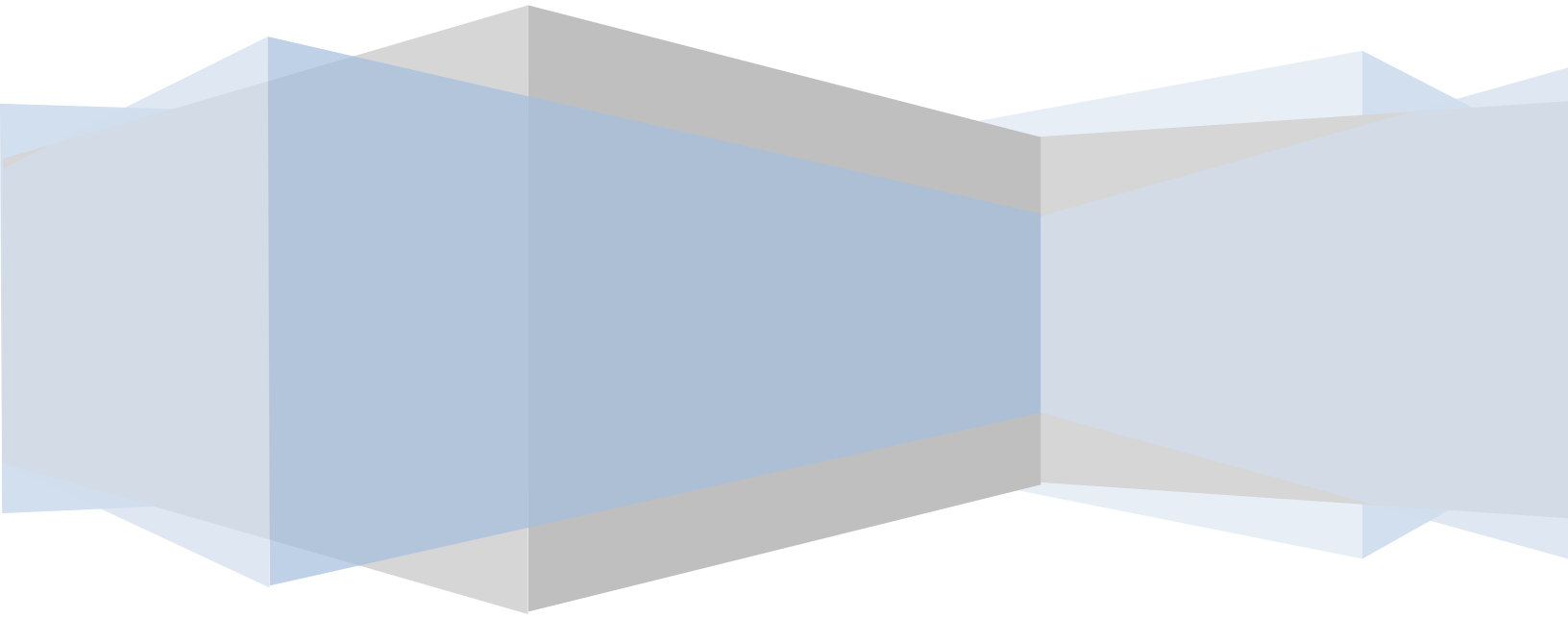
New Mexico Trauma Data Report
Final Report
2005 – 2011

Trauma Program
EMS Bureau
Epidemiology and Response Division
New Mexico Department of Health
September 2013



Introduction

Since 2005 the Emergency Medical Systems Bureau Trauma Program (EMSB/Trauma Program) has been collecting trauma records electronically from participating acute care hospitals in New Mexico. There have been many changes to the trauma system during this period, including an increase in the number of trauma centers, changes in hospitals participating in the voluntary trauma data reporting program, and a change in the state's trauma registry database. However, it has been possible to capture a great deal of information on injured patients and compile a database, providing an opportunity to begin the examination of injury trends utilizing this database, with the eventual goal of improving patient care and focusing injury prevention efforts on the most appropriate issues.

This report describes the methods used for data collection, including listing the participating hospitals, trauma registry inclusion criteria, and definitions used.

Participating hospitals come from one of three categories: 1) New Mexico designated trauma centers; 2) hospitals working to achieve trauma level designation [developing trauma centers]; and 3) hospitals that are not designated or developing, but choose to voluntarily submit data on trauma patients seen at their facilities.

This report focuses on patients discharged from a facility without being transferred to a higher level of care (other than those transferred out-of-state). These patients are referred to as having "definitive care patient records". The only exception is that patients who are transferred to out of state trauma centers are included in this report as well, as these patients may not otherwise be included in the data set. In the seven year period from 2005 until 2011, there were 32,289 of these definitive care records.

A section was dedicated to fall injuries, as (36.6 %) of the 32,289 "definitive care patient records" resulted from falls. Additionally, the New Mexico Department of Health has made fall prevention a primary focus area.

It is important to monitor both the quantity and quality of the data being submitted to the registry. Two data elements were selected as indicators; the "trauma revised injury severity score" (TRISS), and race/ethnicity data entry. Due to improved reporting, the ability to calculate a TRISS rose dramatically in developing trauma centers, from 49% in 2005 to 85% in 2011. Those records meeting the definition of "definitive care patient records" show a consistent and high level of data for TRISS calculation, at about 70% for each year. Completion of the field for race/ethnicity was approximately 90% in 2005, and has risen to over 96% in 2011. Attention to reporting details and communication within the Trauma Registry Workgroup (TRW) and the Trauma Nurse Coordinator Forum (TNCF) have a significant impact on data quality.

This is a report on trauma records submitted to the New Mexico Department of Health. A number of limitations are noted which will be discussed in more detail later in this report. Despite these limitations the state trauma registry continues to evolve and show progress in terms of hospital participation and data quality.

METHODS

Data Submission and Inclusion

To be included and submitted to the State Trauma Registry a trauma record must meet the following criteria:

All patients must have a primary diagnosis of at least one injury ICD-9 Code of 800.00 – 949.9 and at least one of the following

1. Patient admitted to hospital; and/or
2. Patient transferred from or into one acute care facility to another acute care facility; and/or
3. Patient with Emergency Department length of stay > 24 hours (added as of 01/01/2011)
4. Patient dead on arrival or died while in hospital

AND not meet EXCLUSION criteria

1. Injury caused by pre-existing condition, e.g. osteoporosis (fracture); esophageal stricture (choking)
2. Injuries greater than 30 days old (late effects; 905.0-909.9)
3. Superficial injuries (910.0-924.9)
4. Foreign bodies (not injury and non-codable; 930-939)
5. Poisoning and toxic events (960.0-989.9)
6. Submersion injuries (994.1)
7. Strangulation/asphyxiation/anoxic brain death (994.7)
8. Electrocution (994.8)
9. Overexertion injuries (994.5)

As of January 2011 burns were included.

A patient that is discharged from the Emergency Department and has a planned admission for further treatment scheduled does not meet inclusion criteria, unless there is a complication, unplanned return, or missed injury.

The following criteria determine if a hospital must submit a record to the state registry.

1. Designated Trauma Centers (NMAC 7.27.7.8.D.4.e)
2. Developing Trauma Centers
   Developing Trauma Centers must submit trauma data, per the above regulations, and have at least 1 year of complete trauma registry data to be considered for a verification survey.
3. Volunteer Trauma Registry Participants (VTRIP)
   A facility who has sent a letter of commitment to the EMSB/Trauma Program to collect data for at least a year for the fiscal year in which they are being funded by the Trauma System Fund Authority. This program allows and assists with hospitals that are not designated trauma centers

to share the trauma data on a voluntary basis. Eight former VTRIP facilities have committed to become or have been designated as a New Mexico Trauma Center.

All facilities submitting trauma data to the State Trauma Registry must attend the Trauma Registry Workgroup and any other training. This ensures quality and consistency of the trauma data submitted.

Facilities reporting to the State Trauma Registry for the period of 2005-2011

FACILITY	YEAR REPORTING AND TYPE OF REPORTING							
	2005	2006	2007	2008	2009	2010	2011	2012
Artesia General Hospital	VTR	VTR	*	*	*	*	VTR	VTR
Carlsbad Medical Center	VTR	VTR	TC	TC	TC	TC	TC	TC
CHRISTUS-St. Vincent Regional Medical Center	TC	TC	TC	TC	TC	TC	TC	TC
Dr. Dan C. Trigg Memorial Hospital	VTR	VTR	VTR	VTR	VTR	VTR	VTR	VTR
Eastern New Mexico Medical Center	VTR	VTR	VTR	VTR	TC	TC	TC	TC
Gallup Indian Medical Center	VTR	VTR	VTR	VTR	VTR	VTR	VTR	VTR
Gerald Champion Regional Medical Center	VTR	VTR	TC	TC	TC	TC	TC	TC
Guadalupe County Hospital	VTR	VTR	VTR	VTR	VTR	*	*	*
Holy Cross Hospital	*	VTR	VTR	VTR	*	*	*	*
Lea Regional Hospital	VTR	VTR	VTR	VTR	*	*	*	*
Memorial Medical Center	*	VTR	VTR	*	*	*	*	VTR
Mimbres Memorial Hospital	VTR	VTR	*	*	*	*	*	*
Miner's Colfax Medical Center	*	*	*	*	*	VTR	VTR	VTR
Mountain View Regional Medical Center	VTR	VTR	VTR	VTR	*	*	*	*
Nor-Lea General Hospital	VTR	VTR	VTR	VTR	VTR	TC	TC	TC
Presbyterian – Main	VTR	VTR	VTR	VTR	VTR	VTR	VTR	VTR
Presbyterian – Kaseman	VTR	VTR	VTR	VTR	VTR	VTR	VTR	VTR
Presbyterian – Rio Rancho	VTR	VTR	VTR	VTR	VTR	VTR	VTR	*
Presbyterian - Rust Medical Center	*	*	*	*	*	*	*	VTR
Presbyterian – Socorro General Hospital	VTR	VTR	VTR	VTR	VTR	VTR	VTR	VTR
Roosevelt General Hospital	VTR	VTR	TC	TC	TC	TC	TC	TC
San Juan Regional Medical Center	TC	TC	TC	TC	TC	TC	TC	TC
Sierra Vista Hospital	VTR	VTR	VTR	VTR	VTR	VTR	VTR	VTR
University of New Mexico Hospital	TC	TC	TC	TC	TC	TC	TC	TC

* Did not report for this time period

Trauma registry data is collected by trained abstractors in each facility. This information is retained at the hospital and a subset, which does not contain personal health identifiers, is submitted to the State Trauma Registry (STR). Digital Innovations (DI) was awarded the trauma registry database contract in 2010. Since then, the EMSB/Trauma Program has arranged to provide licenses and access to the data collection software to participating hospitals, which includes designated trauma centers, developing trauma centers, and volunteer trauma registry participants. The EMSB Trauma Program has also been engaged with these hospitals and DI to convert hospital historical data (2005-2009) and current data (2010-present) into a format that can be analyzed on a statewide level using existing DI analytic software.

Hospitals with trauma registries routinely access and analyze their own data. This process is supported and facilitated through the Trauma Registry Workgroup. A DI led training on software and reporting capabilities occurred at the EMSB Trauma Program in July, 2011.

The TRW and the TNCF have been focused on the implementation, design, and use of the new state trauma registry software. The previous software system was analyzed field by field by the TRW/TNCF, and components that were useful were added to the new software. Each field type, as well as the selections within those data fields, to be utilized by the facilities in trauma data reporting was analyzed and agreed upon. It was agreed early in the process to adopt the National Trauma Data Base (NTDB) data dictionary for those fields that NTDB collects.

The final product produced by this process requires facilities to submit 252 fields for each record. The total number of possible fields in the current DI software package is 267, of which 80 are NTDB compliant. All PHI data is excluded.

A trauma record consists of data abstracted from a medical record at the facility where the patient was treated and discharged, assuming the inclusion criteria were met. This record is not a duplicate medical record, and should never be used for billing purposes. The uses of the data include trending care at the facility, calculating mortality and morbidity, and determining whether certain mechanisms of injury have a potential for prevention.

The EMSB Trauma Program oversees the STR as part of the Trauma System Process Improvement Program per the Trauma System Rule, NMAC 7.27.7.8.D. The EMSB Trauma Program contracted with DI on July 1, 2011 to provide software for data collection, storage and report writing for the STR. It was necessary to convert all data from 2005 through 2009 from the historical database. The conversion of historical data was completed October 2012.

Trauma Designated facilities who submit trauma data via a third party vendor must download the required trauma data as stipulated by the EMSB Trauma Program. Currently the EMSB/Trauma Program is working with third party vendors and have developed a module to facilitate submission of data. This process has been more complicated and time consuming than anticipated or hoped, but is currently completed.

The STR does not collect PHI data which could potentially identify a patient. Because of this, it is possible for a single patient to have one record at their initial receiving hospital/trauma center, then if they are transferred, another record generated at the higher level trauma facility.

This duplication is why we utilize definitive patient care records (DPCRs) for this report. DPCRs are the records generated when a patient is discharged from the facility at which they received their "definitive" or final hospital care. As mentioned previously, the only exception to this is when a patient is transferred out of state. We do utilize that particular patient's data record from the initial facility. If we didn't, that patient may be "lost" to the other state's data system. The DPCRs are used for most analyses.

Volunteer Trauma Registry

In an effort to collect trauma data across the State of New Mexico, the Volunteer Trauma Registry Incentive Program (VTRIP) began in 2005.

Injury Severity Score

The Injury Severity Score (ISS) is a system for numerically stratifying injury severity. The ISS system has a range of 1-75 and risk of death increases with a higher score. This report recognizes NTDB categories as the standard by which trauma data are analyzed. The categories are:

1-8	Minor
9-15	Moderate
16-24	Severe
>24	Very Severe

Data Quality - TRISS

Data quality was evaluated by examining the percentage of developing trauma centers facilities' data submissions that allowed for TRISS analysis. Only those facilities who submitted data during the entire period 2005 through 2011 were reviewed for data completeness. They included the following hospitals:

Carlsbad Medical Center
Gerald Champion Regional Medical Center
Roosevelt General Hospital
Eastern New Mexico Medical Center
Nor-Lea General Hospital

Data Quality

The EMSB Trauma Program utilizes two groups, the Trauma Registrar Workgroup (TRW) and the Trauma Nurse Coordinator Forum (TNCF), to gather information and input regarding the STR. These two groups are instrumental in ensuring the quality of data submitted, intrastate communication on performance improvement, and making changes to the STR. These meetings are generally held quarterly, and are

well attended. The EMSB Trauma Program supplies the TRW/TNCF with individual reports regarding the quality of data being submitted for various fields in the trauma record submitted to the STR.
For this report, two data elements have been selected as representative indicators of data quality and completeness. These elements are the" trauma revised injury severity score" (TRISS), and the Race and Ethnicity field.

TRISS is an important indicator of mortality and morbidity. To calculate the TRISS the following parameters must be present:

- Revised Trauma Score; (auto generated using the following information) including
    - 1st ED Respiratory Rate
    - 1st ED Systolic Blood Pressure
    - 1st ED Glasgow Coma Scale (GCS)
- Age
- Injury Type
    - Blunt; or
    - Penetrating

If any of these fields are left blank, unknown, have an incorrect value, or a value of "thermal" (Burns) TRISS cannot be determined.

RESULTS

Definitive Patient Care Records

A total of 41,946 records were submitted by all reporting facilities for the seven years from 2005 through 2011. Table 2 provides the number of records submitted by participants in the volunteer trauma registry and represent trauma records from facilities that are not currently seeking designation as a trauma center.

Table 1. **Total Number of Trauma Records Submitted to the State Trauma Registry 2005 through 2011**

2005	2006	2007	2008	2009	2010	2011	Total
3749	4589	5977	6467	7023	7063	7078	41,946

Table 2. **Number of Trauma Records submitted by VTRIP 2005 through 2011**

2005	2006	2007	2008	2009	2010	2011	Total
450	7877	1665	1557	1312	1156	1612	8,539

Table 3. **Number of Trauma Records defined as Definitive Patient Care Records 2005 through 2011**

2005	2006	2007	2008	2009	2010	2011	Total
2953	3622	4322	4723	5292	5487	5890	32,289

Figure 1 shows a steady and positive trend of records suitable for TRISS analysis over the seven year period for these five facilities, increasing from 49% to nearly 85%.

Figure 1.

Percent of Trauma Records Suitable for TRISS Analysis
5 Developing Trauma Centers,
2005 through 2011
N=8,771

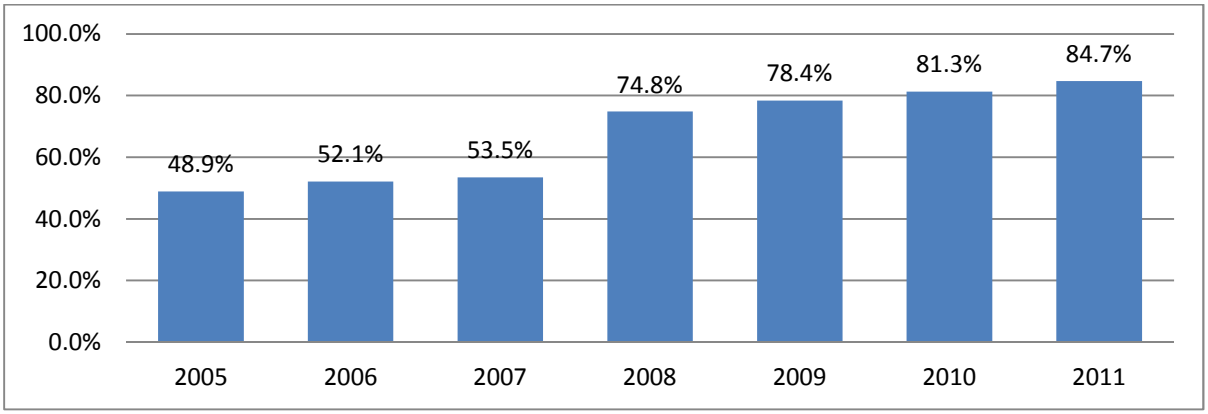
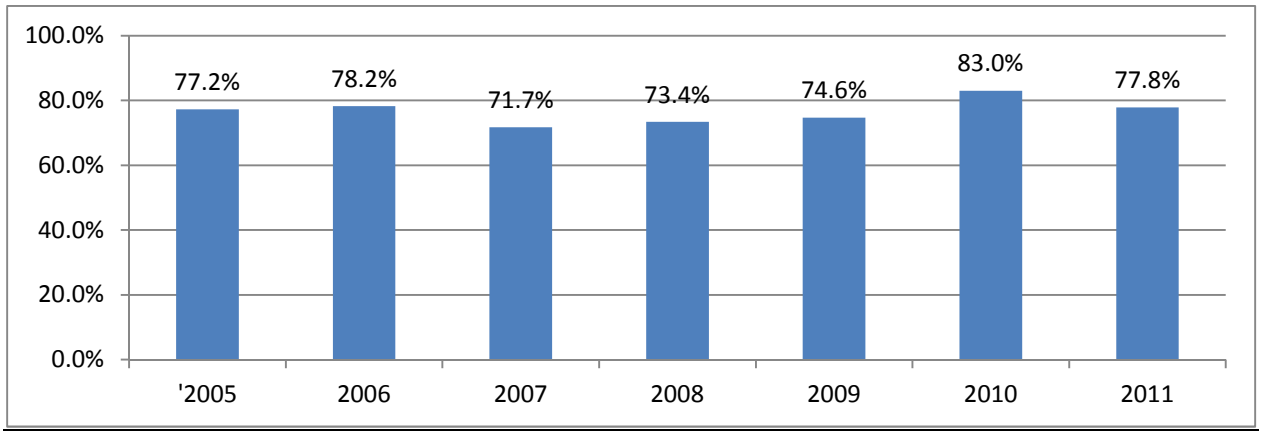


Figure 2 focuses on definitive patient care records to assess TRISS. The percentage of suitable records is relatively stable over the time period, at approximately 77%. Further analyses showed that most of the missing data elements resulted from 74% of the ineligible fields missing a Glasgow Coma Scale upon emergency department admission 35% not having a respiratory rate recorded and 24.7% not have a Systolic blood pressure recorded. (Figure 2).

Figure 2.

Percent of Trauma Records' Suitability for TRISS Analysis
Definitive Patient Care Records
2005 through 2011
N=32,289

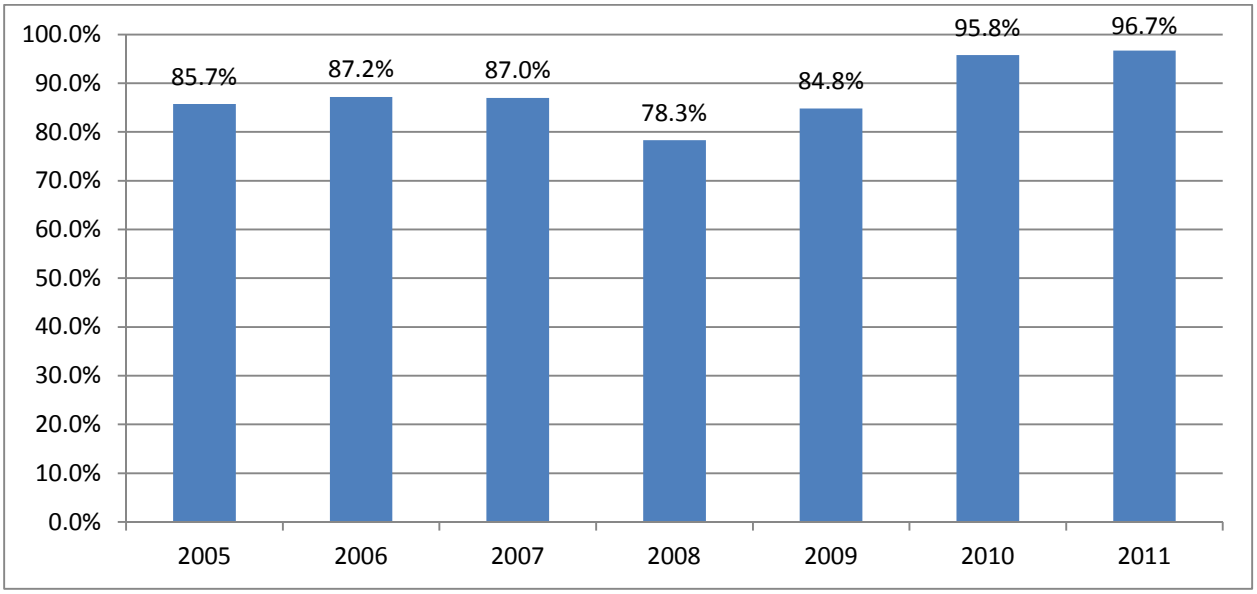


Data Quality – Race/Ethnicity

Race/ethnicity was the other data field examined as an indicator for data quality. It is encouraging to note the high, and increasing, level of completeness for this field (Figure 3).

Figure 3.

Percent of Race/Ethnicity reported by Year
Definitive Patient Care Records
2005 through 2011
N=32,289



Demographics

The following figures and tables describe some characteristics of the population contained in the definitive patient care records. Figure 4 shows the age and gender distribution. Males outnumber females in all age categories, except for the age 65 years and older.

Figure 4. **Age Range by Gender**
Definitive Patient Care Records
2005 through 2011
N=32,289

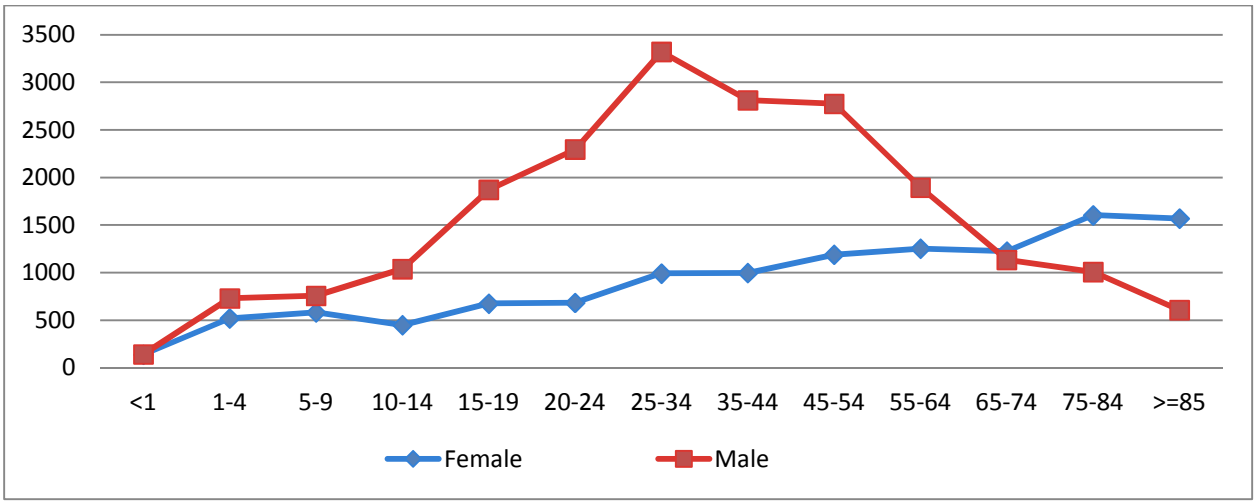
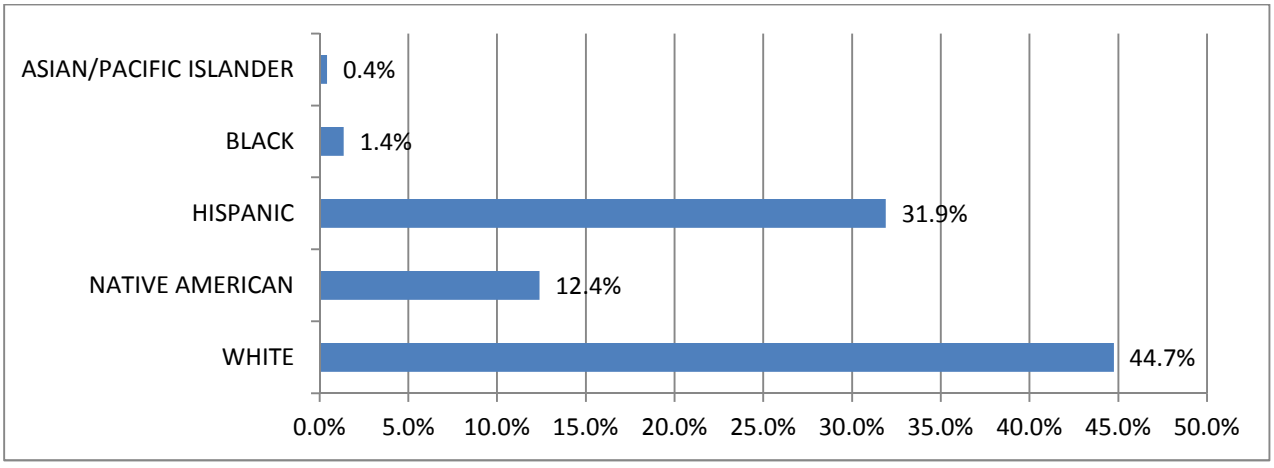


Figure 5 demonstrates the racial/ethnic distribution of the trauma patients.

Figure 5. **Percent of Trauma Records by Race/Ethnicity**
Definitive Patient Care Records
2005 through 2011
N=32,289



Tables 4 and 5 are included to show reporting of variables on alcohol and drug use. The usefulness of these fields is currently limited by missing values.

Table 4. Alcohol Use
Definitive Patient Care Records
2005 through 2011

ALCOHOL USE	NUMBER	PERCENT
No (not suspected - not tested)	1,971	6.1%
No (confirmed by test)	1,322	4.1%
Yes (confirmed by test - trace levels)	1,036	3.2%
Yes (confirmed by test - beyond legal limit)	299	0.9%
Missing	27,661	85.7%
TOTAL	32,289	100.0%

Table 5. Drug Use
Definitive Patient Care Records
2005 through 2011

DRUG USE	NUMBER	PERCENT
No (not suspected - not tested)	4902	15.2%
No (confirmed by test)	536	1.7%
Yes (confirmed by test - prescription drug)	397	1.2%
Yes (confirmed by test-illegal use drug)	914	2.8%
Missing	25,540	79.1%
TOTAL	32,289	100.0%

Table 6 provides the payor sources for injured patients. Of the primary payor sources 43% are public sources including county government; other government; Indian Health Service; Medicaid and Medicare.

Table 6.

Primary Payment Source
Definitive Patient Care Records
2005 through 2011

PRIMARY PAYMENT SOURCE	TOTAL	PERCENT
Car Insurance	783	2.4%
County Government	1287	4.0%
Government	2094	6.5%
HMO	8377	25.9%
IHS	234	0.7%
Medicaid	5436	16.8%
Medicare	6188	19.2%
Other Insurance	449	1.4%
Self Pay	5400	16.7%
Worker's Compensation	1273	3.9%
UNKOWN	768	2.4%
TOTAL	32289	100.0%

Figure 6 shows patients discharged from facilities with an outcome of dead. Over the seven year period, 1458 patients had a discharge status of "dead". From 2005 to 2011, there was an average mortality percentage of about 4.5%.

Figure 6.

Percent of Trauma Records with an Outcome of Death
Definitive Patient Care Records
2005 through 2011
N=1458

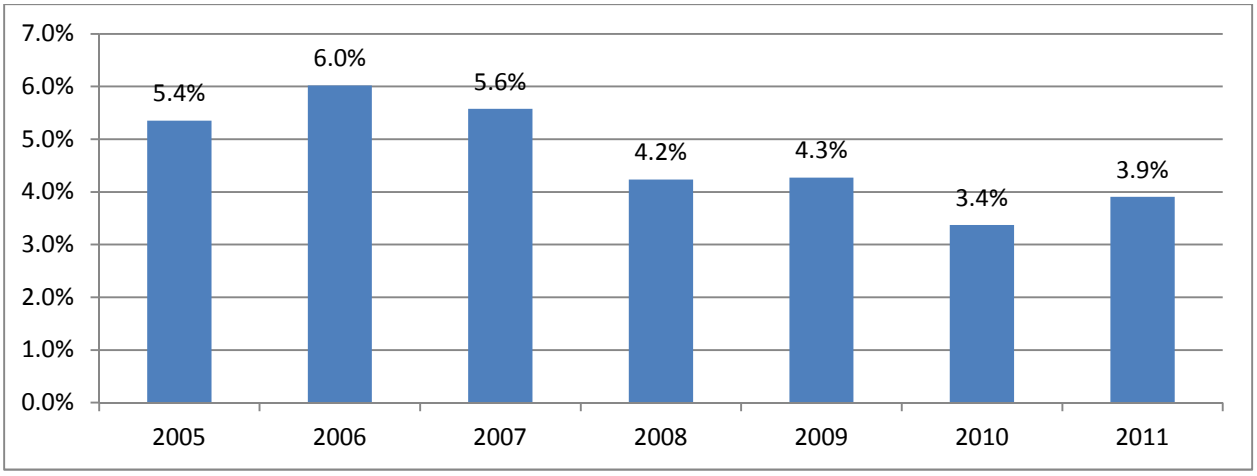


Figure 7 shows the most frequent causes of injury. Of all the injuries 37.7% resulted from falls, and figures 9 and 10 indicated that those falls were mostly in the older population and resulted from falls from a standing level. This pattern was seen in both males and females. Not only are falls the most frequent cause of injury for all trauma patients, they are also the most common cause of injury for those patients who died (Figure 8). Gunshot wounds were the seventh leading cause of injury for all the patients, yet they were the third leading cause of death. It is interesting to note that GSW cause of injury increased from 2.3% to 3.9% with the addition of UNM data. Motorcycle crashes were the fifth leading cause of injury but the fourth leading cause of mortality.

Figure 7.

Top 10 Cause of Injury
Definitive Patient Care Records
2005 through 2011
N=20,233

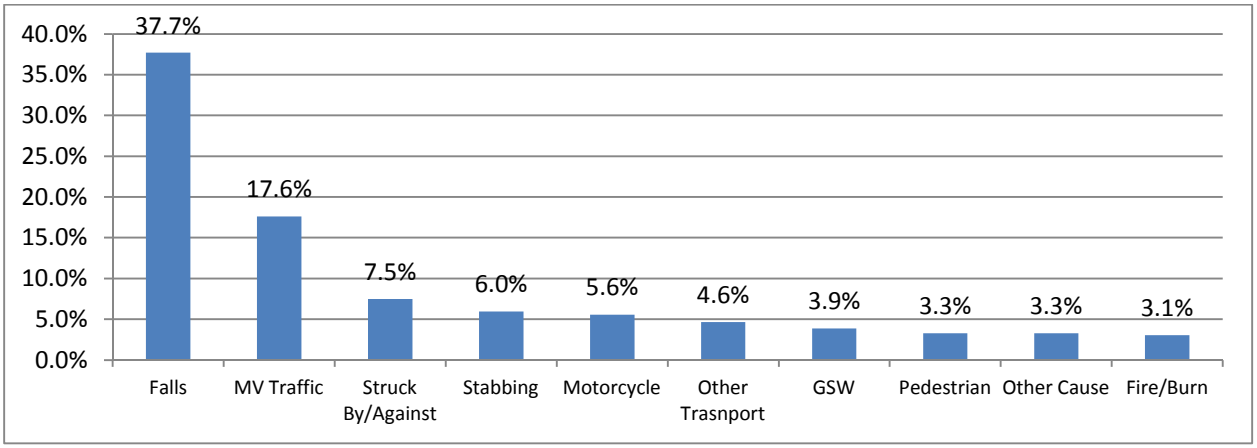


Figure 8.

Top 10 Cause of Injury Deaths
Definitive Patient Care Records
2005 through 2011
N=1458

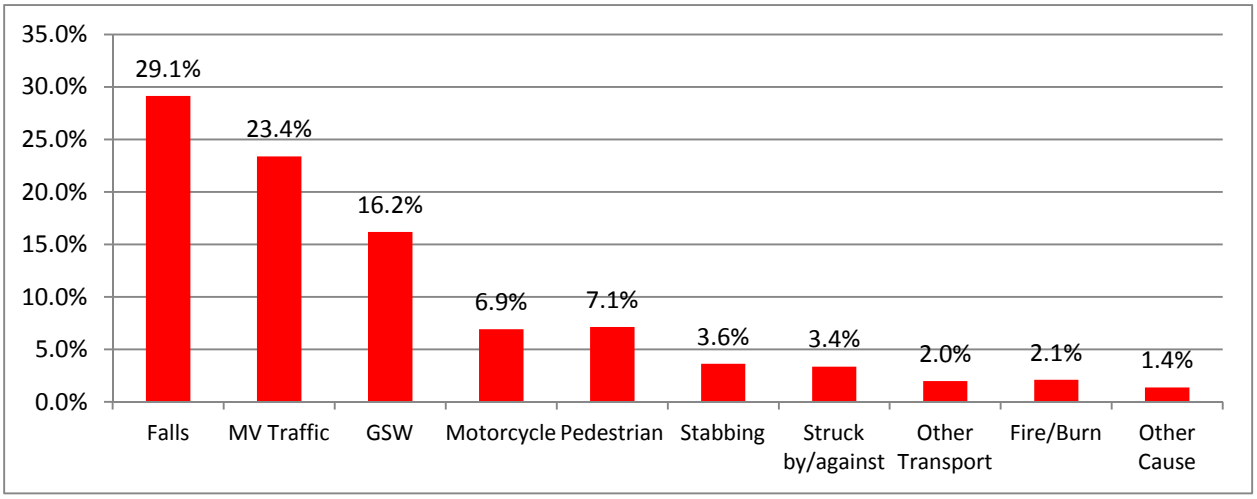


Table 7 shows the distribution of Injury Severity Scores (ISS). Nearly all of the patients in the STR data set had a minor or moderate ISS. These patients would be expected to live and have a good outcome. In the moderately level 2.7% died. Most of these deaths, 57%, resulted from older patients with "fall" as the cause of injury.

Table 7.

Trauma Records by ISS
Definitive Patient Care Records
2005 through 2011

ISS RANGE	NUMBER	PERCENT	DEATHS	Case fatality
1-8	17242	53.4%	122	0.7%
9-15	10262	31.8%	280	2.7%
16-24	2754	8.5%	204	7.4%
>24	1959	6.1%	843	43.0%
ISS NOT VALUED	72	0.2%	9	12.7%
TOTAL	32289	100.0%	1458	4.5%

Figure 9.

Number of Trauma Records with ISS 9-15 with a death due to a fall
By Age/Gender
Definitive Patient Care Records
2005 through 2011
N=161

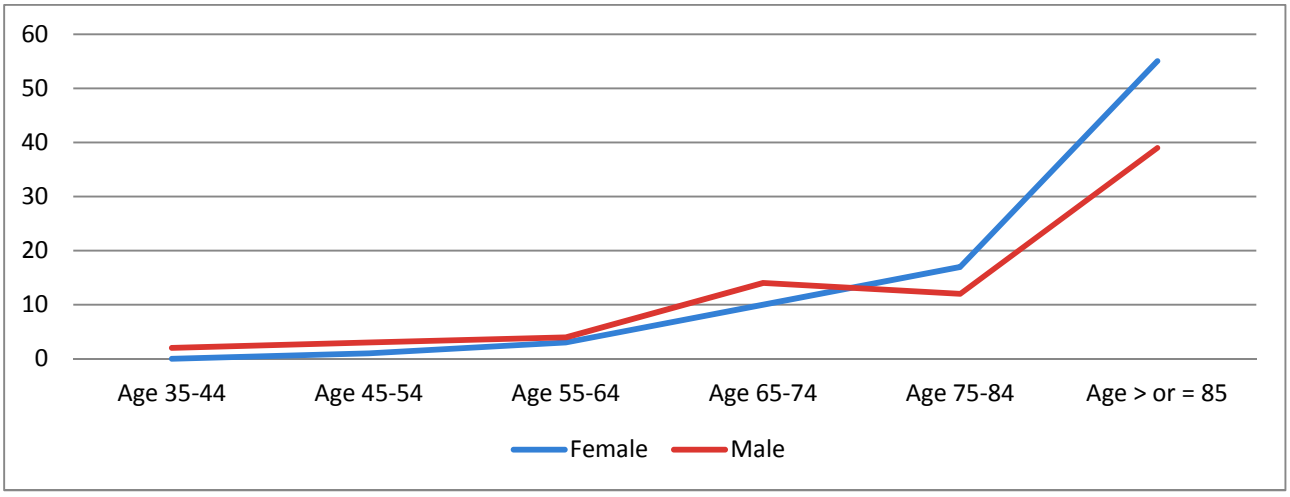


Figure 10.

Falls by Subcategory
Definitive Patient Care Records
2005 through 2011
N=11757

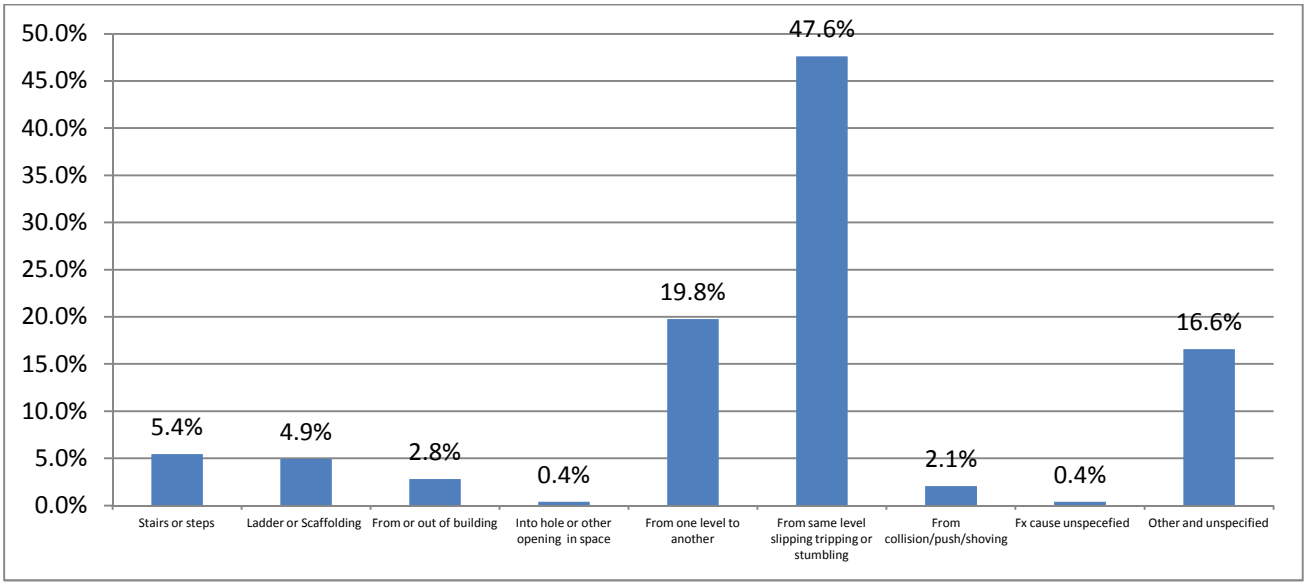


Figure 11.

Falls from the Same Level
By Age Group
Definitive Patient Care Records
2005 through 2011
N=5597

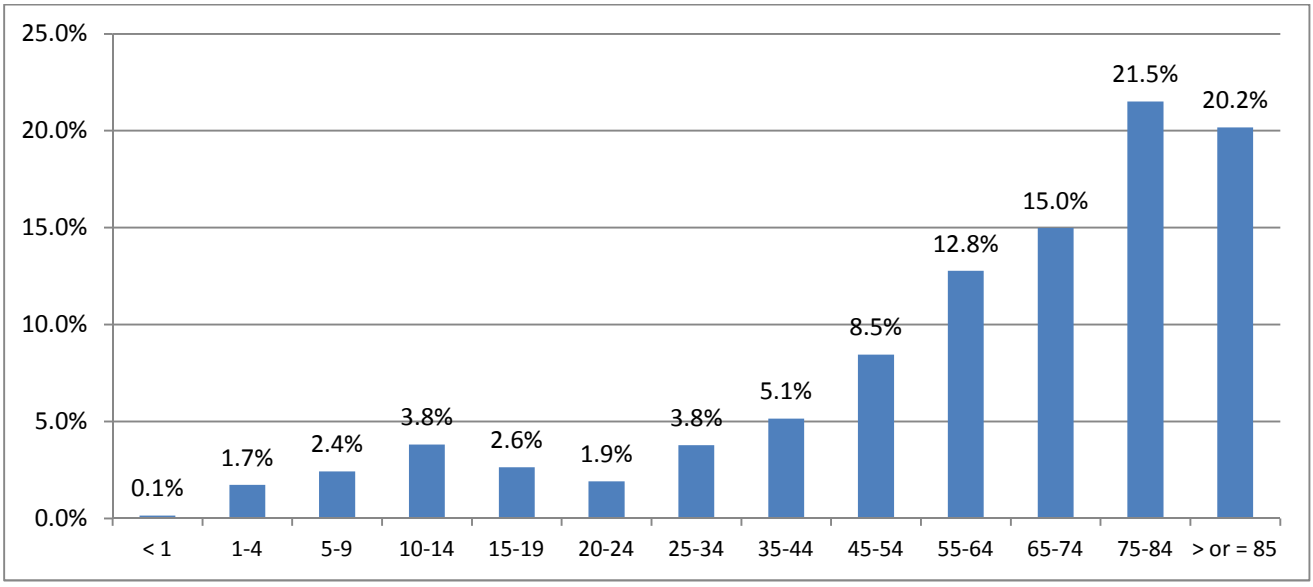


Figure 12.

Falls by Subcategory among Males by Age Group
Definitive Patient Care Records
2005 through 2011
N=5539

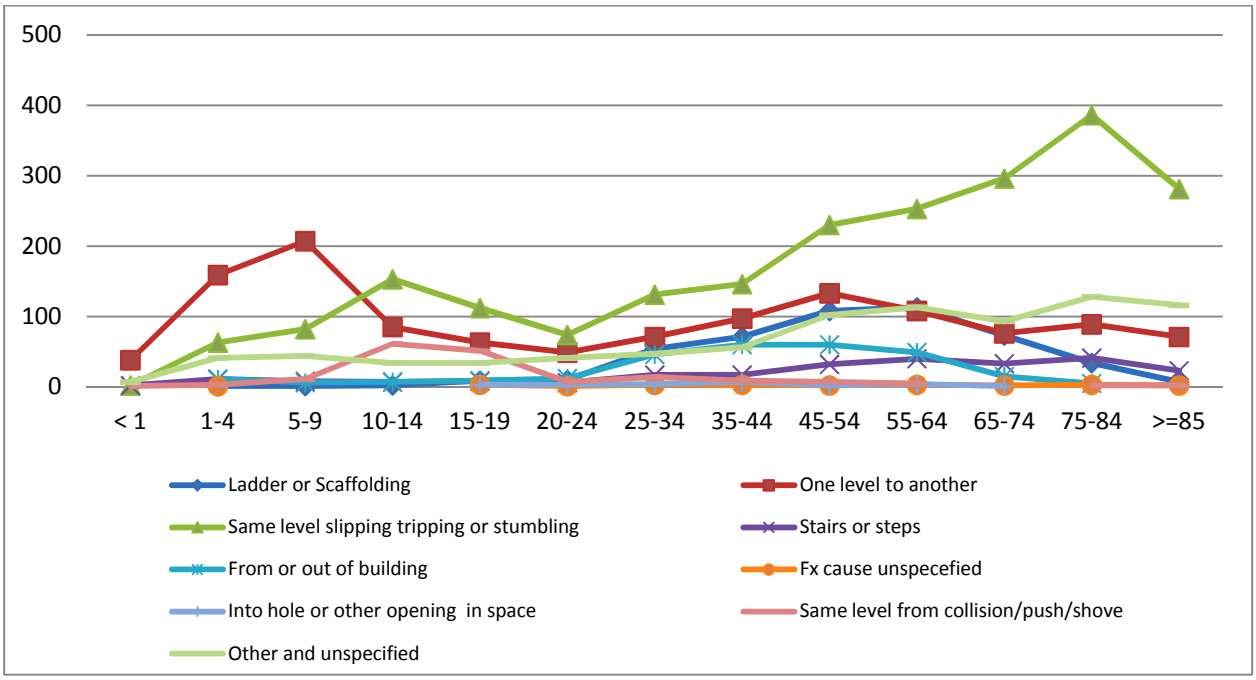
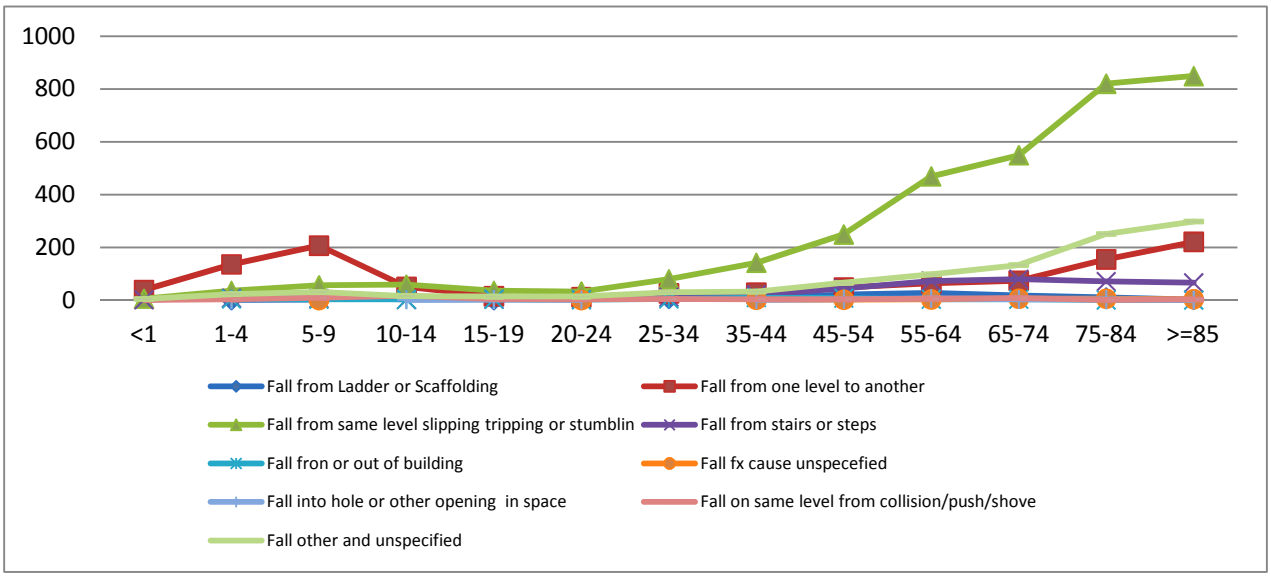


Figure 13.

Falls by Subcategory among Females by Age Group
Definitive Patient Care Records
2005 through 2011
N=6134



*84 Patient Records Not Valued in Falls subcategory by Gender

Figure 14.

Falls by Race/Ethnicity
Definitive Patient Care Records
2005 through 2011
N=11757

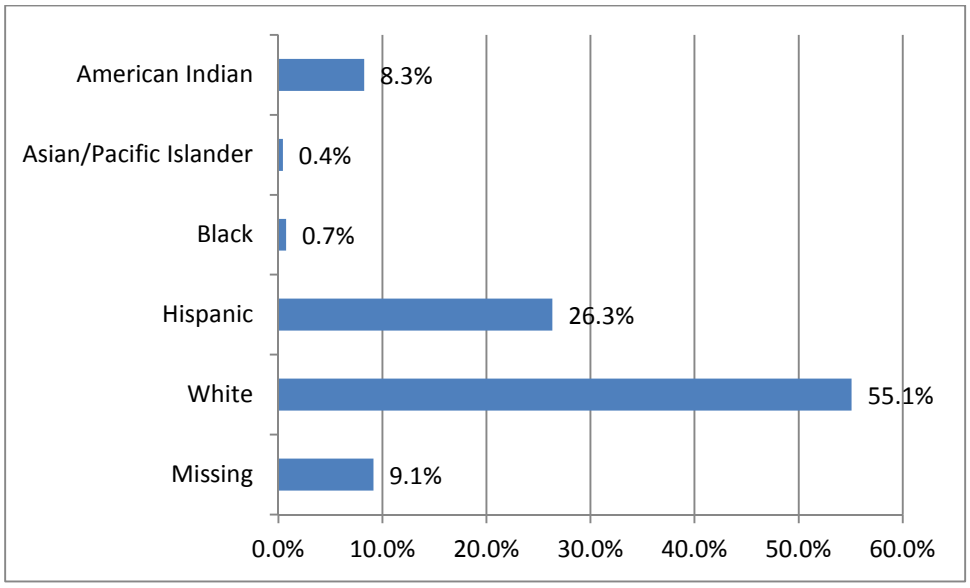
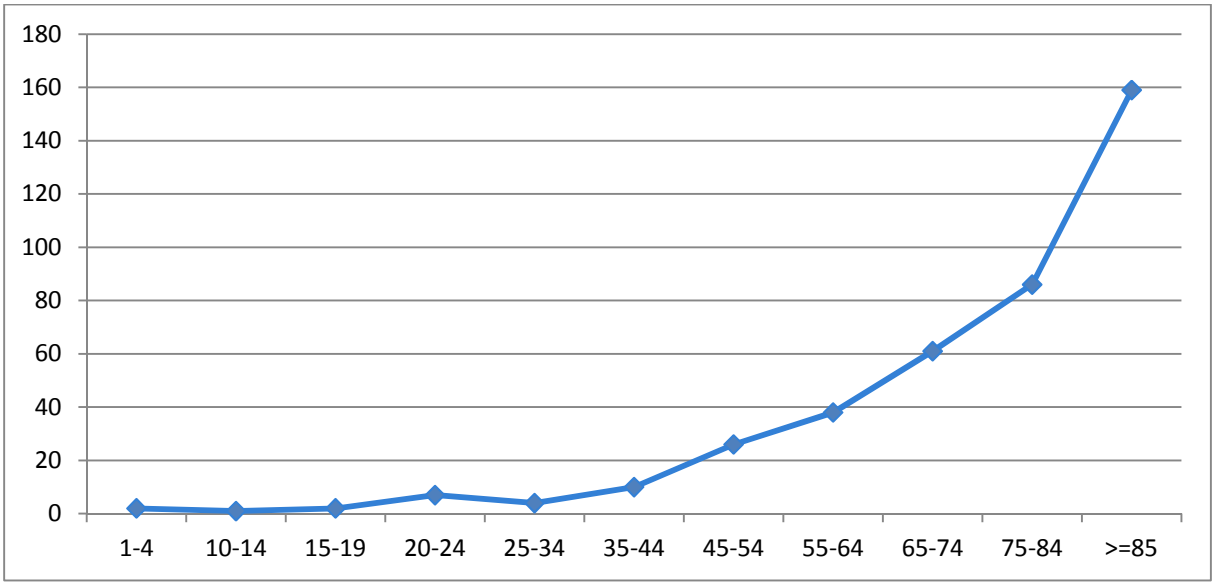


Figure 15.

Fall Deaths by Age Group
Definitive Patient Care Records
2005 through 2011
N=396



CONCLUSIONS

The STR contains a great deal of information on injured patients. This data collection is ongoing and goes back over a seven year period, allowing some observation of trends. It is encouraging to observe the increasing reporting of certain data fields, such as TRISS and race/ethnicity.

It is important to note the large percentage of patients with severe, and sometimes fatal, injuries as a result of falls.

New Mexico Trauma Data Preliminary Report
2012

9/4/2013
Trauma Program
EMS Bureau
Epidemiology and Response Division
New Mexico Department of Health

Introduction

The following preliminary report follows the same methods as indicated in the 2005-2011 report. This report shows only a partial look at all the 2012 data that has been submitted, and is expected to be finalized with input from the Trauma Performance Improvement Committee and the Trauma System Fund Authority by February 2014.

RESULTS – 2012 Data

Definitive Patient Care Records (DPC)

A total of 6944 records were submitted by all reporting facilities in 2012. This number excludes the Texas facilities designated as New Mexico Trauma Centers. Figure 1 provides the percent of records submitted by level of trauma centers. There are currently 14 trauma centers submitting data to the STR. There are nine (9) facilities submitting as part of the Volunteer trauma registry. Of those 9, two (2) are developing trauma centers.

Figure 1

Percent of Trauma Records Submitted by Level of Trauma Center
2012
N=6944

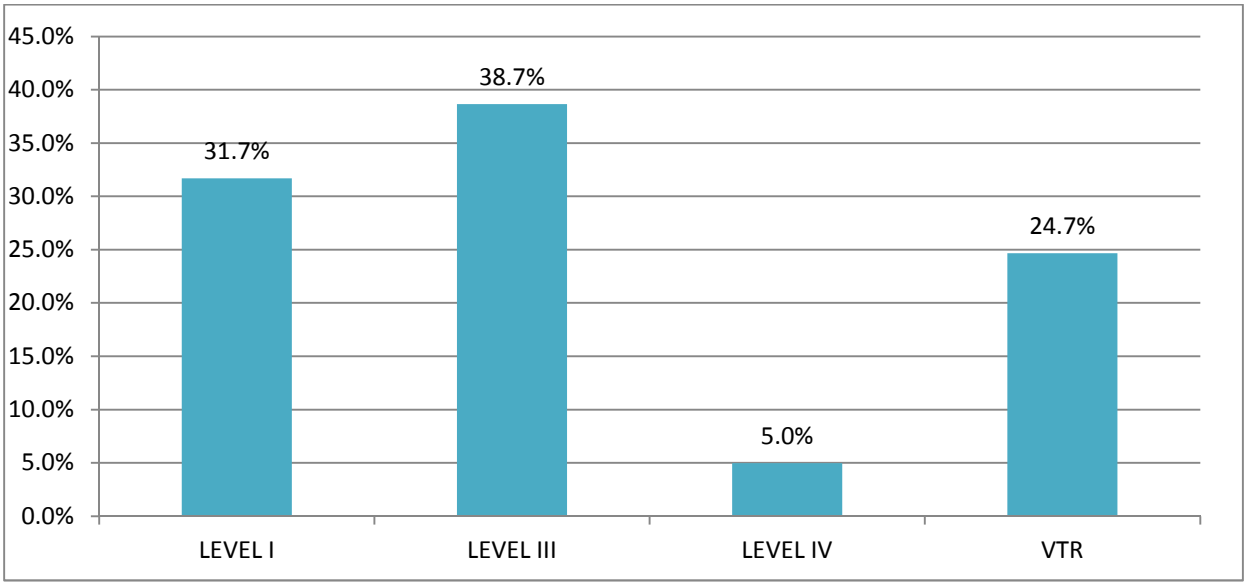


Table 1

Number of records defined as Definitive Patient Care Records
By Reporting Level of Trauma Center
2012

LEVEL OF TRAUMA CENTER (TC)	TOTAL
Level I Trauma Centers (1)	2200
Level III Trauma Centers (6)	2338
Level IV Trauma Centers (4)	249
VTR (8)	1325
Grand Total	**6112**

RESULTS

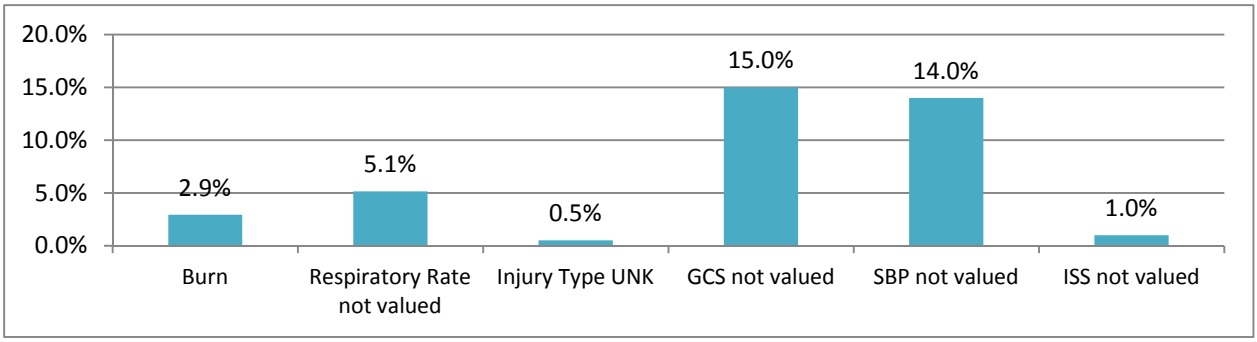
Data Quality

TRISS ANALYSIS

Figure 2 Focuses on Suitability for TRISS analyses. Of the 6112 DPC records, 79.7% were suitable, down from the 2005-2011 report of 84.7%. Of the 1243 records that were suitable the majority of records had GCS and SPB not valued. It appears that this is an education issue at the facility level for abstraction.

Figure 2

Percent of fields not valued for TRISS analysis
2012
N=1243

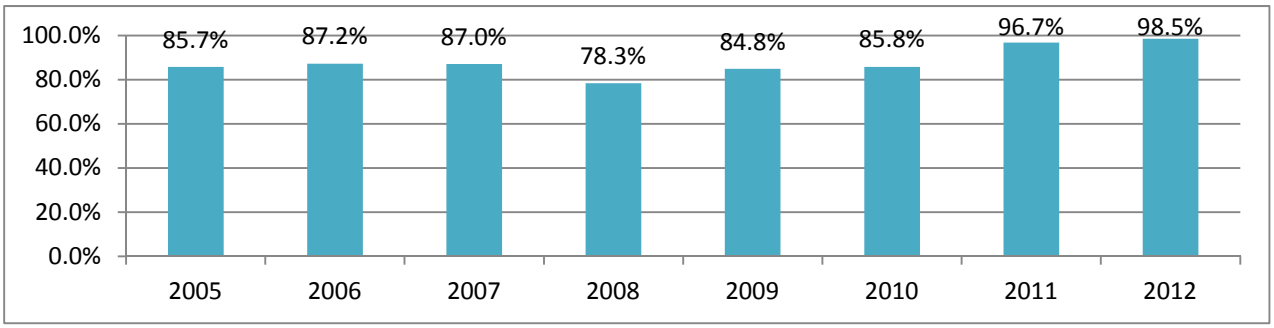


Race/Ethnicity

In Figure 3, it shows that in 2012, 98.5% race/ethnicity valued, which is less than 2% not valued. As a result, analysis of race/ethnicity can be significant for further study of trauma.

Figure 3

Percent of Race/Ethnicity reported by Year
Definitive Patient Care Records
2005 through 2012
N=38401



Demographics

The following figures and tables describe some characteristics of the population contained in the DCP records. Figure 4 shows the age and gender distribution. This is relatively unchanged from previous years. Males continue to outnumber females in all age categories, except for the age of 65 and older. The age group of 25-34, accounts for 13.6% of trauma related injuries, while >85% is number 5, with falls being the major cause of injury. All other age groups were less than 10%

Figure 4

Age Range by Gender
Definitive Care Records
2012
N=6112

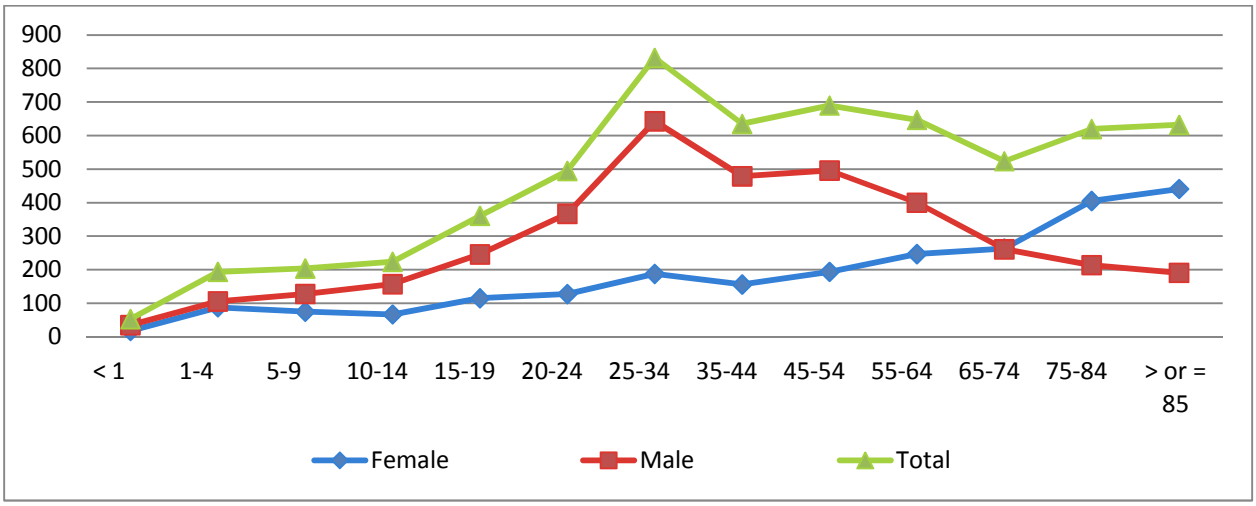
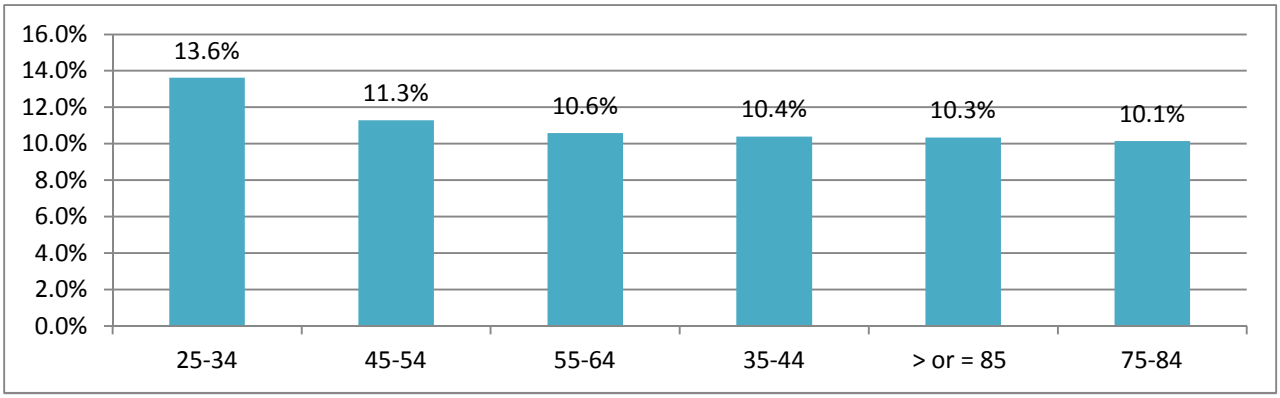


Figure 5

Top 6 Percent of Trauma Records by Age Range
Definitive Patient Care Records
N=6112

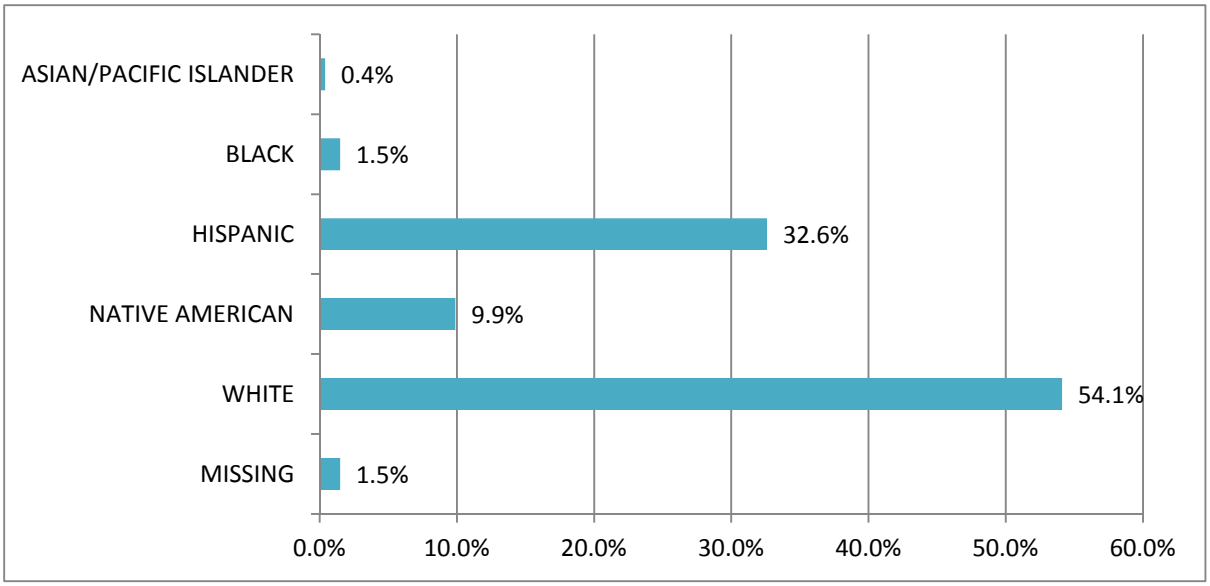


Race/Ethnicity

Figure 6 shows an increase from the 2005-2011 report for category of White from 44.7% to 54.1% in 2012.

Figure 6

Percent of Trauma Records by Race/Ethnicity
Definitive patient Care Records
2012
N=6112



Alcohol/Drug Testing

As noted by Tables 2 and 3 an increase in reporting is noted for alcohol and drug use. There is a decrease in missing values for alcohol from 85.7% in the 2005 through 2011 report to 16.3% in 2012, and drug use from 79.1% to 38.8%. There is also an increase in testing for alcohol from 8.2% to 41.3%.

Table 2

Alcohol Use
Definitive Patient Care Records
2012

ALCOHOL USE	NUMBER	PERCENT
No (not suspected - not tested)	2482	40.6%
No (confirmed by test)	1595	26.1%
Yes (confirmed by test - trace levels)	634	10.4%
Yes (confirmed by test - beyond legal limit)	404	6.6%
Missing	997	16.3%
TOTAL	6112	100.0%

Table 3

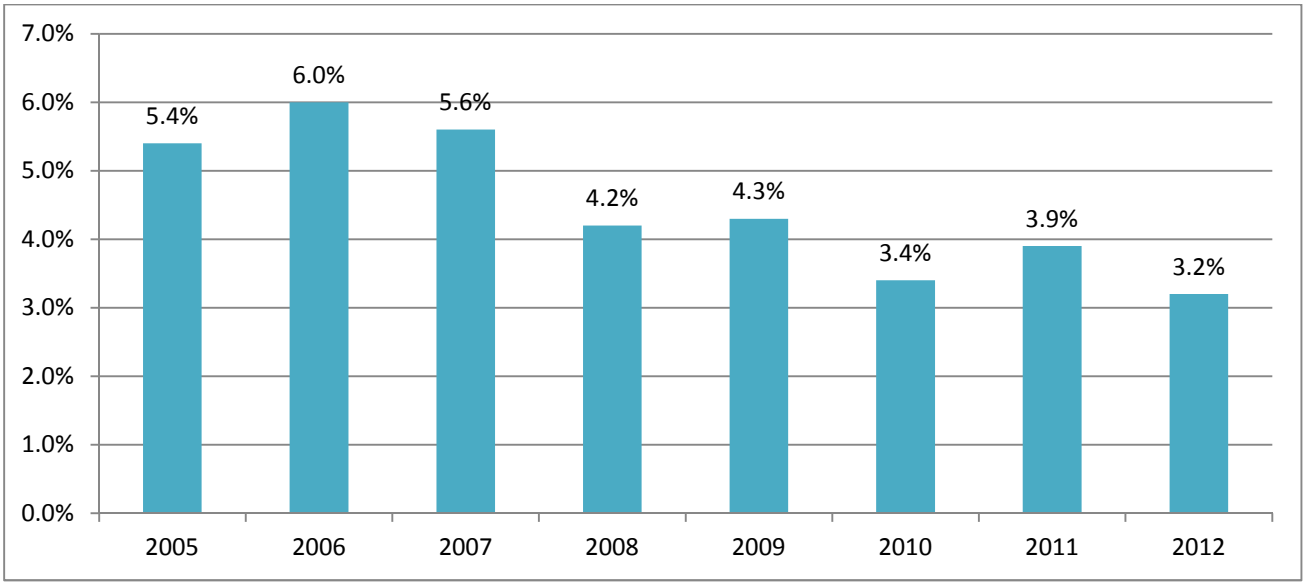
Drug Use
Definitive patient Care Records
2012

DRUG USE	NUMBER	PERCENT
No (not suspected - not tested)	2868	46.9%
No (confirmed by test)	273	4.5%
Yes (confirmed by test – prescription drug)	228	3.7%
Yes (confirmed by test – illegal drug use)	369	6.0%
Missing	2374	38.8%
TOTAL	6112	100.0%

Figure 7 shows patients discharged from facilities with an outcome of dead. The average mortality has decreased from 5.4% iin 2005 to 3.2% in 2012 with an apparent continued decrease in mortality.

Figure 7

Percent of Trauma Records with an Outcome of Death
Definitive Patient Care Records
2012
N=201



Transfers to UNM

Figures, 8 through 11 focus on transfers to UNM from Trauma Centers and Non-Trauma Centers from 2007 through 2012. It is encouraging to note a decreasing trend in the Percentage of trauma patients that are transferred to UNM from all these facilities.

Figure 8

Transfers to UNM from All Facilities
2007 through 2012
N=4305

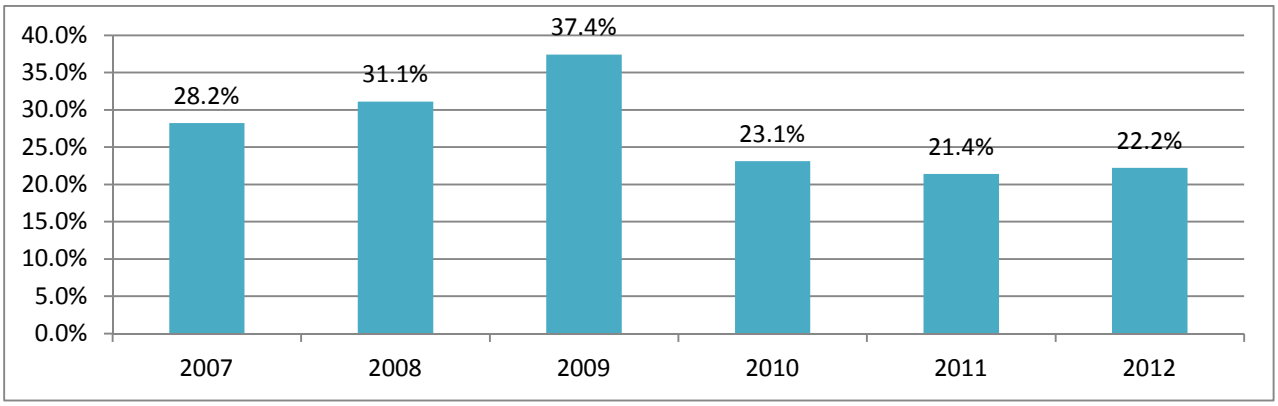


Figure 9

Transfers to UNM from Level III Trauma Centers
2007 through 2012
N=675

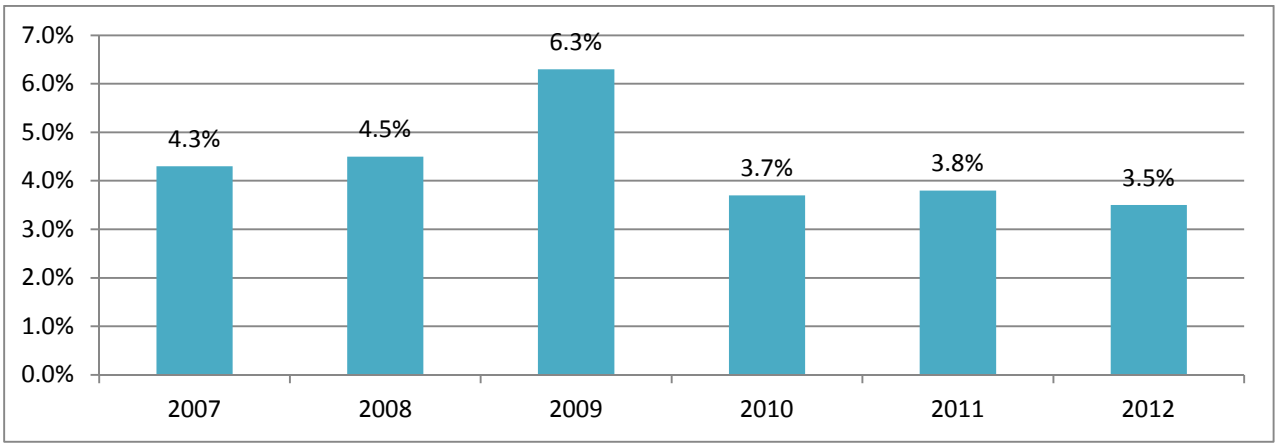


Figure 10

Transfers to UNM from Level IV Trauma Centers
2007 through 2012
N=276

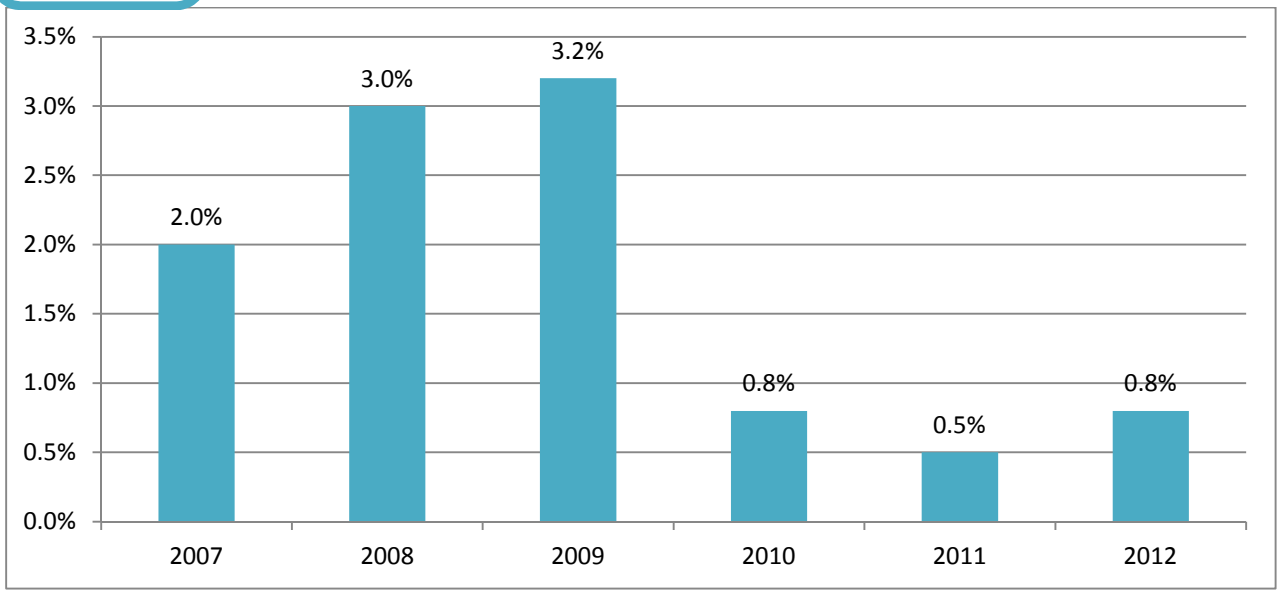
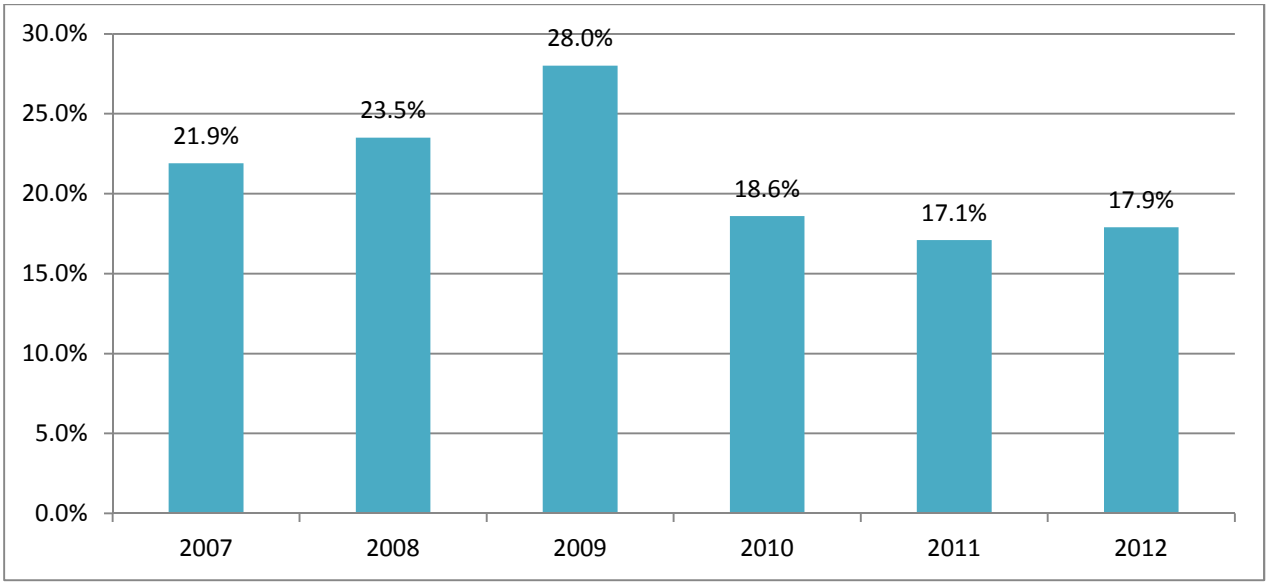


Figure 11

Transfers to UNM from Non-Trauma Centers
2007 through 2012
N=3354



PRELIMINARY CONCLUSION

It is interesting to note the increased significant increase in reporting of ETOH and Drug Use indicators. As this field generates an increased validity in reporting it will be interesting to note which cause of injuries had the highest suspicion of ETOH and drug use, and which were confirmed.

Deaths also appear to be decreasing from previous years. This may be a first look at the benefits of developing the New Mexico Trauma System.