

# Indiana Trauma Registry

## Statewide Quarter 4 Data Report

October 1, 2018—December 31, 2018

9,218 Incidents

### 105 Total Hospitals Reporting

Level I and II:	10 facilities	47.9% of data
Level III:	12 facilities	17.8% of data
(Non-Trauma) Hospitals:	83 facilities	34.3% of data

For Quarter 4 2018 which spanned from October 1, 2018—December 31, 2018 there were 9,218 incidents reported to the Indiana Trauma Registry at the Indiana State Department of Health. There were 105 hospitals that reported data, of which 10 were level I or II trauma centers, 12 were level III trauma centers and 83 were non-trauma centers. There were 3 hospitals that either started to report again or were new to reporting during this quarter compared to the previous quarter, while 5 hospitals dropped off from reporting. A map of the state with the reporting hospitals can be found on page 19. Trauma centers represented 65.7% of the data. There were 3,348 incidents reported for October, 2,910 reported for November, and 2,960 incidents reported for December.

The content of this report has changed due to suggestions and additions requested by the Indiana State Trauma Care Committee at the August 17, 2018 meeting. Explanations of the changes requested and adapted from the ISTCC meeting can be found on page 12.

Some general reminders include that the blue columns represent an Indiana average, red columns represent level I and II trauma centers, green columns represent level III trauma centers and orange 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.**

### 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-10-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.

### Formulas:

#### Acronyms:

ED: Emergency Department	MVC: Motor Vehicle Collision
ICU: Intensive Care Unit	OR: Operating Room
ISS: Injury Severity Score	Ps: Probability of Survival
LOS: Length of Stay	Level I, II and III: Verified and In Process Trauma Centers
NTC: Non-trauma Center	CAHs: Critical Access Hospital

#### Calculations:

$$Ps = 1/(1+e^{-b}) \text{ where } b=b_0+b_1(RTS) + b_2(ISS) + b_3(\text{Age Index})$$

$$\text{Total GCS} = \text{Verbal GCS} + \text{Motor GCS} + \text{Eye GCS}$$

$$RTS = 0.94 * \text{GCS} + 0.73 * \text{SBP} + 0.29 * \text{RR}$$

$$ISS = (\text{AIS})^2 + (\text{AIS})^2 + (\text{AIS})^2$$



Indiana State  
Department of Health  
Trauma and Injury Prevention

# Indiana Trauma Registry

## Statewide Quarter 4 Data Report

October 1, 2018—December 31, 2018

9,218 Incidents

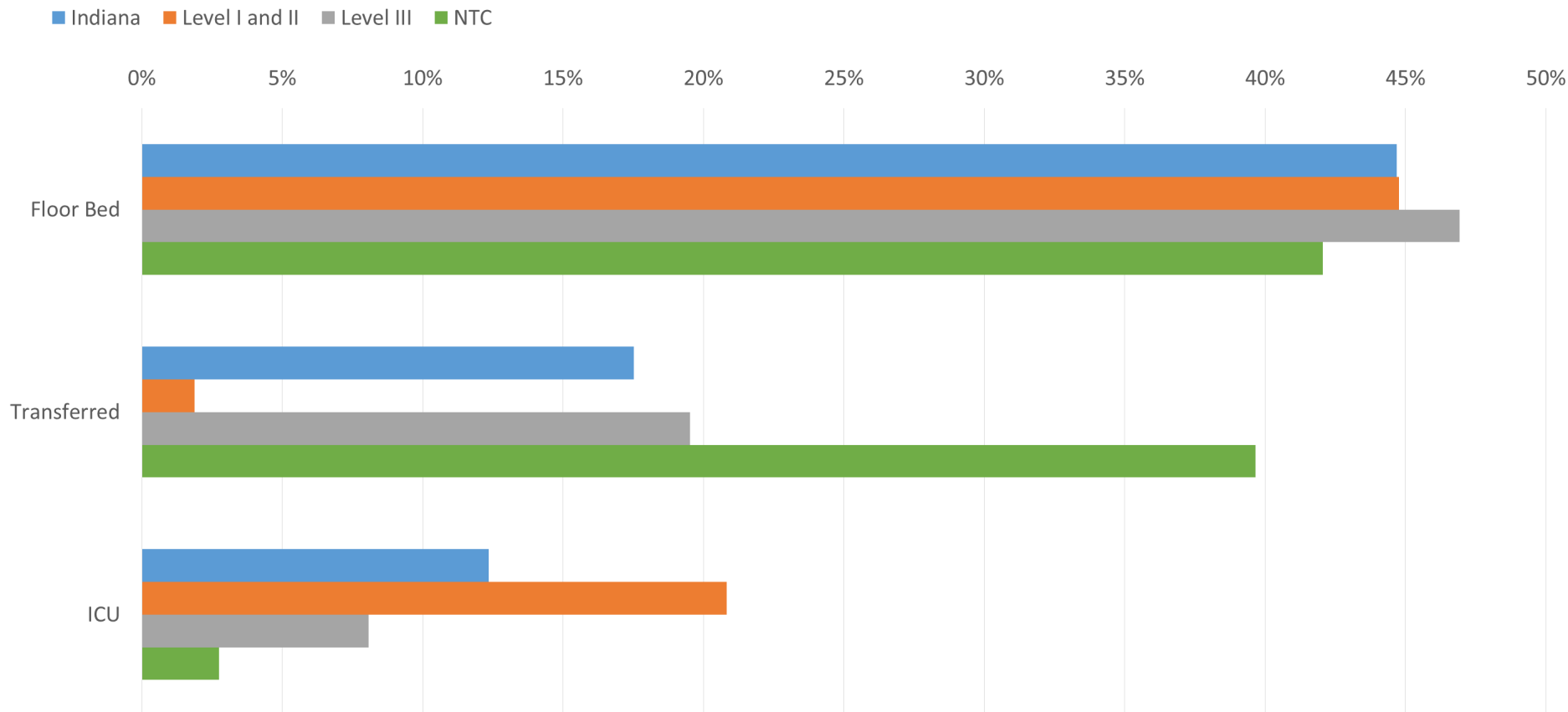
105 Total Hospitals Reporting

Level I and II: 10 facilities 47.9% of data

Level III: 12 facilities 17.8% of data

(Non-Trauma) Hospitals: 83 facilities 34.3% of data

The majority of patients in the ED go to a **floor bed**.



Statewide categories <10% include: OR, home w/o services, observation, step-down, expired, and NK/NR/NA.

# Indiana Trauma Registry

## Statewide Quarter 4 Data Report

October 1, 2018—December 31, 2018

9,218 Incidents

105 Total Hospitals Reporting

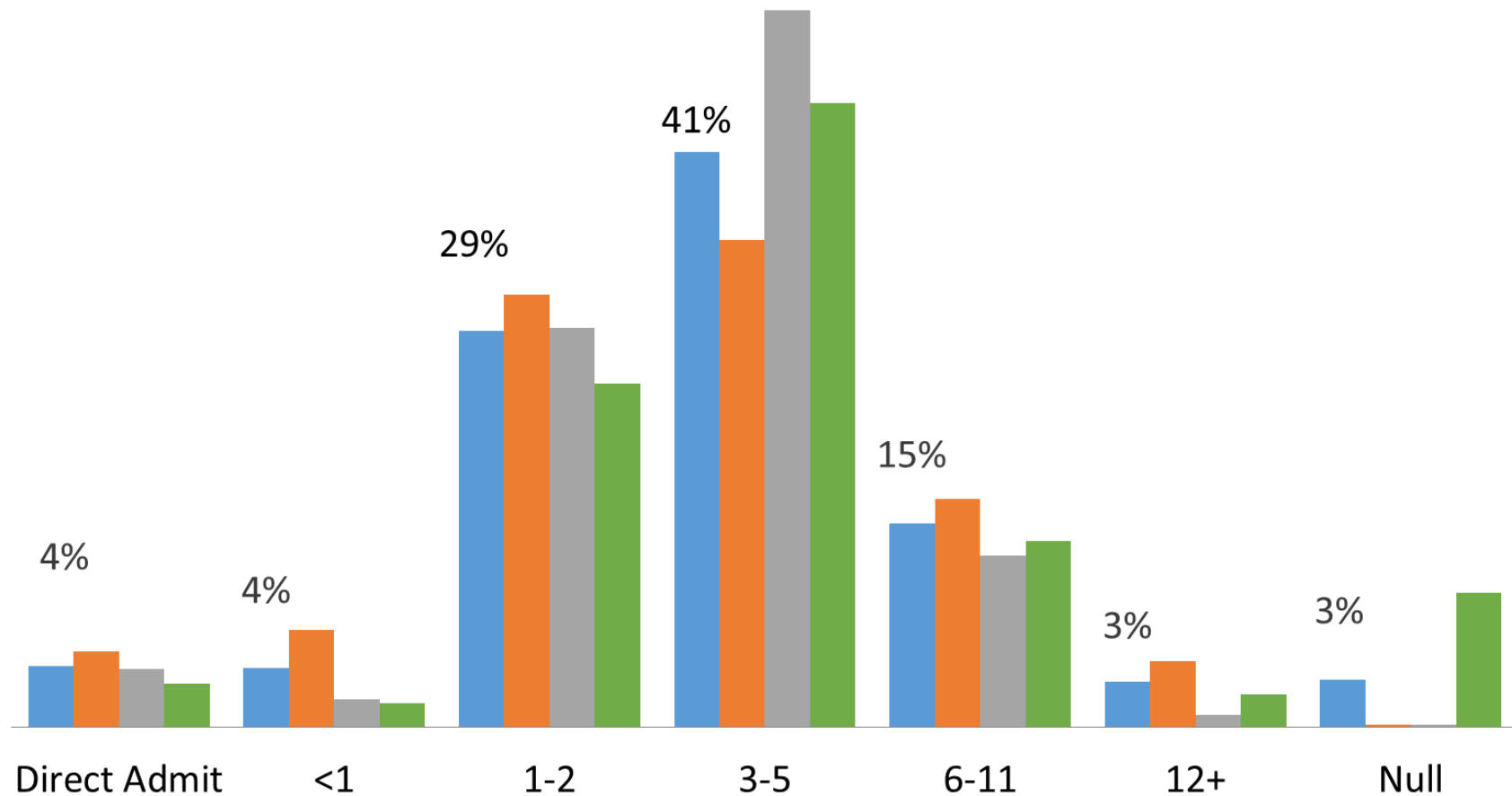
Level I and II: 10 facilities 47.9% of data

Level III: 12 facilities 17.8% of data

(Non-Trauma) Hospitals: 83 facilities 34.3% of data

The majority of patients in the ED stay for **1-5 hours**.

■ Indiana ■ Levels I and II ■ Level III ■ NTC



# Indiana Trauma Registry

## Statewide Quarter 4 Data Report

October 1, 2018—December 31, 2018

9,218 Incidents

105 Total Hospitals Reporting

Level I and II:

10 facilities

47.9% of data

Level III:

12 facilities

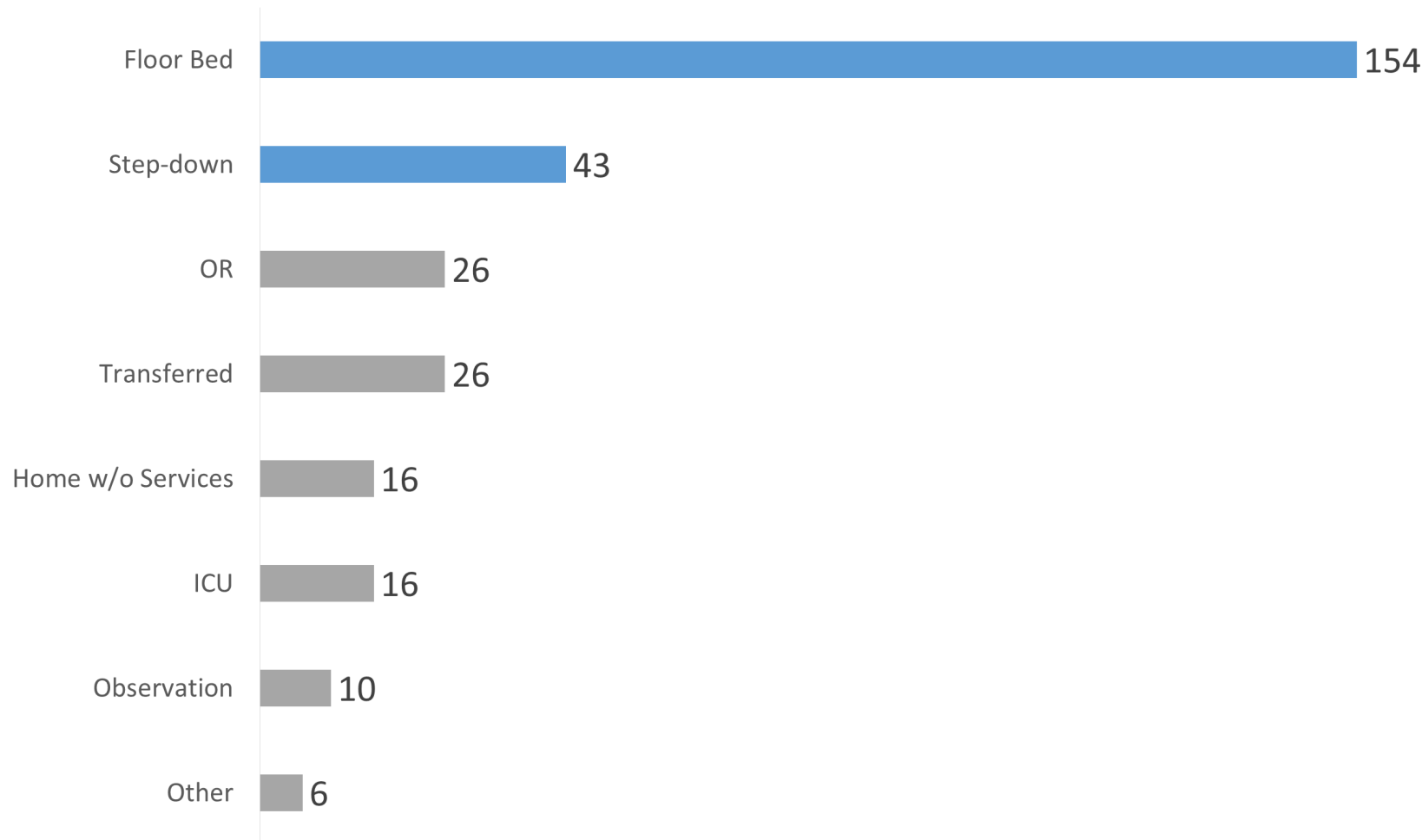
17.8% of data

(Non-Trauma) Hospitals:

83 facilities

34.3% of data

Most patients in the ED>12 hours go to a **floor bed** or **step-down unit**.



None of these patients died or had a disposition of AMA, Other, Home with Services or a Null value.

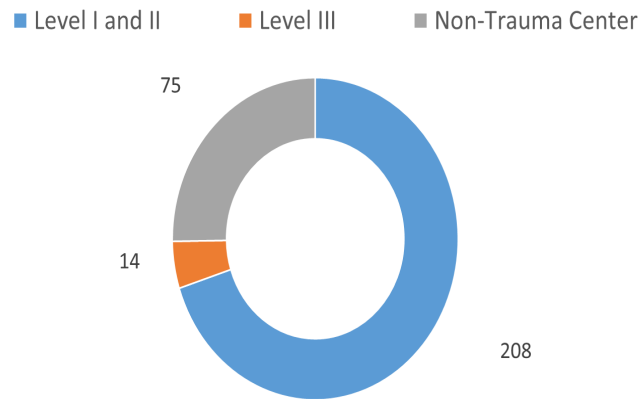
# Indiana Trauma Registry

**Statewide Quarter 4 Data Report**  
**October 1, 2018—December 31, 2018**  
**9,218 Incidents**

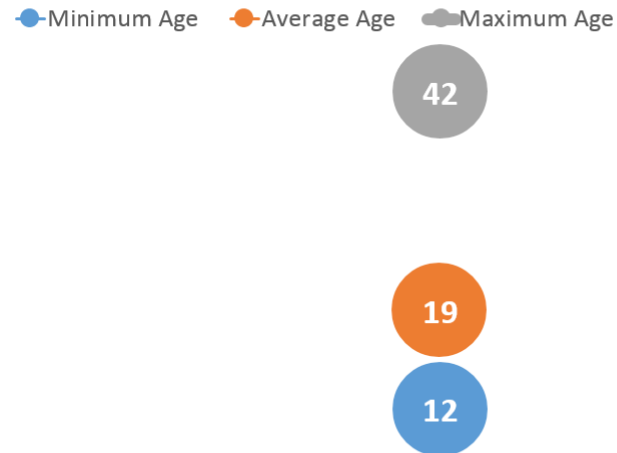
**105 Total Hospitals Reporting**  
 Level I and II: **10 facilities** **47.9% of data**  
 Level III: **12 facilities** **17.8% of data**  
 (Non-Trauma) Hospitals: **83 facilities** **34.3% of data**

## ED LOS > 12 Hours, N=297

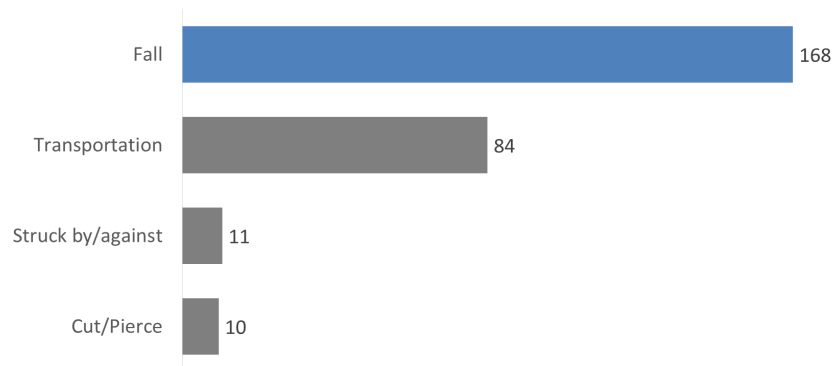
The majority of patients were at a level I or II trauma center.



The average patient age was 19 years.

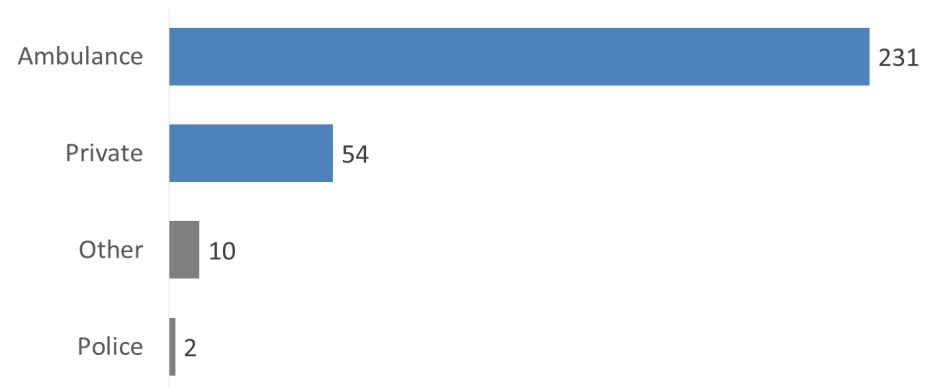


Falls were the most common cause of injury.



Counts <10 include: Fire/burn, firearm, machinery, natural, overexertion, suffocation, other specified, and other.

The majority of patients are transported by ambulance or private vehicle.



# Indiana Trauma Registry

## Statewide Quarter 4 Data Report

October 1, 2018—December 31, 2018

9,218 Incidents

105 Total Hospitals Reporting

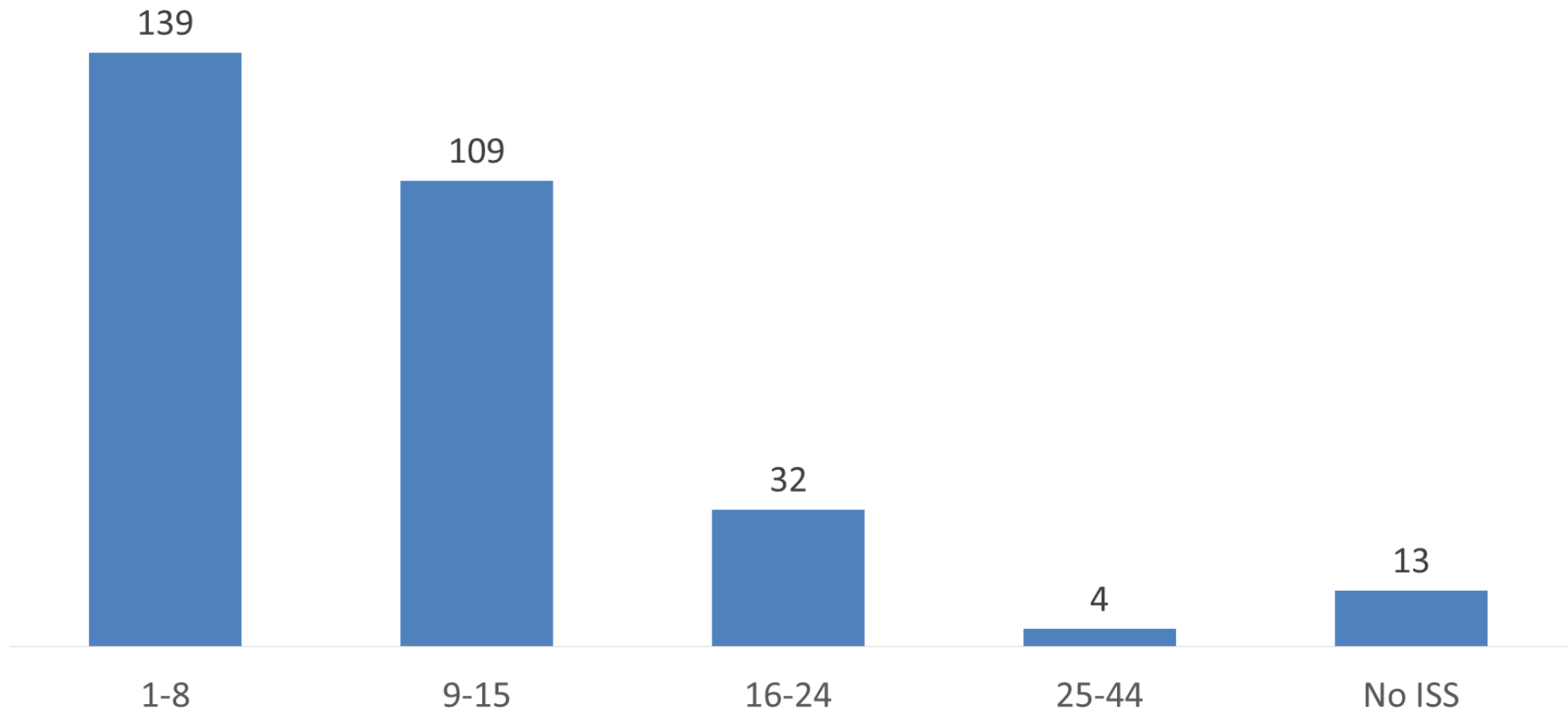
Level I and II: 10 facilities 47.9% of data

Level III: 12 facilities 17.8% of data

(Non-Trauma) Hospitals: 83 facilities 34.3% of data

### ED LOS > 12 Hours, N=297

The majority of patients have an ISS score of 1-15.



# Indiana Trauma Registry

## Statewide Quarter 4 Data Report

October 1, 2018—December 31, 2018

9,218 Incidents

### 105 Total Hospitals Reporting

Level I and II:	10 facilities	47.9% of data
Level III:	12 facilities	17.8% of data
(Non-Trauma) Hospitals:	83 facilities	34.3% of data

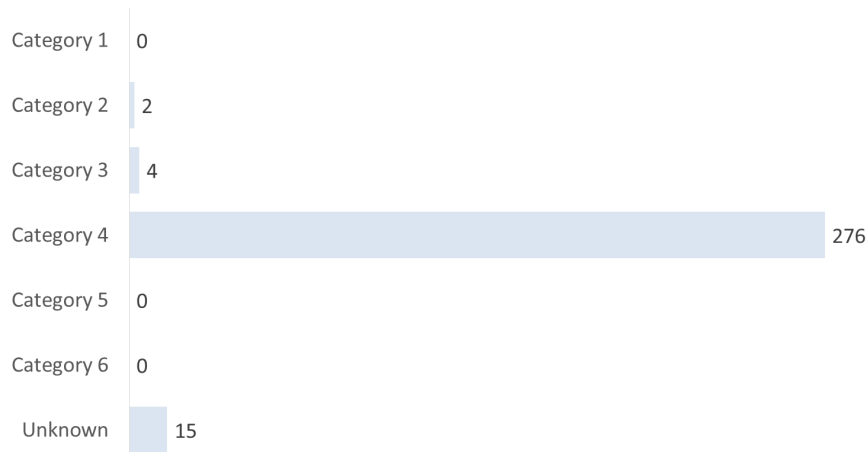
## ED LOS > 12 Hours, N=297

### RTS Respiratory



Interpretation: revised trauma scores (RTS) are based on the patient's severity of injury. Higher categories indicate a lower chance of mortality. The majority of patients had a moderate RTS respiratory category, a moderate systolic blood pressure, and an unknown GCS motor score.

### RTS Systolic



### GCS Motor

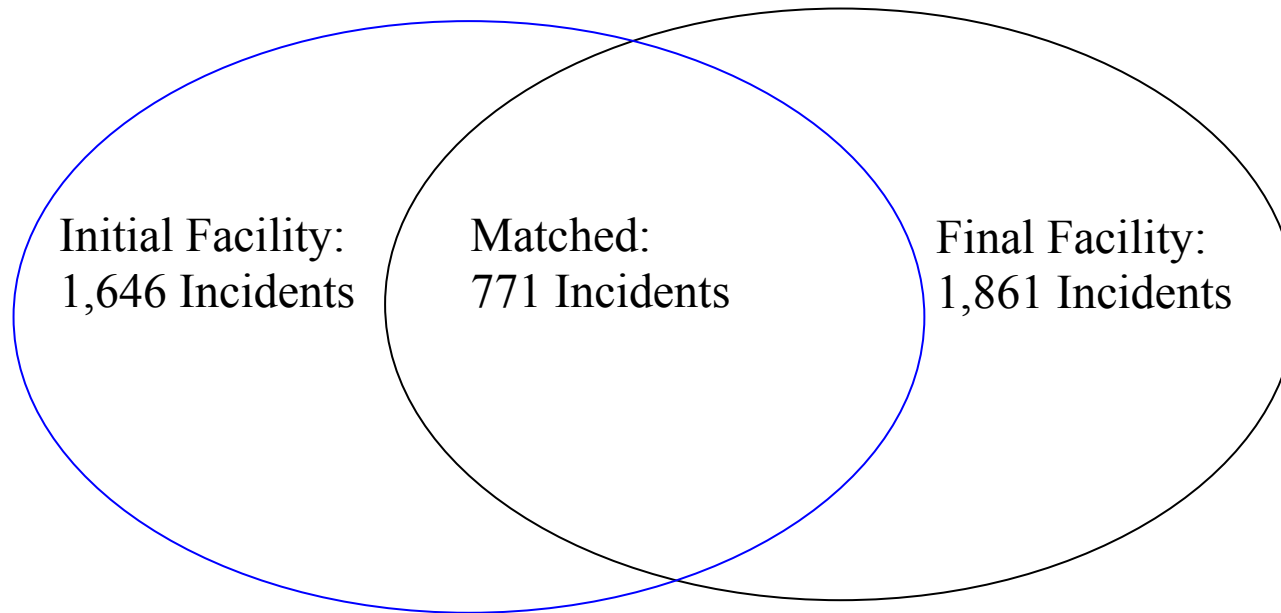


# Indiana Trauma Registry

## Statewide Quarter 4 Data Report October 1, 2018—December 31, 2018 9,218 Incidents

<b>105 Total Hospitals Reporting</b>		
Level I and II:	10 facilities	47.9% of data
Level III:	12 facilities	17.8% of data
(Non-Trauma) Hospitals:	83 facilities	34.3% of data

For Quarter 4 2018 of the 9,218 incidents reported to the Indiana Trauma Registry, 1,646 cases that had an ED Disposition of “Transferred to another acute care facility” at the initial facility and 1861 had the Inter-Facility Transfer equal to “Yes” at the Trauma Center. Of those transferred, 771 cases were probabilistically matched. The linked cases make up 22% of the Q4 2018 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.

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 Trauma Registry

**Statewide Quarter 4 Data Report**  
**October 1, 2018—December 31, 2018**  
**9,218 Incidents**

**105 Total Hospitals Reporting**  
 Level I and II: 10 facilities 47.9% of data  
 Level III: 12 facilities 17.8% of data  
 (Non-Trauma) Hospitals: 83 facilities 34.3% of data

## For Linked Transfer Patients:

For Transfer Patients:				
	All Transfer Patients	Critical*	Physiological Critical**	ISS Critical***
Number of Patients	771	282	222	100
EMS Notified to Scene	12.3 minutes	8.7 minutes	9.1 minutes	8.7 minutes
EMS Scene Arrival to Departure	17 minutes	16 minutes	16.3 minutes	16.7 minutes
EMS Scene Departure to Initial Hospital ED Arrival	18.6 minutes	18.8 minutes	19.6 minutes	17.9 minutes
Initial Hospital ED Arrival to Departure	3 hours 15 minutes	3 hours	2 hours 58 minutes	2 hours 53 minutes
Initial Hospital ED Departure to Final Hospital ED Arrival	53.5 minutes	52 minutes	55.7 minutes	41.6 minutes
TOTAL TIME	4 hours 56.4 minutes	4 hours 35.5 minutes	4 hours 38.7 minutes	4 hours 17.9 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.

\*\*\*ISS Critical Transfer patient is defined as having an ISS  $>$  15 at the initial hospital

# Indiana Trauma Registry

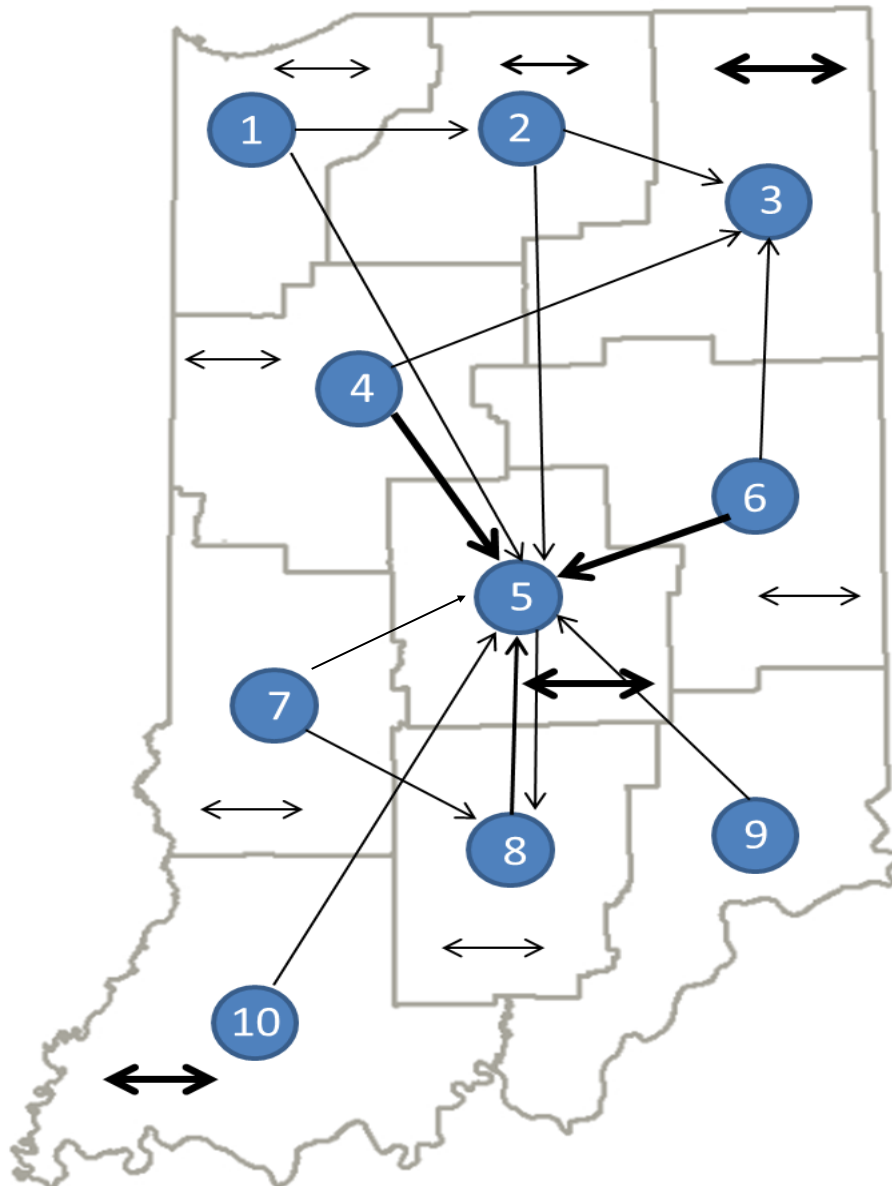
## Statewide Quarter 4 Data Report

October 1, 2018—December 31, 2018

9,218 Incidents

105 Total Hospitals Reporting

Level I and II:	10 facilities	47.9% of data
Level III:	12 facilities	17.8% of data
(Non-Trauma) Hospitals:	83 facilities	34.3% of data



For Transfer Patients:		
Public Health Preparedness District Initial Hospital	Public Health Preparedness District Final Hospital	Incident Counts
1	1	1
1	2	25
1	4	4
1	5	7
2	2	11
2	5	7
3	2	3
3	3	119
3	5	5
4	4	15
4	5	72
5	5	185
6	3	13
6	5	109
6	6	3
7	5	27
7	7	10
8	5	27
8	8	9
8	10	2
9	5	3
10	5	7
10	10	104

\*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 PHPD, not of a specific hospital or county.

# Indiana Trauma Registry

## Statewide Quarter 4 Data Report

October 1, 2018—December 31, 2018

9,218 Incidents

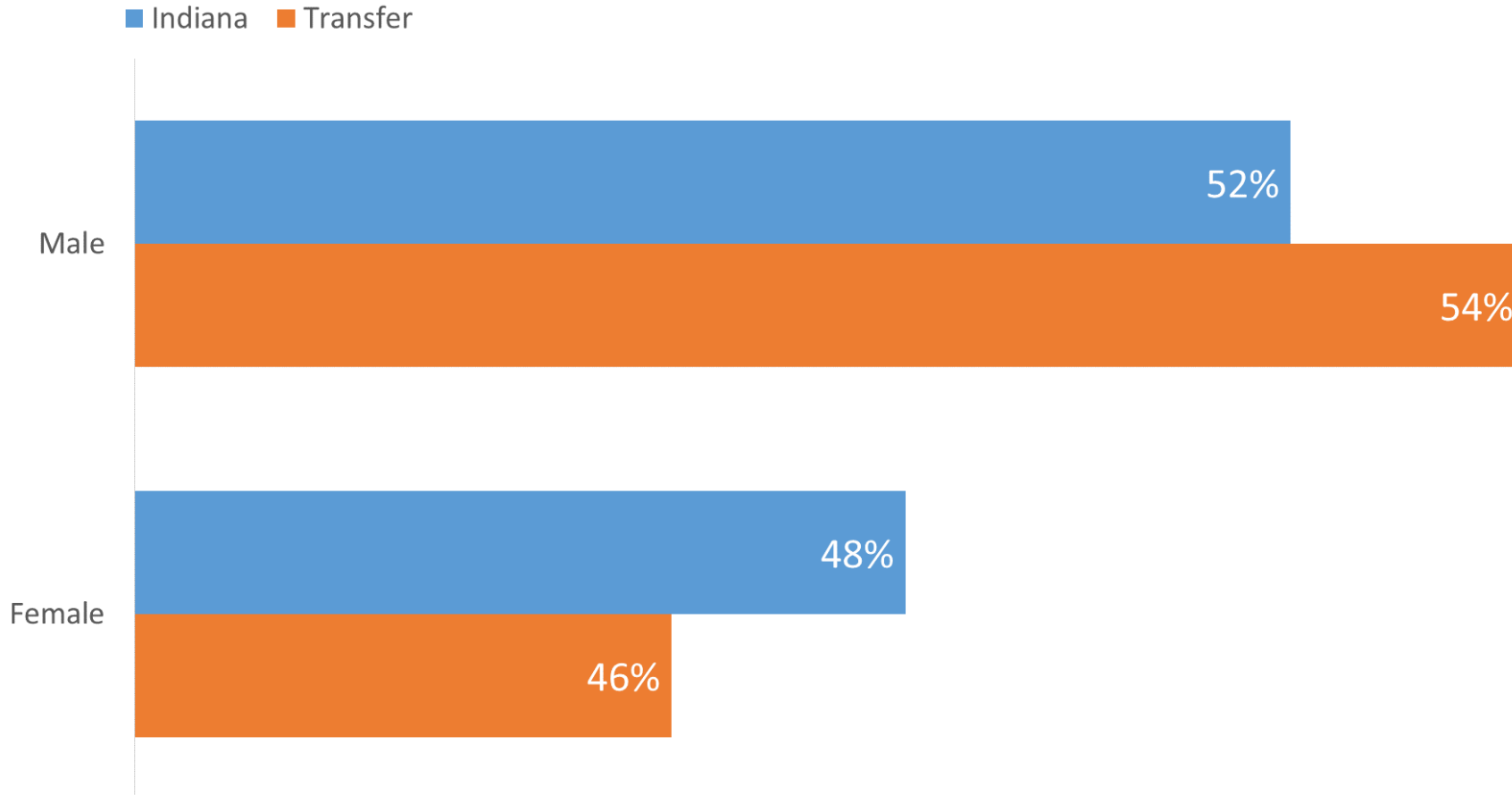
105 Total Hospitals Reporting

Level I and II: 10 facilities 47.9% of data

Level III: 12 facilities 17.8% of data

(Non-Trauma) Hospitals: 83 facilities 34.3% of data

Transfers have a higher percent of male patients than Indiana.



# Indiana Trauma Registry

## Statewide Quarter 4 Data Report

October 1, 2018—December 31, 2018

9,218 Incidents

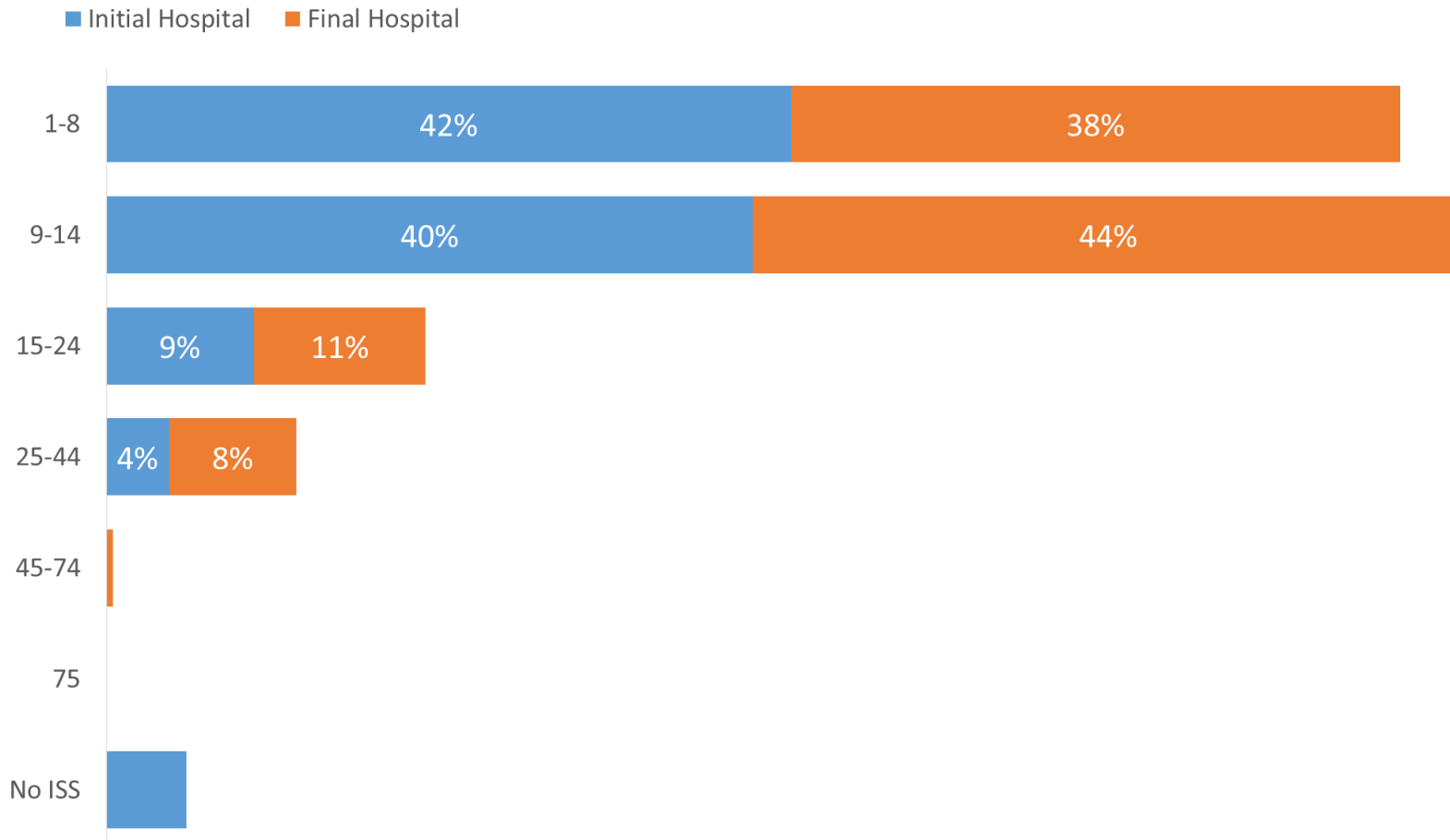
105 Total Hospitals Reporting

Level I and II: 10 facilities 47.9% of data

Level III: 12 facilities 17.8% of data

(Non-Trauma) Hospitals: 83 facilities 34.3% of data

The final hospital has patients with higher injury severity score than the initial hospital.

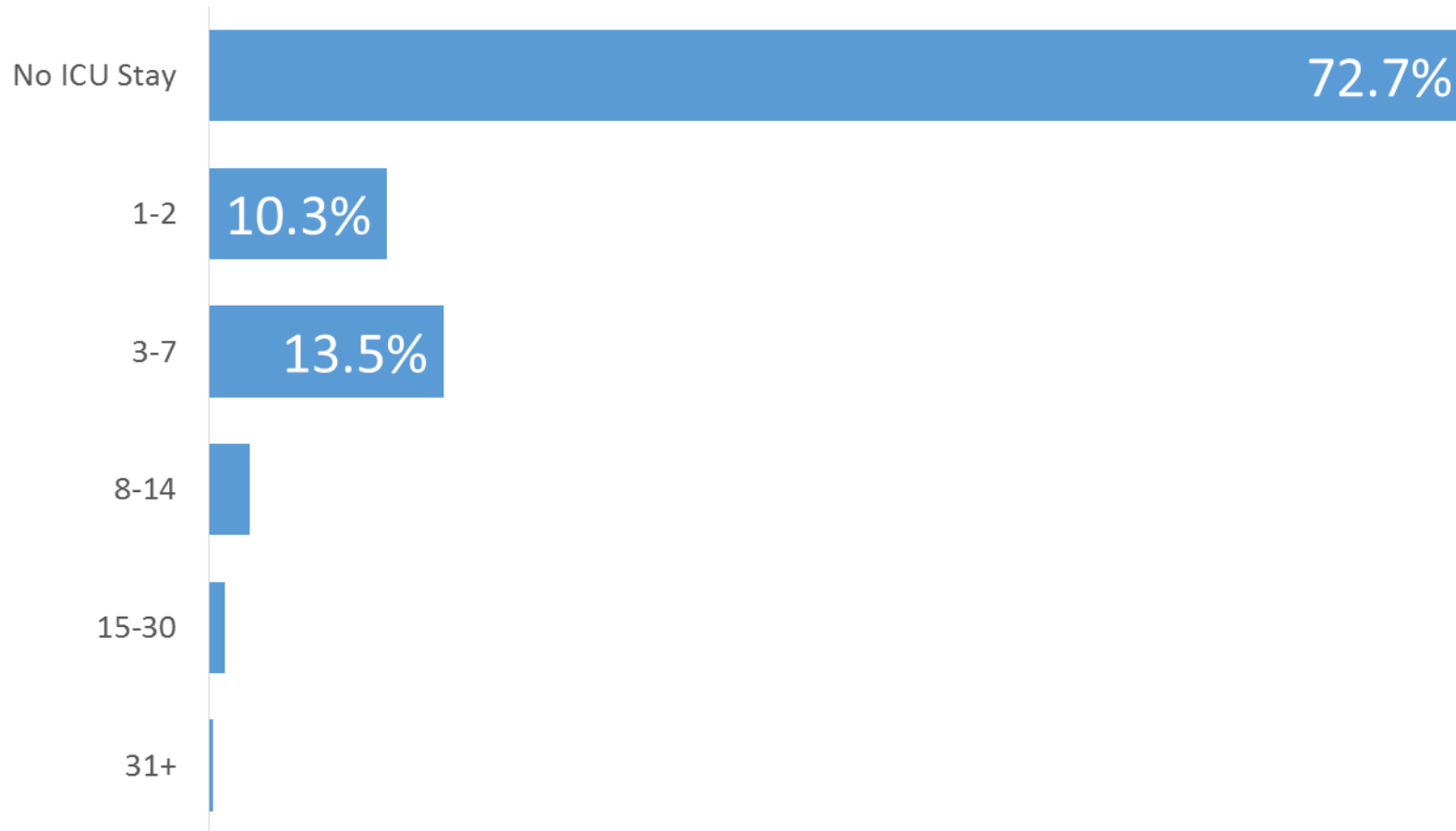


# Indiana Trauma Registry

**Statewide Quarter 4 Data Report**  
**October 1, 2018—December 31, 2018**  
**9,218 Incidents**

**105 Total Hospitals Reporting**  
Level I and II: 10 facilities 47.9% of data  
Level III: 12 facilities 17.8% of data  
(Non-Trauma) Hospitals: 83 facilities 34.3% of data

Most transfers do not go to the ICU.



# Indiana Trauma Registry

## Statewide Quarter 4 Data Report

October 1, 2018—December 31, 2018

9,218 Incidents

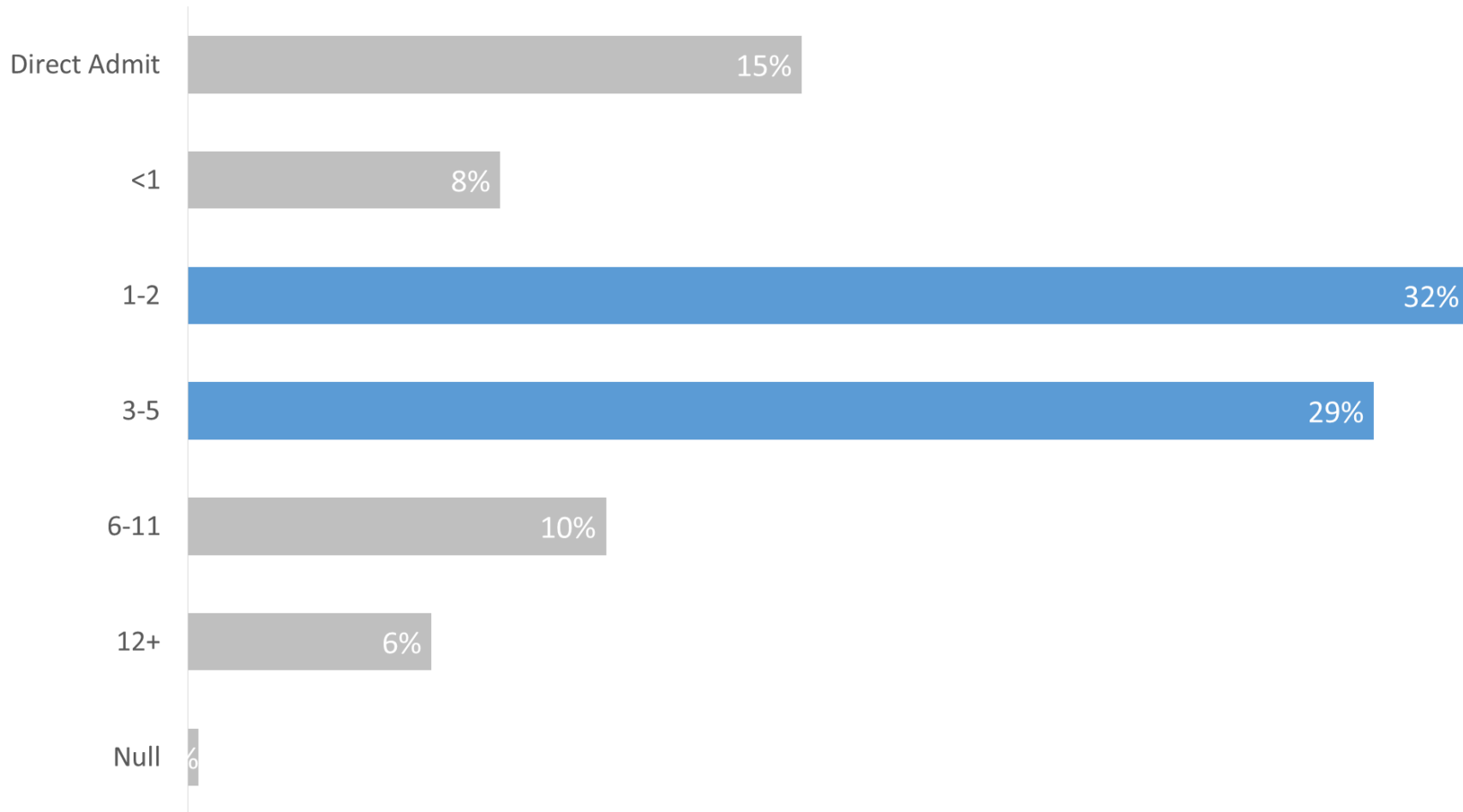
105 Total Hospitals Reporting

Level I and II: 10 facilities 47.9% of data

Level III: 12 facilities 17.8% of data

(Non-Trauma) Hospitals: 83 facilities 34.3% of data

Most transfer patients are in the ED for **1-5 hours** at the final hospital.



# Indiana Trauma Registry

## Statewide Quarter 4 Data Report

October 1, 2018—December 31, 2018

9,218 Incidents

105 Total Hospitals Reporting

Level I and II:

10 facilities

47.9% of data

Level III:

12 facilities

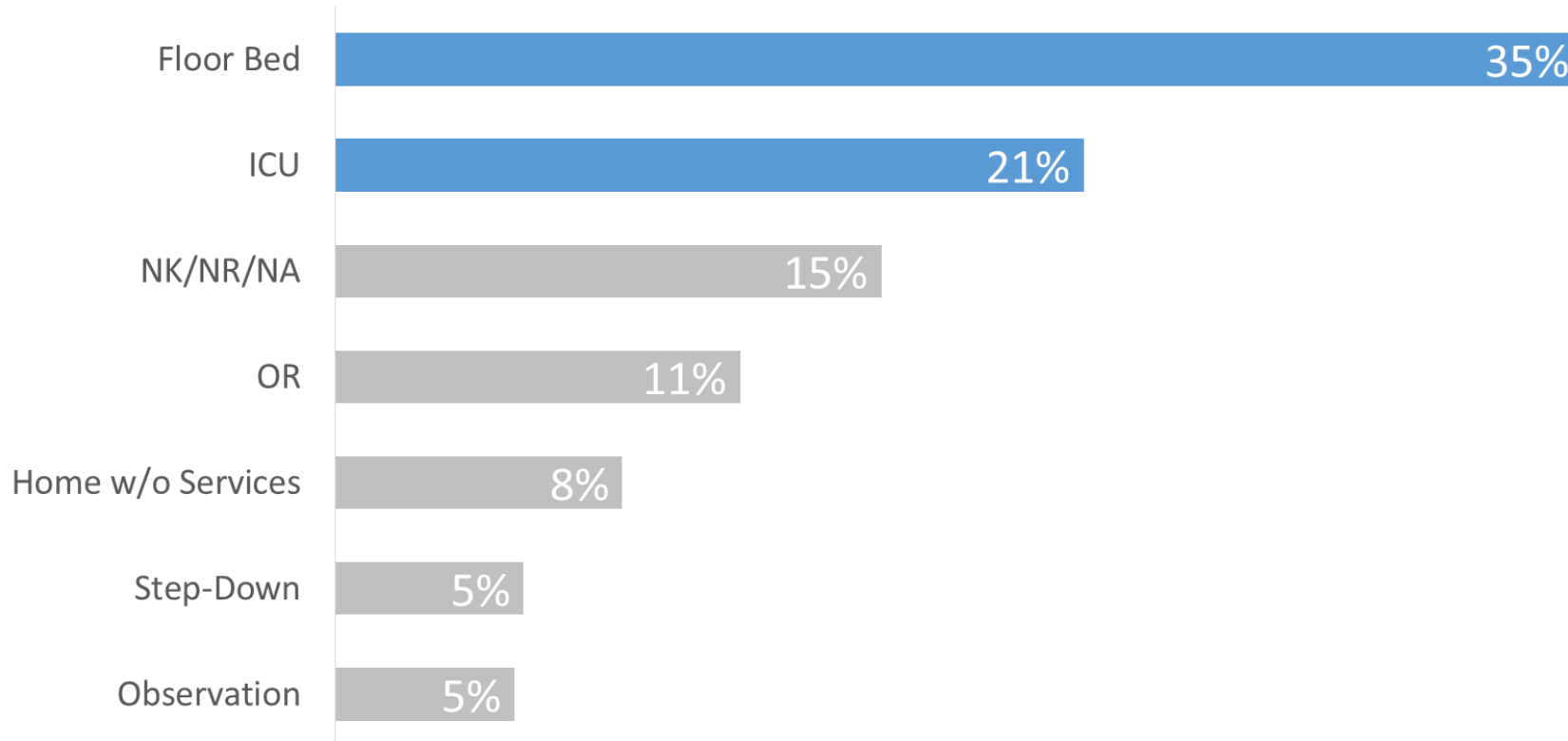
17.8% of data

(Non-Trauma) Hospitals:

83 facilities

34.3% of data

The majority of transfer patients go to a **floor bed** or the **ICU**.



# Indiana Trauma Registry

## Statewide Quarter 4 Data Report

October 1, 2018—December 31, 2018

9,218 Incidents

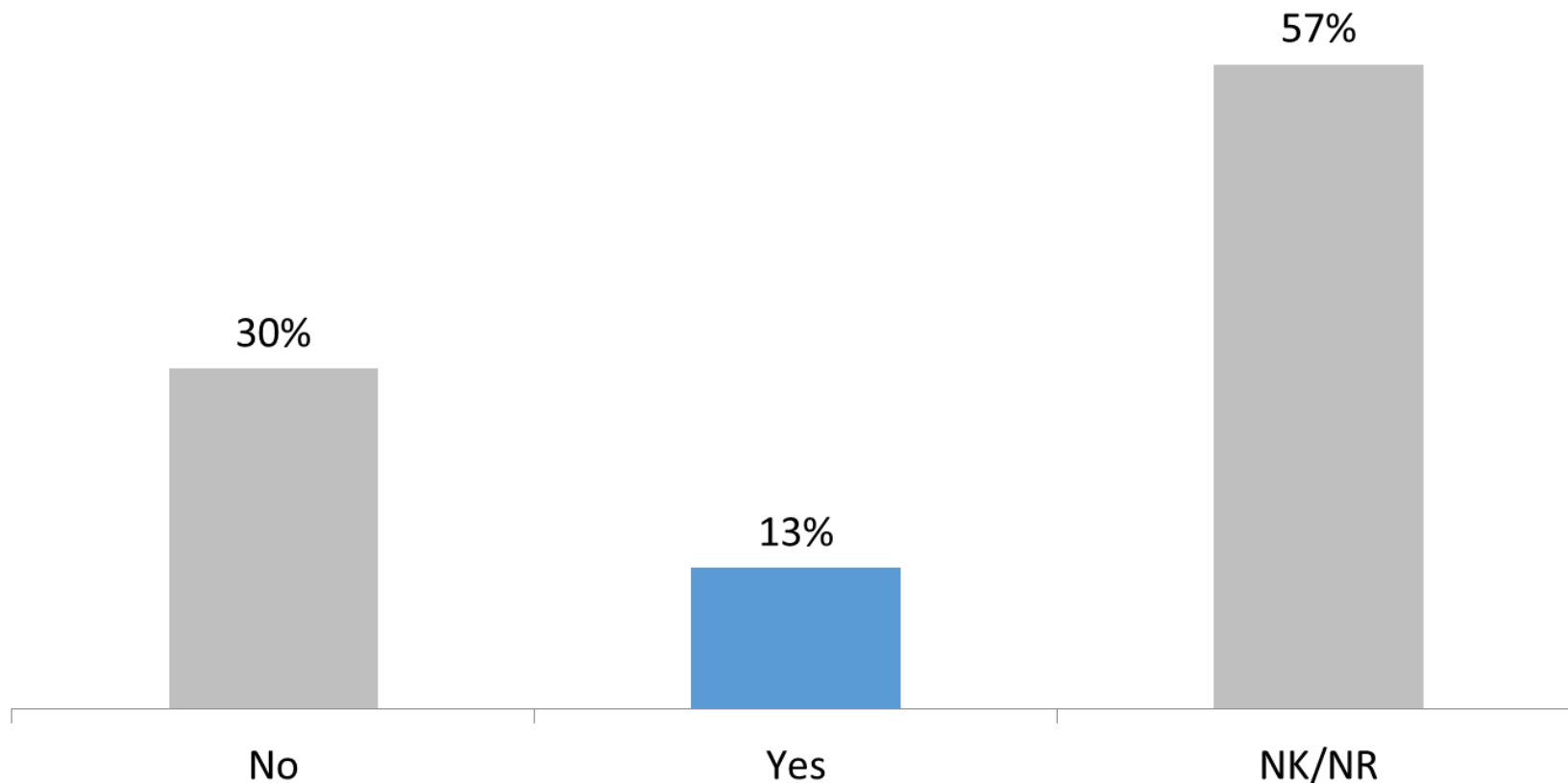
105 Total Hospitals Reporting

Level I and II: 10 facilities 47.9% of data

Level III: 12 facilities 17.8% of data

(Non-Trauma) Hospitals: 83 facilities 34.3% of data

A small portion of transfers had a **delay indicated**.



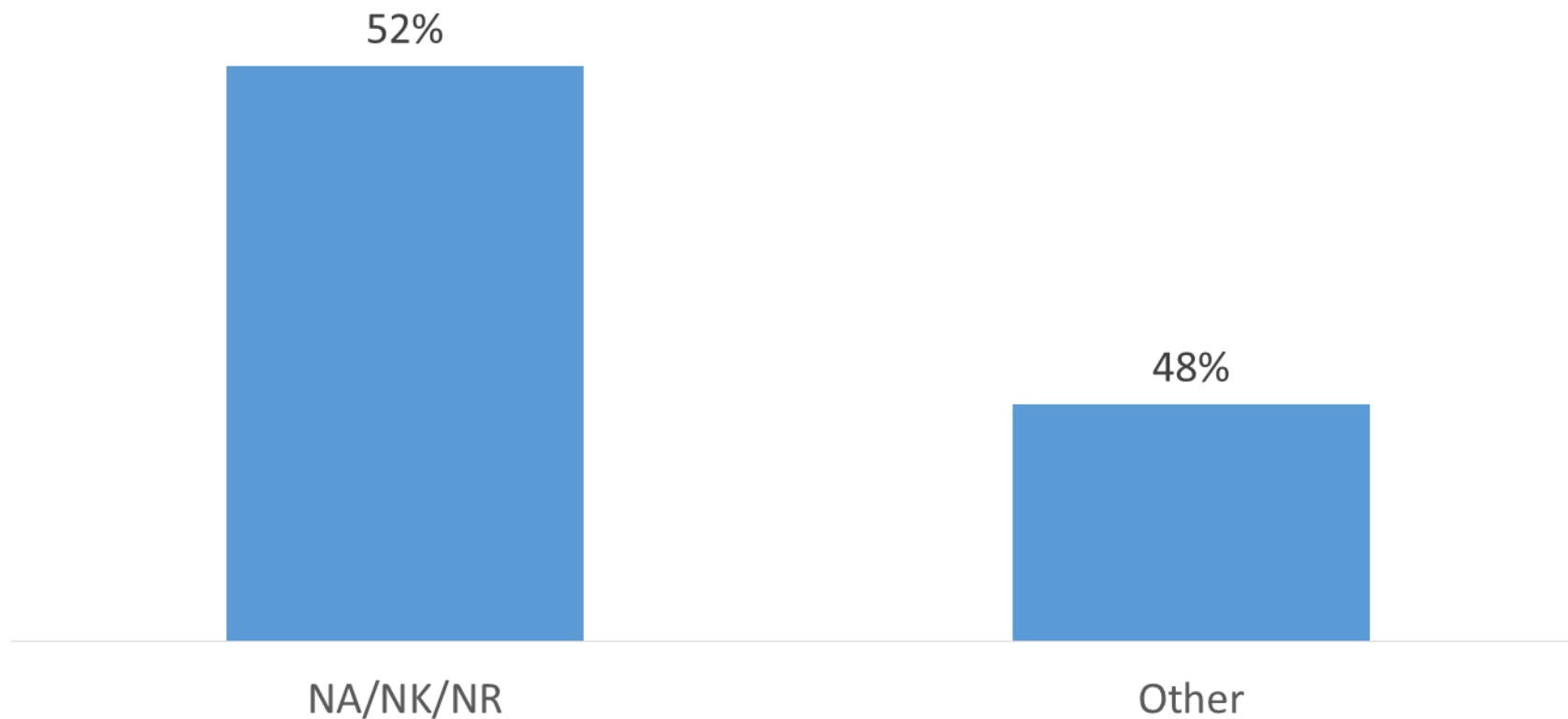


# Indiana Trauma Registry

**Statewide Quarter 4 Data Report**  
October 1, 2018—December 31, 2018  
9,218 Incidents

**105 Total Hospitals Reporting**  
Level I and II: 10 facilities 47.9% of data  
Level III: 12 facilities 17.8% of data  
(Non-Trauma) Hospitals: 83 facilities 34.3% of data

Most delay reasons were not completed.



# Indiana Trauma Registry

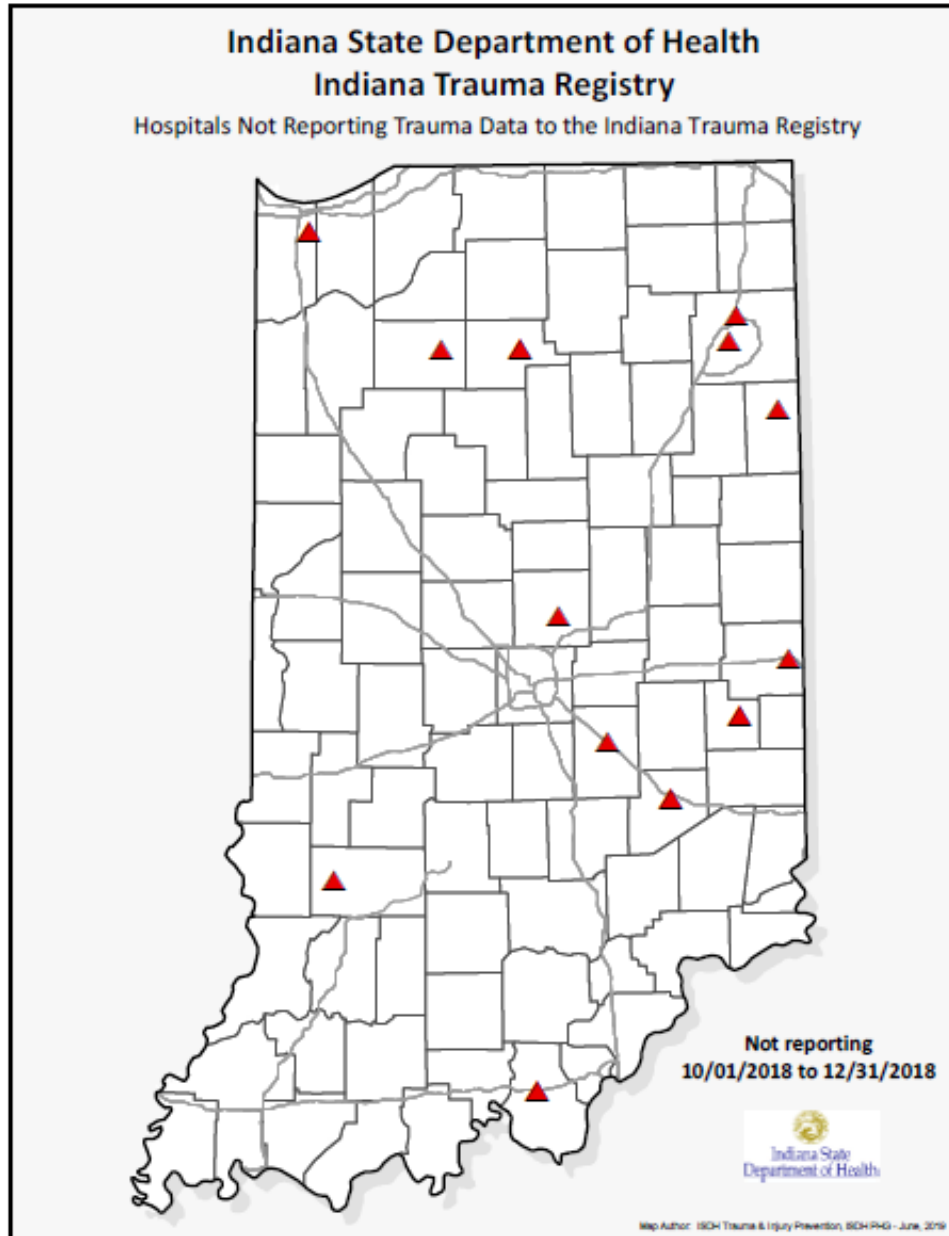
## Statewide Quarter 4 Data Report

October 1, 2018—December 31, 2018

9,218 Incidents

### 105 Total Hospitals Reporting

Level I and II:	10 facilities	47.9% of data
Level III:	12 facilities	17.8% of data
(Non-Trauma) Hospitals:	83 facilities	34.3% of data



### Hospital that did not report during Q4 2018:

- Adams Memorial Hospital
- Decatur County Memorial
- Dupont Hospital
- Fayette Regional Health
- Greene County
- Harrison County
- Major Hospital
- Pulaski Memorial
- Reid Health
- Riverview Health
- St. Joseph Hospital (Fort Wayne)
- St. Mary Medical Center—Hobart
- Woodlawn

# Indiana State Department of Health Indiana Trauma Registry

Hospitals Reporting Trauma Data Quarter 4  
October 1, 2018 to December 31, 2018

## **I II** Level I and II Trauma Centers

Deaconess Hospital  
Eskenazi Health  
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 & Health Services  
Terre Haute Regional Hospital

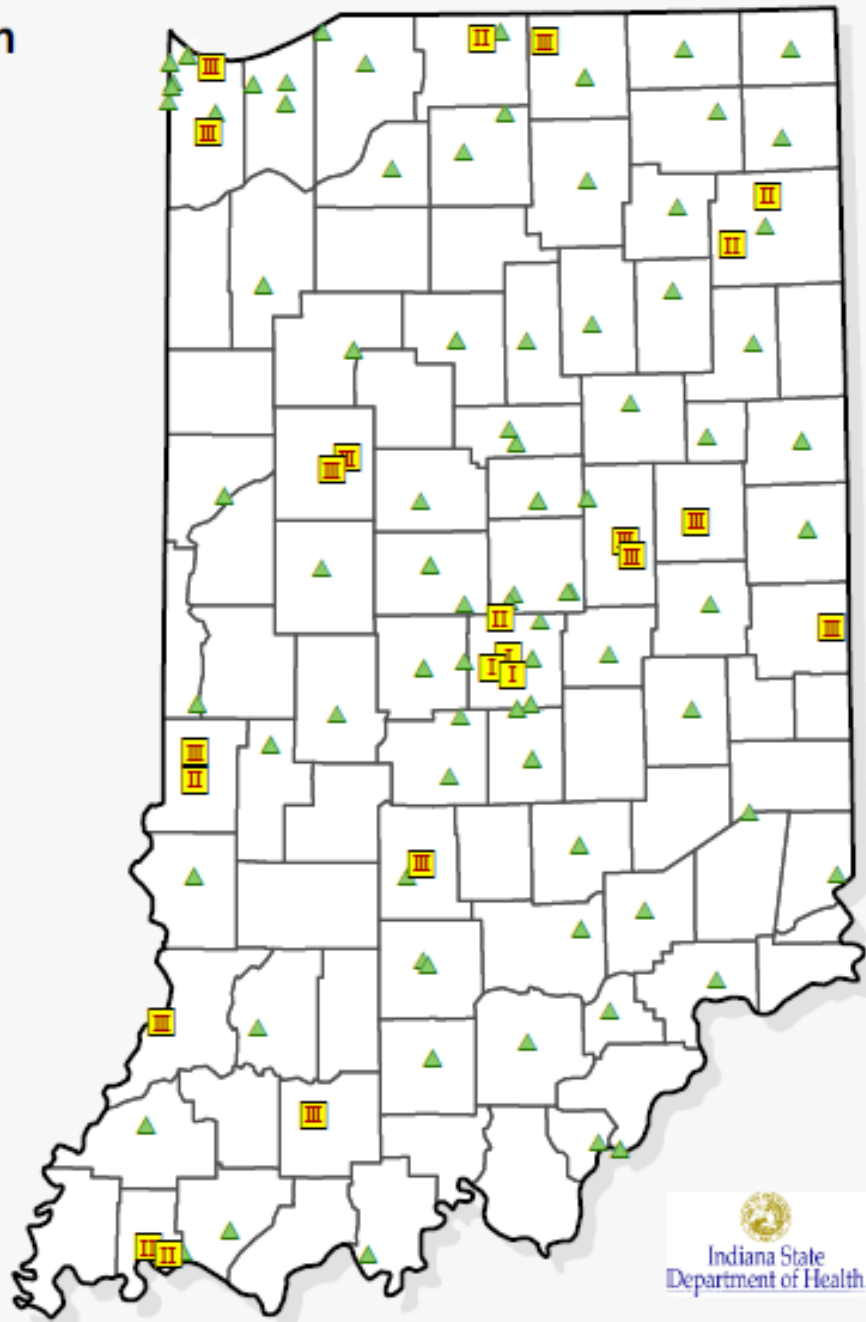
## **III** Level III Trauma Centers

Community Hospital of Anderson & Madison Co.  
Franciscan St Anthony Health - Crown Point  
Franciscan St Elizabeth Health - Lafayette East  
Good Samaritan Hospital  
Elkhart General Hospital  
IU Health Arnett Hospital  
IU Health Ball Memorial Hospital  
IU Health Bloomington Hospital  
Memorial Hospital and Health Care Center  
Methodist Hospitals - Northlake Campus  
Reid Hospital & Health Care Services  
St Vincent Anderson  
Union Hospital Terre Haute

## **▲** Non-Trauma Hospitals

82 Non-Trauma Hospitals

Hospital categories include Verified and "In the Process"  
Trauma Centers as of September 30, 2018.



# Indiana Trauma Registry

## Statewide Quarter 4 Data Report October 1, 2018—December 31, 2018 9,218 Incidents

<b>105 Total Hospitals Reporting</b>		
Level I and II:	<b>10 facilities</b>	<b>47.9% of data</b>
Level III:	<b>12 facilities</b>	<b>17.8% of data</b>
(Non-Trauma) Hospitals:	<b>83 facilities</b>	<b>34.3% of data</b>

Requests and Changes to the Report from Trauma Care Committee members at the August 2018 ISTCC meeting:

-The report was shortened for the quarterly report and an annual report will be presented at the end of the year.

General Report:

-ED LOS caterpillar plots were done for groups only (Indiana, Levels I and II, Level III, and non-trauma centers). They were also done for districts.

-Signs of Life: The two field values for this variable are: 1) Arrived with no signs of life, 2) Arrived with signs of life. A patient with no signs of life is defined as having none of the following: organized EKG activity, pupillary responses, spontaneous respiratory attempts or movement, and unassisted blood pressure. This usually implies the patient was brought to the ED with CPR in progress.

# Indiana Trauma Registry

**Statewide Quarter 4 Data Report**  
**October 1, 2018—December 31, 2018**  
**9,218 Incidents**

**105 Total Hospitals Reporting**  
Level I and II: **10 facilities 47.9% of data**  
Level III: **12 facilities 17.8% of data**  
(Non-Trauma) Hospitals: **83 facilities 34.3% of data**

## Supplemental Report

The Supplemental Report (pages 22 and 23) contains information on emergency department length of stay.

### Definitions:

**Emergency Department Length of Stay (ED LOS):** The time from ED Admission to ED Discharge (Physical Exit). This changed to time from ED Admission to ED Discharge (Orders Written) beginning with Quarter 3 2016 data (July 1, 2016—September 30, 2016). There is a 120 minute performance improvement filter that is tracked for various hospital groups.

**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-10-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.

**Signs of Life:** The two field values for this variable are: 1) Arrived with no signs of life, 2) Arrived with signs of life. A patient with no signs of life is defined as having none of the following: organized EKG activity, pupillary responses, spontaneous respiratory attempts or movement, and unassisted blood pressure. This usually implies the patient was brought to the ED with CPR in progress.

### 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  $b=b_0+b1(RTS) + b2(ISS) + b3(Age\ Index)$

Total GCS = Verbal GCS + Motor GCS + Eye GCS

$RTS = 0.94*GCS+0.73*SBP+0.29*RR$

$ISS = (AIS)^2 + (AIS)^2 + (AIS)^2$



**Indiana State**  
**Department of Health**  
Trauma and Injury Prevention

# Indiana Trauma Registry

## Statewide Quarter 4 Data Report

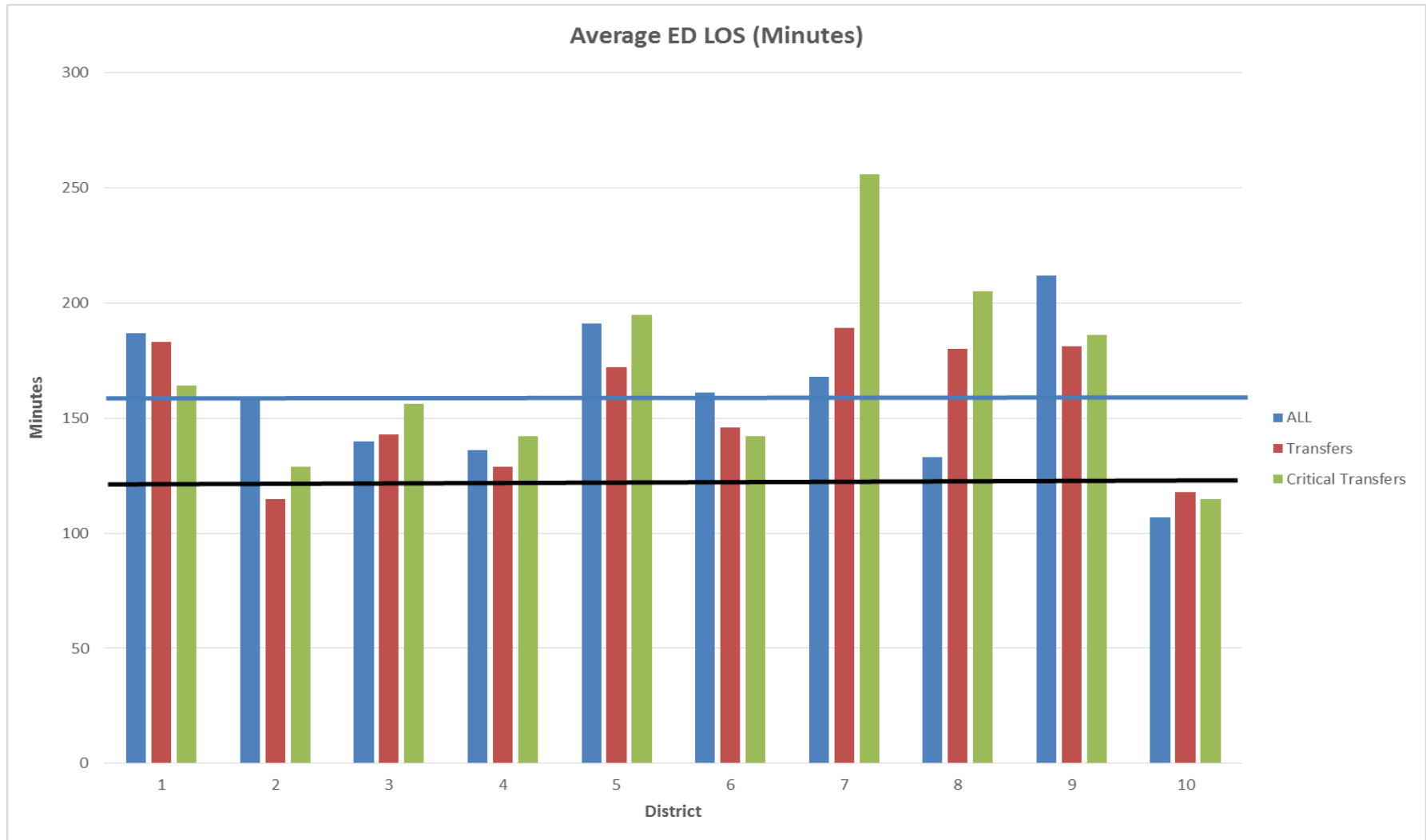
October 1, 2018—December 31, 2018

9,218 Incidents

105 Total Hospitals Reporting

Level I and II:	10 facilities	47.9% of data
Level III:	12 facilities	17.8% of data
(Non-Trauma) Hospitals:	83 facilities	34.3% of data

## ED LOS by District



\*Black line represents the 120 minute performance improvement filter

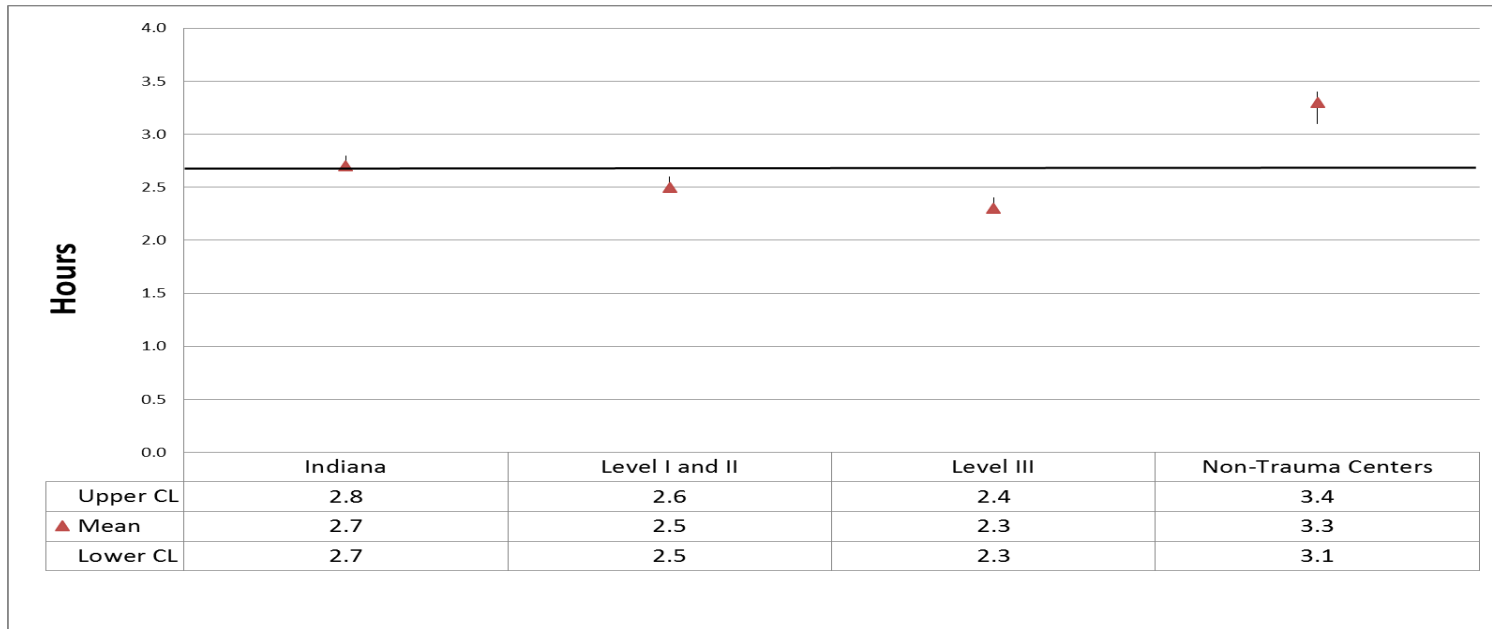
\*\*Blue line represents the state average

# Indiana Trauma Registry

**Statewide Quarter 4 Data Report**  
**October 1, 2018—December 31, 2018**  
**9,218 Incidents**

**105 Total Hospitals Reporting**  
**Level I and II: 10 facilities 47.9% of data**  
**Level III: 12 facilities 17.8% of data**  
**(Non-Trauma) Hospitals: 83 facilities 34.3% of data**

## All Patients Average ED LOS (Hours)



The purpose of the caterpillar graphs is to compare different groups to the average ED LOS. The Indiana mean is the comparison group, which is represented by the black line.

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.

In the chart on the right, the data is for the trauma centers. The trauma center average is in the first column on the left side. The information for each trauma center has been assigned a random number for confidentiality. The mean, 95% confidence limit and lower confidence limit are listed for each group.