>
<td>Dementia</td>
<td>Hypertensive Heart Disease</td>
<td>Pedestrian</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Inflammatory Heart Disease</td>
<td>Bus</td>
</tr>
<tr>
<td>Colon Cancer</td>
<td>Lung Cancer</td>
<td>Truck</td>
</tr>
<tr>
<td>Breast Cancer</td>
<td>Respiratory Disease (kids)</td>
<td>Highway</td>
</tr>
<tr>
<td>All-Cause Mortality</td>
<td>Stroke</td>
<td>Arterial</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fatal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-Fatal</td>
</tr>
</tbody>
</table>
## Health Impacts and Savings

<table>
<thead>
<tr>
<th></th>
<th>Δ Disease Burden</th>
<th>Δ Premature Deaths / Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Moderate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiovascular Diseases</td>
<td>-3.1% ↓</td>
<td>85.6</td>
</tr>
<tr>
<td>Diabetes</td>
<td>-3.0% ↓</td>
<td>9.3</td>
</tr>
<tr>
<td>Depression</td>
<td>-1.1% ↓</td>
<td>0.0</td>
</tr>
<tr>
<td>Dementia</td>
<td>-1.3% ↓</td>
<td>11.6</td>
</tr>
<tr>
<td>Breast Cancer</td>
<td>-1.2% ↓</td>
<td>2.2</td>
</tr>
<tr>
<td>Colon Cancer</td>
<td>-1.1% ↓</td>
<td>2.0</td>
</tr>
<tr>
<td>Road Traffic Crashes</td>
<td>0.0% ↔</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>-1.0% ↓</td>
<td>112.3</td>
</tr>
</tbody>
</table>

Savings: **$116 Million**
per year in healthcare costs
Not just ADT, % Free Flow Speed and LOS

- Physical Activity Rates (Modeled for existing and future land uses and volumes)
- Presence of Sidewalks
- Sales and Property Tax Revenues
- Obesity Rates
- Poverty Rates
- Employment
- Educational Attainment
- Quality of Life Measures
Health and Transportation Partnerships

- Grant review committees (CMAQ & Healthy Built Environments)
- Health data (e.g. obesity) as part of grant applications
- Research
  - Pediatric Asthma and High-Volume Roadways
  - Transportation Access to Cancer Treatment Centers
  - Transportation Access to Substance Abuse Treatment (Opioids)
  - Multimodal Crash Risk Factors
AME70 TRANSPORTATION AND PUBLIC HEALTH

- Review papers
- Assist with social media and communications
- Contribute to strategic planning
- Advance recommendations from the 2019 Conference on Health and Active Transportation
- Investigate research proposals from the Research Roadmap for Transportation and Public Health
- Promote Connecting Transportation and Public Health: A Guide to Communication and Collaboration

www.trbhealth.org
Health and Transportation: Part 3

Health and transportation partnerships: integrating health data into transportation planning

Katherine (Katie) Harmon
UNC HSRC

www.hsrc.unc.edu

October 22, 2020
Background

What is Data Linkage & Why is it Important?

www.hsrc.unc.edu

October 22, 2020
Definition: Data Linkage

**Definition**: A process of combining information believed to be related to the same person (or place, family, event, etc.) from two or more separate data sources.

*Data linkage* is one step in the process of *data integration*, which is the ongoing, systematic linkage of data sources for the purpose of improved research, program management, evaluation, and policy development.

*However*

These terms are often used interchangeably.
Data Linkage Versus Integration

Data linkage:
- Crash data
- EMS data

Data integration:
- EMS data
- Trauma registry data
- Hospital discharge data
- Insurance Claims
- Death certificate data
- Emergency department data

October 22, 2020
**Hypothetical Linked Crash-Patient Record**

### Crash variables
- **Time of Crash**: 20:00
- **Person Type**: Pedestrian
- **KABCO**: B
- **Non-Motorist Location**: Marked crosswalk at intersection
- **AIC Test Status**: No test
- **Striking Vehicle**: SUV

### Linkage variables
- **Name**: John Smith
- **DOB**: 1/9/1950
- **Zip Code**: 27705
- **Diag 1**: S02.101 Fracture of base of skull, right side
- **Diag 2**: Y90.5 Blood alcohol level of 100-119 mg/100 ml
- **Diag 3**: E11.9 Type 2 diabetes mellitus without complications
- **Transport**: Ground ambulance
- **Disposition**: Admitted
- **Payment**: Medicare
- **Charges**: $95,000

### Health outcome variables
- **Internal injuries not visible to LEO**
- **BAC taken at hospital**
- **Comorbidity – may complicate recovery**

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October 22, 2020
North Carolina Crash Injury Surveillance System
NC-CISS
Project Overview

www.hsrc.unc.edu
October 22, 2020
Project Timeline

- Crash/ED/EMS linkage pilot*
- Convene stakeholders
- Develop strategic implementation plan

**Wake county MVCs, only.

Year 0

- Crash/EMS linkage pilot**
- Crash/EMS linkage pilot**
  - Crash/hospital encounter linkage pilot**
  - Crash/ED linkage pilot**

**Pedestrians/bicyclists, only.

Year 1

- Crash/trauma registry linkage pilot
- Crash/Medicaid linkage pilot†
- Crash/ED/death linkage
- Ped/bike linkage

†Pedestrians/bicyclists/motorcyclists, only.

Year 2

- Develop research advisory board
- Develop public facing data tool
- Develop sustainability plan
- Demonstrate success

Year 3

- Wake County Pilot Project (GHSP)
- MVC Injury Data Linkage Project (GHSP)
- NC Crash Injury Surveillance System (CDC)
- Pedestrian/Bicyclist Project (CSCRS)
Collaboration Is Essential

- Project Staff
  - Investigators
  - Program managers
  - Statisticians

- Data owners

- Data users
  - State/Local departments of transportation
  - State/Local health departments
  - Investigators

- Community and advocacy groups

- Funders
NC-CISS: Linked Data Sources

- EMS data
- Trauma registry data
- Medicaid data
- Crash data
- Death certificate data
- Hospital encounter data*
- Emergency department data

*Hospital encounter data: Linked hospital and emergency department data.
Linkage Methods

We investigated four different linkage methodologies but focused on deterministic linkage.

<table>
<thead>
<tr>
<th>Linkage methods</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hierarchical deterministic linkage w/ fuzzy matching</td>
<td>Matches records using a set of pre-defined shared identifiers over multiple passes or “cascades”; allows some flexing with matching variables (age +/- 1 year)</td>
</tr>
<tr>
<td>Recursive partitioning trees</td>
<td>Matches records using a calculated ‘distance’ between linkage variables</td>
</tr>
<tr>
<td>Probabilistic linkage</td>
<td>Matches records based on a pre-assigned probability that the match is correct (e.g. Linksolv)</td>
</tr>
<tr>
<td>Hand review</td>
<td>Matches records through manual review</td>
</tr>
</tbody>
</table>

**Strengths:**
- Easy to explain to a multidisciplinary audience,
- High quality results,
- Fast,
- And replicable in many applications.

**Challenge:**
A sufficient & representative match rate.
Selected Project Results

Pedestrian Injuries & Fatalities

www.hsrc.unc.edu

October 22, 2020
Number of NC pedestrian fatalities: 2009-2018*

Pedestrian fatalities have increased by >50% since 2009

Why Link to Death Certificate Data?

Veteran Pedestrian Fatalities
North Carolina Counties
2014-2018

Veterans make up 11% of NC pedestrian fatalities, but only 9% of NC’s population are veterans.*

Fatalities are just part of the problem.

For each pedestrian fatality, 7-10 pedestrians are treated in the emergency department (ED)."†

"Police-reported crashes, only.

†Based on NC data linkages performed by study authors (estimate varies by ED visit data source).
NC Pedestrian Injuries: CSCRS, 2010-2015 (N=14,264 [Crash Report], N =19,599 [ED])

NC crash data underestimates the total number of pedestrian injuries by 32%.

Certain populations are less likely to have a crash report.
Study Population: CSCRS, 2010-2015

A total of 6,919 crash records for pedestrians involved in police-reported traffic crashes linked to incident NC emergency department visit records for the period October 1, 2010 – September 30, 2015.
Total Estimated Combined Medical & Work Loss Costs for NC Pedestrian Injuries & Fatalities: CSCRS, 2010-2015*

<table>
<thead>
<tr>
<th></th>
<th>Medical costs</th>
<th>Work loss costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian treated in ED, not hospitalized</td>
<td>$19,508,000</td>
<td>$20,225,000</td>
</tr>
<tr>
<td>Hospitalized</td>
<td>$64,847,000</td>
<td></td>
</tr>
<tr>
<td>Died</td>
<td>$8,741,000</td>
<td></td>
</tr>
</tbody>
</table>

Plotted in 2015 US dollars.

Estimated costs in 2015 US dollars:
- Pedestrian treated in ED, not hospitalized: $19,508,000
- Hospitalized: $64,847,000
- Died: $8,741,000

Total estimated combined medical and work loss costs for 5-year period: $1,524,394,000.

NC Pedestrian Injury-Related Emergency Department Visits: CSCRS, 2010-2015

Rate of pedestrians treated in NC EDs (per 100,000 person-years)

Rate per 100,000 person-years:
- Male: 16.58
- Female: 11.64
- 0-14: 8.04
- 25-64: 15.46
- 65+: 8.26
- White: 8.79
- Black: 27.41

Sex: Male, Female
Age group: 0-14, 15-24, 25-64, 65+
Race: White, Black

October 22, 2020
### Injury Diagnoses among Injured NC Pedestrians: CSCRS, 2010-2015†

<table>
<thead>
<tr>
<th>Age Group</th>
<th>TBI*</th>
<th>Fracture*</th>
<th>Open wound/amputation*</th>
<th>Sprain/Strain/Dislocation*</th>
<th>Internal injury</th>
<th>Superficial wound/contusion*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-14</td>
<td>11%</td>
<td>4%</td>
<td>14%</td>
<td>22%</td>
<td>8%</td>
<td>63%</td>
</tr>
<tr>
<td>15-24</td>
<td>10%</td>
<td>10%</td>
<td>13%</td>
<td>23%</td>
<td>18%</td>
<td>60%</td>
</tr>
<tr>
<td>25-64</td>
<td>8%</td>
<td>12%</td>
<td>11%</td>
<td>26%</td>
<td>19%</td>
<td>55%</td>
</tr>
<tr>
<td>65+</td>
<td>10%</td>
<td>13%</td>
<td>14%</td>
<td>34%</td>
<td>14%</td>
<td>54%</td>
</tr>
</tbody>
</table>

**Abbreviations:**
- TBI, traumatic brain injury

*P-value = <.05

†Patients may have more than one injury; therefore percentages do not sum to 100%.
NC Pedestrian Injury Severity & Estimated Driver Speed at Impact: CSCRS, 2010-2015**†

**Pedestrian injury severity:** Defined according to clinical characteristics, not law enforcement assessment (i.e. KABCO).‡

*Significant at p < .001.
†Speed at impact estimated by investigating law enforcement officer.
South Carolina Data Integration for Motor Vehicle Crash Injury Research: The Long Road Ahead

Background

Motor vehicle crashes (MVCs) are one of the leading causes of fatal and nonfatal injuries. 1,495 people were killed and 31,617 people were non-fatally injured in South Carolina MVCs in 2016. The South Carolina Traffic Records Coordinating Committee (CCHI) has an interest in the statewide MVC injury surveillance system. The ability to integrate safety information from a variety of sources has the potential to improve safety outcomes analysis and inform policy and safety programs.

Methods

First, we performed a pilot project linking all NC Division of Motor Vehicles (NC DMV) crash report data with Emergency Medical Services (EMS) and NC DETECT emergency department (ED) data in Wake County. Next, we identified and interviewed NC MVC crash injury stakeholders (trauma centers, crash data centers, etc.). Then, we held two half-day meetings with NC MVC crash injury stakeholders to identify and discuss potential health outcomes data sources for integration. Finally, we performed a series of demonstration and quality improvement projects using NC DMV crash reports and health outcomes data sources. Many of these projects are ongoing.

Results

Table 1: Data Sources

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMS</td>
<td>Emergency Medical Services data</td>
</tr>
<tr>
<td>ED</td>
<td>Emergency Department data</td>
</tr>
<tr>
<td>NC DETECT</td>
<td>North Carolina Department of Transportation and Health Data</td>
</tr>
</tbody>
</table>

Table 2: Data Linkage

<table>
<thead>
<tr>
<th>Project</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot Project</td>
<td>Connects and integrates three data sources: EMS, NC DETECT, and ED change in injury severity</td>
</tr>
<tr>
<td>Demonstration Project</td>
<td>Connects and integrates pedestrian and bicyclist injury severity data</td>
</tr>
<tr>
<td>Quality Improvement Project</td>
<td>Connects and integrates pedestrian and bicyclist injury severity data</td>
</tr>
</tbody>
</table>

Conclusions

NC contains many health outcome data sources that are suitable for integration with NC DMV crash data. These health outcome data sources provide a more detailed characterization of MVC injuries as compared to the crash report data. Finding appropriate filters for linkage and receiving permission to utilize these fields, which often contain personal identifying information has been a challenge.
Acknowledgments: Project Team

- **PI:** Anna Waller
- **Project Managers:** Kathy Peticolas & Erika Redding
- **Carolina Center for Health Informatics:** Clifton Barnett, Dennis Falls, Amy Ising
- **NC Division of Public Health:** Alan Dellapenna, Mike Dolan Fliss, Scott Proeschooldbell
- **NC Trauma Registry:** Sharon Schiro
- **UNC HSRC:** Kari Hancock, Seth LaJeunesse, Nancy Lefler, Eric Rodgman, Laura Sandt, Libby Thomas
- **UNC Injury Prevention Research Center:** Steve Marshall, Becky Naumann
- **Contributions from ~50 Project Stakeholders**
Acknowledgments: Funding Sources

• North Carolina Governor's Highway Safety Program, 2016-2021
• Centers for Disease Control & Prevention, 2019-2021
• Collaborative Sciences Center for Road Safety, 2019-2020
• This project is also supported by the North Carolina Traffic Records Coordinating Committee.

NC DPH Data Attribution & Disclaimer

NC DETECT is a statewide public health syndromic surveillance system, funded by the NC Division of Public Health (NC DPH) Federal Public Health Emergency Preparedness Grant and managed through collaboration between NC DPH and UNC-CH Department of Emergency Medicine’s Carolina Center for Health Informatics. 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 & Contact Information

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919.962.0745

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October 22, 2020
Through Vision Zero SF we commit to working together to prioritize street safety and eliminate traffic deaths in San Francisco.

Health and Transportation Partnerships: Integrating Health Data into Transportation Planning in San Francisco, CA

Pedestrian & Bicycle Information Center
Health and Transportation Webinar Series | October 22, 2020

Shamsi Soltani, MPH
Vision Zero Epidemiologist, San Francisco Department of Public Health
TRAFFIC INJURY IN SAN FRANCISCO: A PUBLIC HEALTH PROBLEM

- ~30 Fatalities per year
- ~500 People hospitalized with severe injuries annually in our public hospital
- $35M in medical costs alone per year

On average, City Trauma Surgeons respond to a serious traffic injury every 17 hours.

~50% of the patients seen at Zuckerberg San Francisco General’s Trauma Center are people injured in traffic collisions.
PUBLIC HEALTH IS INTEGRAL TO VISION ZERO SF

<table>
<thead>
<tr>
<th>Vision Zero Role</th>
<th>Public Health Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Co-Chair of Mayor’s Citywide Vision Zero Task Force with SF Municipal Transportation Agency</strong></td>
<td>Multi-sector <em>Partnerships, Stakeholder Engagement</em></td>
</tr>
<tr>
<td><strong>Lead for Data Systems</strong></td>
<td>Data-Driven to Prevention - Focus on:</td>
</tr>
<tr>
<td></td>
<td>• Most Severe Health Outcomes</td>
</tr>
<tr>
<td></td>
<td>• Comprehensive Data</td>
</tr>
<tr>
<td></td>
<td>• Emerging Issues</td>
</tr>
<tr>
<td><strong>Community Engagement and Education</strong></td>
<td>Engaging with <em>Vulnerable Communities</em></td>
</tr>
<tr>
<td></td>
<td><em>Coordinated Crisis Response for Victims’ Families</em></td>
</tr>
<tr>
<td><strong>Policy</strong></td>
<td><em>Doctors as Critical Voices for Change Evidence-Based Policy</em></td>
</tr>
<tr>
<td></td>
<td><em>Addressing Structural Issues</em></td>
</tr>
<tr>
<td><strong>Elevating Equity</strong></td>
<td><em>Equity is Core to Public Health</em></td>
</tr>
</tbody>
</table>
## TRAFFIC-RELATED DEATHS IN SAN FRANCISCO

<table>
<thead>
<tr>
<th>Year</th>
<th>People Killed While Walking</th>
<th>People Killed While Biking</th>
<th>People Killed in Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>14</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>2006</td>
<td>15</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>2007</td>
<td>24</td>
<td>3</td>
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</tr>
<tr>
<td>2015</td>
<td>20</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
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Vison Zero adopted in 2008:
- Least deadly year in history
- Second-least deadly year in history

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**TransBASE**: Linking Transportation Systems to Our Health

Available Features:
- Speed Limit
- Slope of Street
- Street Width
- Number of Lanes AM
- Number of Lanes PM
- Presence of Cyclic Route
- Presence of Muni Line
- Presence of Median
- Presence of One-way Street
- Presence of On/Ramp
- Presence of Truck Route (Segment)
- Transportation
  - Daily Transit Riders within Quarter Mile Radius (Q)
  - Daily Transit Riders within Eighth Mile Radius (S)
  - MTA Speed Survey Average Speed
  - Updated 2017 Vision Zero High Injury Network
  - Previous 2015 Pedestrian High Injury Corridors (P)
  - Previous 2014 Cyclic High Injury Corridors (CIC)
  - Previous 2014 Vehicle High Injury Corridors (VMR)
  - Previous 2015 Vision Zero High Injury Network
- Fatal Struts CR Variables (2015-2016)
- Vehicle-Pedestrian
  - Collisions
  - Time
  - Day of Week
  - Month
  - Year
  - Weather
  - Type of Collision
  - WIP Violation Category
  - Collision Severity (Highest Degree of Injury)
    - Fatal Collision
    - Severe Injury Collision
    - Other Uninjury Collision
    - Compromised of Plac Collision
- Vehicle-Bicycle

Active Features:
- CPSGS 99G81
- X: 13651861, Y: 4540020.444

Base Map Tiles © Esri
VISION ZERO INJURY PREVENTION RESEARCH COLLABORATIVE (VZIPR)

Working since 2014 to develop, institutionalize and utilize comprehensive injury data in support Vision Zero SF’s data-driven, evidence-based approach to saving lives.

Diverse group:
- Vision Zero Epidemiologist funded by SFMTA
- Trauma Surgeons and Nurses
- Emergency Physicians
- Geospatial Analysts
- & other key staff
LINKING HOSPITAL AND POLICE DATA: TRANSPORTATION RELATED INJURY SURVEILLANCE
# Improving Injury Surveillance for Targeted Interventions

## Standard Practice: Police Reported Injury Collisions

- Detailed data about **crash characteristics**
- Little data on injury severity (4 levels of injury severity classification)
- **Underreporting** of injuries
  - 21% underreporting of pedestrian injuries (Sciortino et al 2005)
  - 27% underreporting of cyclist injuries (Lopez et al 2012)

## Unintentional Injury: Hospital Medical Records

- Improved **injury severity assessment** and detailed health outcome data
- **Comorbidities** (mental illness, hypertension, etc)
- **Disability** status
- **Demographics** (race/ethnicity, insurance type)
- **Homelessness**
  - Little data on cause, injury location
    - Mechanism of injury code
    - No location info
    - No cause of crash info
b. **Suspected Serious Injury.** A suspected serious injury is any injury other than fatal which results in one or more of the following:

1. Severe laceration resulting in exposure of underlying tissues/muscles/organs or resulting in significant loss of blood.
2. Broken or distorted extremity (arm or leg).
3. Crush injuries.
4. Suspected skull, chest or abdominal injury other than bruises or minor lacerations.
5. Significant burns (second and third degree burns over 10% or more of the body).
6. Unconsciousness when taken from the collision scene.
7. Paralysis.

**Police Definition: Visual Assessment**

**Hospital-Based Definition: Clinical Examination**

**Severe Injury:**
Admitted to ZSFGH and/or
Injury Severity Scale (ISS) > 15*

Consistent with:
- American College of Surgeons
- National Trauma Data Bank
- California Dept. of Public Health
- World Health Organization

**Different Severe Injury Definitions = Changes in Severity Classification in Linked Data**

* Injury Severity Scale (ISS) score correlates linearly with mortality, morbidity, hospital stay and other measures of severity.

WHO IS TRANSPORTED TO HOSPITAL BUT NOT REFLECTED IN POLICE REPORTS?

- Severely-injured bicyclists: 39%
- Severely-injured pedestrians: 24%
- Severely-injured people in vehicles: 28%

HIGH INJURY NETWORK

SEVERE AND FATAL INJURY BY DATA SOURCE (2013-2015)

- **59%** Linked Police and Hospital (N=883)
- **28%** Hospital Only (N=411)
- **7%** Police Only (N=104)
- **6%** Medical Examiner (N=96)

- **13%** of the city’s street miles
- **75%** of all severe and fatal injuries
- **77%** of pedestrian severe and fatal injuries
- **71%** of cyclist severe and fatal injuries
- **75%** of vehicle severe and fatal injuries
- **61%** of all transportation-related injuries
31% of Surface Streets

51% of the High Injury Network
Injury Segments in Priority Areas:
- 75% of severe/fatal injuries
- 57% on the VZ High Injury Network
- 35% on Traffic Calm-able Streets

**Priority Areas:** Where Seniors and People with Disabilities Live and Travel, e.g.:
- Census Tracts with the highest 1/3 of population density
- Senior Centers
- Public Libraries
- Paratransit Drop Off/Pick Up Locations
- Public Health Facilities
DEMAND FOR INJURY DATA

Health Officials Prepare to Track Electric Scooter Injuries

What Can We Do to Make Dockless Electric Scooters Safer?

CDC says there's an epidemic of e-scooter injuries that could easily be prevented

Injuries prompt CDC investigation into e-scooters

After a brief absence, shared electric scooters will soon return to San Francisco, and the city and its doctors want to track the injuries that result — from skinned knees to head trauma. Jason Henry for The New York Times
CAPTURING EMERGING VEHICLE TYPES AT ZSFG TRAUMA CENTER

- Congruent with CHP/SFPD categories
- Balance desire for data with capacity to collect data
- Specific enough to respond to data and reporting needs
Both reports available at: https://www.sfdph.org/dph/EH/PHES/PHES/TransportationandHealth.asp
Micromobility Modes, New Codes!

Categorizing injuries related to emerging transportation.

• National patient injury codes close a gap in transportation injury data

• Implemented just this month, for the first time injury associated with micromobility devices will be routinely collected

SUCCESSFUL ADVOCACY TO CDC

- National patient injury codes close a gap in transportation injury data

- Implemented just this month, for the first time injury associated with micromobility devices will be routinely collected
DATA LINKAGE: ADDED VALUE

- More accurate, comprehensive data for decision-making.

Local police data alone:
- Underestimate injury severity
- Miss between 24-39% of severe injuries alone seen at the hospital, depending on mode

- Leverage strengths of different data sources
PARTNERING WITH PUBLIC HEALTH: ADDED VALUE

- Interdisciplinary approach – **clinical expertise and testimony**
- **Access data** to inform **targeted prevention efforts** to save lives, reduce injury severity
- **Understand vulnerabilities** to inform targeted policies: e.g. people with disabilities, people experiencing homelessness.
Acknowledgements

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San Francisco Municipal Transportation Agency
San Francisco Police Department
San Francisco Office of the Medical Examiner
San Francisco Fire Department
American Medical Response
King-American Ambulance Company
San Francisco Transportation Authority
San Francisco Department of Public Works
San Francisco Planning Department

Community Partners and Advocates
Thank you!

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Rightarrow Archive at  www.pedbikeinfo.org/webinars