

# Indiana Trauma Registry

## Statewide Quarter 3 Data Report

July 1, 2014 to September 30, 2014

8,814 Incidents

### 95 Total Hospitals Reporting

Trauma Centers:	11 facilities	52.7% of data
(Non-Trauma) Hospitals:	84 facilities	47.3% of data

For Quarter 3 2014, which spanned from July 1, 2014 to September 30, 2014, there were 8,814 incidents reported to the Indiana Trauma Registry at the Indiana State Department of Health. There were 95 hospitals that reported data, of which 11 were trauma centers and 84 were non-trauma centers. There were 5 hospitals that either started to report again or were new to reporting during this quarter compared to the previous quarter, while 1 hospital dropped off from reporting this quarter from the previous quarter. A map of the state with the reporting hospitals can be found on page 33. Community Hospital of Anderson & Madison, Franciscan St. Elizabeth Health—Lafayette East, Good Samaritan Hospital and St. Vincent Anderson Regional Hospital were the four hospitals with “in the process” status during the quarter. Trauma centers represented 52.7% of the data. There were 3,002 incidents reported for July, 3,042 reported for August, and 2,770 incidents reported for September.

The content of this report has changed due to suggestions and additions requested by the Indiana State Trauma Care Committee at the November 14, 2014 meeting. Explanations of the changes requested and adapted from the ISTCC meeting can be found on page 34.

Some general reminders include that the blue columns represent an Indiana average, red columns represent trauma centers, and green columns represent non-trauma centers. If a single percent is listed above a group of bars, the percent listed represents the average for Indiana. If a number is listed above a group of bars, it represents the count for Indiana. The category ‘All Transfers’ denotes the patient group where ED Disposition = Transferred to Another Hospital. **The category ‘Linked Transfers’ represents the patient group for whom the initial hospital and final hospital information could be linked.**

The E-codes used in this report follow the ICD-9 CDC matrix of external cause of injury.

### Definitions:

**Direct Admit:** Patient is admitted directly to the hospital and does not spend time in Emergency Department. The ED Length of Stay should reflect a direct admittance.

**External Cause of Injury:** ICD-9-CM codes that are used to describe the mechanism or external factor that caused the injury event.

**Trauma Type:** The classification of the force applied to the body. Trauma type categories include blunt, penetrating, thermal, and other trauma.

**Injury Severity Score:** An anatomical scoring system defined as the sum of the three highest squared maximum Abbreviated Injury Scale (AIS) values to account for multiple injuries in the six body regions.

### Acronyms:

E-code: External Cause of Injury	MVC: Motor Vehicle Collision
ED: Emergency Department	OR: Operating Room
ICU: Intensive Care Unit	Ps: Probability of Survival
ISS: Injury Severity Score	CAHs: Critical Access Hospital
LOS: Length of Stay	

### Calculations:

$Ps = 1/(1+e^{-b})$  where  $b=b_0+b1(RTS) + b2(ISS) + b3(\text{Age Index})$   
Total GCS = Verbal GCS + Motor GCS + Eye GCS  
 $ISS = (AIS)^2 + (AIS)^2 + (AIS)^2$



Indiana State  
Department of Health  
Trauma and Injury Prevention

# Indiana Trauma Registry

## Statewide Quarter 3 Data Report

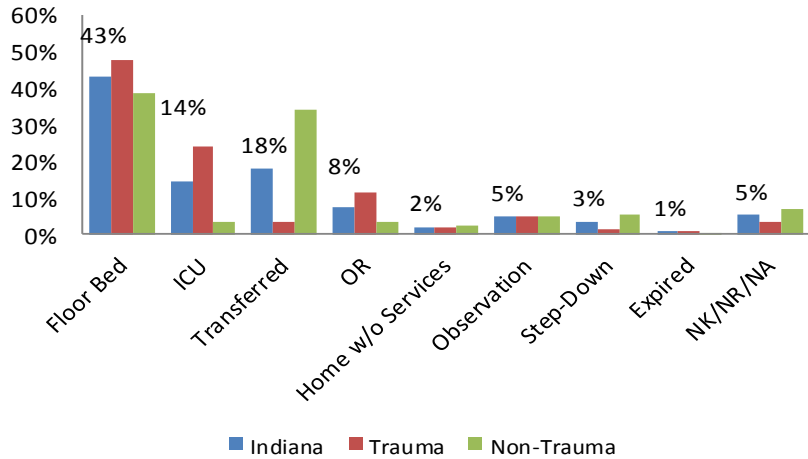
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8,814 Incidents

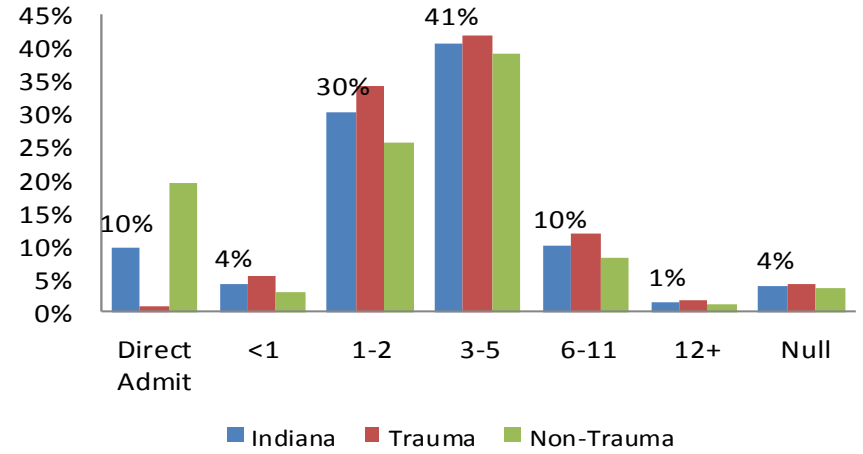
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 (Non-Trauma) Hospitals: 84 facilities 47.3% of data

### ED Disposition by Percentage

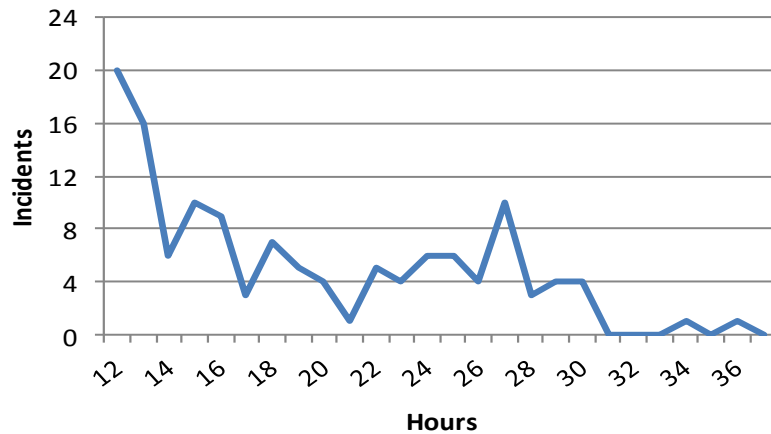


### ED Length of Stay (Hours)



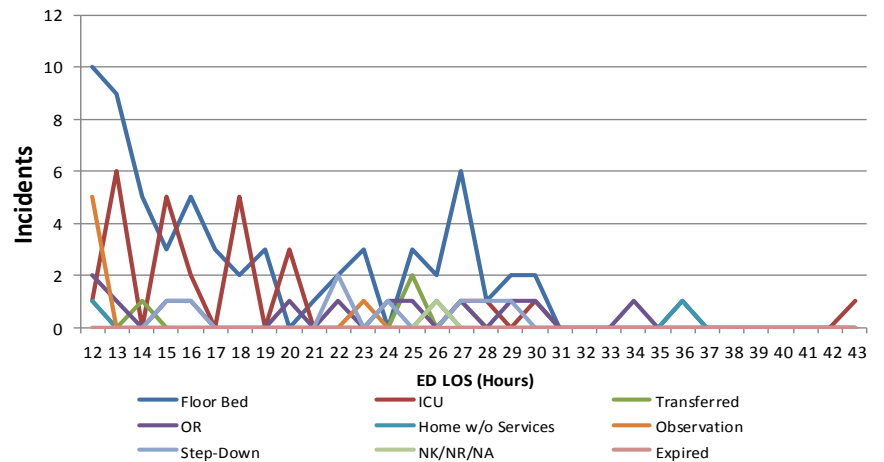
<1% ED Disposition: AMA; Home with Services; Other

### ED LOS >12 Hours



N=130

### ED Disposition for ED LOS >12 Hours



N=125

\*No cases expired > 12 hours

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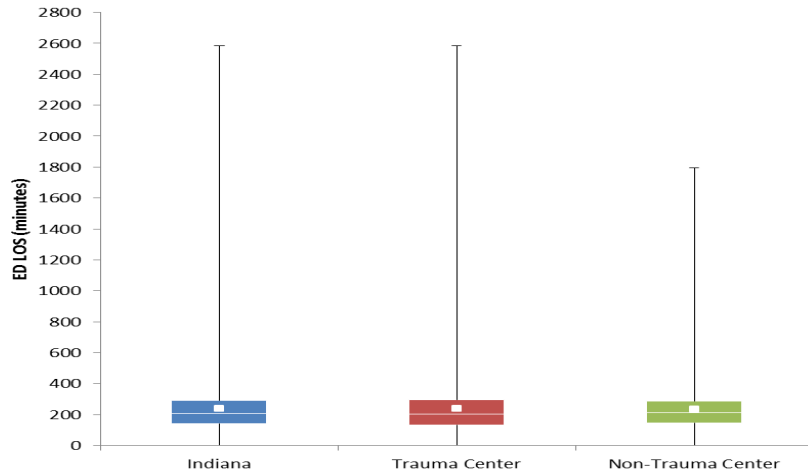
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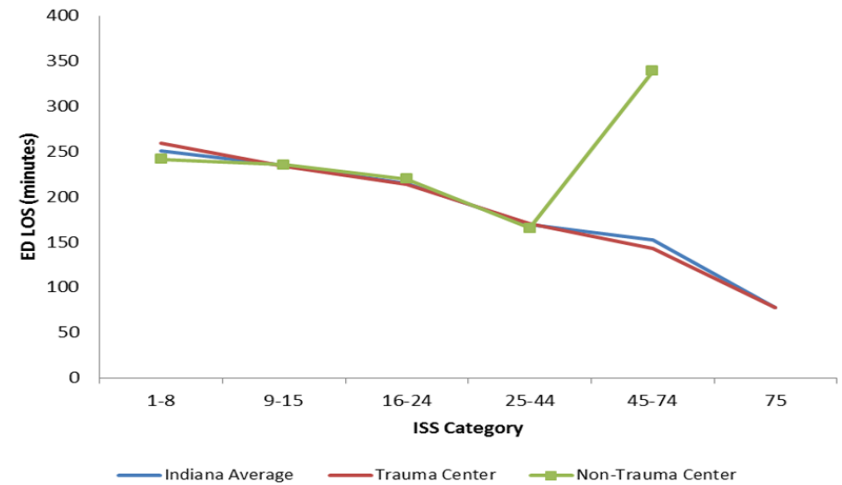
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### ED LOS (Minutes) - All Patients



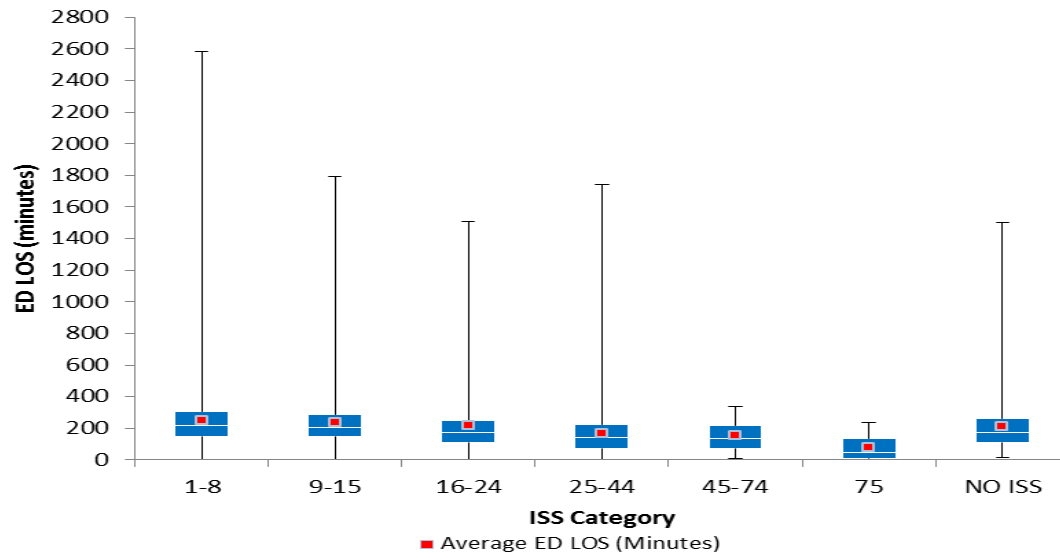
### ED LOS (Minutes) by ISS



A table with all the values for ED LOS is found on page 31.

### ED LOS (Minutes) by ISS

Note for EDLOS by ISS, there were 2 cases at Non-Trauma Centers with ISS greater than 45.



A table with values for ED LOS by ISS may be found on page 31.

# Indiana Trauma Registry

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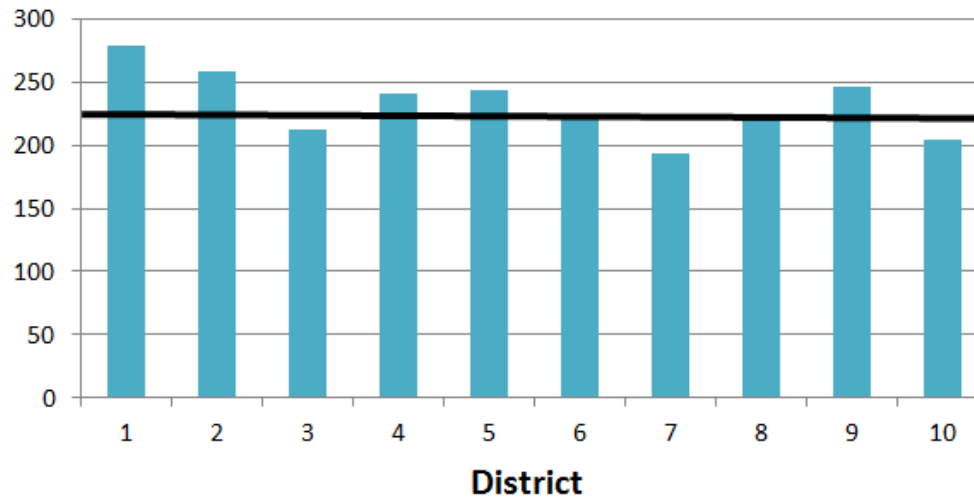
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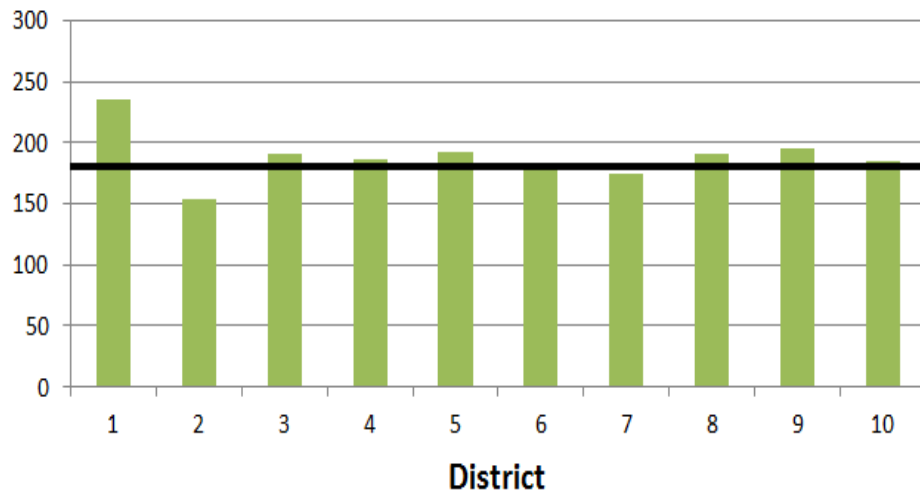
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### Average ED LOS (Minutes) - All Patients

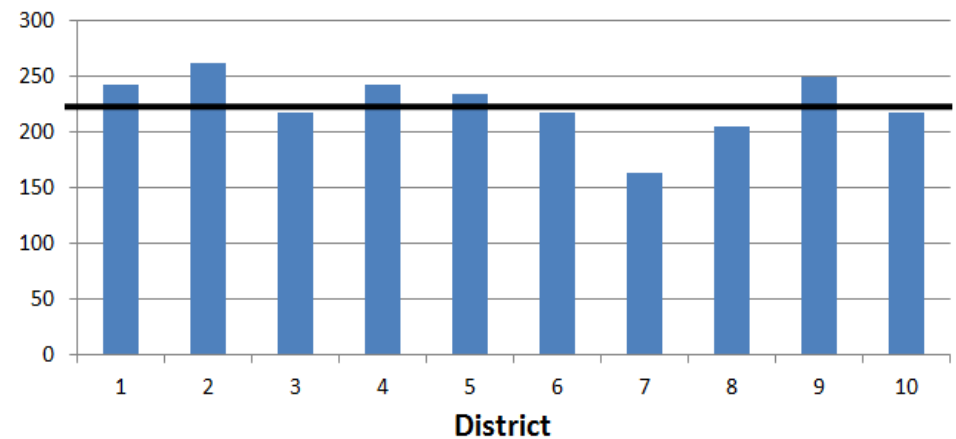


The black bar represents the average for each group.

### Average ED LOS (Minutes) - All Transfers



### Average ED LOS (Minutes) - All Critical Transfers



Critical Transfers have a GCS  $\leq 12$  or a Shock Index  $> 0.9$  or ISS  $> 15$ .

# Indiana Trauma Registry

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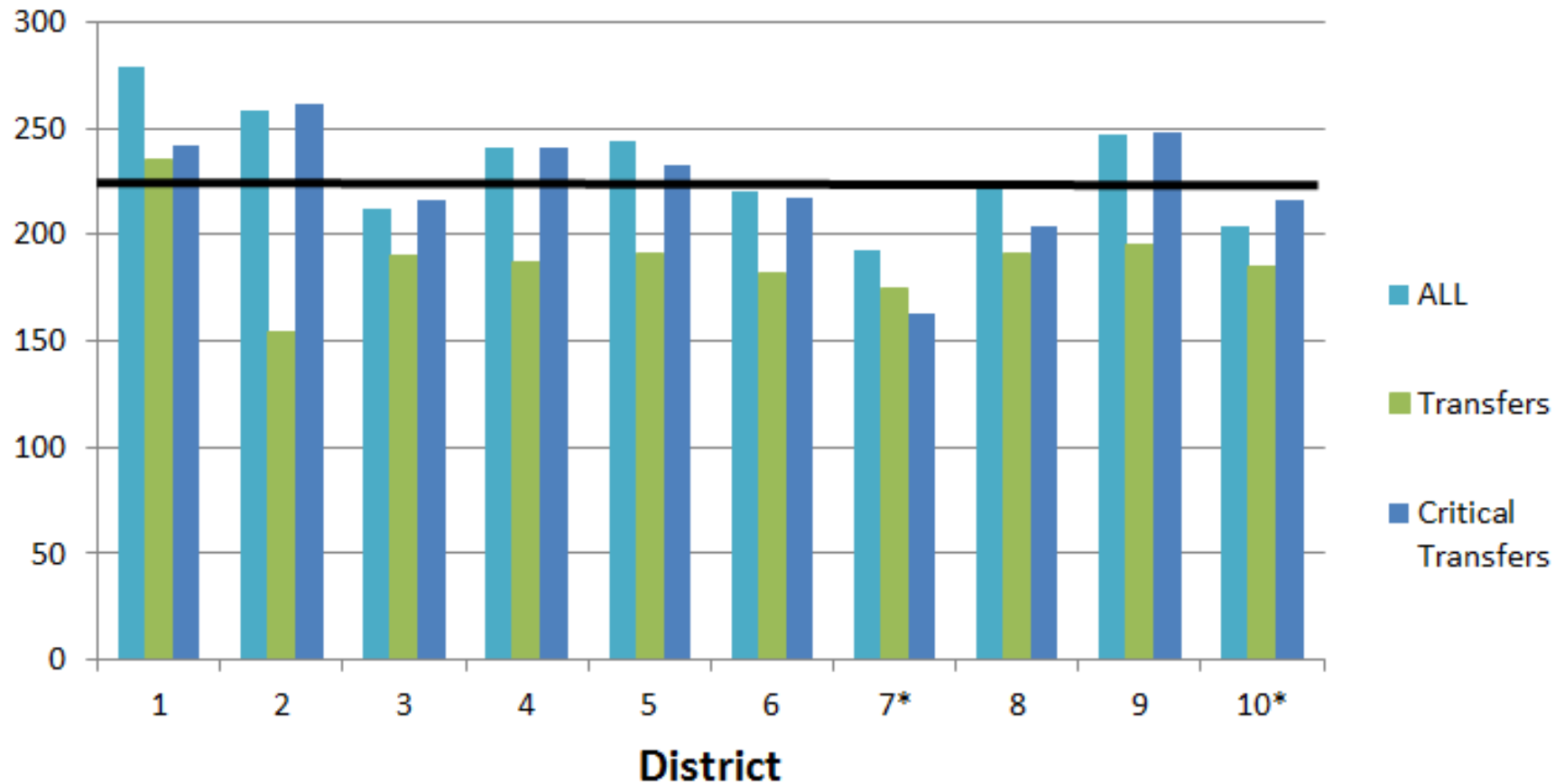
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## Average ED LOS (Minutes)



\*Districts 7 and 10 have all hospitals reporting. The average bar is for all patients.

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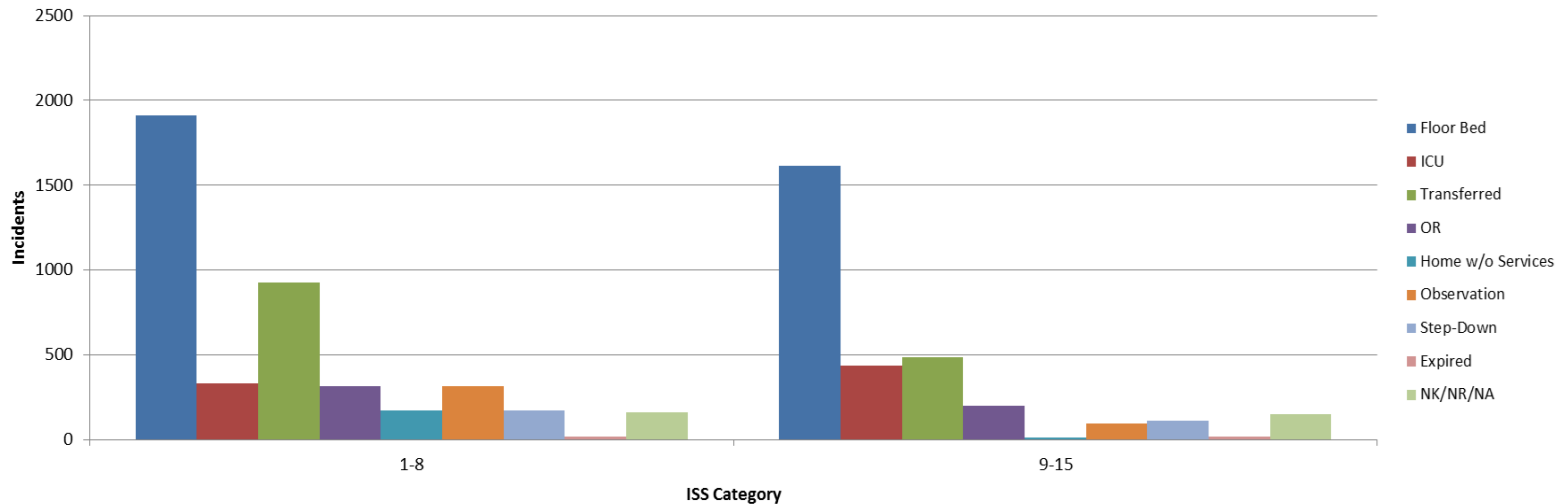
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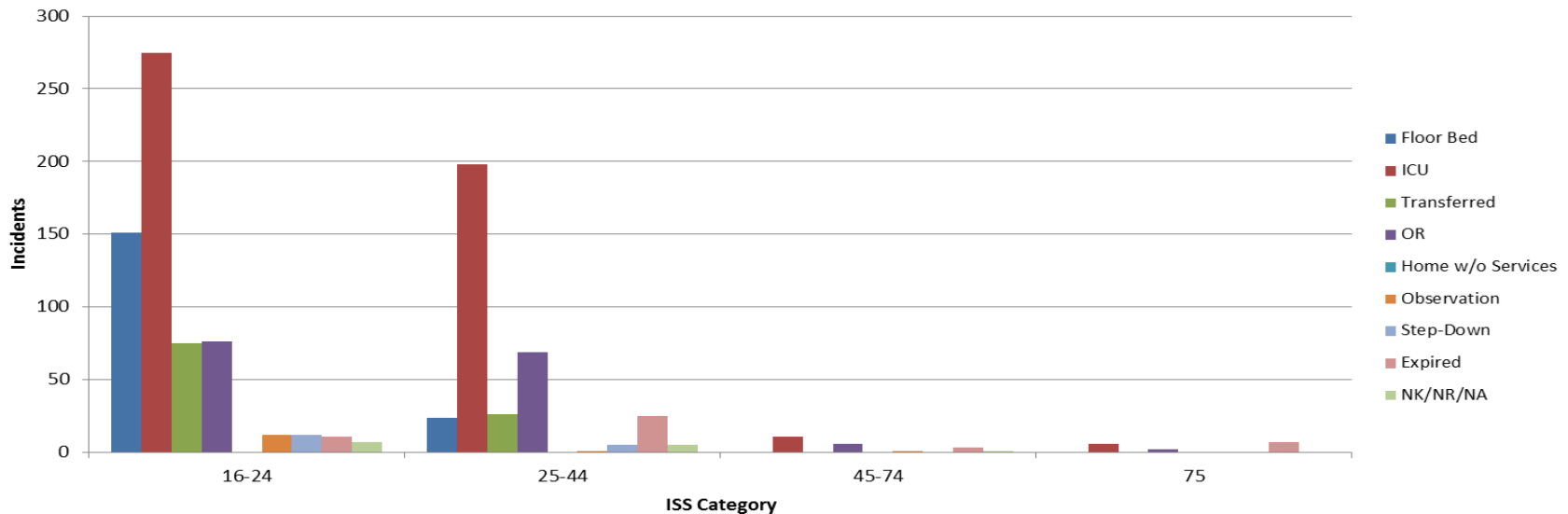
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### ED Disposition by ISS 1-14



### ED Disposition by ISS 15-75



ED Disposition <1%: AMA; Home with services; Other (Jail, Mental Institution, etc.). Please note the difference in axis scale between the top and bottom graphs.  
 \*A table with values for ED Disposition by ISS is found on page 32.

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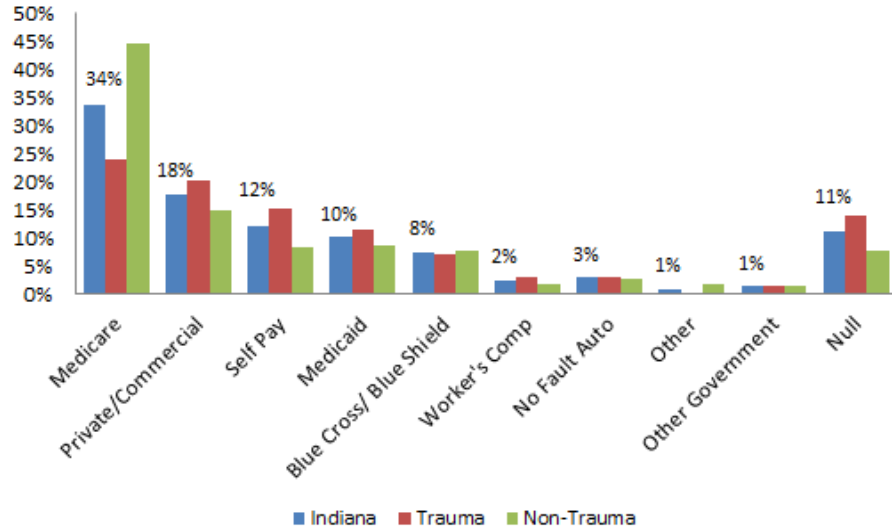
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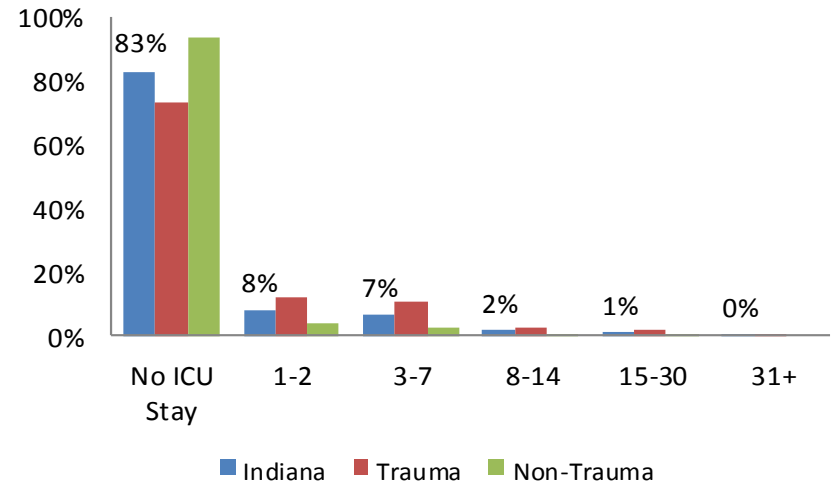
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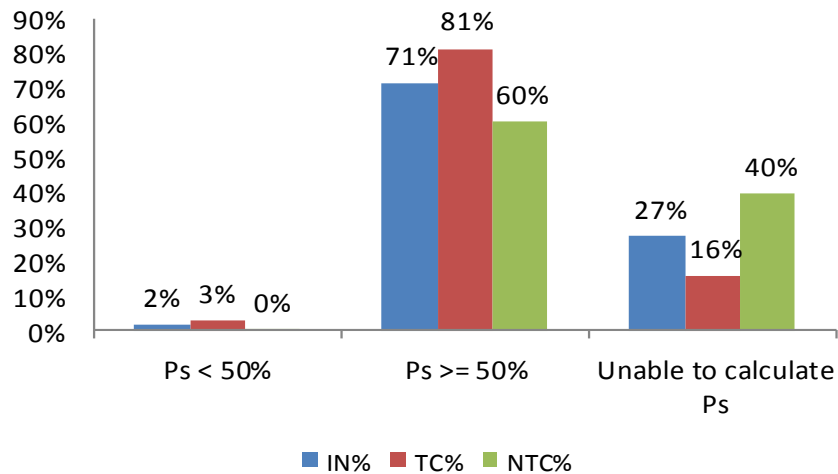
### Primary Payer Mix



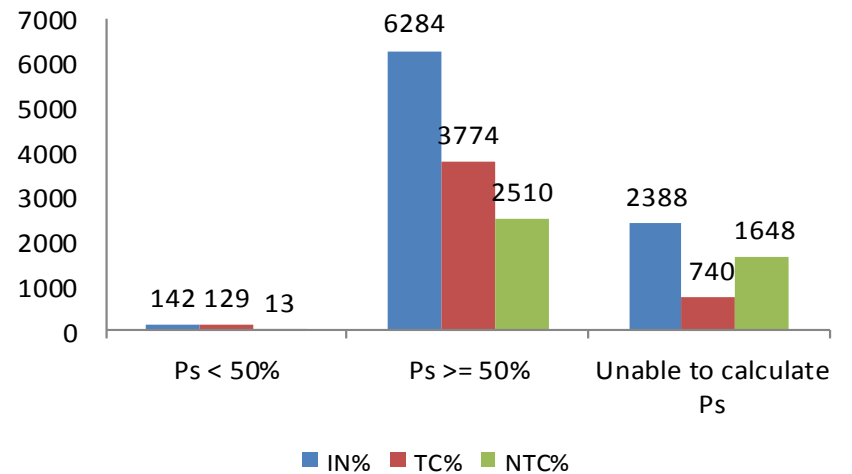
### ICU Length of Stay (Days)



### Probability of Survival (Ps) by Percent



### Probability of Survival (Ps) by Count



Due to the many data points required to calculate Ps, not every patient has a calculated Ps. These two graph represents 6,426 incidents with calculated Ps.

# Indiana Trauma Registry

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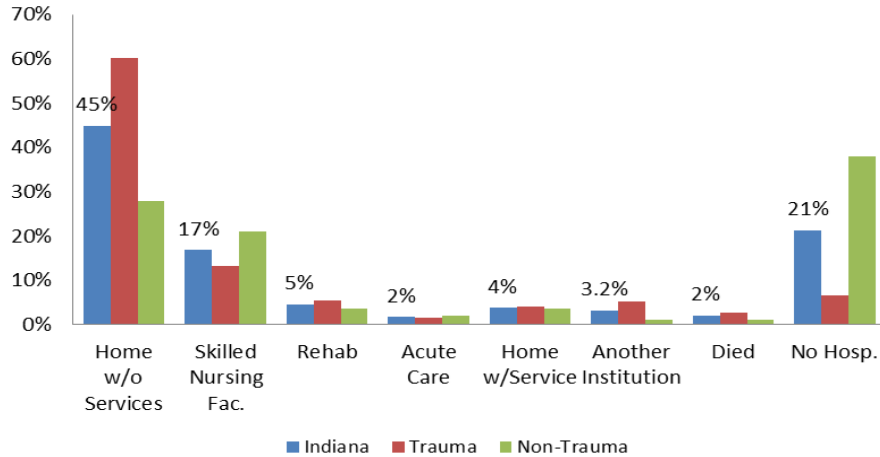
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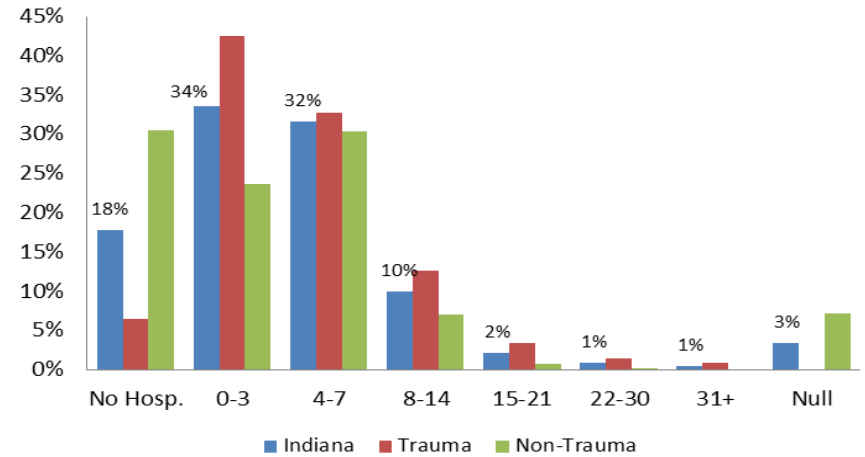
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### Hospital Disposition

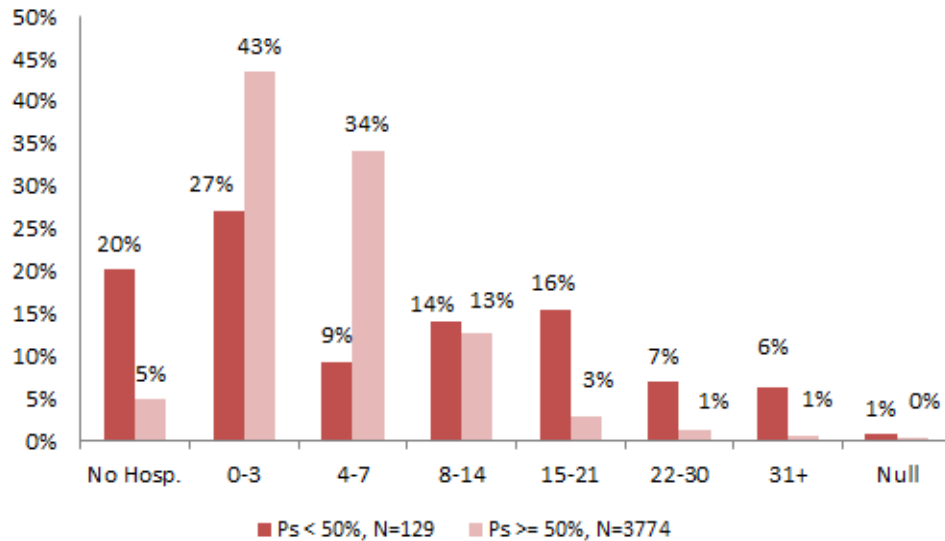


### Hospital Length of Stay (days)

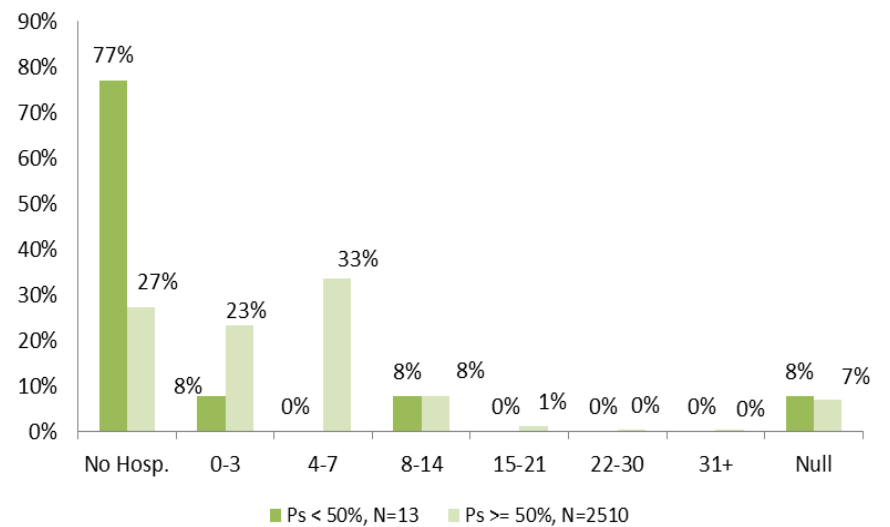


\*There are new categories for the Hospital Disposition for the 2014 Data Dictionary  
 <1%: null, psych., long term care hospital, AMS, hospice and intermediate care

### Hospital LOS (days) by Ps Trauma Centers



### Hospital LOS (days) by Ps Non-Trauma Centers





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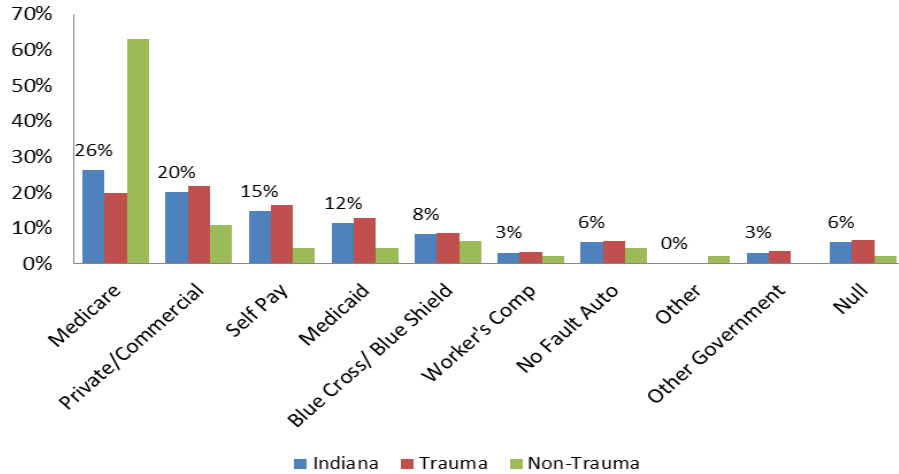
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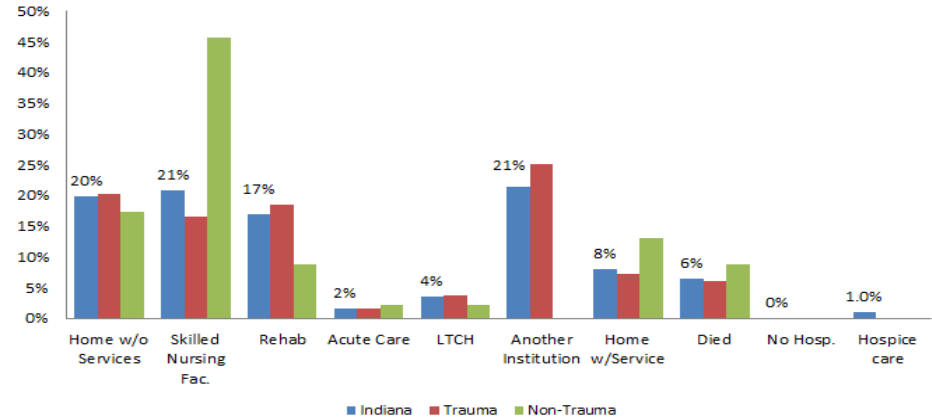
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## Hospital Length of Stay > 15 days, N=312

### Primary Payer Mix

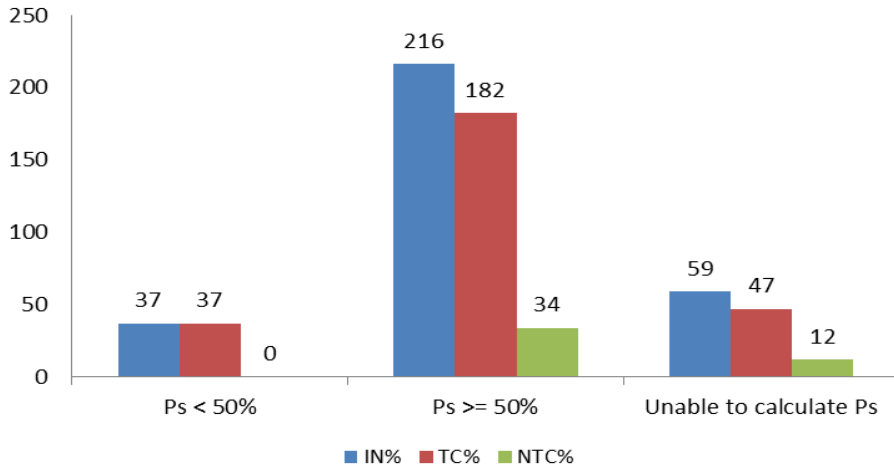


### Hospital Disposition

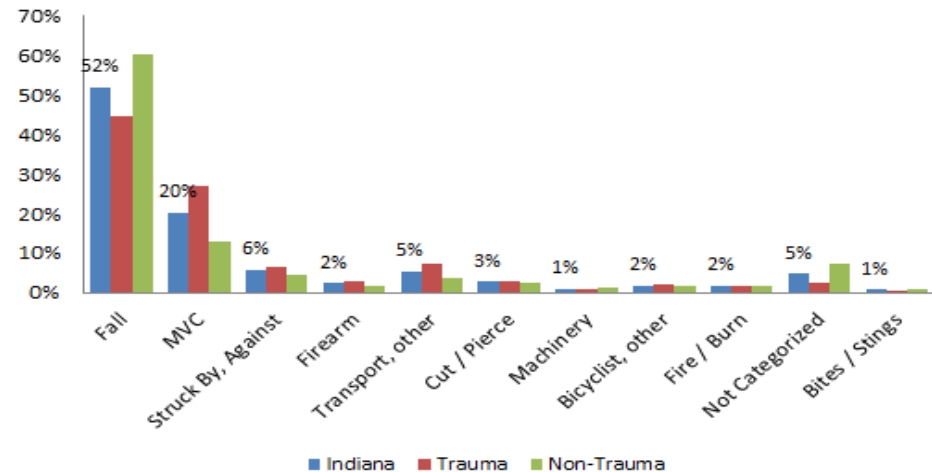


Another Institution includes any other medical facility not defined in the other categories

### Probability of Survival



### Cause of Injury



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### ED Disposition of Expired for Ps ≥ 50%, N=5

Patients with Ps ≥50% Expired in ED, N=5			
Gender	1 Female, 4 Males	Interfacility Transfer	1 Yes; 4 No
Average Age	66.8 years (21-92 years)	Average Distance from Scene to Facility	13.74 miles (1.4-44 miles)
Facilities	3 Non-Trauma Centers 2 Trauma Centers	Signs of Life	5 Arrived with signs of life
Transport Type	4 Ground ambulance; 1 Not Known	Trauma Type	5 Blunt
Cause of Injury	4 Falls, 1 MVC		

	Trauma Type	ISS	RTS- GCS Scale	RTS- Systolic Scale	RTS- Respiratory Scale	Revised Trauma Score (RTS)	B Value	PS	Signs of life
1	Blunt	25	4	4	3	7.55	1.82	0.86	Arrived with signs of Life
2	Blunt	4	3	4	3	6.61	2.82	0.94	Arrived with signs of Life
3	Blunt	29	0	4	4	4.09	0.44	0.61	Arrived with signs of Life
4	Blunt	9	3	3	3	5.88	1.81	0.86	Arrived with signs of Life
5	Blunt	9	2	4	3	5.68	1.64	0.84	Arrived with signs of Life

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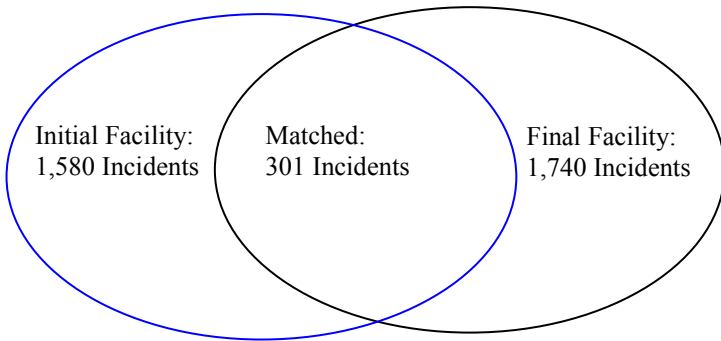
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For Quarter 3, 2014, of the 8,814 incidents reported to the Indiana Trauma Registry, 1580 cases that had an ED Disposition of “Transferred to another acute care facility” at the initial facility or that had the Inter-Facility Transfer equal to “Yes” at the Trauma Center. Of those transferred, 301 cases were probabilistically matched. The linked cases make up 9.1% of the Q3 2014 data. All public health preparedness districts are represented. The diagram below illustrates the overlap between the transfers reported from the initial facility and from the final facility that can be matched.



The initial facility in which transfers come from may be considered Critical Access Hospitals (CAHs). All Indiana CAHs are considered Rural, and must meet additional requirements to have a CAH designation, such as having no more than 25 inpatient beds and being located in a rural area. Facilities that are highlighted indicate that these facilities reported data for Quarter 3, 2014.

Within this transfer data section, the purple columns represent the transfer cases and the single percentages represent the percent for the transfer cases. For two demographic variables, patient age groupings and gender, the Indiana average is included to provide more insight to this transfer population.

### Indiana Critical Access Hospitals (CAHs)

Adams Memorial Hospital	Pulaski Memorial Hospital
Cameron Memorial Community Hospital Inc	Putnam County Hospital
Community Hospital of Bremen Inc	Rush Memorial Hospital
Decatur County Memorial Hospital	Scott Memorial Hospital
Dukes Memorial Hospital	St Vincent Frankfort Hospital Inc
Gibson General Hospital	St Vincent Jennings Hospital Inc
Greene County General Hospital	St Vincent Mercy Hospital
Harrison County Hospital	St Vincent Randolph Hospital Inc
IU Health Bedford Hospital	St Vincent Salem Hospital Inc
IU Health Blackford Hospital	St. Mary's Warrick Hospital Inc
IU Health Paoli Hospital	St. Vincent Clay Hospital Inc
IU Health Tipton Hospital	St. Vincent Dunn Hospital Inc
IU Health White Memorial Hospital	St. Vincent Williamsport Hospital, Inc.
Jasper County Hospital	Sullivan County Community Hospital
Jay County Hospital	Union Hospital Clinton
Margaret Mary Community Hospital Inc	Wabash County Hospital
Parkview LaGrange Hospital	Woodlawn Hospital
Perry County Memorial Hospital	

### Rural Hospitals

Columbus Regional Hospital	King's Daughters' Health
Daviess Community Hospital	Kosciusko Community Hospital
Doctor's Neuromedical	Marion General Hospital
Fayette Regional Health System	Memorial Hospital
Franciscan St Anthony Health - Michigan City	Memorial Hospital and Health Care Center
Franciscan St Elizabeth Health - Crawfordsville	Parkview Noble Hospital
Good Samaritan Hospital	Reid Hospital & Health Care Services
Henry County Memorial Hospital	Saint Joseph RMC - Plymouth
Indiana University Health La Porte Hospital	Schneck Medical Center
Indiana University Health Starke Hospital	

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8,814 Incidents—301 Transfers

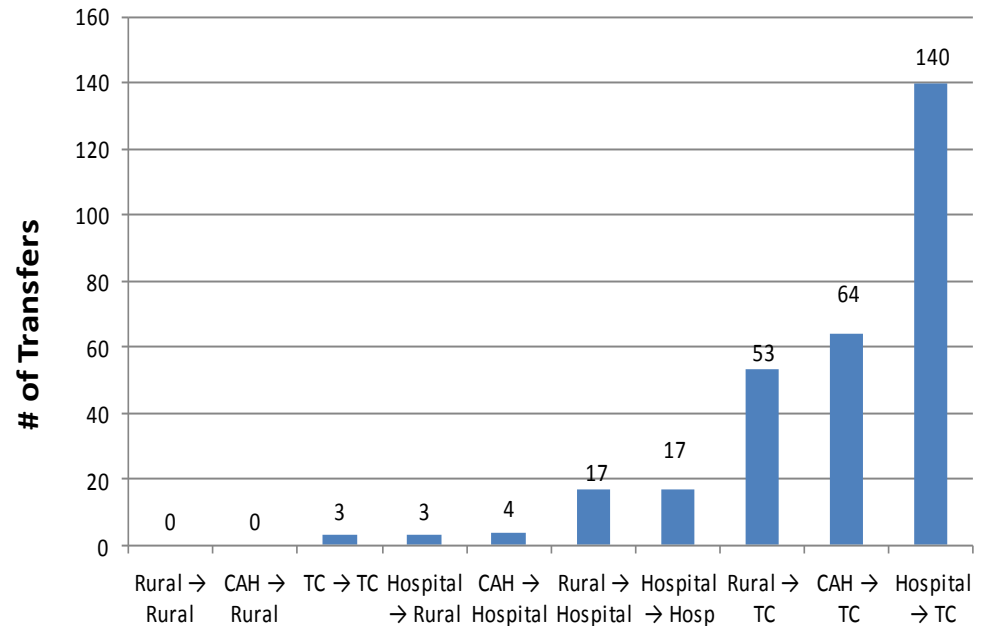
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### Facility to Facility Transfers

For Transfer Patients:		
Initial Hospital Type	Final Hospital Type	Incident Counts
Rural Hospital	Rural Hospital	0
Critical Access Hospital	Rural Hospital	0
Trauma Center	Trauma Center	3
Hospital	Rural	3
Critical Access Hospital	Hospital	4
Rural Hospital	Hospital	17
Hospital	Hospital	17
Rural Hospital	Trauma Center	53
Critical Access Hospital	Trauma Center	64
Hospital	Trauma Center	140

### Facility Transfer Type



Rural = Rural Hospital; TC = ACS Verified Trauma Center; CAH = Critical Access Hospital; Hospital = does not fall into above categories

\*There were four hospitals deemed “in the process” trauma centers for the purposes of the triage and transport rule during Q3, 2014. Because this report spans data from July 1, 2014 through September 30, 2014, and there were fewer than five hospitals with “in the process” status during the entire quarter, we cannot separate the “in the process” trauma centers from “hospitals” because of respect for patient privacy. Patients may be able to be identified due to isolating one hospital’s data.

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## For Linked Transfer

For Transfer Patients:				
	All Transfer Patients	<u>Critical*</u> Transfer Patients	<u>Physiological Critical**</u> Transfer Patients	<u>ISS Critical***</u> Transfer Patients
<b>Number of Patients</b>	301	113	100	52
<b>EMS Notified to Scene</b>	8.2 minutes	8.3 minutes	8.1 minutes	7.9 minutes
<b>EMS Scene Arrival to Departure</b>	16.4 minutes	16.5 minutes	16.3 minutes	15.2 minutes
<b>EMS Scene Departure to Initial Hospital ED Arrival</b>	16.7 minutes	15.6 minutes	15.1 minutes	18.9 minutes
<b>Initial Hospital ED Arrival to Departure</b>	2 hours 52.4 minutes	2 hours 50 minutes	2 hours 50 minutes	2 hours 15 minutes
<b>Initial Hospital ED Departure to Final Hospital ED Arrival</b>	58.1 minutes	55.9 minutes	55.8 minutes	1 hour 14.7 minutes
<b>TOTAL TIME</b>	4 hours 2 minutes	4 hours 26 minutes	3 hours 30 minutes	4 hours 12 minutes

\*Critical patient is defined as having a GCS  $\leq$  12, OR Shock Index  $>$  0.9 OR ISS  $>$  15 at the initial hospital.

\*\*Physiological Critical Transfer patient is defined as having a Shock Index  $>$  0.9 OR GCS  $\leq$  12 at the initial hospital.

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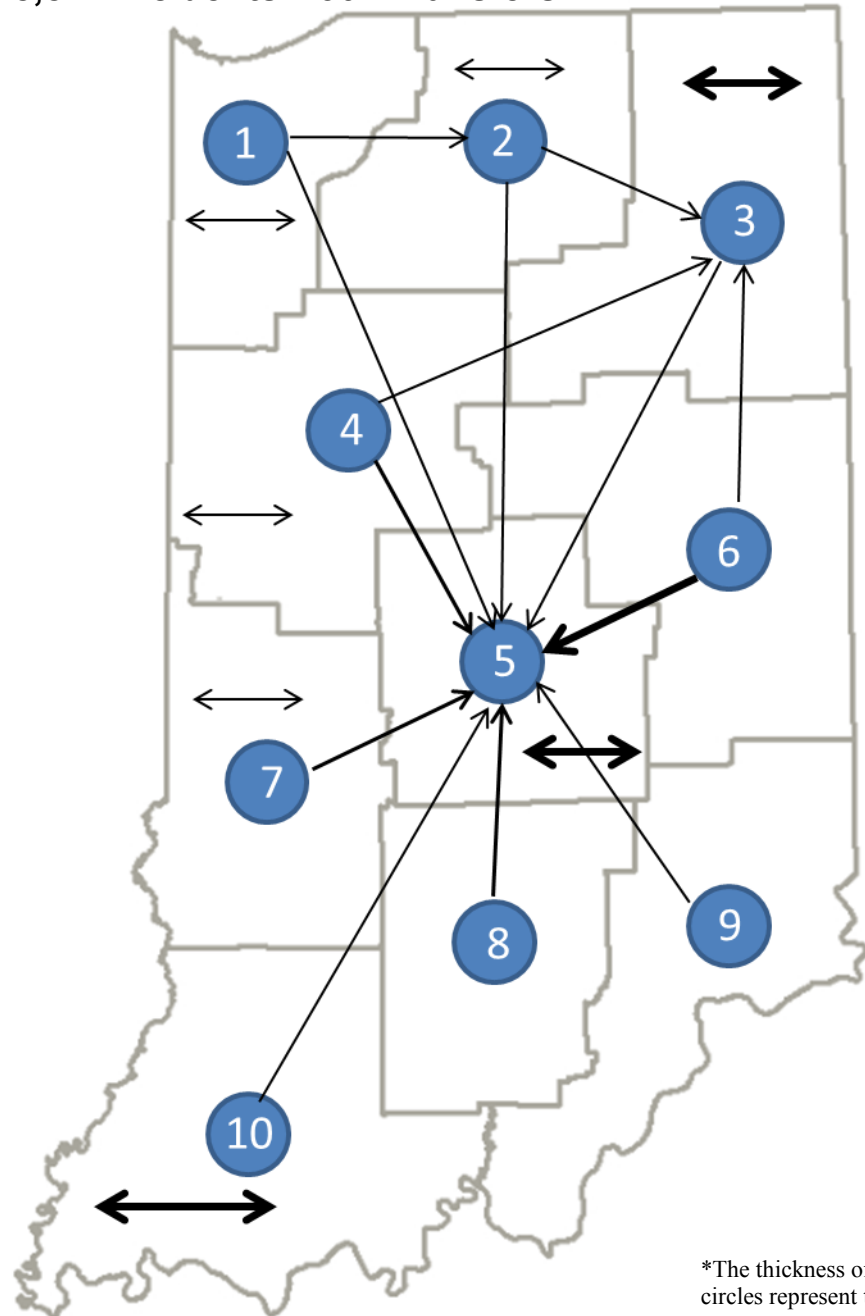
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### For Transfer Patients:

Public Health Preparedness District Initial Hospital	Public Health Preparedness District Final Hospital	Incident Counts
1	1	8
1	2	10
1	5	2
2	2	2
2	3	7
2	5	2
3	3	48
3	5	2
4	3	3
4	4	2
4	5	12
5	5	77
6	3	2
6	5	45
7	5	28
7	7	4
8	5	13
9	5	1
10	5	1
10	10	32

\*The thickness of the line indicates the frequency of transfers out of or within the public health preparedness district. The circles represent transfers from a specific Public Health Preparedness District, not of a specific hospital or county.

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### For Linked Transfer Patients:

For Transfer Patients:				
	All Transfer Patients	<u>Critical*</u> Transfer Patients	<u>Physiological Critical**</u> Transfer Patients	<u>ISS Critical***</u> Transfer Patients
Number of Patients	301	113	100	52
Total Time	4 hours 2 minutes	4 hours 26 minutes	3 hours 30 minutes	4 hours 12 minutes
Total Mileage	54.7	54.8	54.7	60.3
Injury Scene to Initial Hospital Mileage***	7.9	8.0	7.9	7.1
Initial Facility to Final Facility Mileage	46.8	46.8	46.8	53.2

Estimated Average Distance (miles) by Region (region of final hospital):					
Region	Injury Scene to Initial Facility Mileage <sup>†</sup>	Initial Facility to Final Facility Mileage	Total Mileage	Drive Count	Air Count
Indiana Average	7.9	46.8	54.7	256	45
North Region	7.2	40.9	48.0	127	17
Central Region	9.5	52.2	61.7	101	25
South Region	5	52.8	57.8	28	3

\*Critical patient is defined as having a GCS  $\leq$  12, OR Shock Index  $>$  0.9 OR ISS  $>$  15 at the initial hospital.

\*\*Physiological Critical Transfer patient is defined as having a Shock Index  $>$  0.9 OR GCS  $\leq$  12 at the initial hospital.

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<sup>†</sup>Injury Scene to Initial Facility Mileage location estimated by zip code centroid

Statistics for Estimated Average Distance by Region calculated by Public Health Geographics, Epidemiology Resource Center, ISDH

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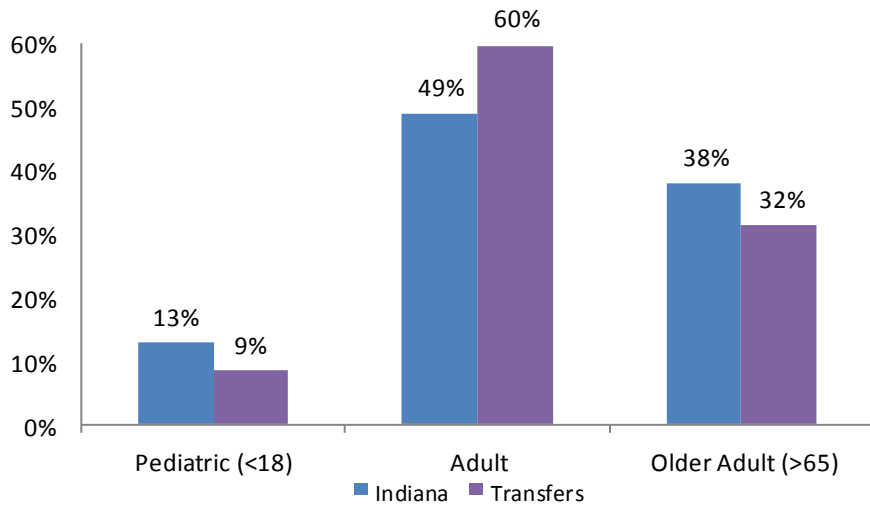
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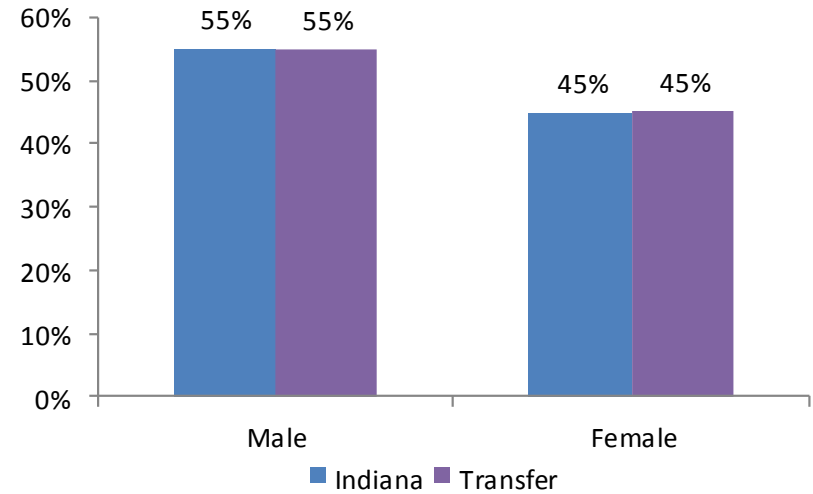
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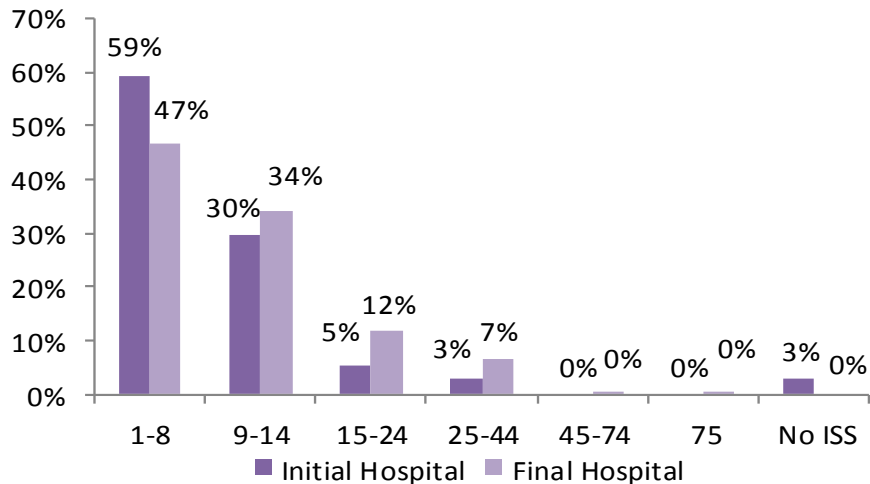
### Patient Age Groupings



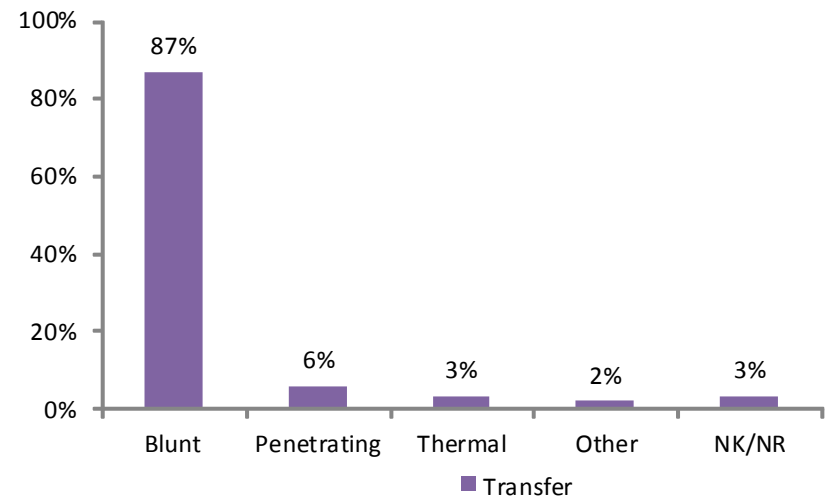
### Patient Gender



### Injury Severity Score (ISS)



### Trauma Type- Final Hospital



There was 1 case in the ISS 45-74 category and 1 case in the 75+ ISS category



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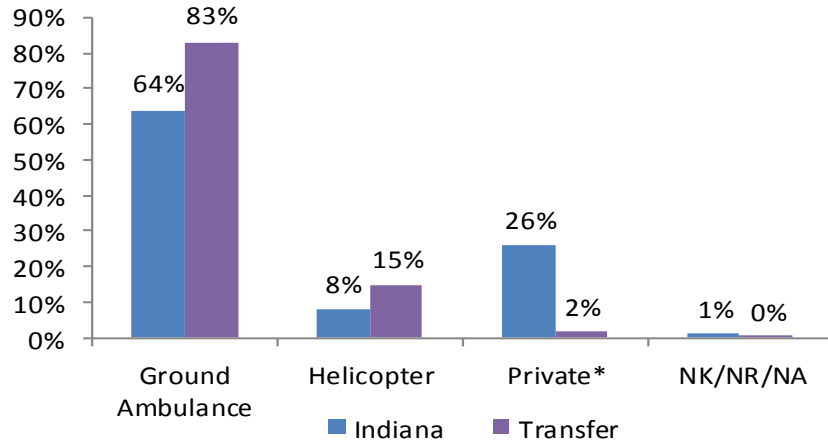
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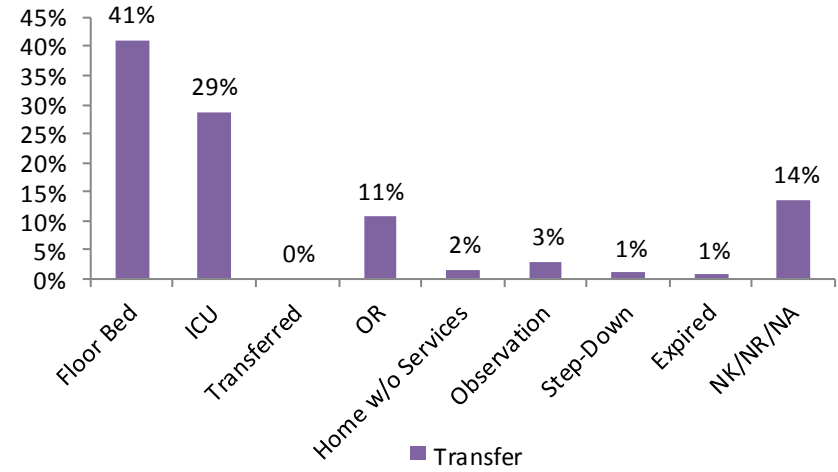
### Transport Mode— Final Hospital



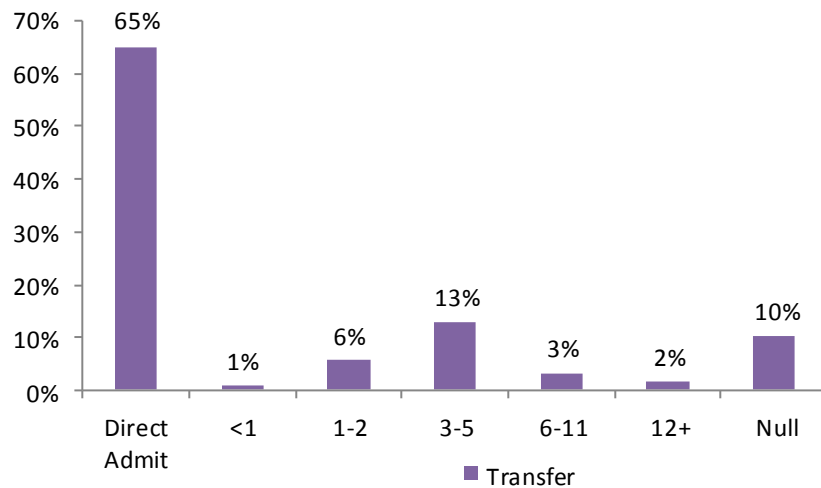
<1% Transport Mode: Police, Other

\* Indicates Private/ Public Vehicle, Walk-in

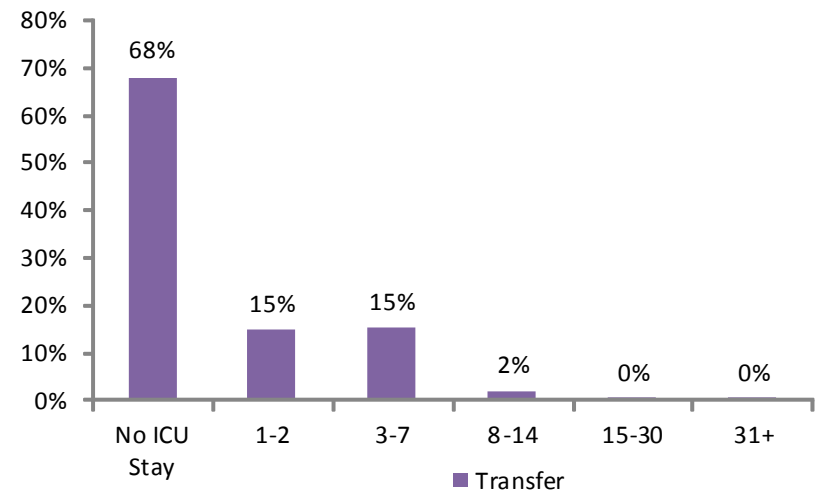
### ED Disposition by Percentage- Final Hospital



### ED Length of Stay (hours)- Final Hospital



### ICU Length of Stay (days)- Final Hospital



# Indiana Trauma Registry

## Statewide Quarter 3 Data Report

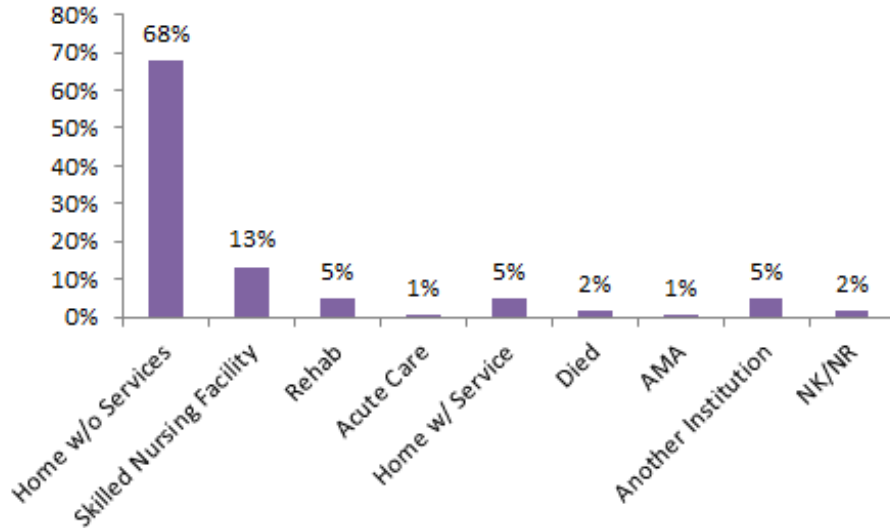
July 1, 2014 to September 30, 2014

8,814 Incidents—301 Transfers

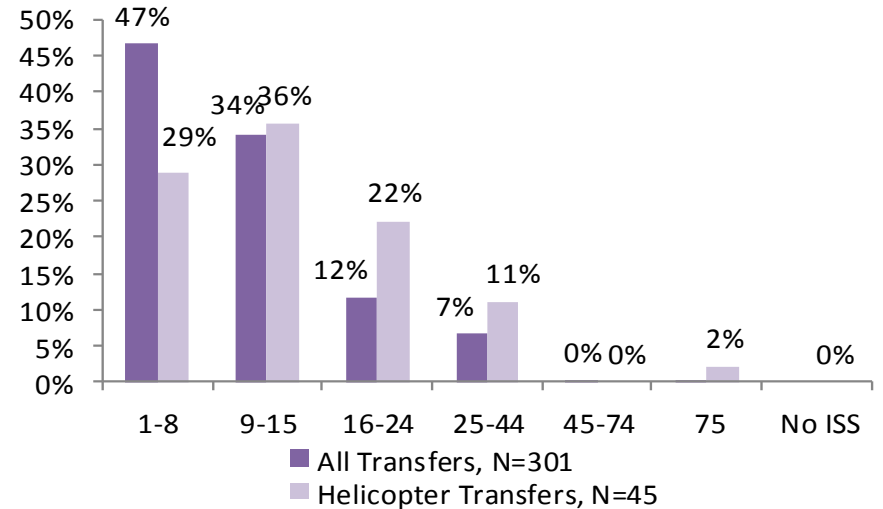
95 Total Hospitals Reporting

Trauma Centers: 11 facilities 52.7% of data  
 (Non-Trauma) Hospitals: 84 facilities 47.3% of data

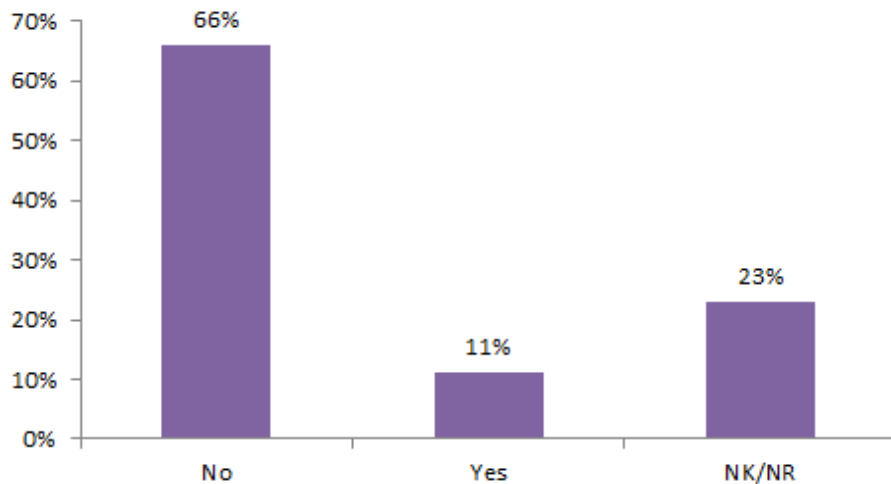
### Discharge Disposition— Final Hospital



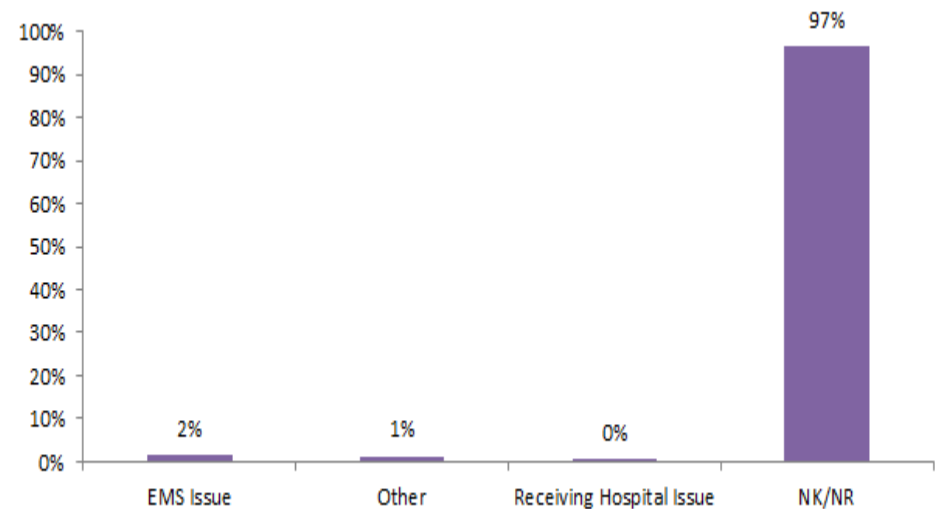
### Helicopter Transfers by ISS— Final Hospital



### Transfer Delay Indicated- Initial Hospital



### Initial Facility Transfer Delay Reason -



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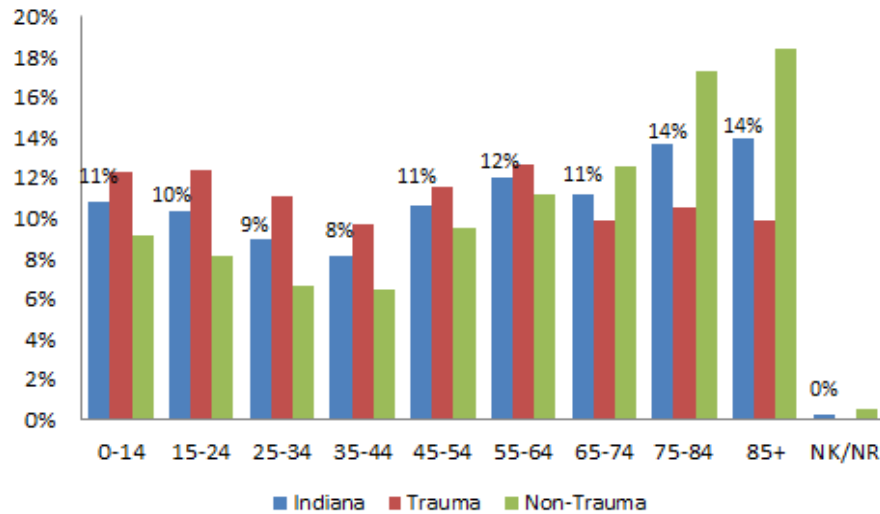
July 1, 2014 to September 30, 2014

8,814 Incidents

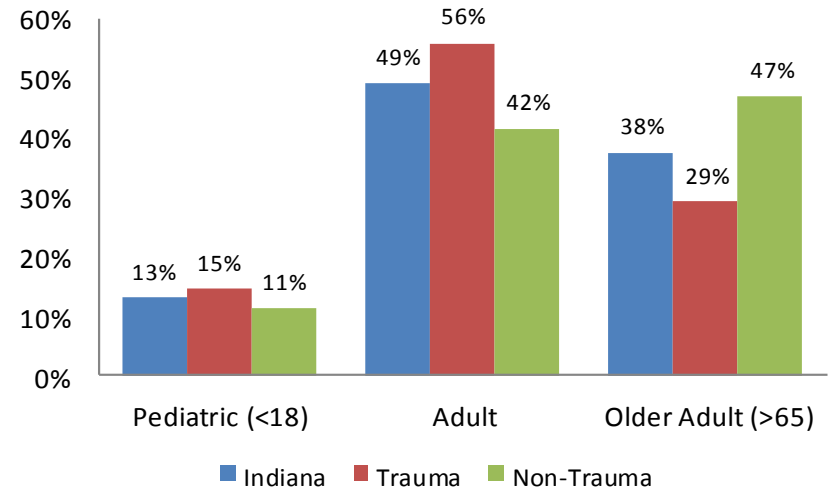
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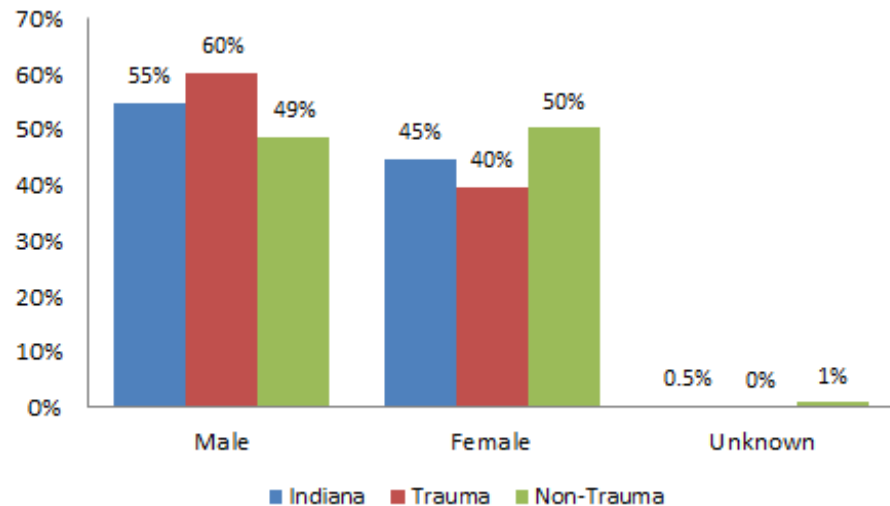
### Patient Age (Years)



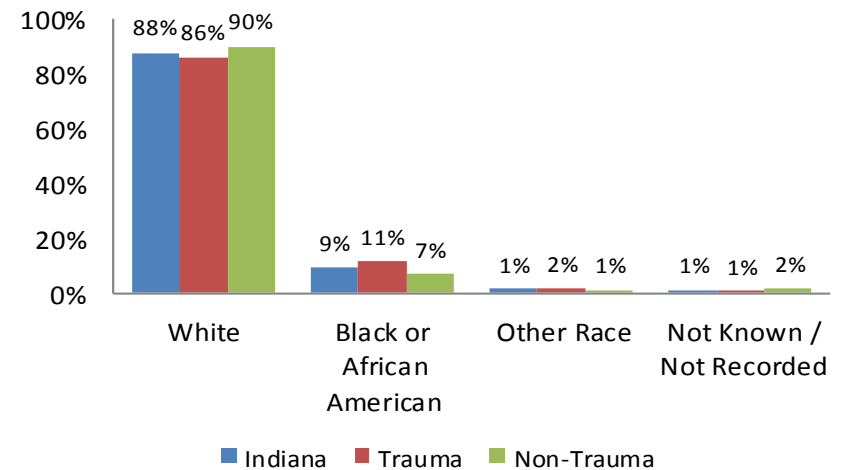
### Patient Age Groupings



### Patient Gender



### Patient Race



# Indiana Trauma Registry

## Statewide Quarter 3 Data Report

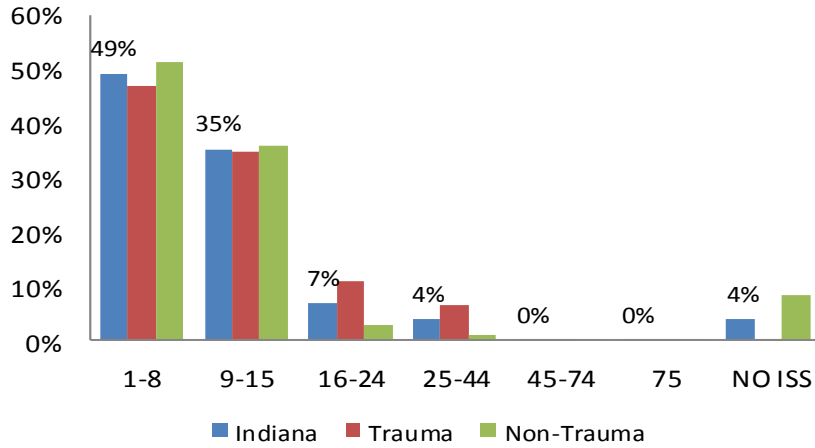
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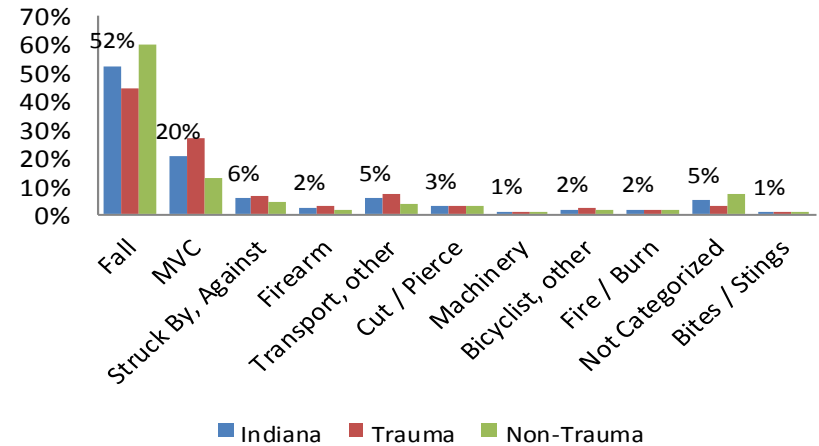
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### Injury Severity Score (ISS)



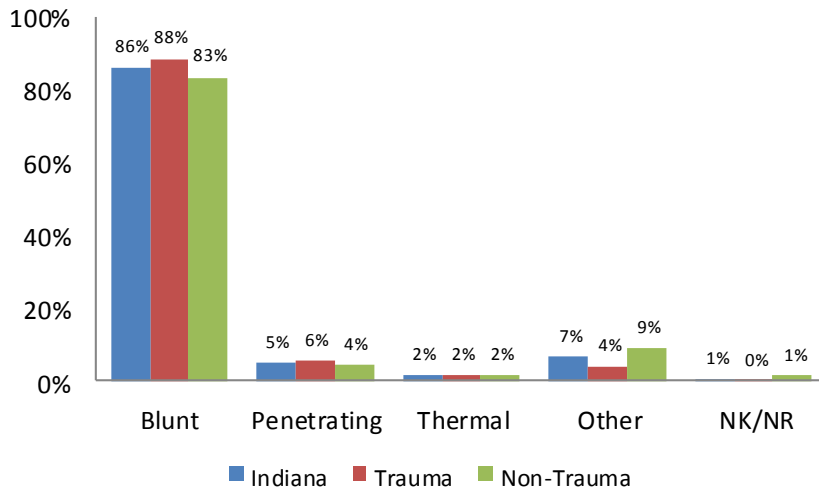
### Cause of Injury



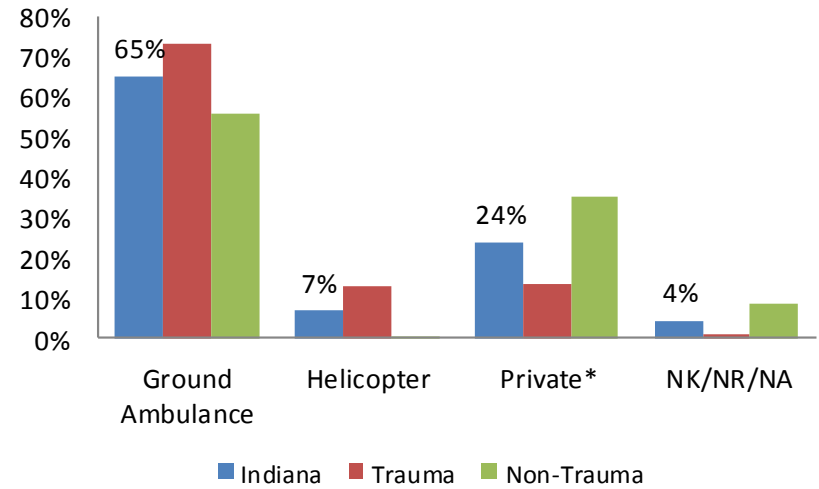
There was one case in both the 45-74 and 75+ categories.

<1% COI: Pedestrian Traffic Accident, Natural/Environment, Overexertion, No E-Code

### Trauma Type



### Transport Mode



<1% Transport Mode: Police, Other

\* Indicates Private/ Public Vehicle, Walk-in

# Indiana Trauma Registry

## Statewide Quarter 3 Data Report

July 1, 2014 to September 30, 2014

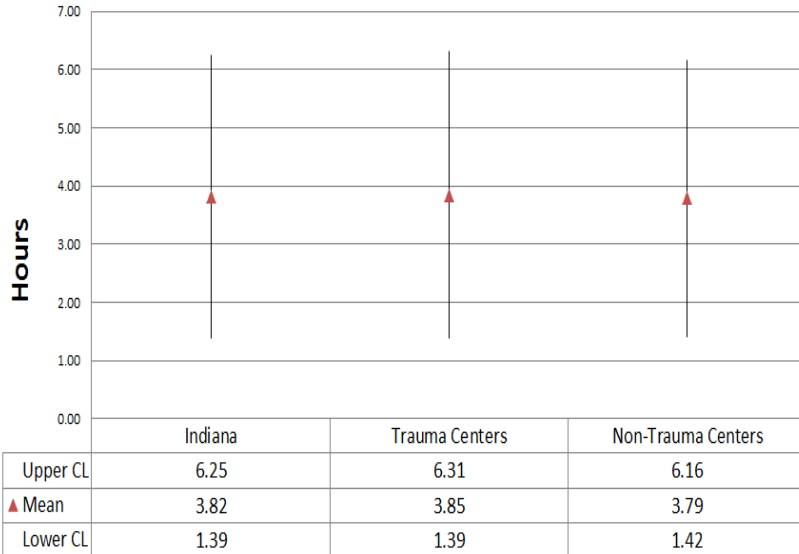
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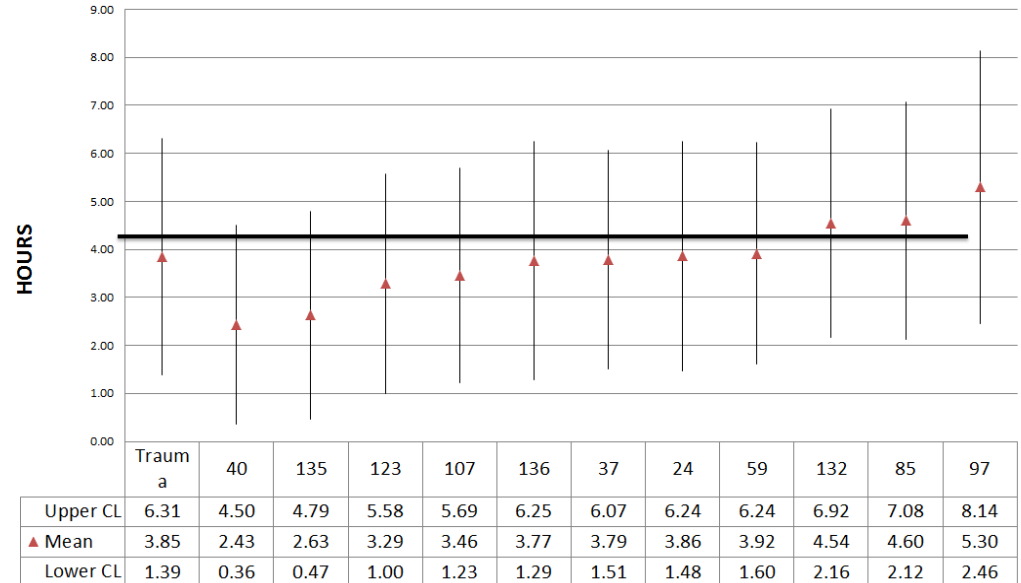
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### All Patients

#### Average ED LOS (Hours)



#### Trauma Centers-Average ED LOS (Hours)



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The ED LOS for these graphs was modeled using time-to-event analysis. The purposes of using this analysis were to account for censoring (death) and to see how variables influence ED LOS. The outcome variable was ED LOS and the independent variables were total GCS and age. If total GCS was missing but manual total GCS was recorded, then the manual total GCS was used. These two variables were used because they were the most similar to variables used in the published, peer-reviewed literature on ED LOS. Both were significant in the model. Increasing total GCS and age led to a slightly shorter ED LOS. Hospitals that did not have enough incidents with total GCS or age could not be modeled.

In the chart on the left, note the trauma center average is above the mean and the non-trauma center is below the mean. The mean, 95% confidence limit and lower confidence limit are listed for each group.

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# Indiana Trauma Registry

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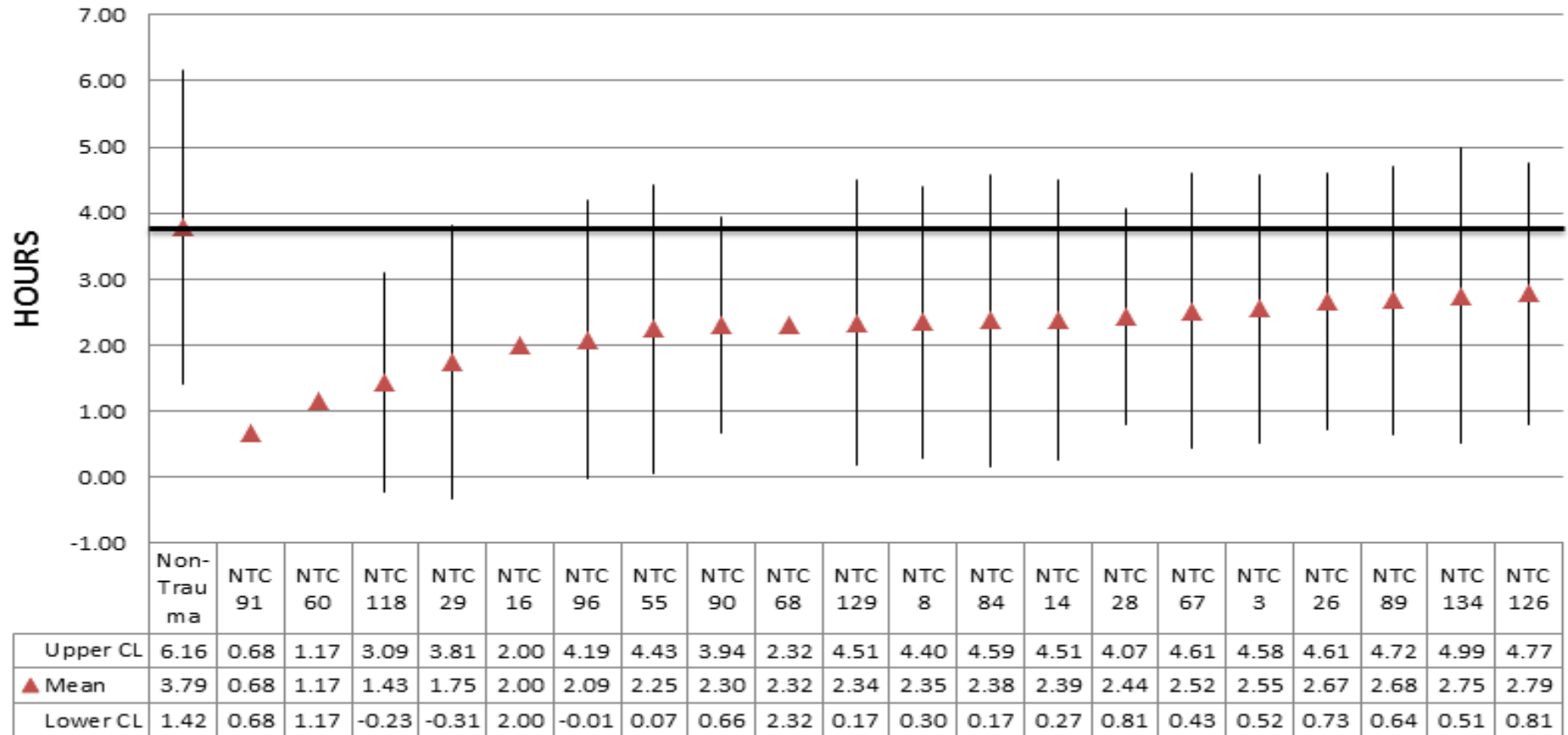
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### All Patients Non-Trauma Centers- Average ED LOS (Hours)



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# Indiana Trauma Registry

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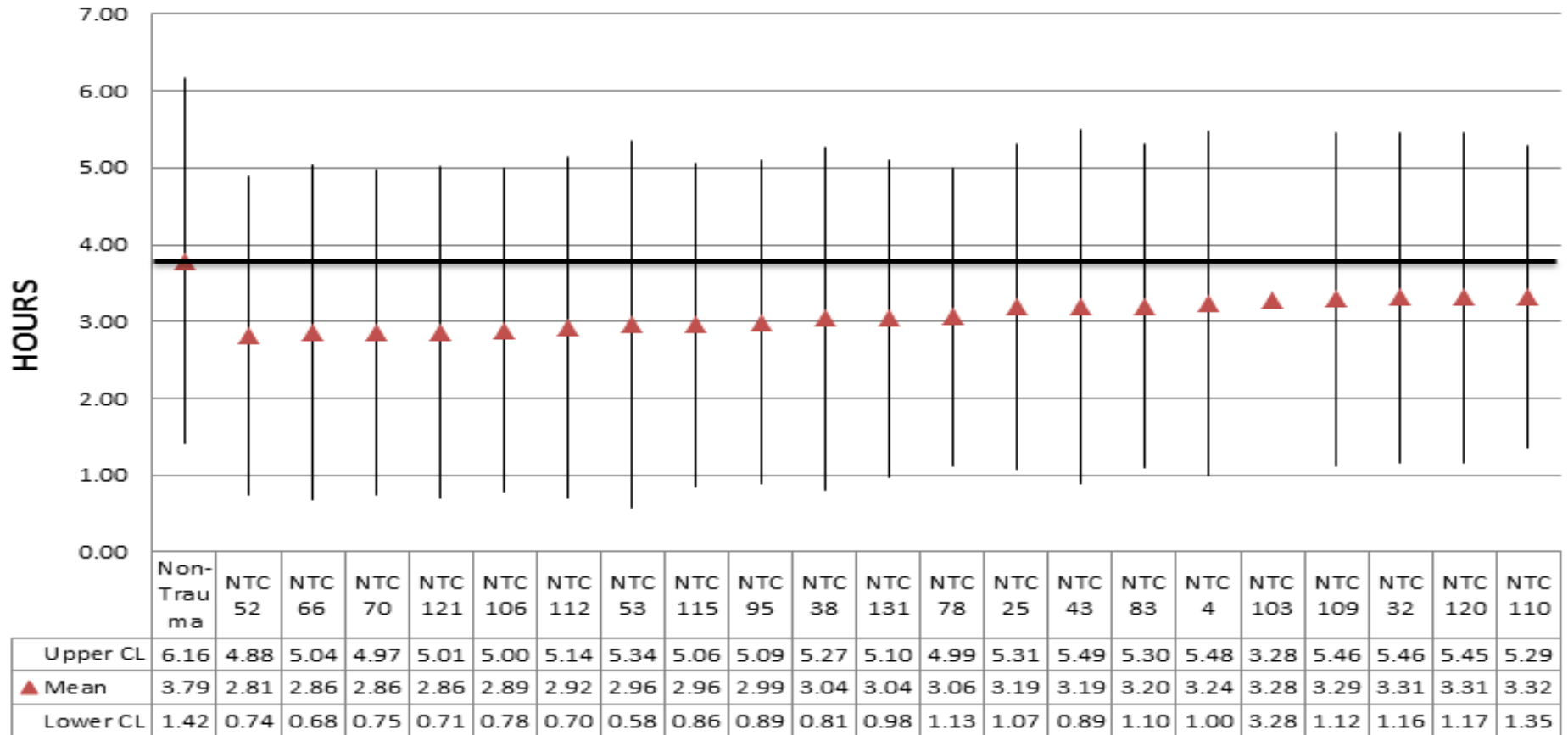
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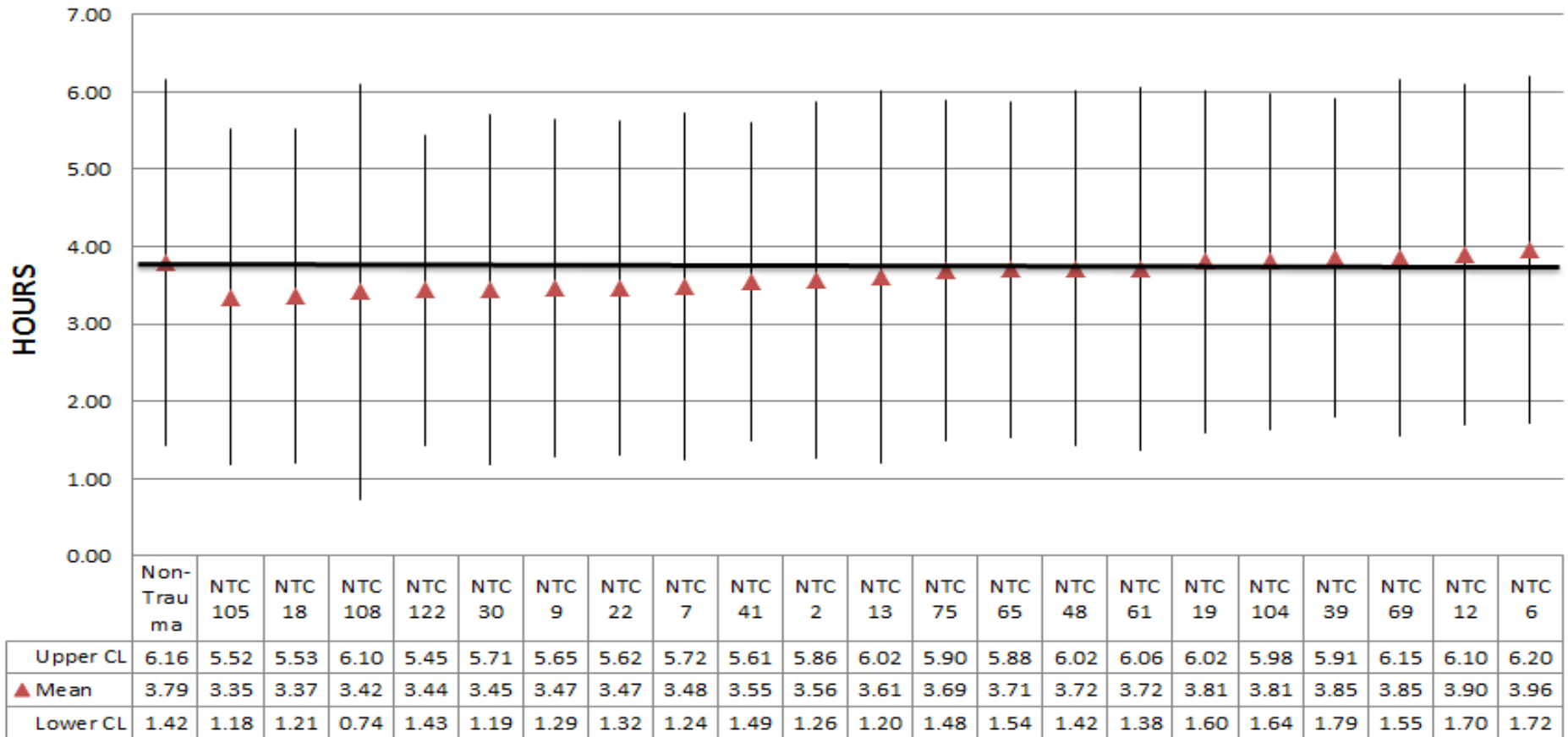
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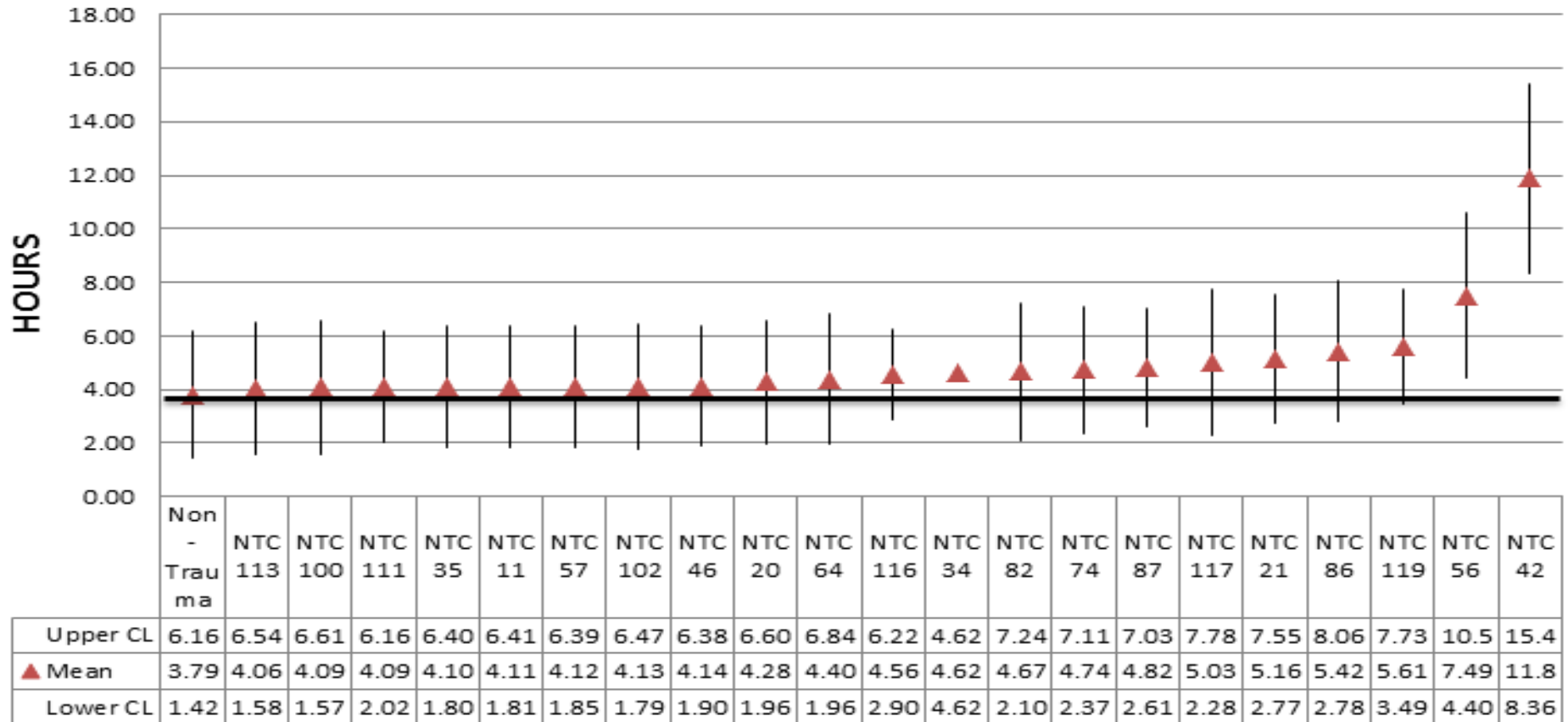
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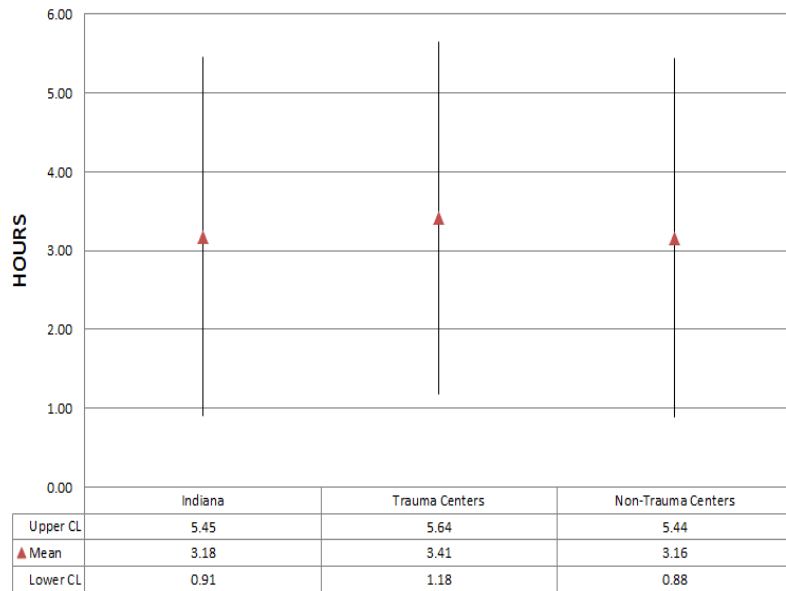
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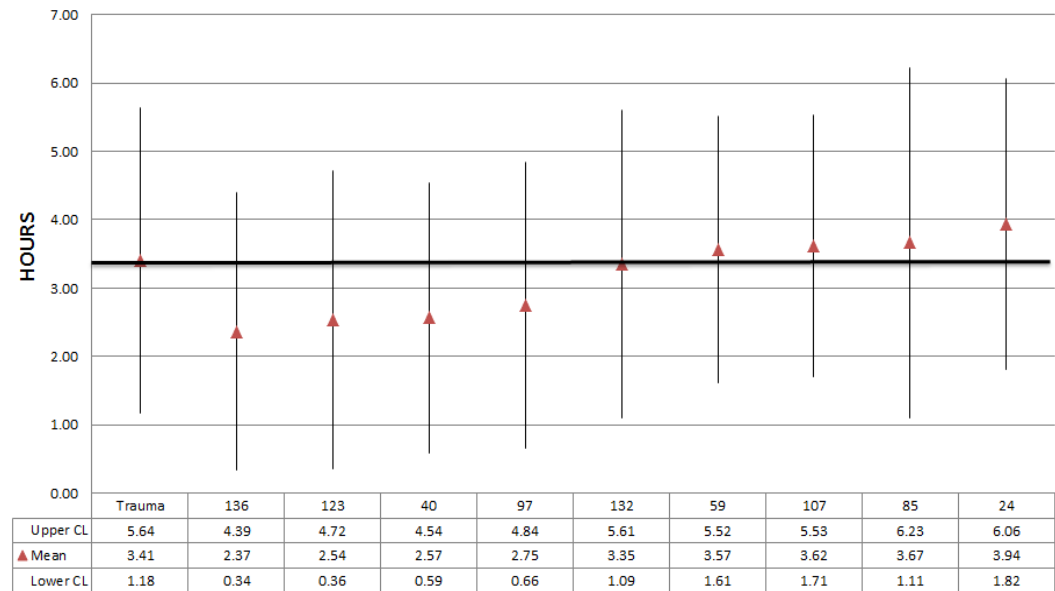
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### ED Disposition = Transferred

#### Average ED LOS (Hours)



#### Trauma Centers-Average ED LOS (Hours)



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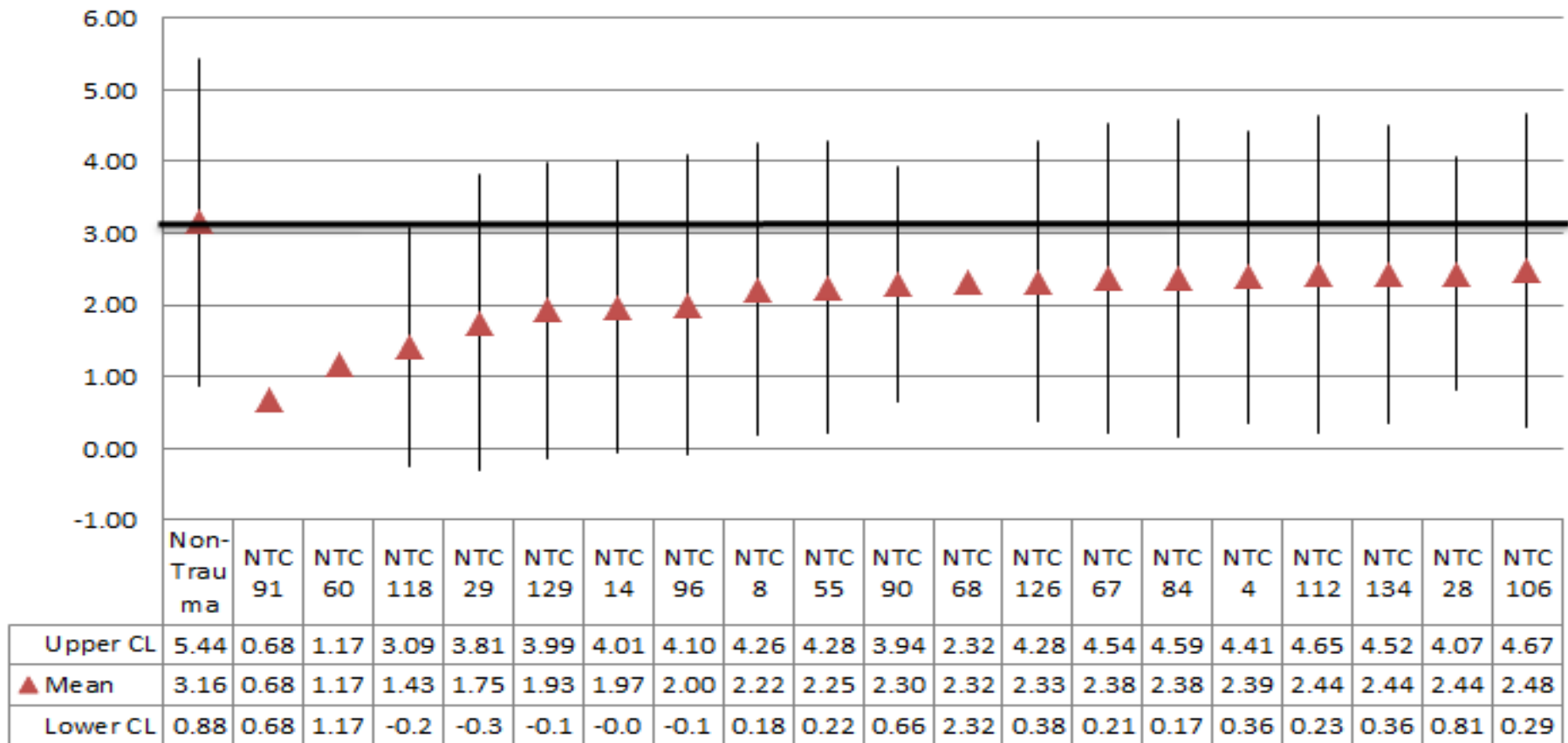
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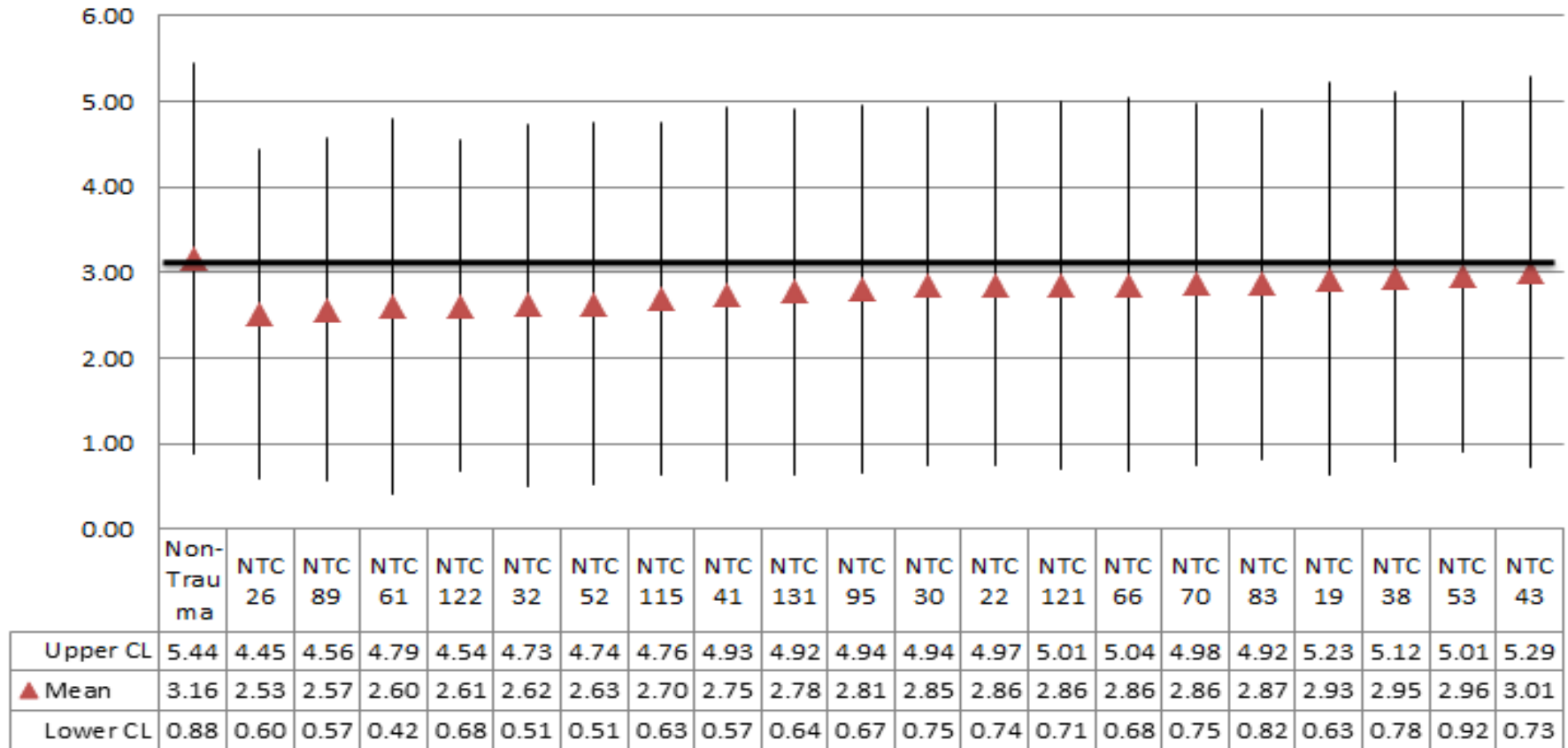
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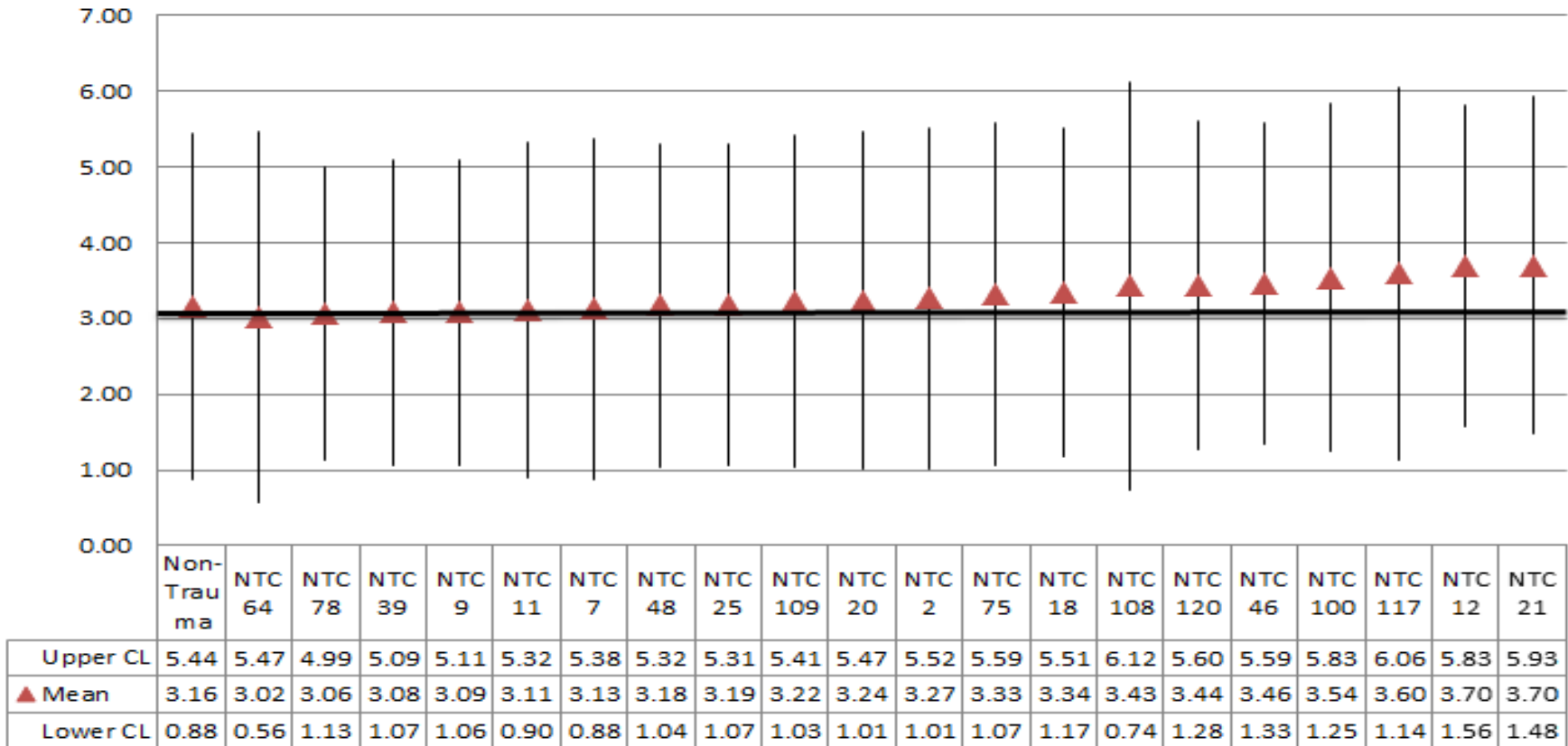
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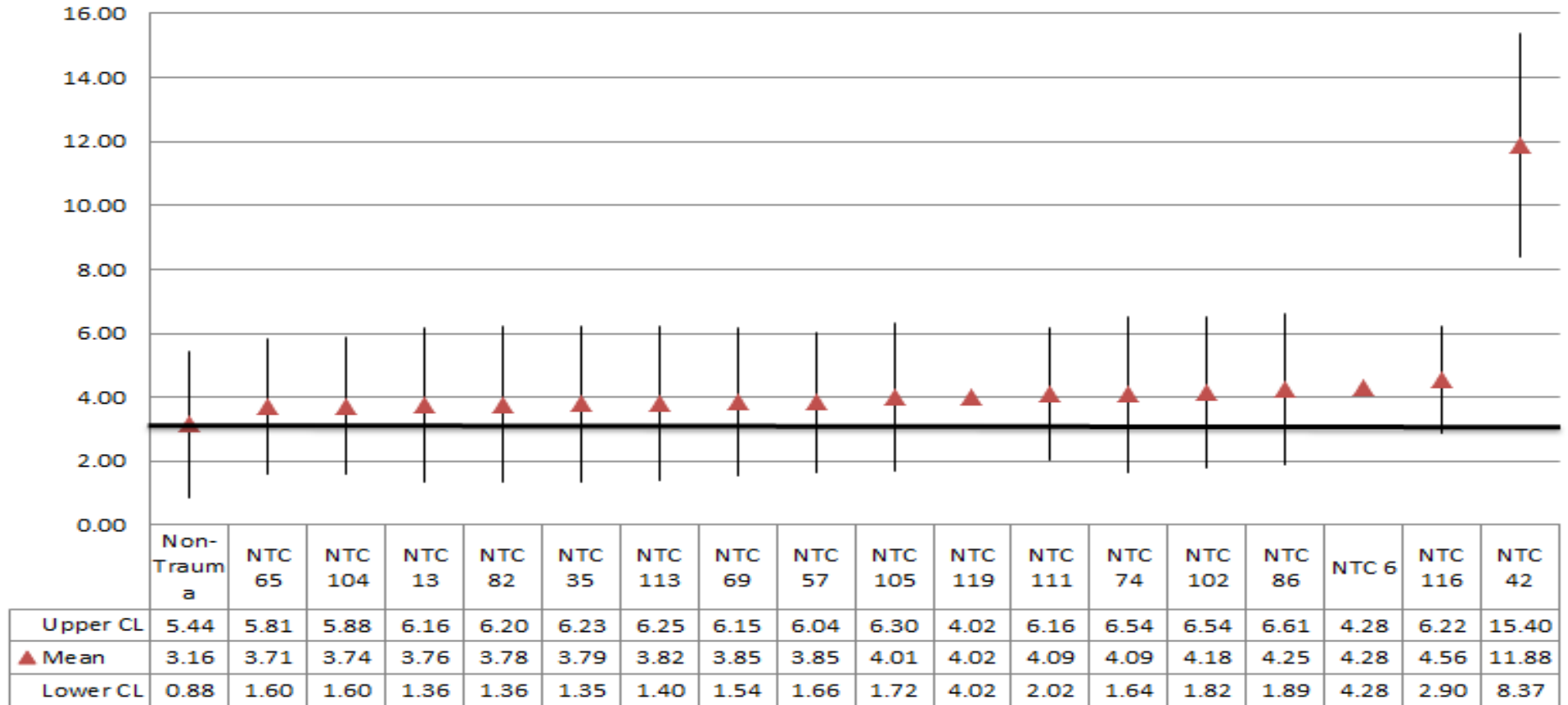
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### ED Length of Stay

ED Length of Stay (minutes)			
	Indiana Average	Trauma Center	Non-Trauma Center
N=	7647	4432	3215
Average	236.7	237.4	235.9
Std. Deviation	175.6	182.2	165.9
Minimum	0	0	0
Quartile 1	140	133.5	147
Median	207	204	211
Quartile 3	290	294	285
Maximum	2582	2582	1793

### ED Disposition

ED Disposition (count)			
	Indiana	Trauma Center	Non-Trauma Center
Floor Bed	3823	2218	1605
ICU	1267	1113	154
Transferred	1578	156	1422
OR	667	531	136
Home w/o Services	185	91	94
Observation	432	232	200
Step-Down	305	77	228
Expired	79	51	28
AMA	1	0	1
Home W/ Services	3	0	3
Other	10	3	7
NK/NR/NA	464	171	293

### ED Length of Stay by ISS

ED Length of Stay (minutes)						
ISS Category	Indiana Average	Indiana Average	Trauma Center	Trauma Center	Non-Trauma Center	Non-Trauma Center
	Counts	Minutes	Counts	Minutes	Counts	Minutes
1-8	3808	251	2063	259	1745	241.4
9-15	2748	234.5	1528	233.9	1220	235.1
16-24	589	214.4	492	313.4	97	220
25-44	330	169.4	292	170	38	165.2
45-74	21	152.2	20	142.9	1	339
75	14	77.7	14	77.7	0	-
No ISS	115	208.5	109	280.3	115	204.6

\*A bar graph of ED Disposition is found on page 2.

\*A bar graph of ED Length of Stay is found on page 2.

\*A Box and Whisker plot of ED LOS is found on page 3.

\*A Box and Whisker plot of ED Length of Stay by ISS is found on page 3.

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### ED Disposition (count) by ISS Category

	Floor Bed	ICU	Transferred	OR	Observation	NK/NR/NA	Step-Down	Home w/o Services	Expired	Other	AMA	Home w/ Services	Total
1-8	1910	332	927	315	315	158	172	170	16	7	1	2	4325
9-15	1615	436	484	197	94	150	111	12	16	1	0	1	3117
16-24	151	275	75	76	12	7	12	0	11	1	0	0	620
25-44	24	198	26	69	1	5	5	0	25	0	0	0	353
45-74	0	11	0	6	1	1	0	0	3	00	0	0	22
75	0	6	0	2	0	0	0	0	7	00	0	0	15
NO ISS	123	9	66	2	9	143	5	3	1	1	0	0	362
<b>Total</b>	<b>3823</b>	<b>1267</b>	<b>1578</b>	<b>667</b>	<b>432</b>	<b>464</b>	<b>305</b>	<b>185</b>	<b>79</b>	<b>10</b>	<b>1</b>	<b>3</b>	<b>8814</b>

\*Bar graph of ED Disposition by ISS is found on page 6.



# Indiana State Department of Health Indiana Trauma Registry

Hospitals Reporting Trauma Data  
Quarter 3, 2014  
July 1- September 30, 2014

## **H** Trauma Centers

Deaconess Hospital  
Eskenazi Health  
IU Health - Arnett Hospital  
IU Health - Ball Memorial Hospital  
IU Health - Methodist Hospital  
Lutheran Hospital of Indiana  
Memorial Hospital of South Bend  
Parkview Regional Medical Center  
Riley Hospital for Children at IU Health  
St. Mary's Medical Center of Evansville  
St. Vincent Indianapolis Hospital

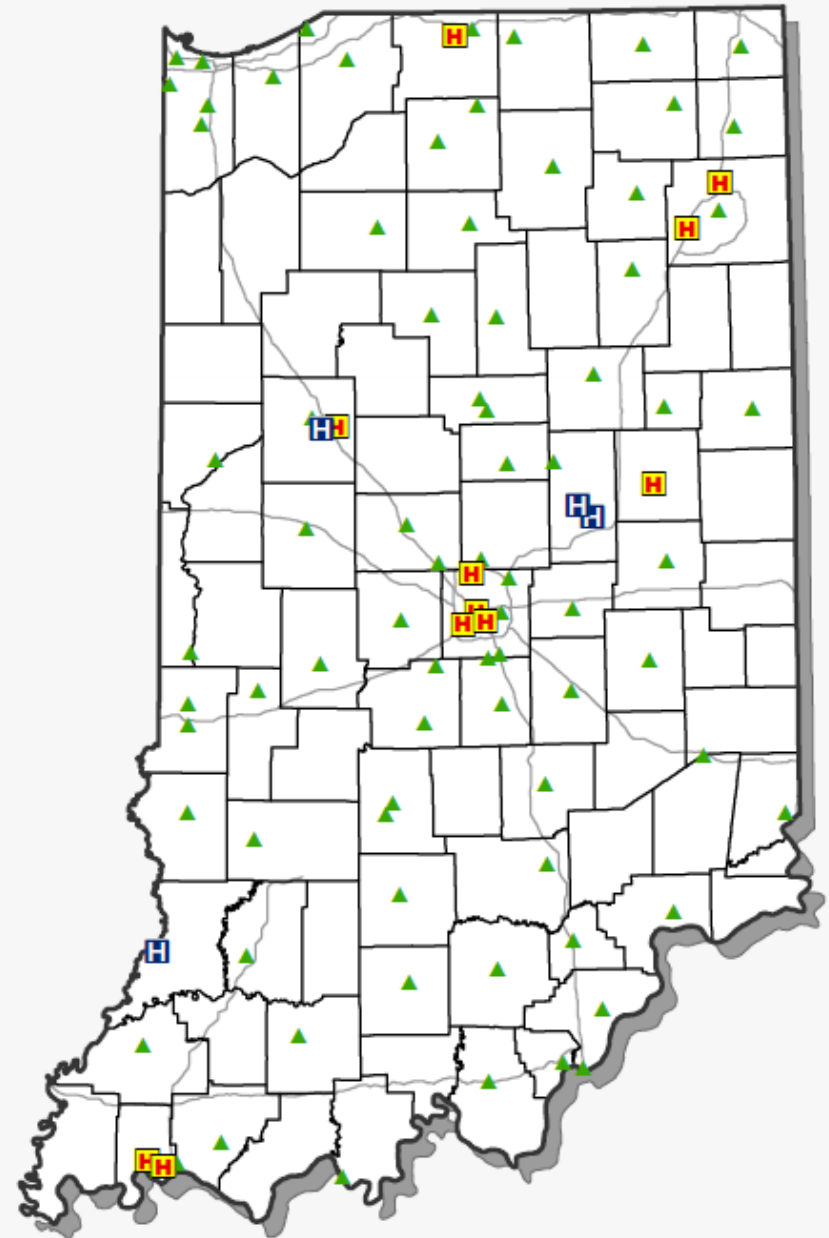
## **H** "In the Process" Hospital\*

Community Hospital of Anderson  
Good Samaritan Hospital  
St. Elizabeth East Hospital  
St. Vincent Anderson Hospital

## **▲** Non-Trauma Hospitals

84 Non-Trauma Hospitals

\* Considered a trauma center for purposes of the triage and transport rule.



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Requests and Changes to the Report from Trauma Care Committee members at the November 2014 ISTCC Meeting:

General Report:

- We are continuing to track the number of cases that fell into the ED LOS >12 hours category, which is on page 2.
- A map of all reporting hospitals is found on page 33. Note there were four “in the process” facility during Quarter 3 2014.
- Average ED LOS by district may be found on pages 4 and 5. ED LOS is split out into transfers and critical transfers.
- There were five cases with Ps  $\geq 50\%$  and ED Disposition of expired.
- A fourth column for transferred patients with ISS>15 was added on pages 13 and 15.

Transfer data:

-At the time this report was created, there were four hospitals deemed “in the process” trauma centers for the purposes of the triage and transport rule. Because this report spans data from July 1—September 30, 2014, and there were fewer than 5 hospitals with “in the process” status during the entire quarter, we cannot separate the “in the process” trauma center into its own column due to patient privacy. We were also unable to tease out “in the process” centers from hospitals on page 21 and 26 because of the same issue. Patients may be able to be identified due to isolation of one hospital’s data. We recognized the suggestion of the Trauma Care Committee and will reconsider the idea for the next report.

Example Bar and Whisker Plot:

-Bar and whisker plots were requested at the November, 2013 ISTCC meeting in order to show more than just an average ED LOS and ED LOS by ISS. The bar and whisker plots represent the four quartiles of data, as illustrated on the example graph to the right. The blue boxes each contain 25% of the values and the error bars each represent where 25% of the values fell. The median is represented in the middle of the two blue boxes with the white line. The red dot in the center indicates the average for that category. The cap on the error bars indicates the minimum and maximum of each category and all the values fall within the two caps.

-For the ED LOS bar and whisker plots to the right, the average is represented by the white dot and the color boxes reflect the hospital type. The ED LOS by ISS plots on the next page follow the same layout and the red dots indicate the average for each of the ISS categories.

