

Indiana Trauma Registry

Statewide Quarter 3 Data Report

July 1, 2019—August 30, 2019

11,442 Incidents

108 Total Hospitals Reporting

Level I and II:	10 facilities	48.1% of data
Level III:	13 facilities	19.1% of data
(Non-Trauma) Hospitals:	85 facilities	32.7% of data

For Quarter 3 2019 which spanned from July 1, 2019—September 30, 2019 there were 11,442 incidents reported to the Indiana Trauma Registry at the Indiana State Department of Health. There were 108 hospitals that reported data, of which 10 were level I or II trauma centers, 13 were level III trauma centers and 85 were non-trauma centers. Trauma centers represented 67% of the data. There were 3,819 incidents reported for July, 3,816 reported for May, and 3,758 incidents reported for June.

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 8.

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.

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:

$$P_s = 1/(1+e^{-b}) \text{ where } b=b_0+b_1(RTS) + b_2(ISS) + b_3(\text{Age Index})$$
$$\text{Total GCS} = \text{Verbal GCS} + \text{Motor GCS} + \text{Eye GCS}$$
$$RTS = 0.94 * GCS + 0.73 * SBP + 0.29 * RR$$
$$ISS = (AIS)^2 + (AIS)^2 + (AIS)^2$$



Indiana State
Department of Health
Trauma and Injury Prevention

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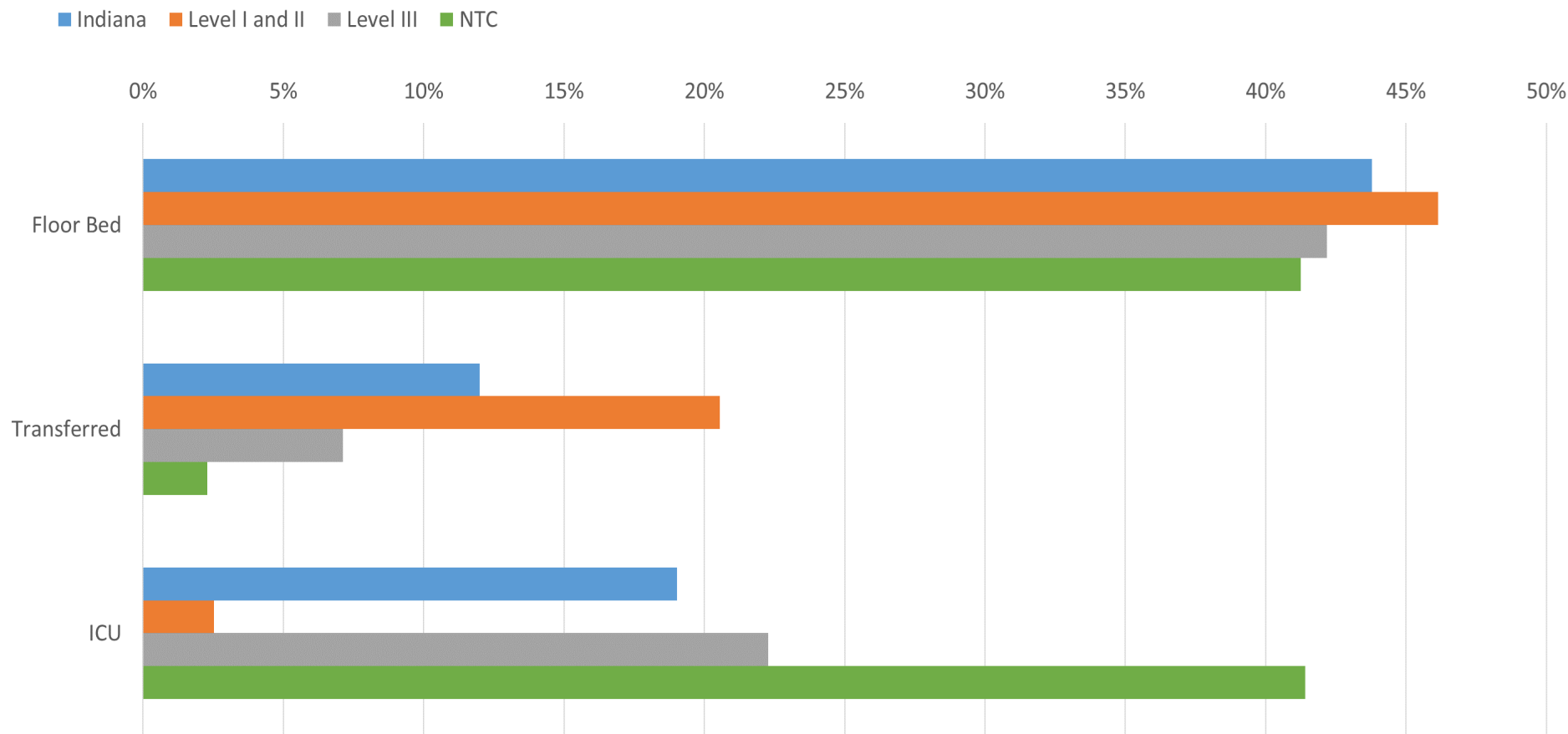
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The majority of patients in the ED go to a **floor bed or ICU** at non-trauma centers.



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

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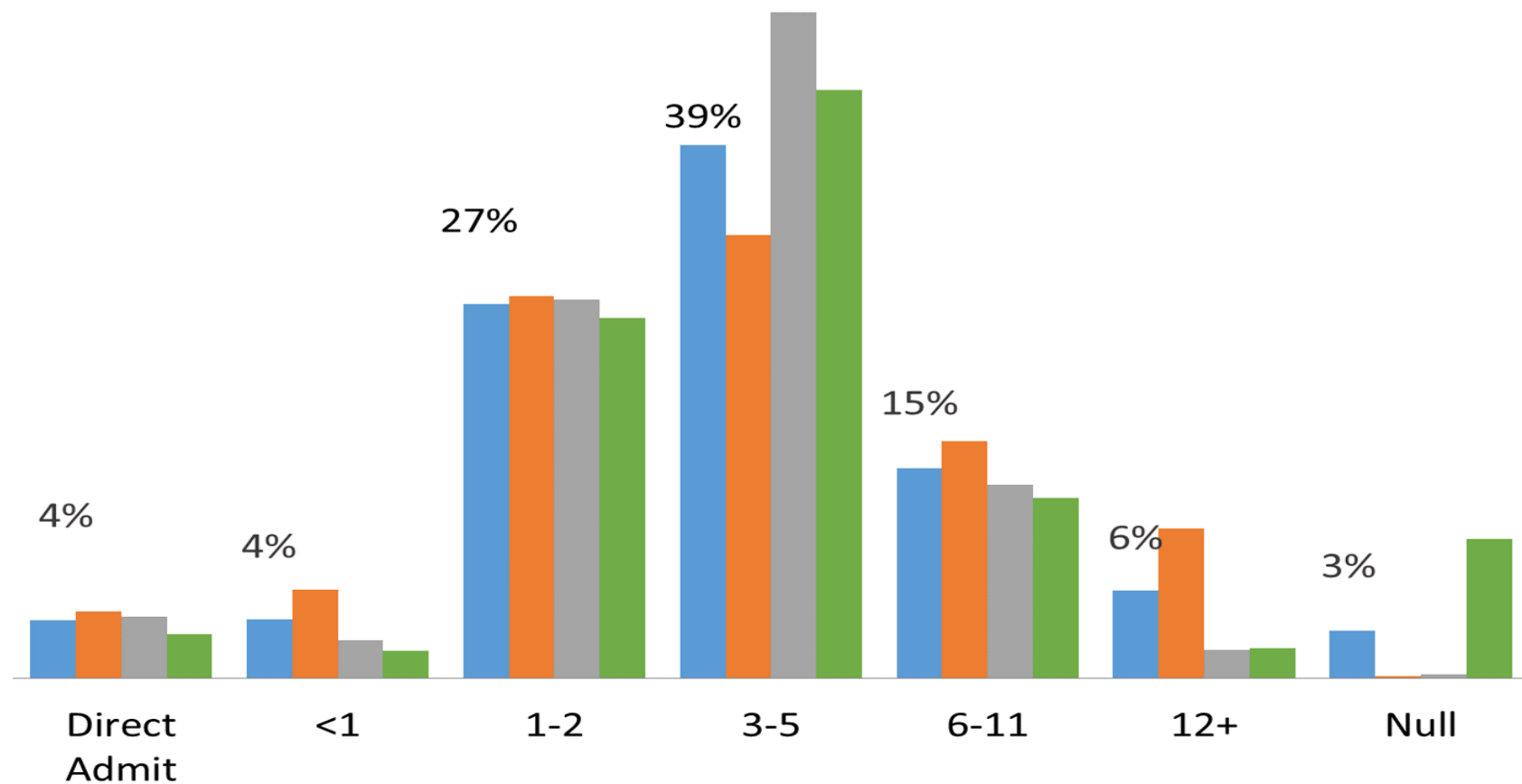
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The majority of patients in the ED stay for **1-5 hours**.

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



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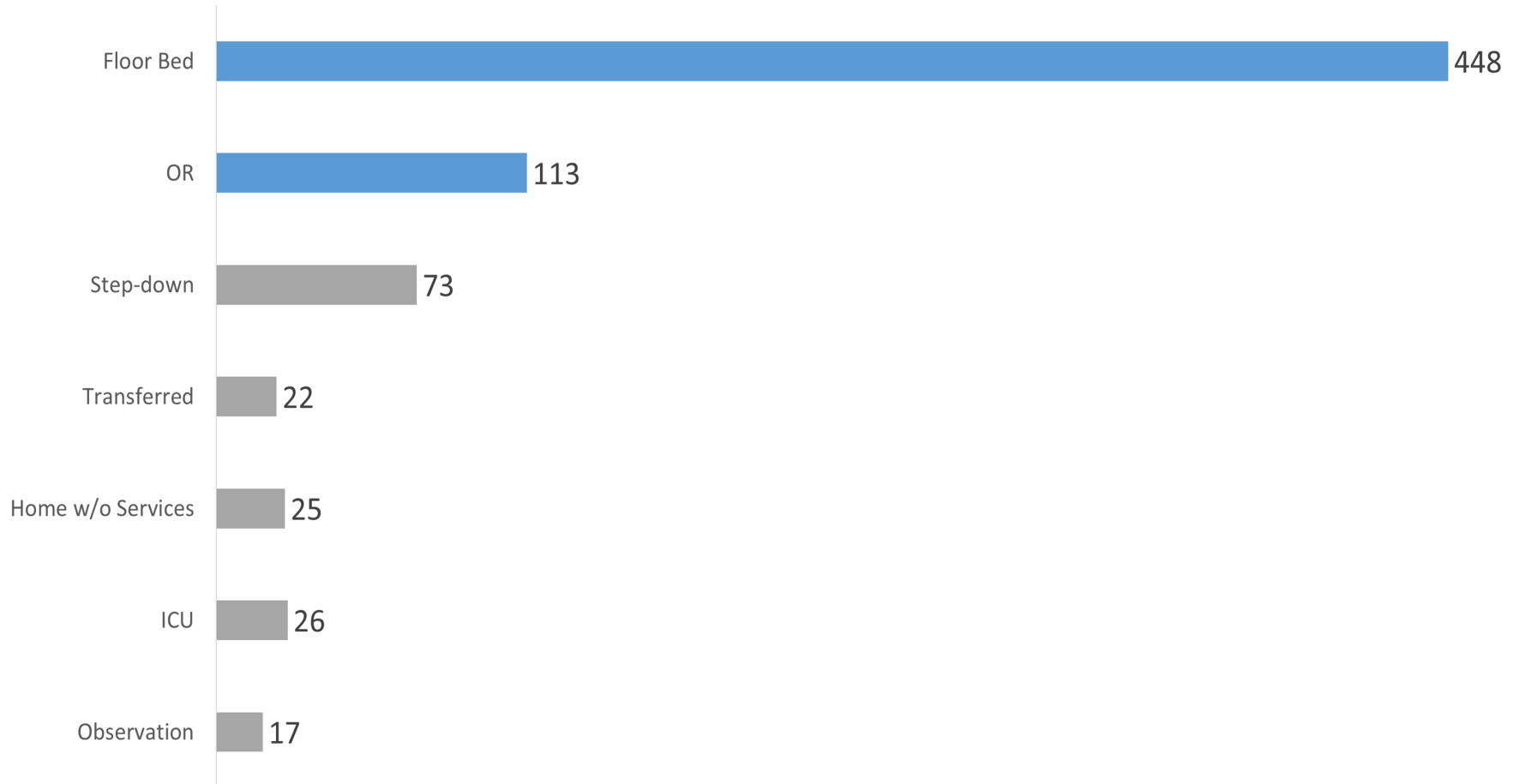
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Most patients in the ED>12 hours go to a **floor bed** or **the OR**.



*This data includes both trauma and non-trauma centers

**None of these patients died or had a disposition of Null, Home with Services, or Expired.

***Categories with counts <10 include AMA and Other.

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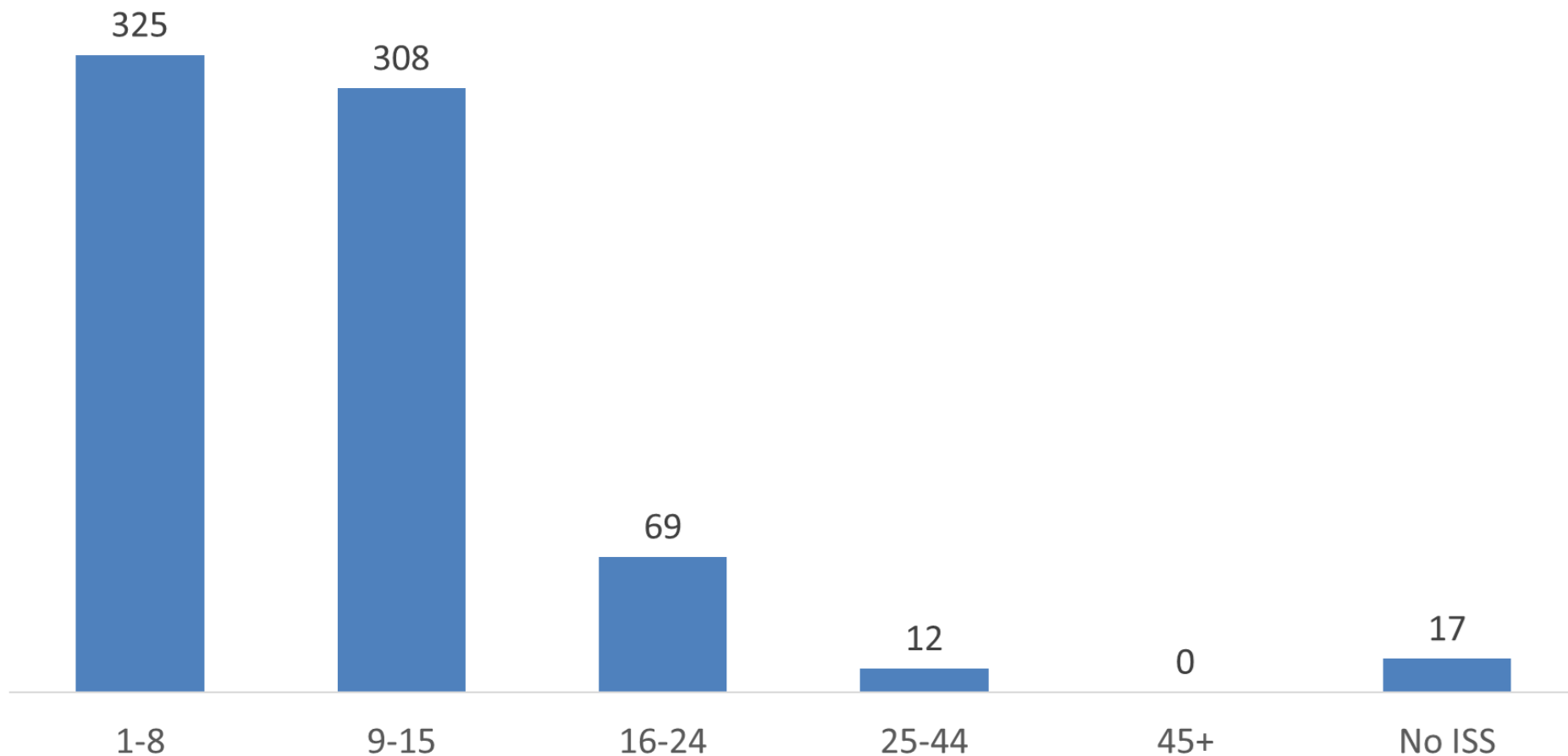
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ED LOS > 12 Hours, N=731

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



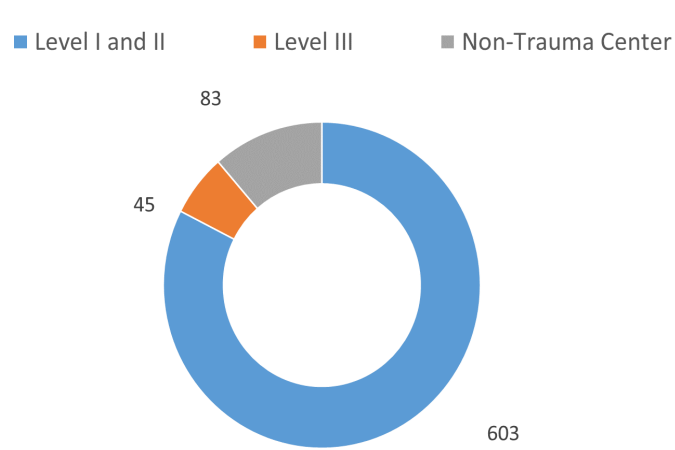
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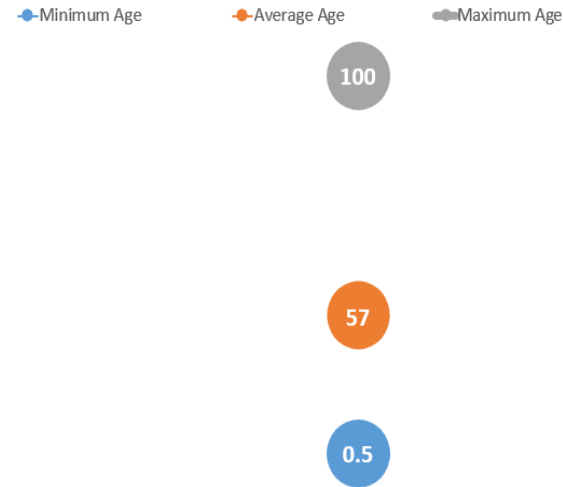
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ED LOS > 12 Hours, N=507

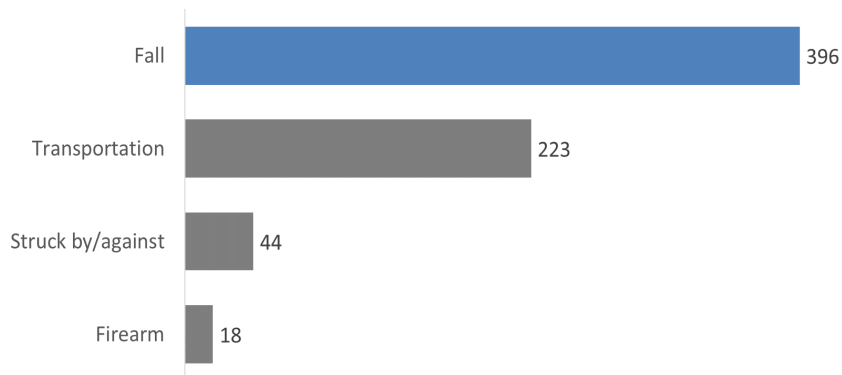
The majority of patients were at a level I or II trauma center.



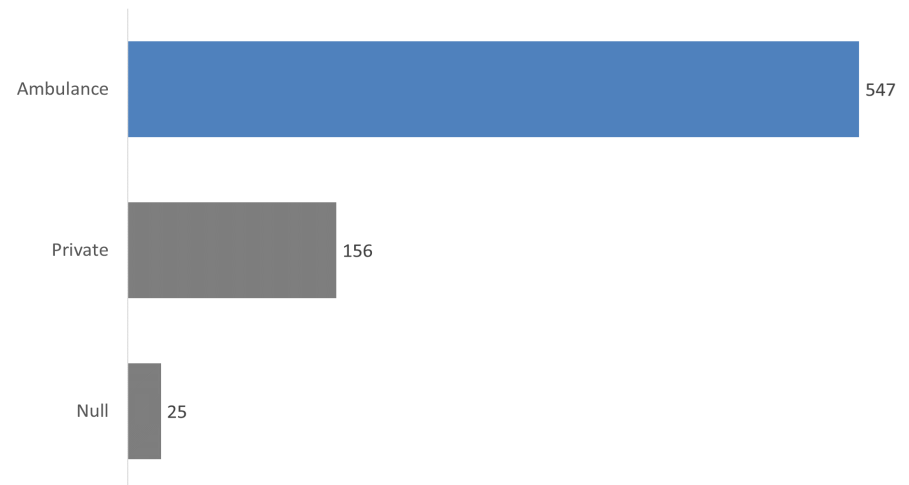
The average patient age was 57 years.



Falls were the most common cause of injury.



The majority of patients are transported by ambulance.



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

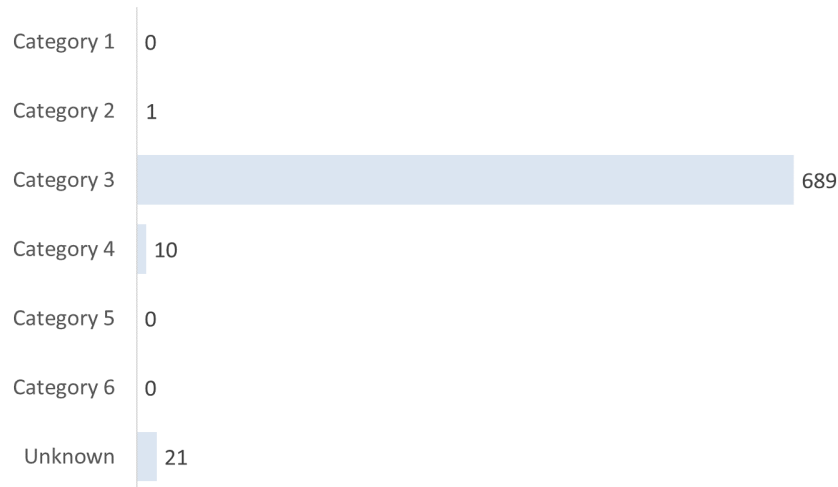
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ED LOS > 12 Hours, N=507

RTS Respiratory

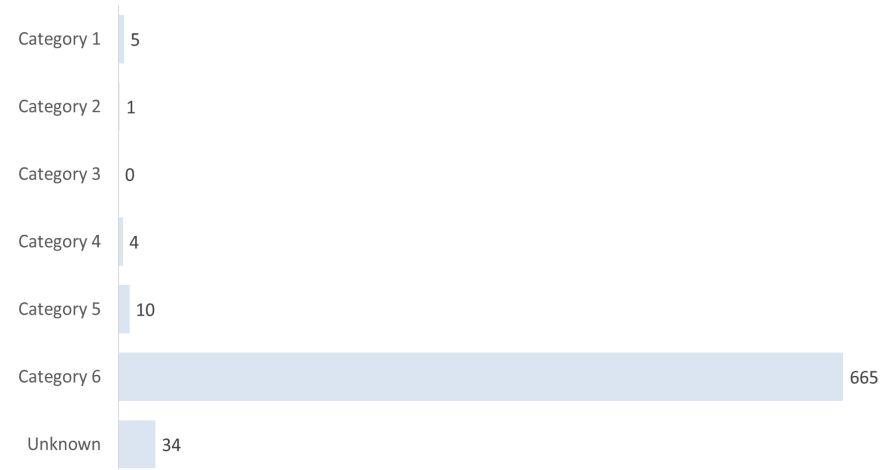


Interpretation: revised trauma scores (RTS) are based on the patient's severity of injury. Higher categories indicate a lower chance of mortality. The majority of patients had a moderate RTS respiratory category, a moderate systolic blood pressure, and an unknown GCS motor score.

RTS Systolic



GCS Motor



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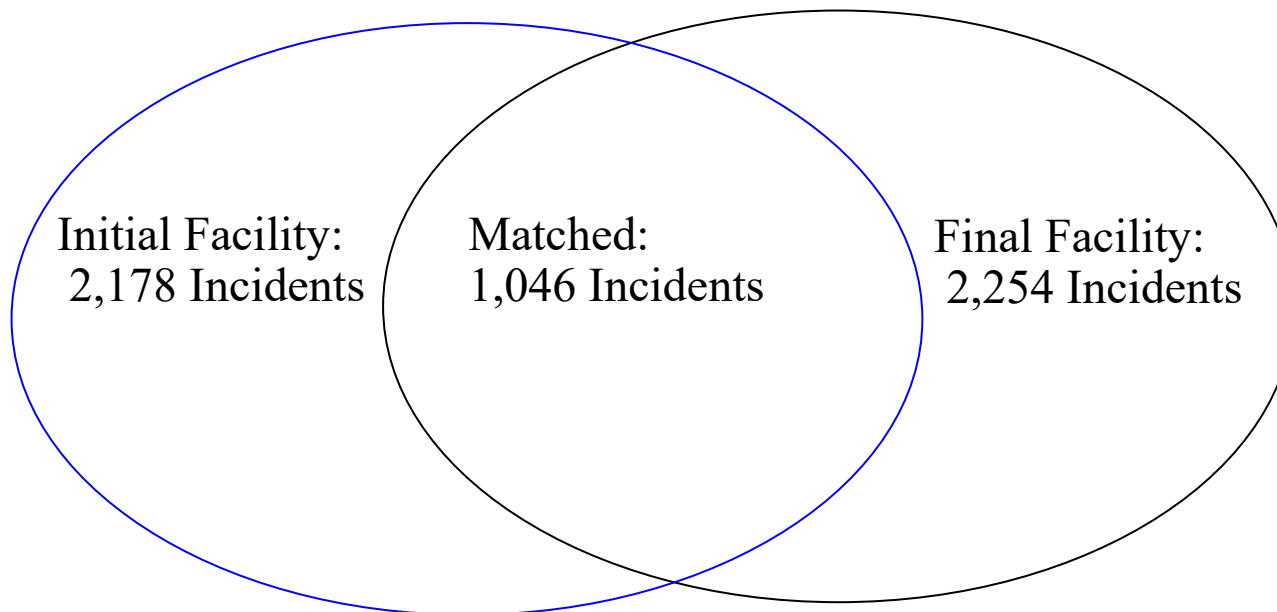
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For Quarter 3 2019 of the 11,442 incidents reported to the Indiana Trauma Registry, 2,178 cases that had an ED Disposition of “Transferred to another acute care facility” at the initial facility and 2,254 had the Inter-Facility Transfer equal to “Yes” at the Trauma Center. Of those transferred, 1,046 cases were probabilistically matched. The linked cases make up 24% of the Q3 2019 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.

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For Linked Transfer Patients:

For Transfer Patients:				
	All Transfer Patients	Critical*	Physiological Critical**	ISS Critical***
Number of Patients	1046	445	370	133
EMS Notified to Scene	8.4 minutes	8.1 minutes	8.2 minutes	8.1 minutes
EMS Scene Arrival to Departure	17 minutes	17.2 minutes	17.8 minutes	16.4 minutes
EMS Scene Departure to Initial Hospital ED Arrival	18.1 minutes	16.6 minutes	16.9 minutes	17.2 minutes
Initial Hospital ED Arrival to Departure	3 hours 37 minutes	3 hours 12 minutes	3 hours 13 minutes	3 hours 45 minutes
Initial Hospital ED Departure to Final Hospital ED Arrival	55.3 minutes	54.4 minutes	56.8 minutes	47.7 minutes
TOTAL TIME	5 hours	5 hours 12 minutes	5 hours 30 minutes	4 hours 44 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

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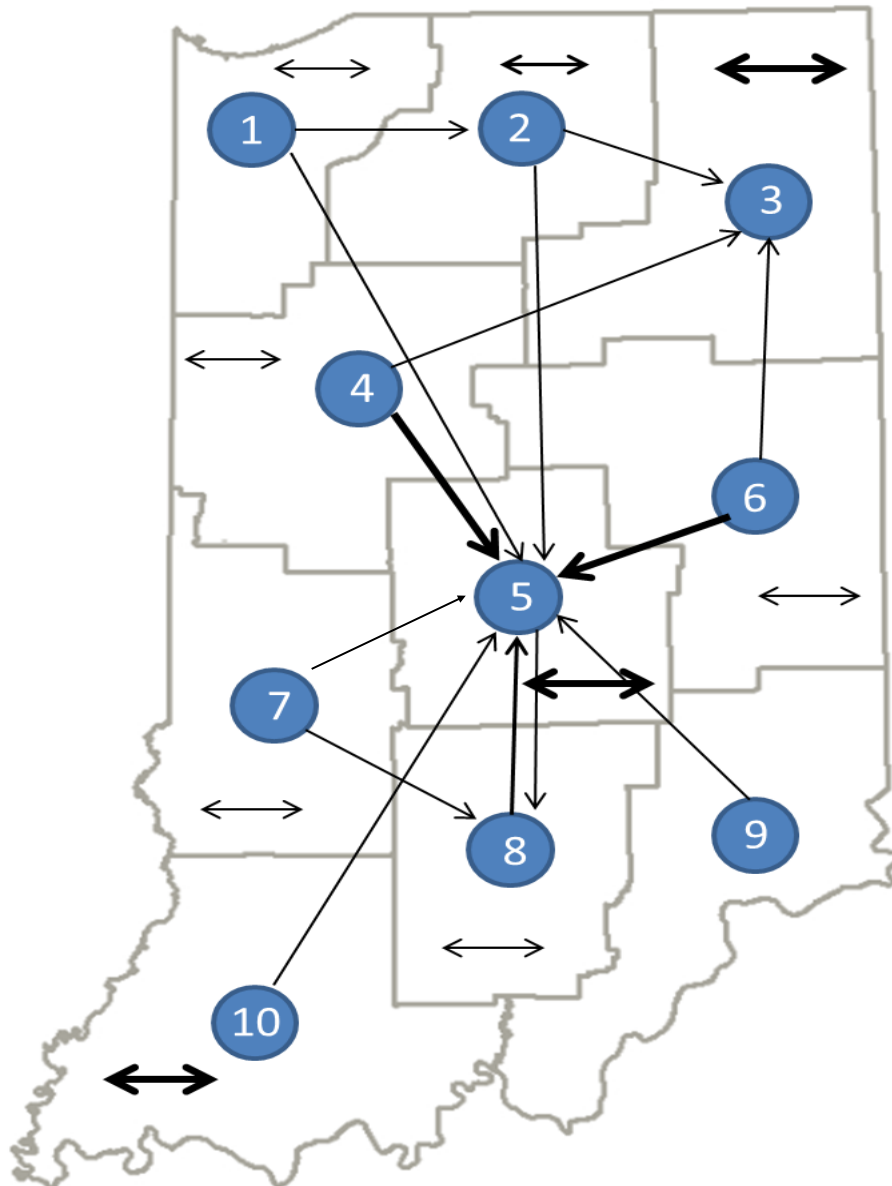
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For Transfer Patients:		
Public Health Preparedness District Initial Hospital	Public Health Preparedness District Final Hospital	Incident Counts
1	1	9
1	2	35
1	5	12
2	2	14
2	3	3
2	5	3
3	3	172
3	5	9
4	4	22
4	5	70
5	5	243
6	3	11
6	5	153
6	6	4
7	5	32
7	7	32
8	5	73
8	8	15
8	9	0
9	5	6
10	5	14
10	10	125

*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.

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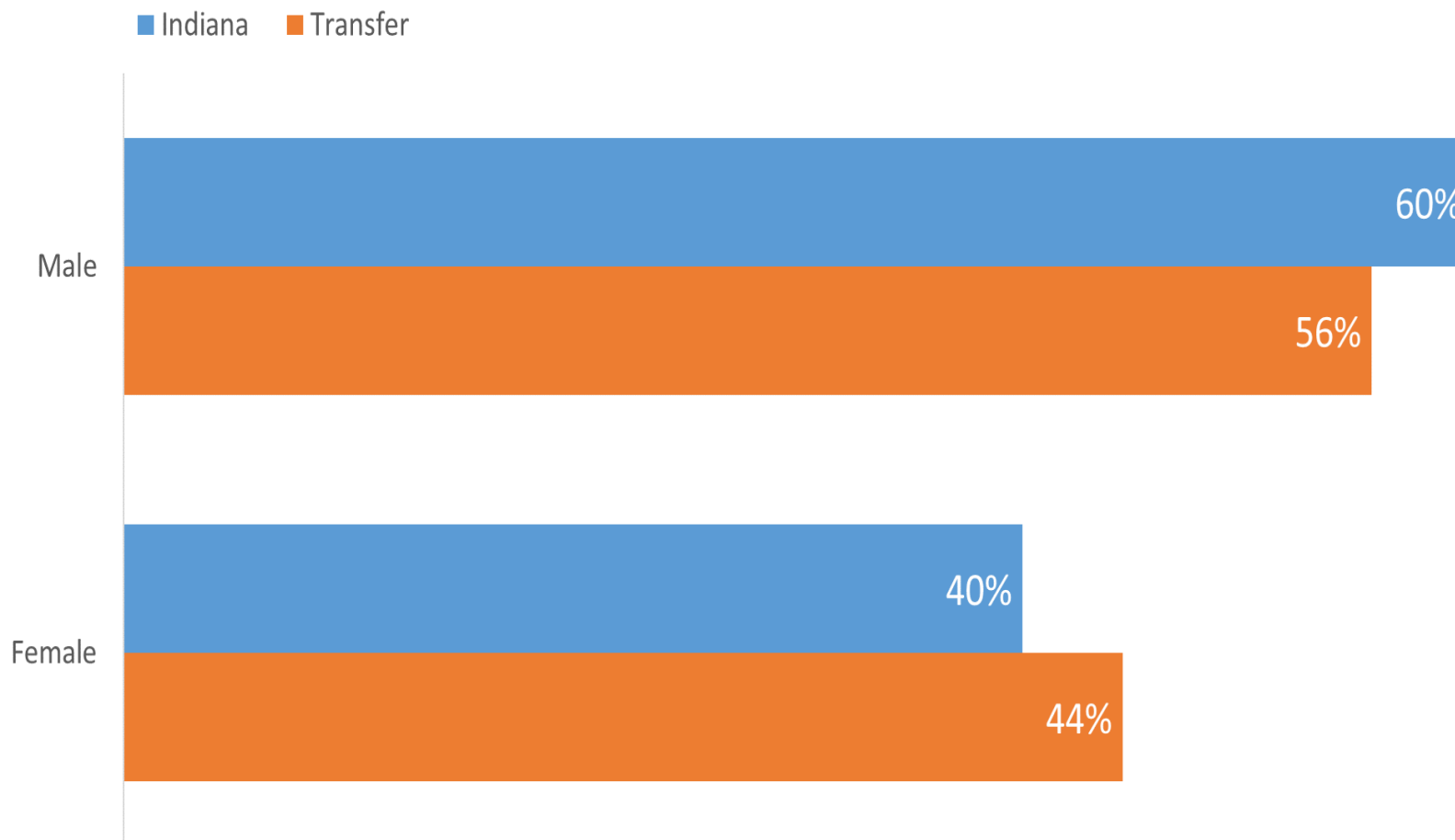
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There were more males than females for transfers and Indiana overall.



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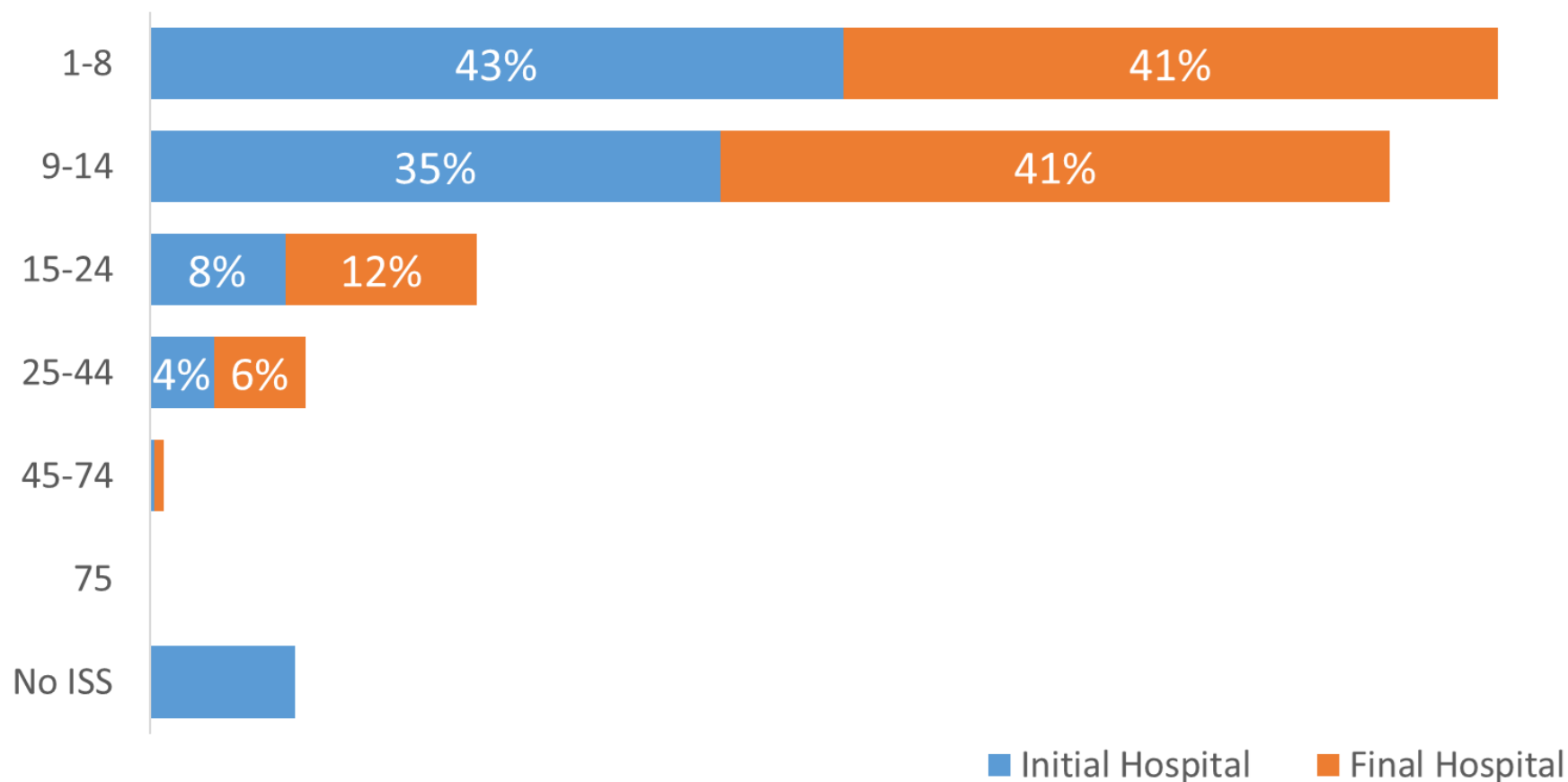
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The final hospital has patients with higher injury severity score than the initial hospital.

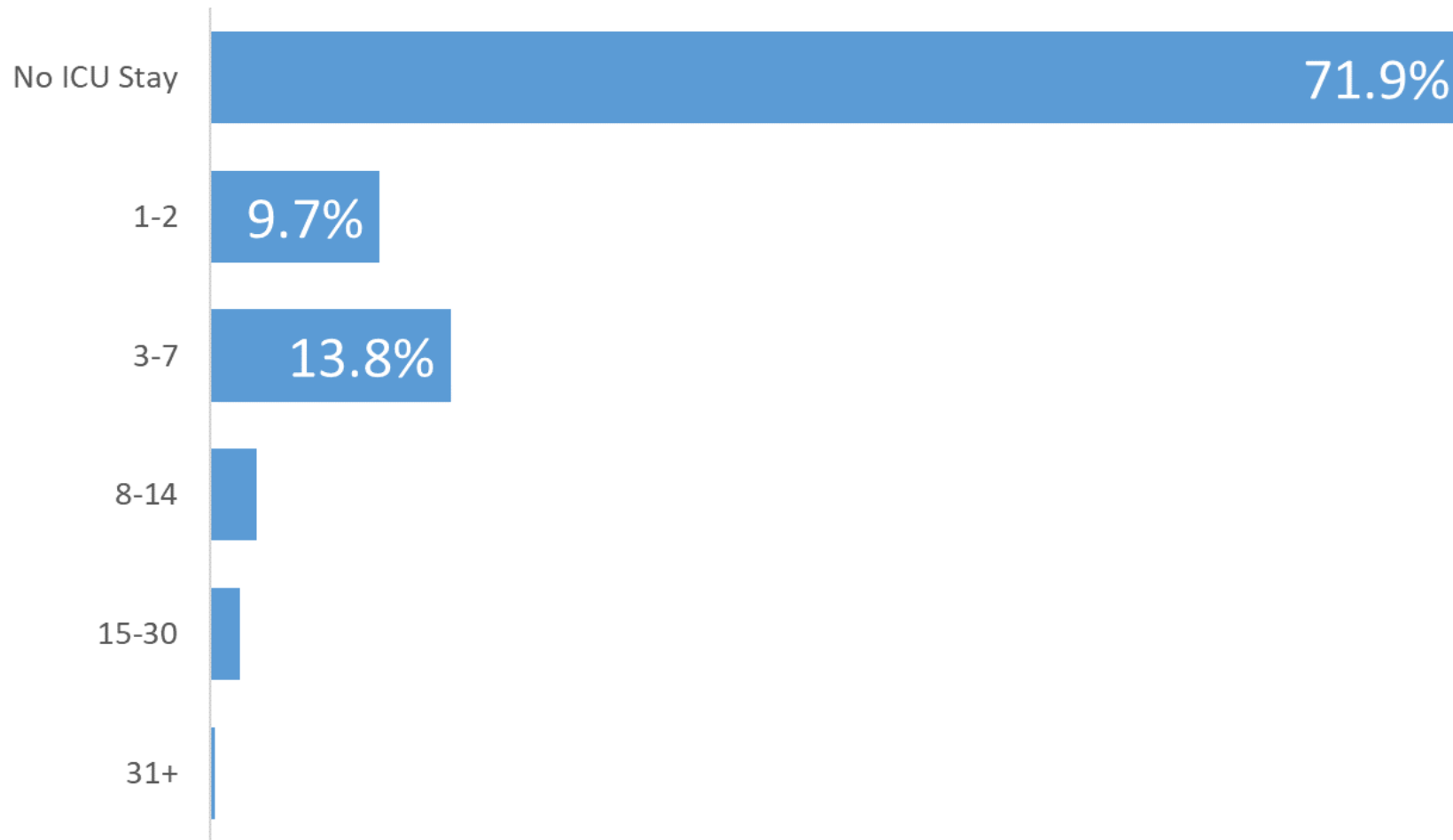


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Most transfers do not go to the ICU.



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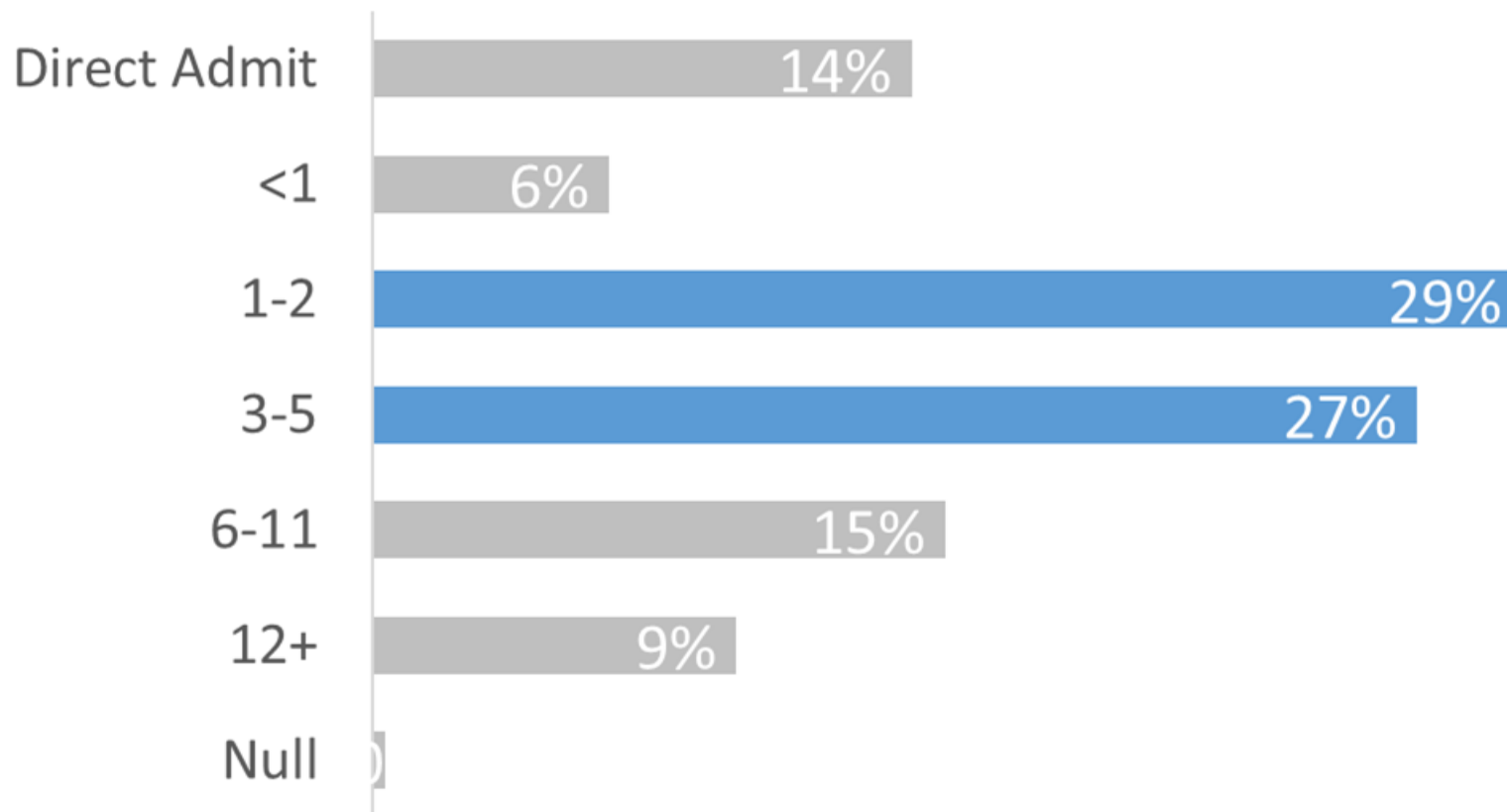
19.1% of data

(Non-Trauma) Hospitals:

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



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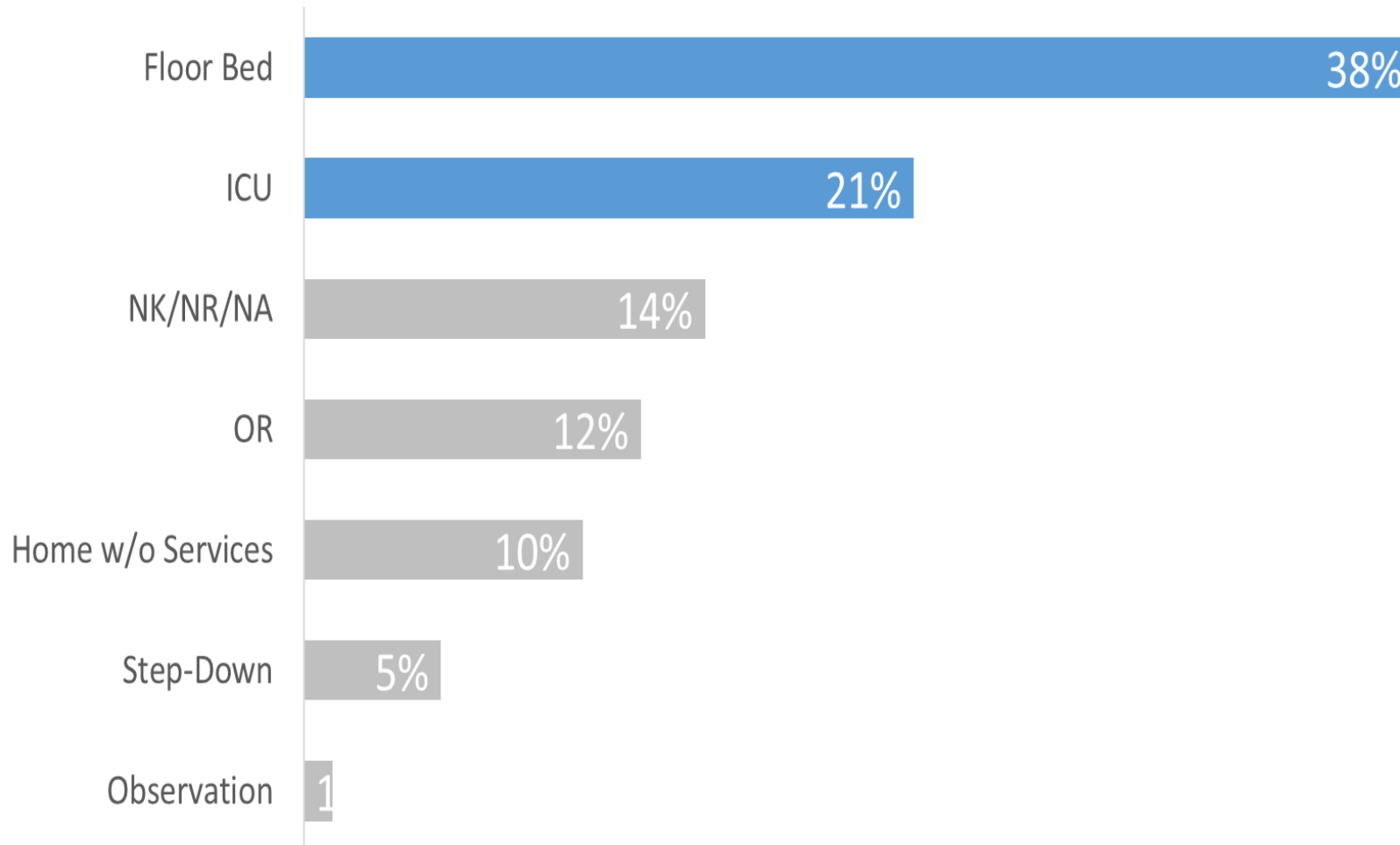
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The majority of transfer patients go to a **floor bed** or the **ICU**.



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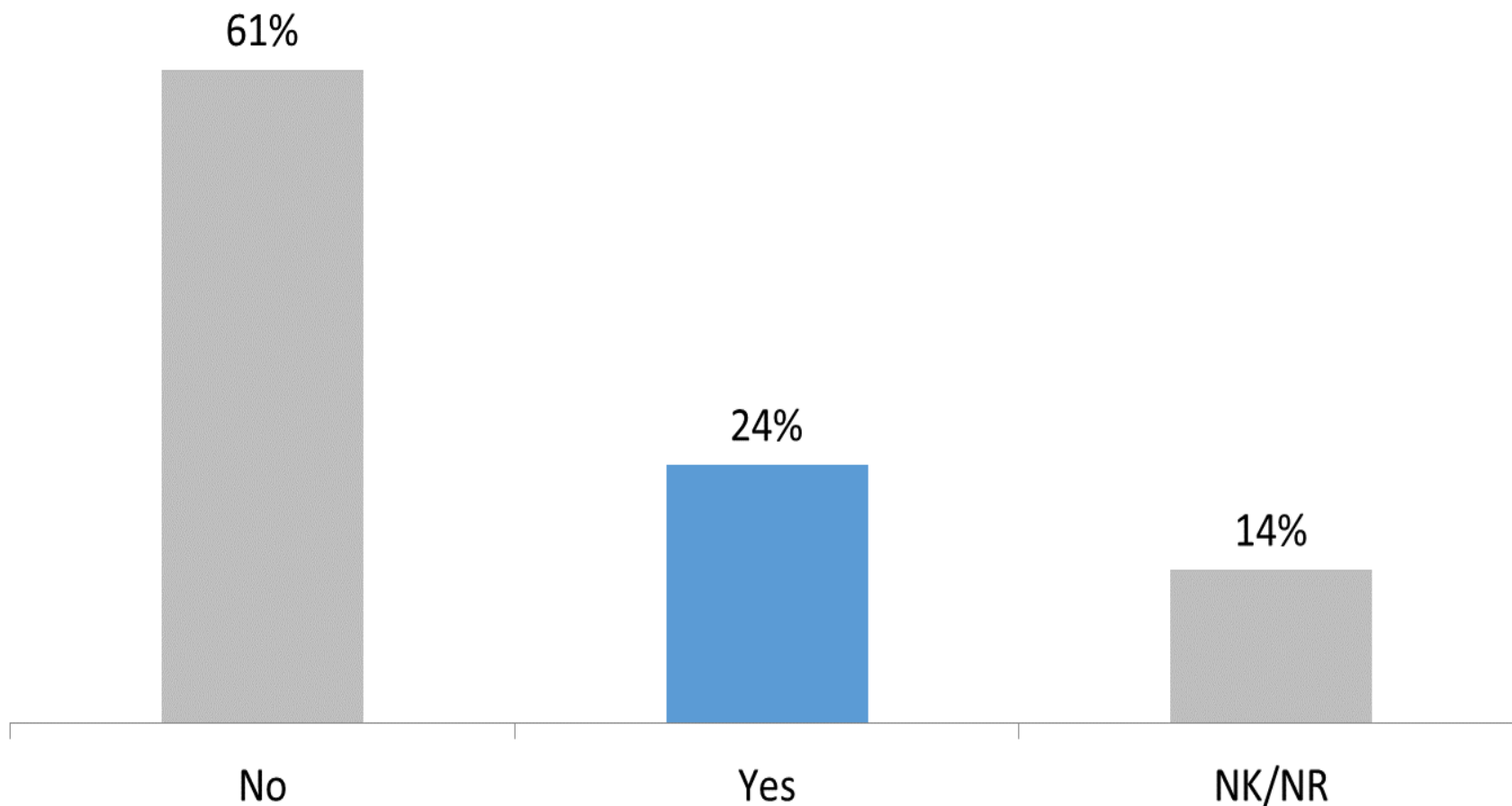
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A small portion of transfers had a **delay indicated**.



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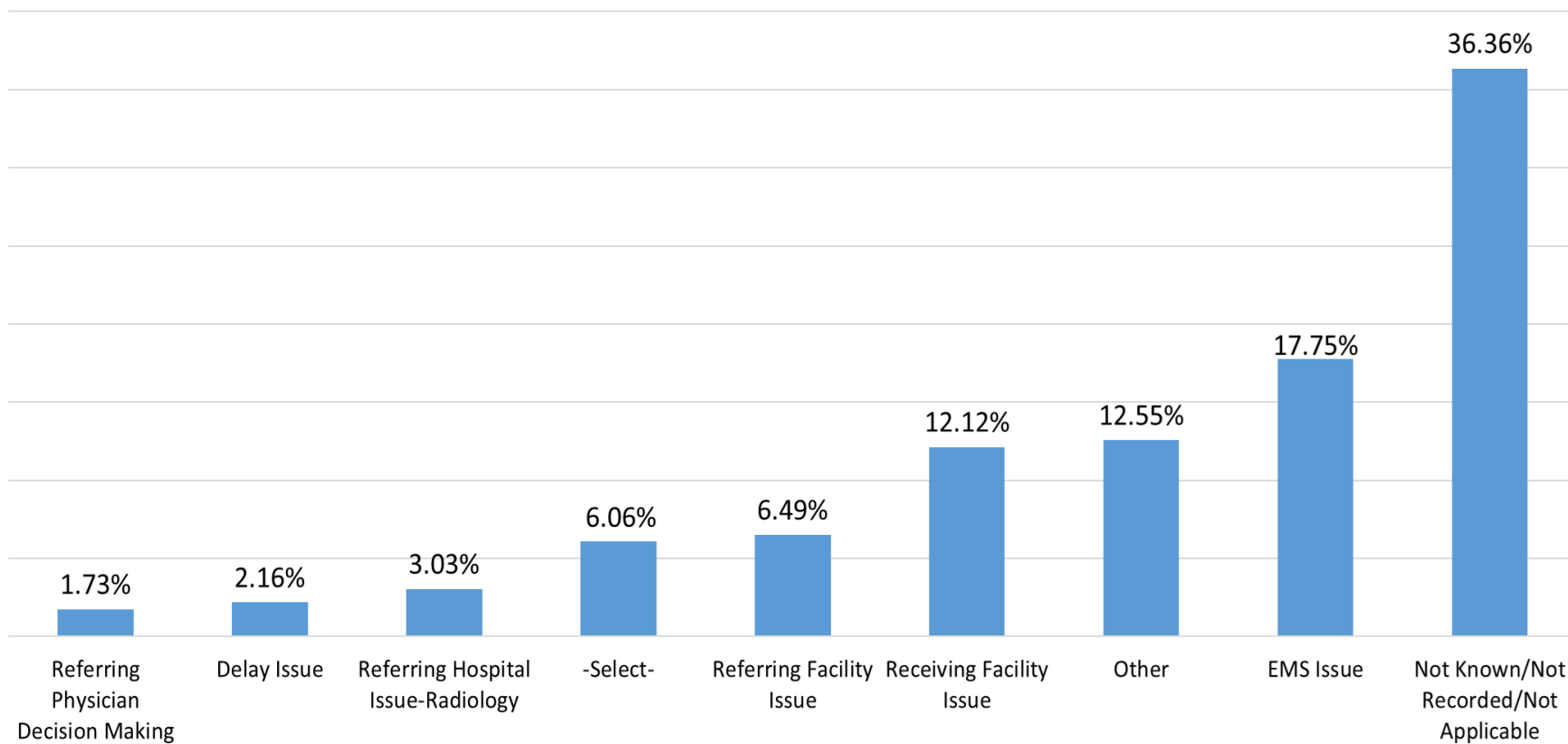
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Transfer delay reasons



*Categories with counts <1% include Communication and Family, Legal Guardian, or Patient Issue

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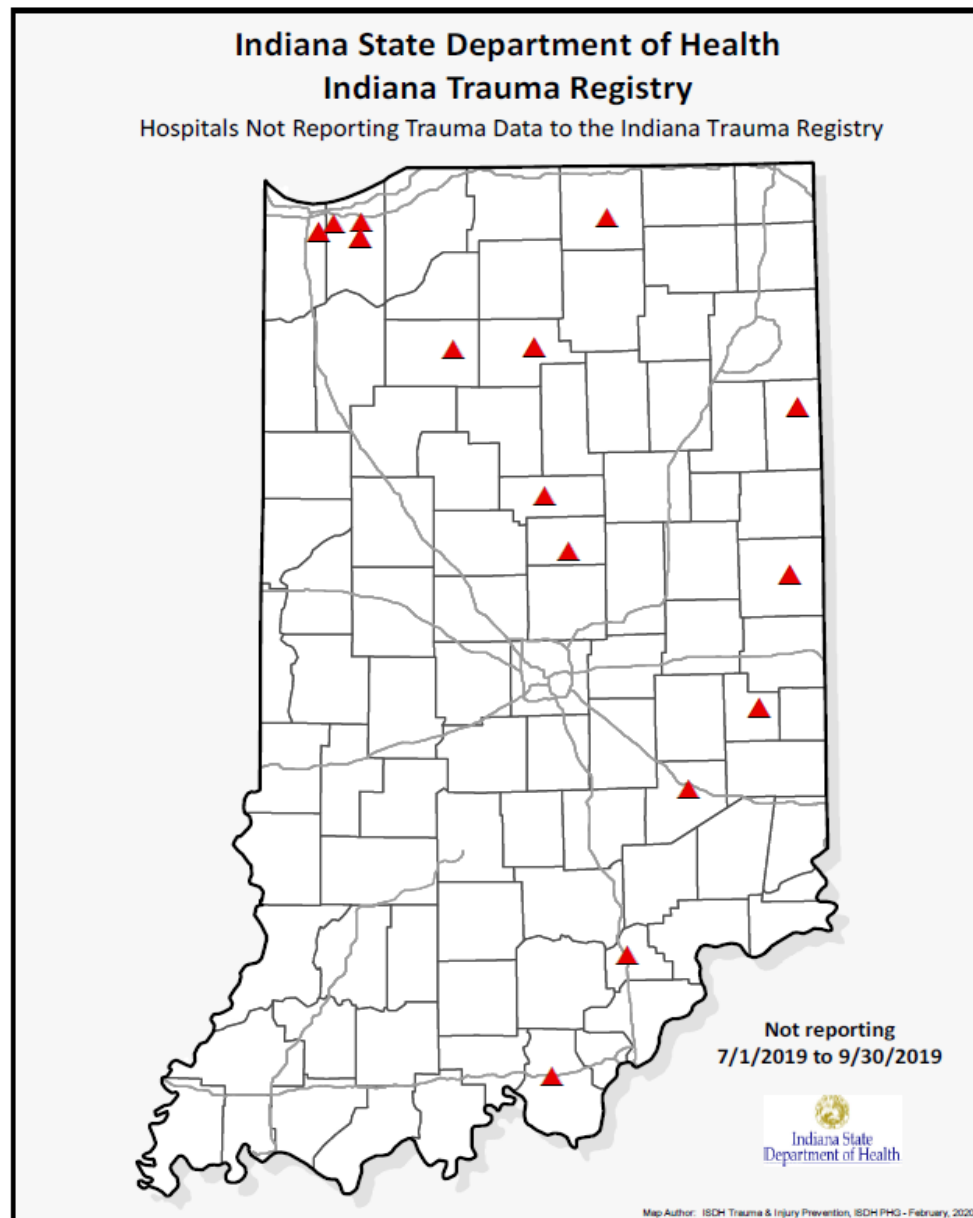
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Hospital that did not report during Q3 2019:

- Adams Memorial Hospital
- Ascension St. Vincent - Kokomo
- Ascension St. Vincent - Randolph
- Decatur County Memorial
- Fayette Regional Health
- Goshen Hospital
- Harrison County
- IU Health-Tipton
- Portage Hospital
- Porter Regional-Valparaiso
- Pulaski Memorial
- Scott County Memorial
- St. Mary Medical Center-Hobart
- Valparaiso Medical Center
- Woodlawn

Indiana State Department of Health Indiana Trauma Registry

Hospitals Reporting Trauma Data Quarter 3
July 1, 2019 to September 30, 2019

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 Vincent Evansville
St Vincent Indianapolis Hospital & Health Services
Terre Haute Regional Hospital

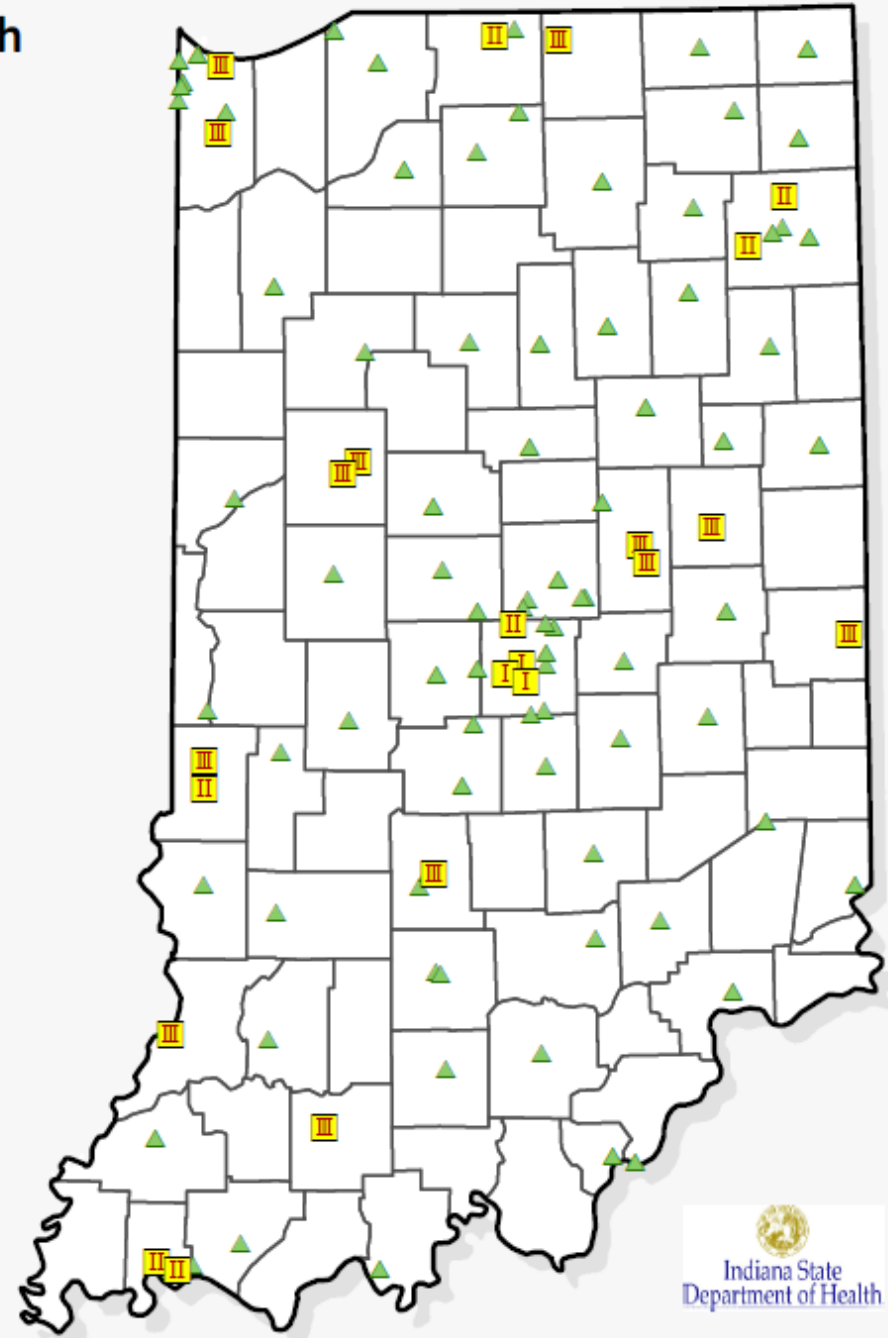
III Level III Trauma Centers

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

85 Non-Trauma Hospitals

Hospital categories include Verified and "In the Process"
Trauma Centers as of June 30, 2019.



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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.

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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 $b=b_0+b_1(RTS) + b_2(ISS) + b_3(\text{Age Index})$

Total GCS = Verbal GCS + Motor GCS + Eye GCS

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

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



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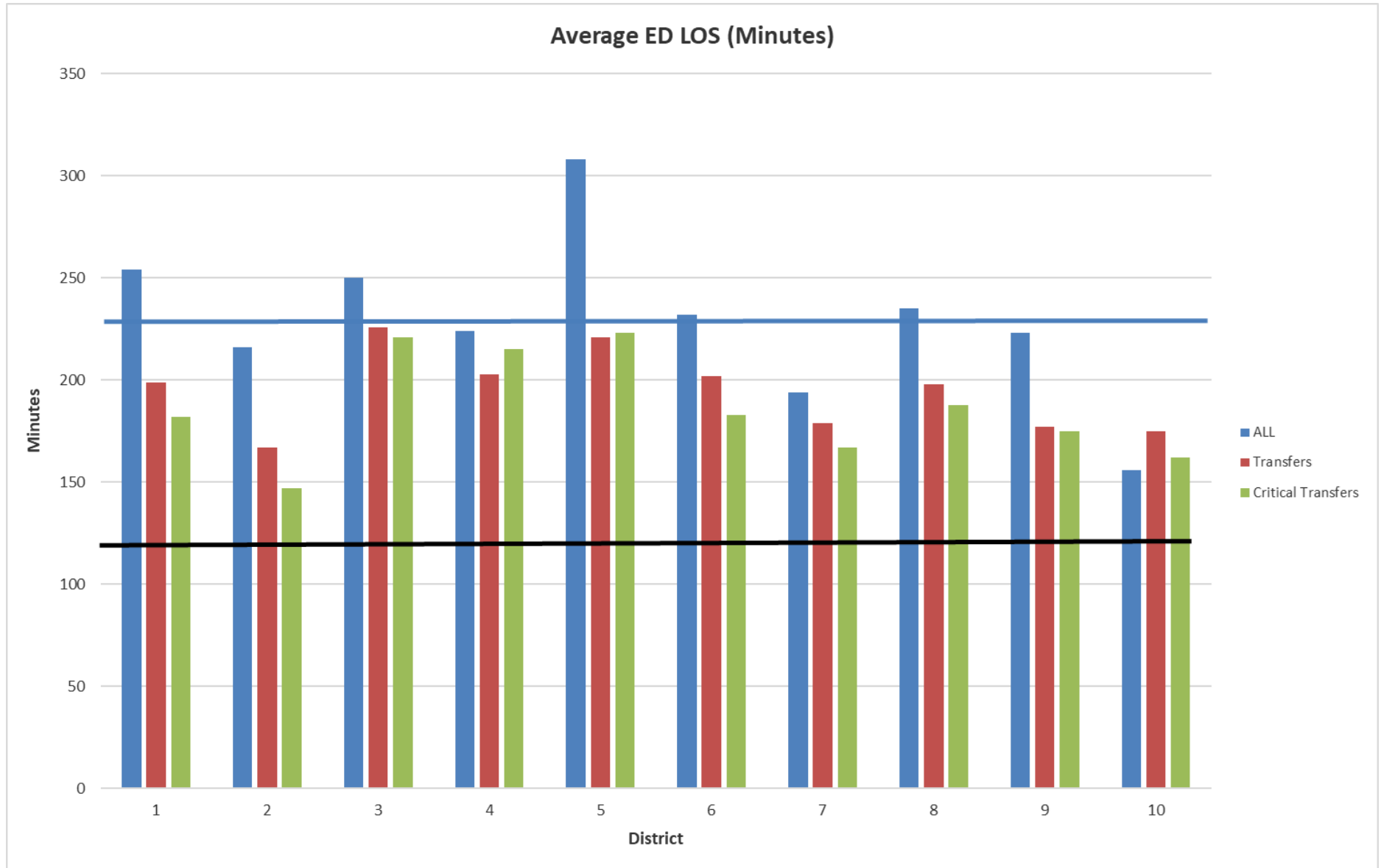
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ED LOS by District



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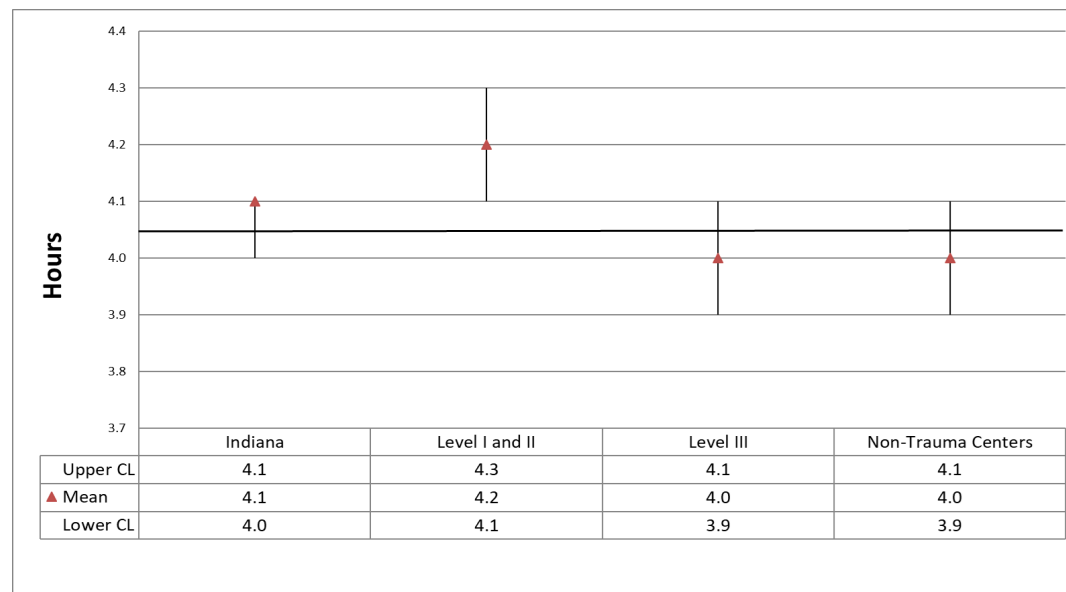
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All Patients Average ED LOS (Hours)



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.