



Kentucky Transportation Cabinet  
Division of Highway Safety Programs  
**FINAL REPORTING – NON-OVERTIME  
ENFORCEMENT PROJECTS**

TC 35-22  
02/2011

**Activities Completed: October 1, 2013 - September 30, 2014**  
**Return by November 2014**

**Agency Name: Kentucky Injury Prevention and Research Center**

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**Grant Number: K9-14-05**   **Phone Number: 859-323-7873**   **Fax Number: 859-**

**Please provide a summary of activities/accomplishments for the grant year.**

**Title: Probabilistic Linkage of Trauma Registry and CRASH databases and quality improvement of data elements for the presence of drugs and alcohol in injured drivers**

**Measurable goals and objectives:**

- 1. To increase the percentage of appropriate records in the Trauma Registry (TR) that are probabilistically linked to CRASH records from 0% in 2010 dataset to at least 80% in 2012 dataset by September 30, 2014.**

**There were 10,044 records submitted to KY TR for calendar year 2012. Of those, 3,194 records were coded as injuries due to a motor vehicle traffic collision (MVC). For 1,008 cases the state of incident was Kentucky, in 82 cases the incident was out of state, and for almost 66% of the cases the state of incident**

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was missing. Assuming that a police report likely existed for each of the in-state motor vehicle traffic collisions, not more than 3,100 trauma registry records were considered appropriate records for linkage with CRASH database (assuming that the state of incident for all these records was KY). To account for possible coding mistakes all 10,044 TR records were imported in the probabilistic linkage software LinkSolve. Data variables considered as important comparison fields to link TR and CRASH data sets included: occupant/patient date of birth, gender, resident zip code, injured person type (driver, passenger, pedestrian, pedal cyclist), incident date/hospital arrival date, incident time/hospital arrival time, and indicated participation in motor vehicle traffic collision. After several passes, total of 2,735 TR records were linked to CRASH records; 94% of the linked records were linked with a high matched probability, above 90%. Of the thirty one hundred trauma registry records initially considered appropriate for linkage with the police collision reports, 2,410 (78%) were successfully linked.

2. To increase the percentage of state Trauma Registry records with standardized coding for specific drug classes in injured drivers who tested positive for drugs from 0% in 2011 to 30% in 2013 data collection by September 30, 2014

The Ky-specific data fields added to the TR in 2013 allowed the collection of the information from the toxicology/drug screen results. Most of the facilities using TraumaBase software started submitting information on the drugs identified on the drug screens in 2013. There were issues with Pikeville and Hazard ARH but the issues were addressed and the two facilities will start collecting and submitting Ky-specific data fields in October 2014. Four facilities have trauma software

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developed by Digital Innovation. They will start submission of data on the new data elements for the last quarter of 2014.

There were 3,050 TR cases of motor vehicle traffic collision injuries treated in trauma facilities reporting to the Kentucky Trauma Registry in 2013. Of those, 1,551 (50.9%) were coded as drivers of motor vehicle other than motorcycle, 670 (22%) were passengers in motor vehicles other than motorcycles, 447 (14.7%) were drivers of motorcycles, 35 (1.2%) were passengers of motorcycles, 56 (1.8%) were pedal cyclists, 209 (6.9%) were pedestrians, 20 (0.7%) were other specified persons, and 53 (1.7%) were unspecified persons in motor vehicle traffic collision.

The “drug use indicator” is a mandatory TR field. For 169 drivers of motor vehicles, 10.9% of all motor vehicle drivers treated in TR, the drug use indicator listed illegal use of drug by the patient that was confirmed by tests. Among the motorcycle drivers, 59 (13%) were listed as positive for illegal use of drugs. “Illegal use drug” includes illicit drugs as well as illegal use of prescription drugs. Specific drugs were reported for 54 (32%) of the drivers of motor vehicles who were confirmed as using drugs illegally and for 32 (54%) of the motorcycle drivers who were confirmed as using drugs illegally. Cocaine was confirmed in 36 cases of injured drivers, Marijuana/THC/Cannabinoids in 49, Oxycodonein 10.

3. To improve the integration of Trauma Registry with other components of the state Traffic Record System by adding the following data elements to the state Trauma Registry database: county of residence, city of residence, state of residence, county of injury, injury state, transport agency name with origin and destination, EMS run number, by September 30, 2014.

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The data elements related to county of injury, state of injury, and city of injury are already part of the state system but are poorly populated as they are not required fields for the submission to the National Trauma Data Bank. The issue is being addressed through education of the facility registrars. The two vendors, Clinical Data Management (CDM) and Digital Innovations (DI), providing trauma software to the KY facilities made the necessary modifications of their software to accommodate 19 new, Kentucky-specific data elements.

CDM made the implementations earlier this year and the majority (87%) of the 2013 records submitted by the CDM customers had new data elements populated. Pikeville Hospital and Hazard ARH didn't submit any information for the KY-specific data fields but CDM is currently working with the two facilities to update the software and start the submission of the new data elements.

Digital Innovations (DI) completed the software modification, testing and implementation in Sept 2014 so the submission of records with the new data elements will start in October-November in 2014. There are 4 facilities using DI software: Ephraim McDowell Regional Medical Center, Taylor Regional Medical Center, Kosair Children's Hospital, and Owensboro Medical Center.

The following Kentucky-specific data elements were added to the state TR data collection:

- 1). Service admitting patient to facility (e.g., trauma, burn, pediatrics, orthopedics)
- 2). Cause of for admission/cause of injury

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- 3). Discharge destination code – Code used to indicate specific location to which patient is discharged, with special attention to acute care hospital destinations
- 4). ED destination code - Code used to indicate specific location to which patient is discharged, with special attention to acute care hospital destinations, when the patient is not admitted to your facility
- 5). EMS run number - Number assigned by EMS or Air Medical to identify a transport.
- 6). Blood alcohol level - Three digit blood alcohol level as documented at any facility treating this patient event.
- 7). Injury details - Manually entered text description of injury event
- 8). Medication codes - Medication administered as part of patient care on scene, enroute, at a referring facility or at the receiving facility that may influence drug screen results
- 9). Medication location code - Place of administration of medications listed on “Medication Code” list.
- 10). Outcome - Status of patient on discharge from facility as alive or expired
- 11). Position in vehicle - Position of patient in vehicle at time of injury
- 12). Referring hospital arrival date - Date of arrival of patient at referring facility
- 13). Referring hospital name - State report code for initial treating facility prior to transfer to this facility
- 14). Referring hospital arrival time - Time of arrival of patient at referring facility
- 15). Toxicology/drug screen results - Drug screen results by drug classification
- 16). Trauma type - Type of trauma classified as blunt, penetrating or burn

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- 17). Transport agency - State report code for ambulance or air medical company transporting patient to receiving facility
- 18). Transport destination - Name of receiving facility taken from facilities list
- 19). Transport origin - Code indicating where transport started—scene, referring facility or, for patients with more than one agency providing a single transport, intercept

Standardized definitions and coding were developed and included in the 2013 Kentucky State Trauma Registry Data Dictionary.

The definitions, coding and other issues related to the new data elements were discussed at two statewide trauma registry trainings (03-05-2015, 05-14-2014).

4. Concordance between the CRASH and TR variables: The analysis of the concordance between the information recorded on the police report and in the TR records was based only on the records linked with very high matched probability, above 95%. Falsely matched records from TR and CRASH datasets can lead to false conclusions about the completeness and accuracy of relevant information recorded in both systems. To minimize the possibility of false positive matches, the concordance analysis was based only on the high probability matches. A set of 2,572 high probability matched records was used for this analysis.

- 1) The cause of injury was listed as MVTC in trauma system for 2,264 (88.02%) of the 2,572 high probability linked TR cases.
- 2) Person type concordance (crash data elements: person type, position in/on vehicle; trauma registry data elements: fourth-digit subdivisions used with ICD-9

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external-cause-of-injury codes to identify the injured person): There was 91.6% concordance (2,357 out of 2,572 matched records) between the listed injured person category (TR) and the person type (CRASH).

3) Presence of drugs in injured drivers: “Drug involvement” was listed as a human factor on the police report for 61(3%) of the 1,774 injured drivers treated in trauma facilities. For 20 of these 61 drivers the TR listed illegal use of drugs (prescription of illicit) confirmed by a test, for additional 20 cases the TR listed presence of prescription drugs confirmed by test. The TR data identified additional 126 drivers with illegal use of drugs confirmed by tests who’s police report didn’t list “drug involvement” as human factor. TR listed 503 drivers with presence of prescription drugs confirmed by tests (indicating that the drugs were taken according to a prescription or the trauma registrars didn’t have enough information to classify the prescription drugs showing on the toxicology screen as prescription drugs taken illegally). Overall, only 19 of the 145 cases identified as illegal use of drugs by the TR were listed as human factor “drug involvement” on the police report.

4) Presence of alcohol in injured drivers: there was 87% concordance between CRASH data field human factor=“alcohol involvement” and TR data indicator for alcohol presence in injured drivers. Of the 1,774 injured drivers there were:

- 1,549 concordant records (87.3%)
  - o 617 records with TR alcohol indicator= No (not tested) and CRASH alcohol involvement human factor not listed on the police report
  - o 681 records with TR alcohol indicator= No (confirmed by test) and CRASH alcohol involvement human factor not listed on the police report

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- o 35 records with TR alcohol indicator= Yes (confirmed by test [trace levels]) and CRASH alcohol involvement listed as contributing human factor on the police report
- o 155 records with TR alcohol indicator= Yes (confirmed by test [beyond legal limit]) and CRASH alcohol involvement listed as contributing human factor on the police report records with TR alcohol indicator= No (confirmed by test) and CRASH alcohol involvement human factor not listed on the police report
- o 61 records with TR alcohol indicator= Not applicable and CRASH alcohol involvement human factor not listed on the police report
- 225 discordant records:
  - o 54 records with TR alcohol indicator= Yes (confirmed by test [trace levels]) and 76 records with TR alcohol indicator=Yes (confirmed by test [beyond legal limit]) where CRASH alcohol involvement human factor was not listed on the police report
  - o 28 TR alcohol indicator= No (not tested) and 19 records with TR alcohol indicator=No (confirmed by test ) where CRASH alcohol involvement was listed as a human factor on the police report
  - o TR alcohol indicator= Yes (confirmed by test [trace levels]) and 76 records with TR alcohol indicator=Yes (confirmed by test [beyond legal limit]) where CRASH alcohol involvement human factor was not listed on the police report
  - o 8 cases with CRASH report listing alcohol as a human factor with missing alcohol use information on TR records and 40 cases with alcohol not listed as a human factor for the injured driver where TR records didn't have any information on alcohol use

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According to the “Violation information” section on the police report, 55 injured drivers were tested for alcohol and 110 injured drivers were tested for alcohol and drugs. For 137 (83%) of these 165 injured drivers the police report listed status “pending” for the test results; only 4 reports listed results for alcohol above legal limit. All four cases had status alcohol use= Yes (confirmed by test [beyond legal limit]) on TR record. Among the 165 injured drivers tested for alcohol according to the police report the trauma registry records identified 70 drivers with alcohol use beyond legal limit, 20 drivers with trace levels alcohol use, 28 with no alcohol use confirmed by a test, 37 were not tested, and for 10 drivers the alcohol use information was not present or not applicable. Overall, there was very poor concordance between the alcohol test result information on the police report and the indicator for alcohol use on the TR records.

**List each objective and provide information relevant to the status of each through contract end date, September 30, .**

**Objective 1. To increase the percentage of appropriate records in the Trauma Registry (TR) that are probabilistically linked to CRASH records from 0% in 2010 dataset to at least 80% in 2012 dataset by September 30, 2014.**

**Status: COMPLETED. Of the thirty one hundred trauma registry records initially considered appropriate for linkage with the police collision reports, 2,410 (78%) were successfully linked.**

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**Objective 2: To increase the percentage of state Trauma Registry records with standardized coding for specific drug classes in injured drivers who tested positive for drugs from 0% in 2011 to 30% in 2013 data collection by September 30, 2014**

**Status: COMPLETED.** Specific drugs were reported for 54 (32%) of the drivers of motor vehicles who were confirmed as using drugs illegally and for 32 (54%) of the motorcycle drivers who were confirmed as using drugs illegally.

**Objective 3: To improve the integration of Trauma Registry with other components of the state Traffic Record System by adding the following data elements to the state Trauma Registry database: county of residence, city of residence, state of residence, county of injury, injury state, transport agency name with origin and destination, EMS run number, by September 30, 2014.**

**Status: COMPLETED.** The proposed data elements were added to the state data collection, software modified, tested, implemented, data collection already ongoing.

**If you did not meet an objective, provide explanation along with the status.  
All objectives were met.**

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