umass SAFE

Utilization of Crash and Medical Data to Reduce Motor Vehicle Crash Severity

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UMassAmherst
The Commonwealth's Flagship Campus

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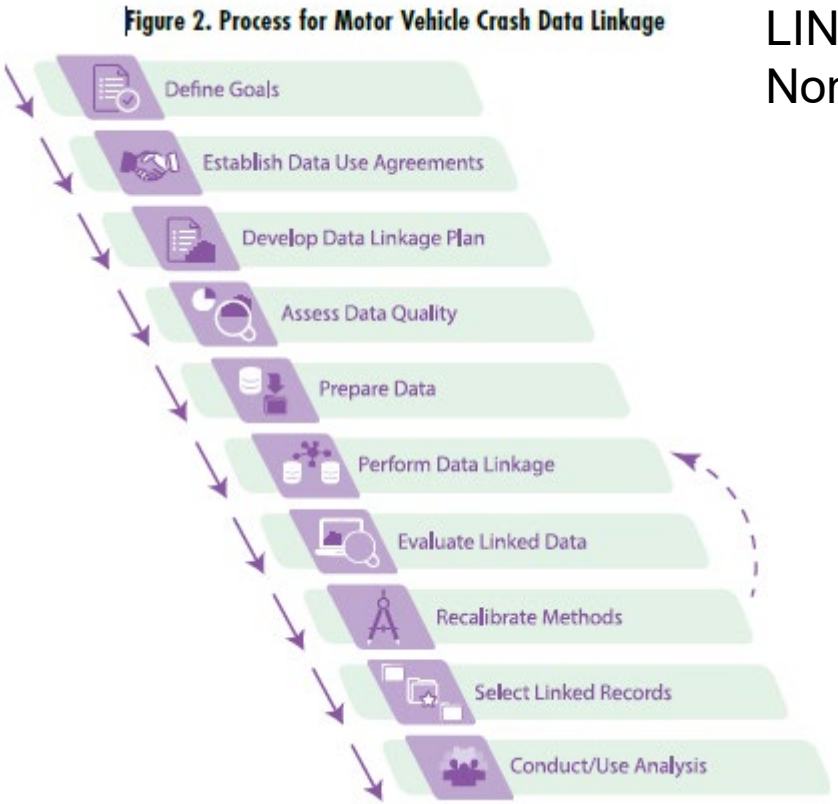
Linkage Process



LINCS – Linking Information for Nonfatal Crash Surveillance

A guide for integrating motor vehicle crash data to help keep Americans safe on the road.

Center for Disease Control and Prevention

Data Sources

Crash Data

- Compiled by Registry of Motor Vehicle
- Crashes on MA roadways involving injury to any person or property damage over $1,000
- Reports submitted by state and local police and/or motor vehicle operators

Emergency Medical Service (EMS) Data

- Compiled by Department of Public Health
- Massachusetts Ambulance Trip Record Information System (MATRIS)
- Repository for ambulance trip data submitted by EMS providers

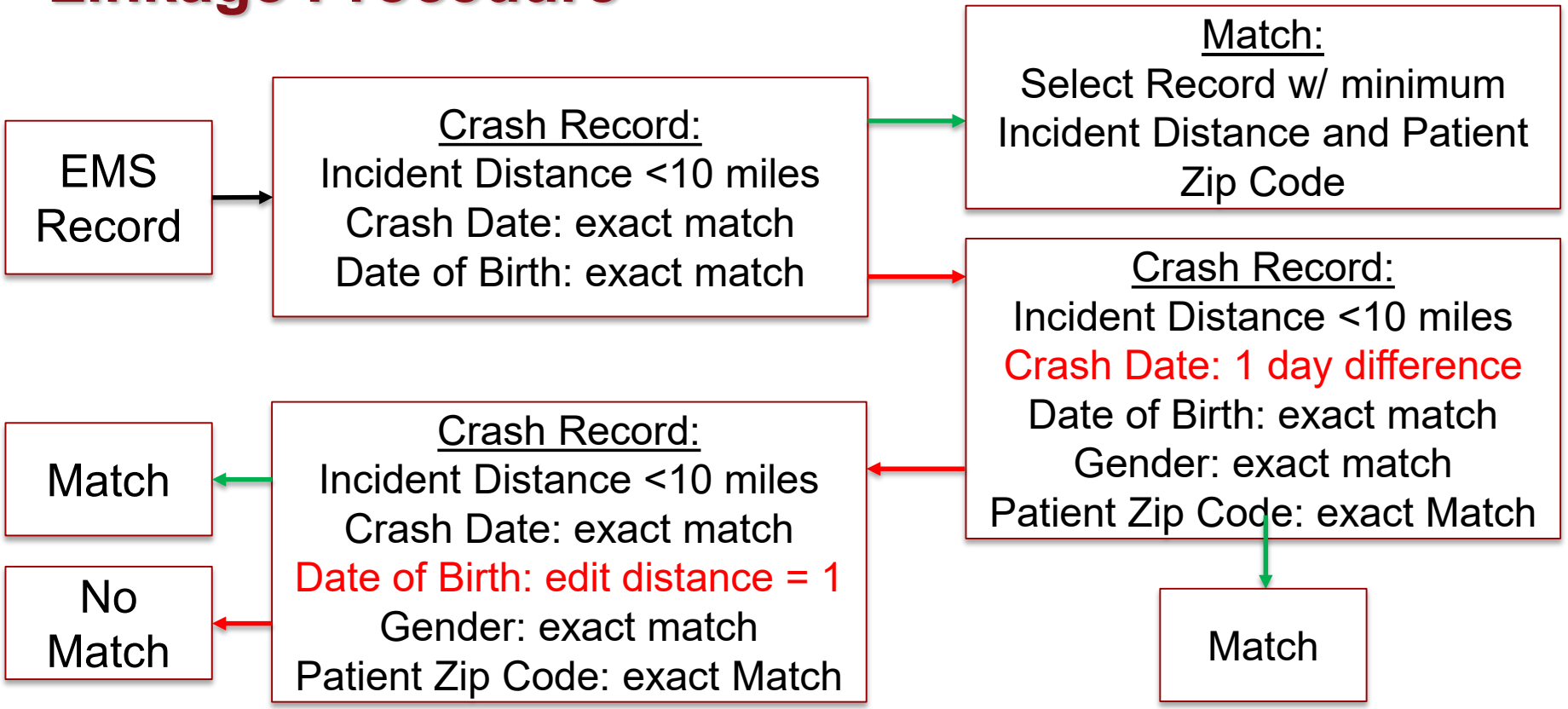
Objectives

- Develop method to link EMS and Crash Data
- Evaluate injury outcomes associated with different crash patterns
- Incorporate a third (or fourth) dataset into linkage

Linkage Procedure

- 94,318 EMS-Incident Records
  - Provided by DPH
  - “Cause of Injury” field indicated possible motor vehicle crash
- 1,030,639 Crash-Person Records
- 2014-2016 data

Linkage Procedure



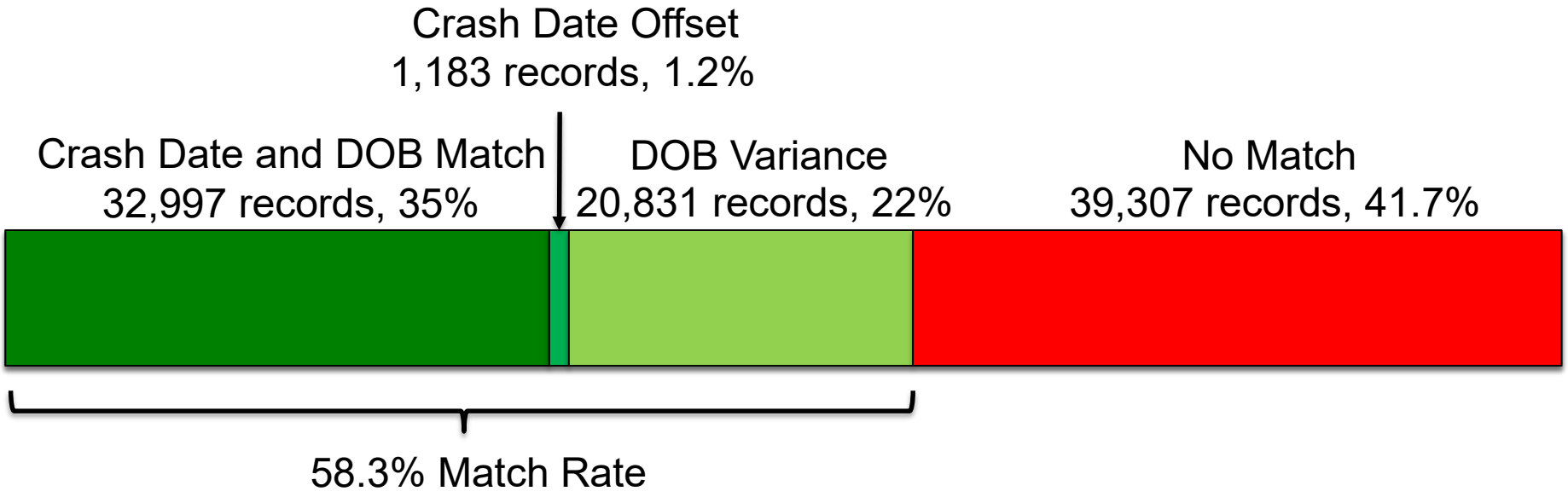
Validation

Small sample provided to DPH

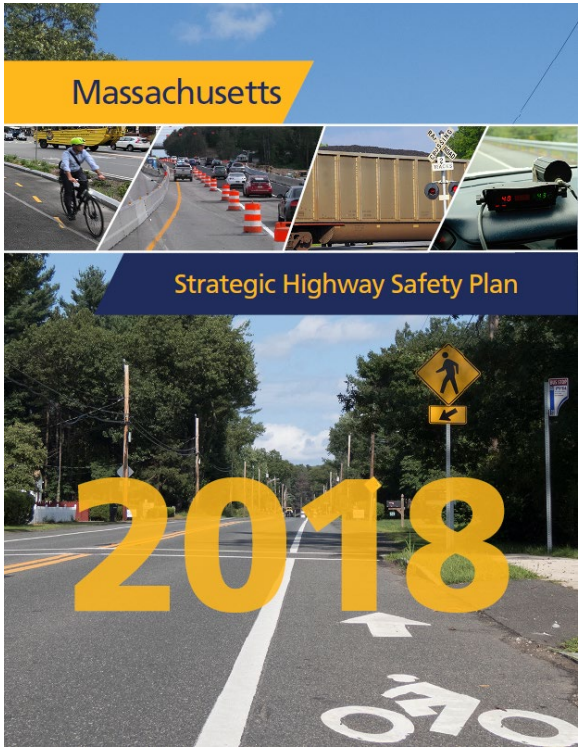
Criteria	Sample Size	Match		No Match		Inconclusive	
		#	%	#	%	#	%
Base	10	7	70%	0	0%	3	30%
Crash Date Offset	25	19	76%	1	4%	5	20%
Date of Birth Variance	20	15	75%	1	5%	4	20%

Final Linkage Result

94,318 EMS-Incident Records

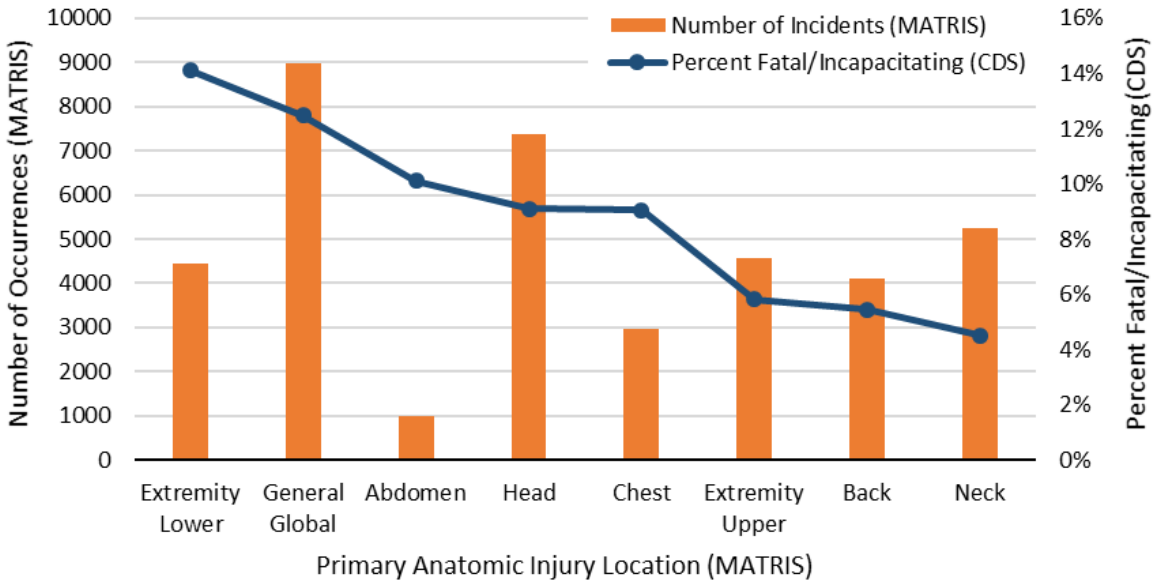


Report Structure



Emphasis Area
Lane Departure Crashes (198)
Impaired Driving (124)
Occupant Protection (102)
Speeding & Aggressive Driving (97)
Intersection Crashes (96)
Pedestrians (80)
Older Drivers (74)
Motorcycle Crashes (49)
Young Drivers (41)
Large Truck-Involved Crashes (34)
Driver Distraction (30)
Bicyclists (10)
Safety of Persons Working on Roadways (2)
At-Grade Rail Crossings (1)

Primary Anatomic Injury Location

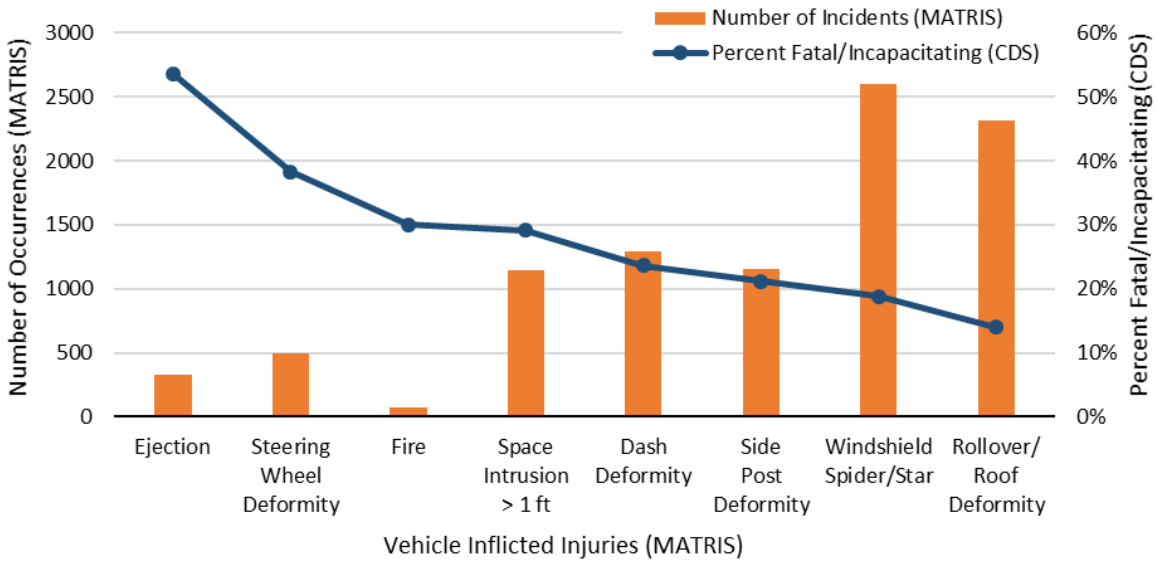


- General/Global, Head and Neck injuries occurred the most frequently within the linked dataset.
- Lower Extremity injuries were the fifth most common but had the highest proportion of incapacitating/fatal injuries.

Field indicating the area of the patient's body that was most injured (only 1)

Vehicle Inflicted Injuries

- Ejections, although infrequent, were by far the most severe of the Vehicle Inflicted Injuries,
- Windshield and Rollover Roof Deformity were the most frequently-utilized codes. However, they also had the lowest proportion of incapacitating/fatal injuries.



Field indicates the physical result of the veh damage and areas of the veh. That inflicted injury on the patient.

Speed Related Crashes

Primary Anatomic Injury Location (MATRIS) and Associated Injury Severity (CDS)

Complaint Anatomic Location (MATRIS)	Driver Contributing Code (CDS)				Incapacitating/Fatal Injury (%)	
	Non-Speeding-Related		Speeding-Related			
	n	%	n	%	Non SR	SR
General/Global	5841	23%	322	27%	12%	15%
Head	4522	18%	298	25%	8%	13%
Neck	3651	15%	79	7%	5%	8%
Extremity-Upper	3047	12%	164	14%	6%	6%
Back	2708	11%	91	8%	6%	12%
Extremity-Lower	2443	10%	128	11%	14%	20%
Chest	2018	8%	88	7%	9%	14%
Abdomen	549	2%	19	2%	10%	16%
Total Patients*	**24779**		**1189**		**9%**	**13%**

- Patients in speeding-related crashes had a higher proportion of General/Global and Head injuries.
- Nearly all injury types/locations resulted in a greater occurrence of incapacitating/fatal injuries in crashes classified as speeding-related.

Speed Related Crashes

Vehicle Related Injuries (MATRIS) and Associated Injury Severity (CDS)

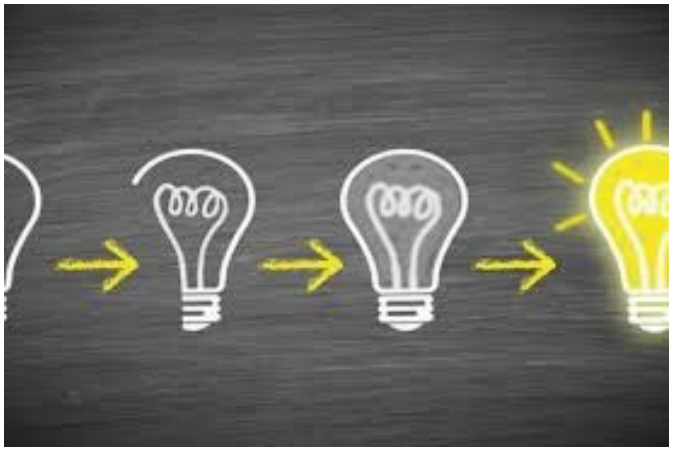
Vehicle inflicted injuries (MATRIS)	Driver Contributing Code (CDS)				Incapacitating/Fatal Injury (%)	
	Non-Speeding-Related		Speeding-Related			
	n	%	n	%	Non SR	SR
Windshield Spider/Star	2420	39%	185	33%	18%	26%
Rollover/Roof Deformity	2053	33%	258	47%	14%	16%
Dash Deformity	1183	19%	108	19%	22%	40%
Side Post Deformity	1056	17%	104	19%	20%	29%
Space Intrusion > 1 Foot	1048	17%	101	18%	29%	35%
Steering Wheel Deformity	433	7%	66	12%	37%	44%
Ejection	275	4%	57	10%	52%	61%
Fire	62	1%	8	1%	26%	63%
Total Occupants*	**6262**		**554**		**17%**	**23%**

- All *Vehicle Inflicted Injuries* correlated with higher occurrences of incapacitating or fatal injuries when a crash was speeding-related.
- Rollover/Roof Deformity injuries were much more common in speeding-related crashes.

Takeaways

- Crash/EMS linked data can be used to better understand SHSP emphasis area problems.
- EMS data provides more detail on injury types.
- Linked data could potentially be used to examined SHSP EA trends over time.

Takeaways



- Vehicle designs and safety technology should **consider specific injury locations**, for female drivers specifically
- EMS can be more aware of **what injuries to anticipate** and account for in crashes with female drivers compared to male drivers
- **Safety programs** can employ the specific injury locations and disparities to create safer driving scenarios for female drivers, including in regards their seating position, seat belt placement, etc.

Benefits of Linked Dataset

- Allows for increased detail of injury (location, severity, etc.)
- Data includes that of a health professional; police officers are often not trained to determine detailed injury status
- EMS often provide more detailed injury mechanisms (e.g. ejections from vehicle, burns, etc.)
- Enables a comparison of fields within each dataset and the linked dataset, allowing for a data quality review of specific fields.

Limitations of Crash/EMS Linked Dataset

- EMS data does not provide a comprehensive clinical assessment
- EMS data may underrepresent crash injuries, as not all motor vehicle crash injuries are transported or treated by EMS respondents.
- Crash/EMS linked data does not allow examination of cost nor long term consequences of crashes.

Questions?

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