

North Carolina Data Integration for Motor Vehicle Crash Injury Research: The Long Road Ahead

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Background

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 non-fatally injured in North Carolina MVCs in 2016.

The NC Traffic Records Coordinating Committee (TRCC) has an interest in a statewide MVC injury surveillance system. The ability to integrate safety information from a variety of sources has the potential to improve safety outcome analysis and inform policy and safety programs.

* 2016 NHTSA FARS data ** 2016 NC DMV data

TABLE 1. Injury Data Available By Data Source

	DMV crash data	EMS data from EMSPIC	ED data in NC DETECT	Trauma Registry data
KABCO	✓			
Primary impression		✓		
Triage notes			✓	
Primary symptom		✓		
Chief complaint		✓	✓	✓
Diagnostic codes			✓	✓
Disposition		✓	✓	✓
Glasgow Coma Scale (GCS)		✓		✓
Injury Severity Scores (AIS/ISS)				✓

TABLE 2. Results with Deterministic Linkage

Project / Description	Data Sources			Linkage Fields Used				Results of Linkage (% Matched)
	Crash	Pre-Hospital	Hospital	Unique ID	Patient Data	Timing	Location	
Pilot Project Describe and integrate three data sources: crash report, EMS and ED for Wake County, NC	NC DMV crash data	EMS data from Wake EMS	ED visit data in NC DETECT		Date of birth (DOB) (same) + sex (same)	Crash date/time +/- 30 min. (EMS), Crash date/time +2 hrs (ED)		1: Crash to EMS data (55%) 2: Linked Crash-EMS to ED visit data (18%)
Demonstration Project I Describe & integrate pedestrian & bicycle involved MVCs using two sources: EMS and crash report data	NC DMV crash report data	EMS data from EMSPIC			DOB: 2 of 3 date elements: day, month, or year + sex (same)	Crash date/time +/- 3 hours	Patient county of residence (same) OR destination hospital (same)	3: Crash to EMS data (14%)
Quality Improvement Project I Evaluation of pedestrian/bicycle crash custom event reports available in NC DETECT			ED visit data in NC DETECT + data from a level I trauma center	Medical record # (same)		ED arrival date/time (+/- 1 hour)		4: Trauma to ED visit data (99%)

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) visit data in Wake County, NC.

Next, we identified and interviewed NC MVC crash injury stakeholders (crash data owners, crash data users, etc.).

Then, we held two half-day meetings with NC MVC crash injury stakeholders to identify and discuss potential health outcome data sources for integration.

Finally, we performed a series of demonstration and quality improvement projects using NC DMV crash report and health outcome data sources. Many of these projects are on-going.

Recommendations

Pilot Project

1. Add a yes/no variable to DMV crash reports to indicate if EMS responded to the scene.
2. Include a unique personal identifier on all MVC injury data sources.
3. Improve capture of transport mode in ED visit data.

Demonstration Project I

1. Document methods used to perform data linkage.
2. Improve quality of health outcome data captured by NC OEMS.

Quality Improvement Project I

1. Improve injury mechanism coding in NC DETECT data for the improvement of pedestrian/bicycle crash injury surveillance.
2. Explore the use of keyword-based definitions for identifying pedestrian/bicycle crash-related NC DETECT ED visits.

Conclusion

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 fields for linkage (and receiving permission to utilize these fields, which often contain personal identifying information) has been a challenge.

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TABLE 3. Other Motor Vehicle Crash-Health Outcome Data Integration Projects

	Description	Status (April 2019)
Demonstration Project 2	Crash Report -> NC DETECT ED visit data integration	Completed; linkage undergoing review & evaluation
Demonstration Project 3	Crash Report -> NC trauma center data integration	Linkage in progress
Demonstration Project 4	Crash Report -> NCHA hospital encounter data integration	Completed; results of linkage available at http://go.unc.edu/thdata