

NC Data Integration

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Data
Integration



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Acknowledgements



- Funding source:
 - NC Governor's Highway Safety Program (GHSP), 2014 - present
- We would like to acknowledge:
 - UNC Highway Safety Research Center (HSRC)
 - UNC Injury Prevention Center (IPRC)
 - EMS Performance Improvement Center (EMSPIC)
 - NC Healthcare Association (NCHA)
 - NC Division of Public Health (NC DPH)
 - GO Team (NHTSA)



Project Staff



- Project Director: Anna Waller (CCHI/IPRC)
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- Information Security Officer: Dennis Falls (CCHI)
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 - HSRC: Seth LaJeunesse, Laura Sandt, Eric Rodgman
 - EMSPIC: Tony Fernandez
 - NCTR: Sharon Schiro
 - NC DPH: Alan Dellapenna
 - IPRC: Steve Marshall



Presentation Outline



- Background
- Benefits and challenges of data linkage
- Wake County pilot project
- Stakeholder meetings
- Demonstration, quality improvement and other projects
- Conclusions and Questions





Background

Statement of the Problem and Project Objectives

Problem: NC Motor Vehicle Crash Injuries



- Motor vehicle crashes (MVCs) are one of the leading causes of fatal and nonfatal injuries
- 1,450* people were killed and 130,137** people were injured (nonfatal) in NC MVCs in 2016



Program Objectives



- The NC Traffic Records Coordinating Committee (TRCC) ultimately wants a statewide MVC injury surveillance system
 - Understand need and potential
 - Determine feasibility
- The ability to integrate MVC and health information from a variety of sources has the potential to:
 - Improve safety outcome analysis
 - Inform policy and safety programs



Potential Benefits of Data Linkage in NC



- Describe the nature of crash injuries
 - Injury outcomes from crashes
 - Cost of injuries/treatments
 - Frequency of injuries
 - Identification of risk factors for crashes and injury
- Provide material to community groups and organizations to help communicate the severity of motor vehicle crash injury
- Data will help inform where and how we develop roadway safety interventions and programs



How are linked crash and health outcome data used in other states?



1. Identify Traffic Safety Problems
2. Support Traffic Safety Decisions and Legislation Policies
3. Education Purposes
4. Additional Benefits

Milani, J., Kindelberger, J., Bergen, G., Novicki, E. J., Burch, C., Ho, S. M., & West, B. A. (2015). *Assessment of Characteristics of State Data Linkage Systems* (No. DOT HS 812 180).

National Highway Traffic Safety Administration. (2010). The crash outcome data evaluation system (CODES) and applications to improve traffic safety decision-making. *NHTSA Technical Rep. DOT HS 811, 118.*



Identify Traffic Safety Problems



Examples of how linked data were used to identify **traffic safety problems** in other states:

- Identification of crash risk factors for teen drivers (e.g., types of crashes involving teens, injury outcomes, safety belt use by teen drivers and passengers)
- Cost of MVC injuries in terms of hospital charges and hospital stays
- Effectiveness of seat belts and child restraints at preventing MVC injuries and deaths
- Identification of the types of individuals involved in MVCs and their injury outcomes



Do Not Let Distraction Take You

Distracted driving is any activity that could divert a the primary task of driving. It occurs anytime you take your hands off the wheel, and your mind off the primary task of driving.

- About 1 in 6 fatal crashes and 20% of injury crashes are distracted from driving.*
- In 2009 alone, 5,474 people were killed and 474,000 people were injured in crashes caused by distracted driving.*

In Nebraska

- From 2005 to 2009, distracted driving resulted in 14,706 deaths and injuries, and over 1.7 billion dollars in economic damage.
- Teen drivers are more likely to engage in distracted driving.

Figure 1. Deaths and Injuries Due to Distracted Driving, Nebraska, 2005-2009

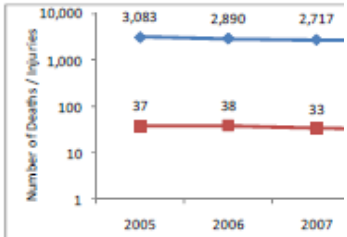
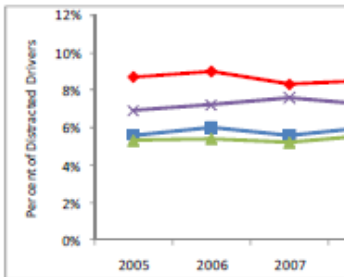


Figure 2. Percent of Distracted Drivers among Each Age Group, Nebraska, 2005-2009



* Source: distraction.gov

† Distracted is defined as "inattention", "mobile phone distraction", or "distracted-other" as reported in crash investigations.

Figure 1. Deaths and Injuries Due to Distracted Driving, Nebraska, 2005-2009

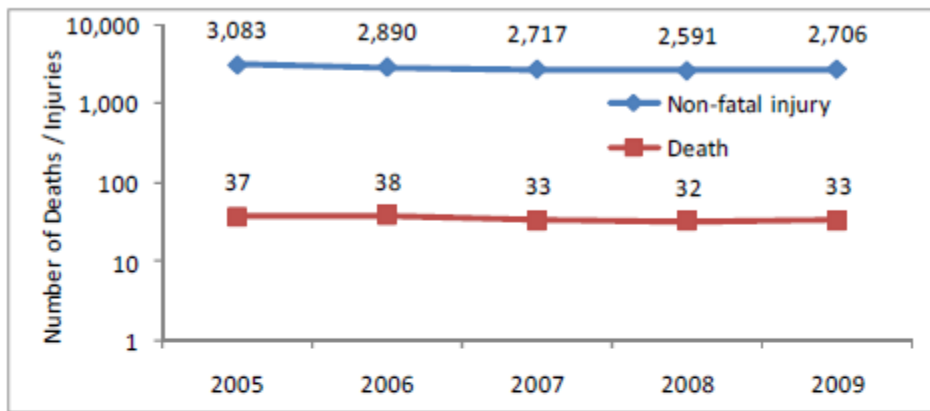
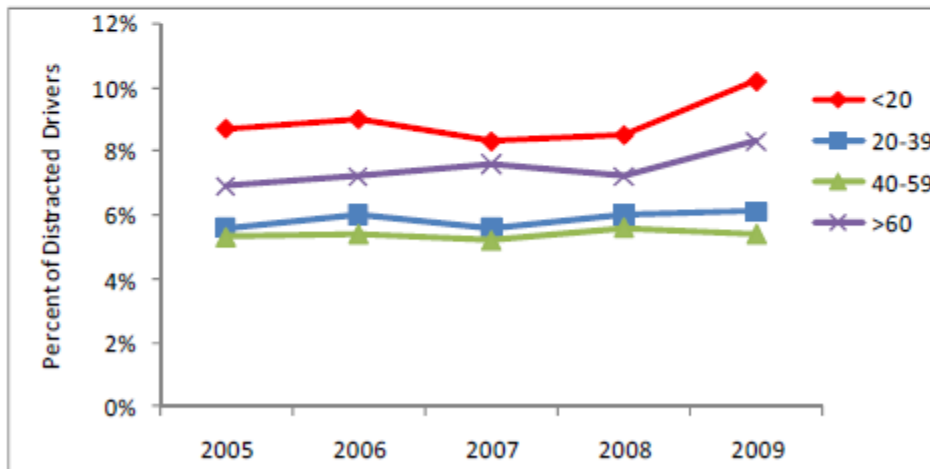


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* Source: distraction.gov

† Distracted is defined as "inattention", "mobile phone distraction", or "distracted-other" as reported in crash investigations.

traction-related crashes were caused by cell phone use.

- Using a cell phone while driving, whether it's hand-held or hands-free, delays a driver's reactions as profound as drunk driving.
- Text messaging creates a crash risk 23 times worse than driving while not distracted.

Nebraska Crash Outcome Data Evaluation System
 Phone: (402) 471-4377
 Fax: (402) 471-1371



Support Traffic Safety Decisions and Legislation



Examples of **traffic safety laws** supported using linked data:

- Motorcycle Helmet Laws
 - How effective are helmets at reducing costs of injuries?
- Safety Belt Use Laws
 - Provide evidence for law to cover ALL passengers
- Drinking While Driving Laws
 - Identifying costs and injury consequences of drinking while driving
- Graduated Drivers License Program
 - How effective is GDL at preventing MVCs among teen drivers?





TR

Eighteen states in the CODES network submitted data, combining information on 104,472 motorcyclists involved in crashes during 2003-05. Results include the following:

Motorcyclists by helmet-use and head injury

	Helmet not used	Helmet used
No head injury	40,408 (91.9%)	54,933 (94.7%)
Head injury	3,575 (8.1%)	3,071 (5.3%)

Of the unhelmeted motorcyclists, 8.1% suffered head injury compared to 5.3% for helmeted motorcyclists. So helmets are estimated to be at least 35% effective at preventing head injuries.

Again, a crucial issue is how effectiveness can be determined reliably. In this study, researchers used logistic regression, a statistical method that enables them to account for other crash factors (e.g., speed) and focus in on the effect of helmet use or non-use. Using this method, they estimated the effectiveness of helmets at preventing traumatic brain injury to be 41% for single-vehicle crashes and 25% for multiple-vehicle crashes.

Researchers have also tracked the outcomes of states enacting universal helmets laws and also the effect of repealing or weakening these laws. For instance, a 2005

Not Wearing a Helmet, for Motorcycle Crashes in Wisconsin, 2008. Researchers combined WisDOT crash data with emergency department and hospital data from the Wisconsin Hospital Association. They faced the challenge of linking records between two data sets when one or both did not have person-level identifiers such as name, address or social security number. This problem was solved using a method called probabilistic linkage (see presentation on website). Their findings included:



continued on page 4

Motorcycle and passenger vehicle crash victims in Wisconsin (2008)

	Motorcycle	Passenger vehicle	Ratio
Total crash victims	3,455	238,129	
Visited an ER	1,375	22,76	
%	39.8%	9.6%	4.1
Hospitalized	676	2,266	
%	19.6%	1.0%	19.6
Died	90	359	
%	2.6%	0.2%	13.0
Total medical costs (millions)	\$ 77	\$ 398	
Average	\$ 22,196	\$ 1,649	13.5
Total other costs (millions)	\$ 303	\$ 2,053	
Average	\$ 87,635	\$ 8,621	10.2



Texting and other deadly distractions

Major Dan Lonski
Director, BOTS

Distracted driving received extensive media and public attention when a new state law that bans texting while driving went into effect on December 1, 2010. It is now illegal in Wisconsin to drive "any motor vehicle while composing or sending an electronic text message or an electronic mail message."

Wisconsin currently is one of 30 states and the District of Columbia that ban texting on a cell phone or similar device while driving. Wisconsin's texting ban is a primary enforcement law, so police officers may stop motorists suspected of this offense alone. All forms of distracted driving are dangerous, but texting is especially hazardous because the driver's eyes, hands and mental focus are all diverted from safe driving for too much time. As with any traffic safety law, we hope that drivers will voluntarily comply with this ban and also eliminate other distractions while behind the wheel.



Distracted drivers are a threat to themselves and everyone else on the road. The National Highway Traffic Safety Administration (NHTSA) attributes an estimated 6,000 traffic deaths and 500,000 injuries to distracted driving in 2008.

NHTSA and the entire traffic safety community are devoting time and resources on educational and enforcement efforts to reduce distracted driving.

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Education Purposes



Linked data can be used to **educate** decision makers and the public about traffic safety. Data can be used:

- To create fact sheets relating to motor vehicle safety
- By advocacy groups to make the case to change traffic safety laws
- For presentations at traffic records coordinating committee (TRCC) and legislative meetings
- To run online queries of de-identified and aggregated data by making the data available on web portals or on-line data warehouses



Motorcycles in South Carolina

You've got
the bike and the gear.
Now learn the facts.

SCDPS
RIDESMART

CRASHES

There were 1,819 motorcycle crashes in 2010.

Motorcycle fatalities accounted for 1.7% of all traffic fatalities in 2010, but only about 1.7% of all traffic fatalities.

The number of motorcycle crashes decreased by 10% from 2009 to 2010.

INJURIES, FATALITIES

A total of 81 motorcycle riders were injured in 2010.

The average age for motorcycle riders in 2010 was 35 and the youngest was 15 and the oldest was 75.

In 2010, motorcycle injuries resulted in 2,963 emergency department hospitalizations and emergency department visits.

Motorcycle riders 19 to 24 years old had the highest emergency department visits. Motorcycle riders 45-54 years old had the highest hospitalization rate (27.1 per 100).

In 2010, the average hospital stay for motorcycle injuries was 4.1 days.

71.4% of the South Carolina motorcycle crashes had a valid Class M permit.

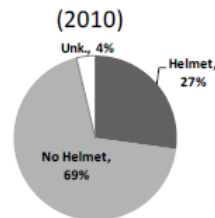
The leading anatomic site for emergency department visits was the head (11%), followed by the neck (11%), and the torso (11%). The principal diagnosis in 11% of emergency department visits was traumatic brain injury.

Among those hospitalized for motorcycle injuries, 74% had a traumatic brain injury.

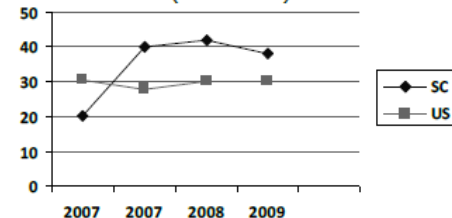
Wearing a helmet and riding sober saves lives

- ◆ 69% of all South Carolina motorcycle riders killed in crashes in 2010 were not wearing a helmet.
- ◆ The South Carolina Crash Outcome Data Evaluation System analysis for 2008 showed that riders wearing helmets are 71% less likely to incur a traumatic brain injury than riders not wearing helmets.
 - ◆ Motorcycle helmets reduce the risk of dying in a motorcycle crash by 37%.
- ◆ 38% of all fatally injured motorcycle riders in 2009 had blood alcohol content levels at the legal limit (.08 g/dL) or higher.
 - ◆ The most common contributing factor in fatal motorcycle crashes in 2011 was riding while intoxicated.
 - ◆ Operating a motorcycle while intoxicated increases the likelihood of a fatal crash.

Fatalities and Helmet Use



Fatalities and Blood Alcohol Content (2007-2010)



SOUTH CAROLINA MOTORCYCLE RIDER TRAINING CLASSES*

South Carolina has beginner and advanced motorcycle training classes available. See back for details.



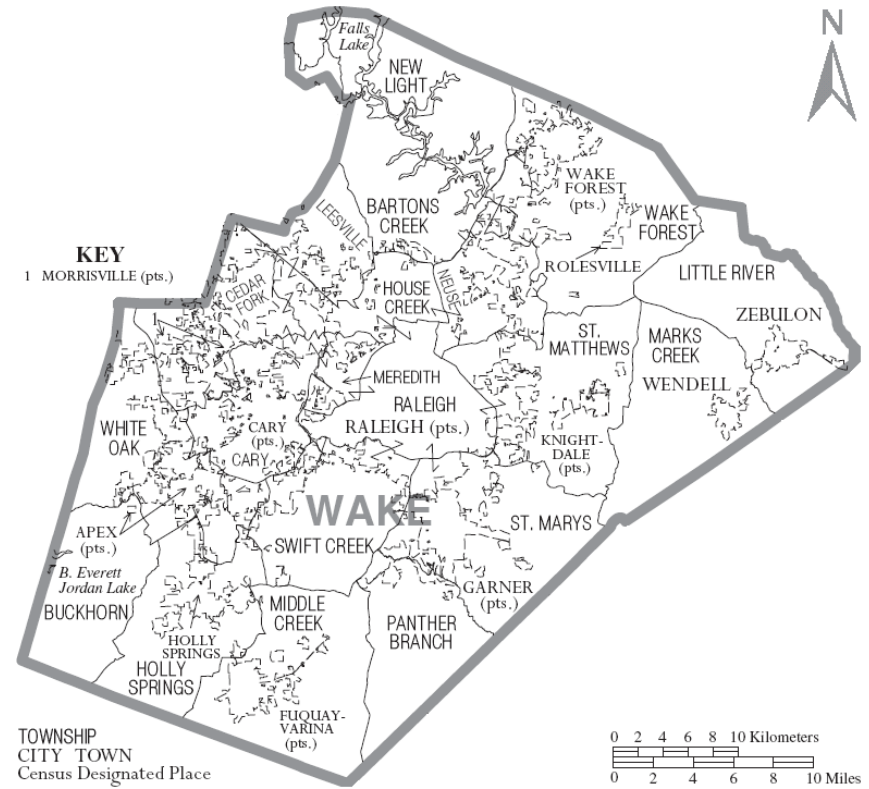
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Potential Barriers to Data Linkage



- Data Privacy Concerns
- Financial Implications (data costs, technical costs, and legal costs)
- Data Quality Concerns (free text variables, paper crash report forms, incomplete/missing data)
- Technical barriers (e.g., linkage technology, staff turnover, process documentation, no common identifier variables)
- Data Ownership / Permissions





Pilot Project

Overview of Pilot Project to Integrate Crash Report, EMS, and ED Visit Data for Wake County, NC

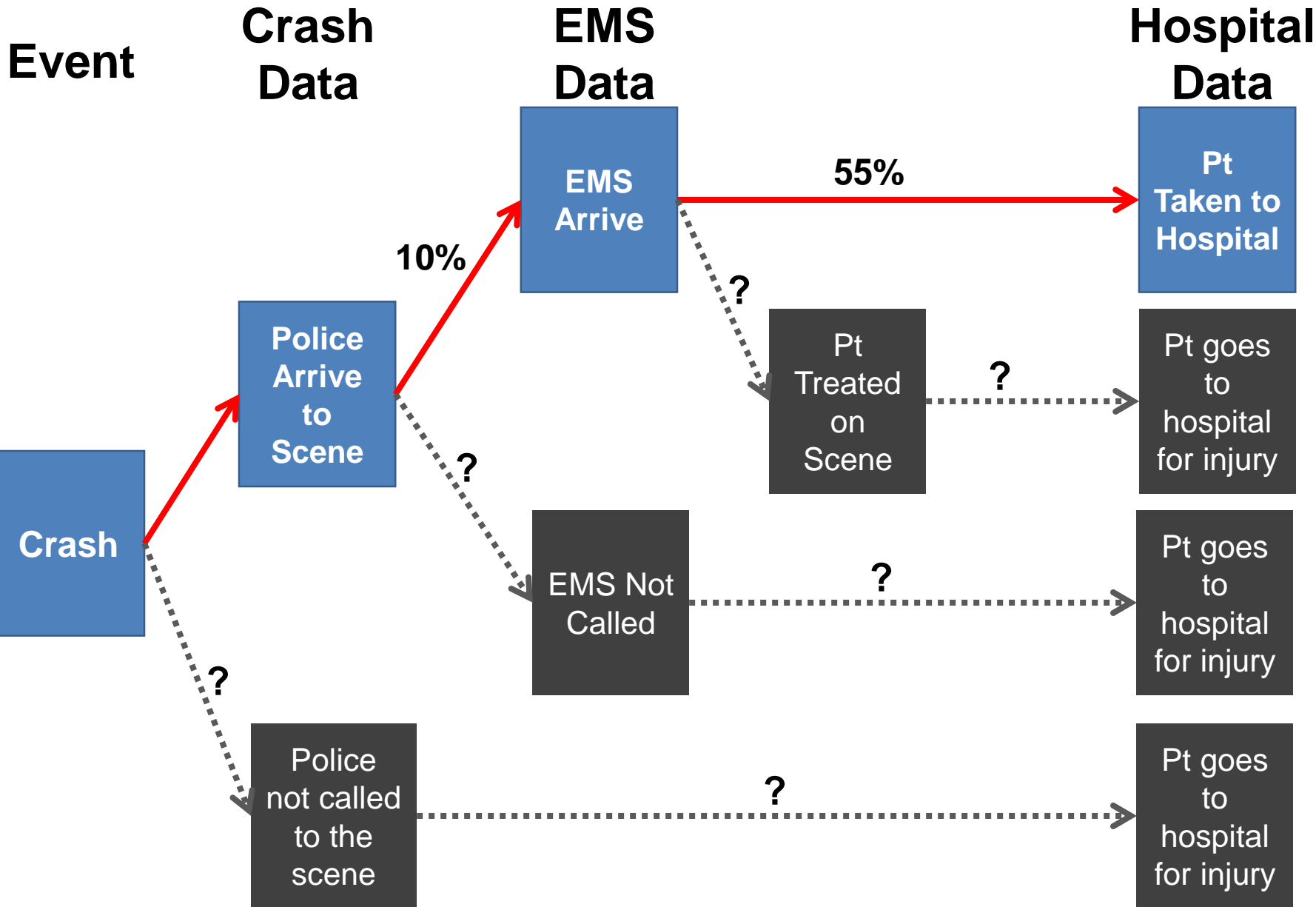


Overview of Pilot Project



- Two year project to describe and integrate three data sources: crash report, EMS and ED for Wake County, NC, 2013
- Year 1
 - Describe MVC injury according to each data source
- Year 2
 - Link MVC injury data using deterministic linkage





Linkage Results: Wake County Pilot Project



- Crash Report → EMS Data
 - Linked 4,086 unique records using a 30 minute window between police crash time and EMS crash time
 - Linked 55% of the crash report data
 - Linked 56% of the EMS data
- ED Visit Data → Linked EMS-Crash Data
 - Linked 3,134 unique ED Visit records to linked EMS-Crash data using a two hour window between events times
 - Linked 18% of the ED visit data
 - Linked 77% of the linked EMS-Crash data



Recommendations Based on Wake County Pilot Project



1. Add a yes/no variable to DMV crash reports to indicate if EMS responded to the scene

46 Name of EMS _____
47 Injured Taken _____ by EMS to (Treatment Facility and City or Town)

2. Include a unique personal identifier on all MVC injury data sources
3. Improve capture of transport mode among ED records
4. Improve the communication between various MVC stakeholders

Stakeholder Meetings

Large & Small Group Stakeholder Meetings



April 6, 2017 Stakeholder Meeting



- 51 invited stakeholders (31 participants)
 - NC Department of Transportation, NC Division of Public Health, NC Healthcare Association, NC Office of EMS, NC Office of Chief Medical Examiner, etc.
- Reviewed & discussed benefits of project and willingness to assist with data integration opportunities
- Identified and prioritized data integration opportunities



Summer 2017 Small Group Meetings



- Held three focused small group meetings to discuss the following health outcome data sources:
 - EMS
 - ED/Hospitalization
 - Mortality



December 12, 2017 Stakeholder Meeting



- Reconvened stakeholders for second full group meeting (27 participants)
- Updated stakeholders on project progress
- Identified and prioritized future integration projects





Demonstration / Quality Improvement Project Focus

Pedestrian & Bicycle Involved Motor Vehicle Crashes



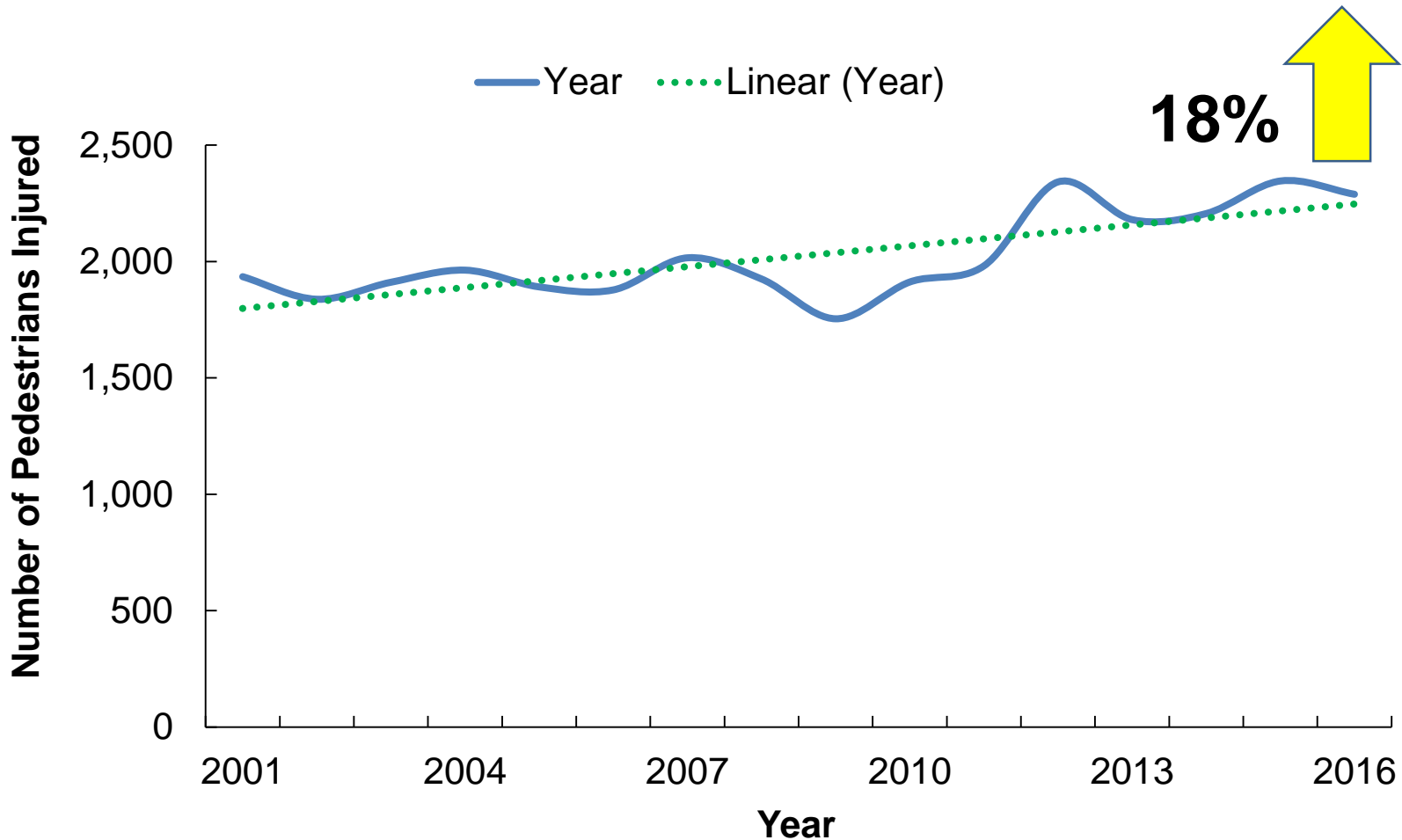
Why Pedestrian and Bicycle Crashes?



- Manageable number of records for data linkage and analysis
- Pedestrian/bicycle crashes more likely to result in injuries
- Project Staff expertise
- Increased incidence in the rate of pedestrian/bicycle crash injuries



Number of Pedestrians Injured in Reportable MVCs: UNC HSRC, 2001-2016*



Demonstration & Quality Improvement Projects

Completed and Ongoing Projects & Projects in Development



Demonstration Projects



- Demonstration Project 1
 - Crash report and EMS Data Integration
 - Describe previously linked statewide 2010/2011 crash report → EMS data
 - Completed – Lack of documentation led to poor linkage results
 - Recommendation: Delay further Crash-EMS data integration until transition to NEMSIS v.3 is complete
- Demonstration Project 2
 - Integrating statewide crash and NCHA hospital encounter data
 - In process of acquiring 2017 pedestrian/bicycle crash data
 - Developing Data Use Agreement with NCHA to integrate hospital encounter data



Quality Improvement Projects



- Quality Improvement Project 1
 - Evaluate Ped/Bike crash injury surveillance case definitions using trauma center data
 - Completed – trauma center data proved very useful
 - Injury surveillance case definitions being improved
- Quality Improvement Project 2
 - Completed integration of NC DETECT ED visit and crash report data with trauma center data
 - Will inform future projects using trauma center data



Data Documentation Project



- NHTSA consistently recommends NC improve data documentation
 - NC TRCC funded project to address the problem
 - Develop standardized data documentation template; apply it to data sources
 - Ongoing – template developed and currently being applied to many health data sources



Flowchart of Motor Vehicle Injury Research Data Sources

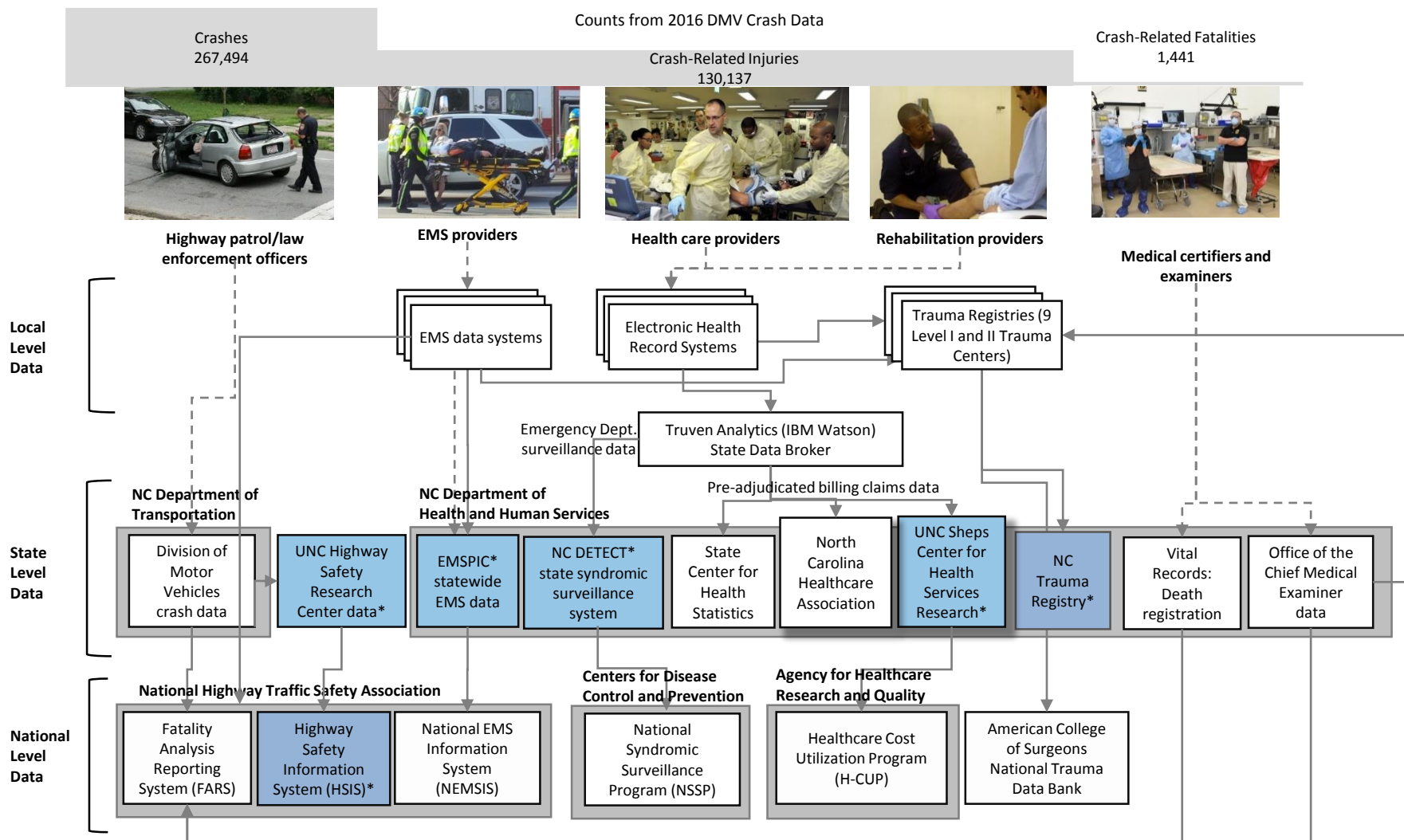


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- <http://www.dover.af.mil/News/Article-Display/Article/842305/oafme-plays-a-vital-role/>

*Managed within the University of North Carolina System

In Conclusion...

MVC - Health Data Integration is:

Complicated

Requires Stakeholder Buy In

Technological Resources

Planning

& Flexibility



Questions?



Contact Information



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Thank You!

