Indiana Trauma Registry

Statewide Quarter 1 Data Report
January 1, 2019—March 31, 3019
9,037 Incidents

104 Total Hospitals Reporting

Level I and II:	10 facilities	45.2% of data
Level III:	13 facilities	19.5% of data
(Non-Trauma) Hospitals:	81 facilities	35.3% of data

For Quarter 1 2019 which spanned from January 1, 2019—March 31, 2019 there were 9,037 incidents reported to the Indiana Trauma Registry at the Indiana State Department of Health. There were 104 hospitals that reported data, of which 10 were level I or II trauma centers, 13 were level III trauma centers and 81 were non-trauma centers. Trauma centers represented 64.7% of the data. There were 3,197 incidents reported for January, 2,859 reported for February, and 2,984 incidents reported for March.

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
ICU: Intensive Care Unit
ISS: Injury Severity Score
LOS: Length of Stay
NTC: Non-trauma Center

MVC: Motor Vehicle Collision
OR: Operating Room
Ps: Probability of Survival
Level I, II and III: Verified and In Process Trauma Centers
CAHs: Critical Access Hospital

Calculations:
$Ps = 1/(1+e^{-b})$ where $b=b_o+b1(RTS) + b2(ISS) + b3(Age\ Index)$
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 1 Data Report
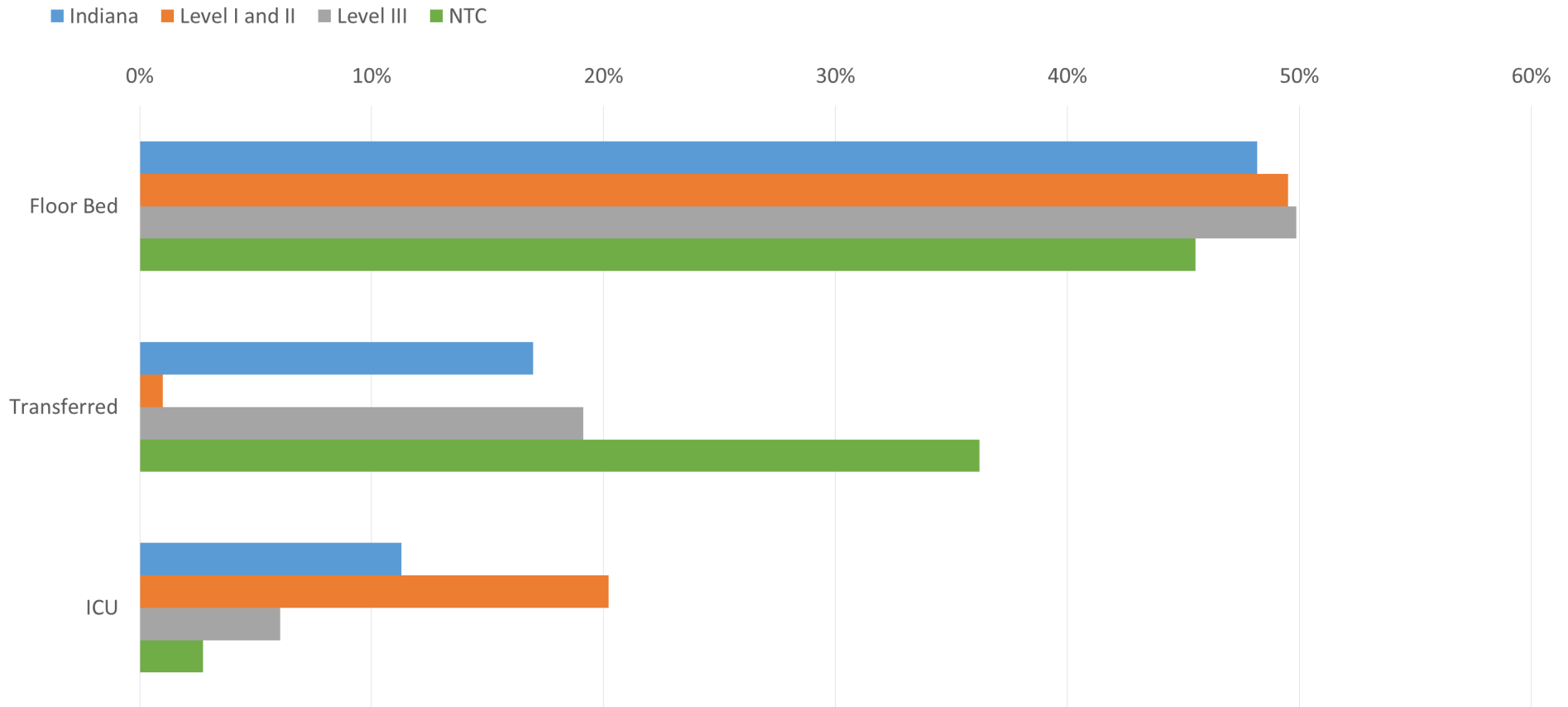**January 1, 2019—March 31, 3019**
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The majority of patients in the ED go to a **floor bed.**

Legend: Indiana, Level I and II, Level III, NTC

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

Indiana Trauma Registry

Statewide Quarter 1 Data Report
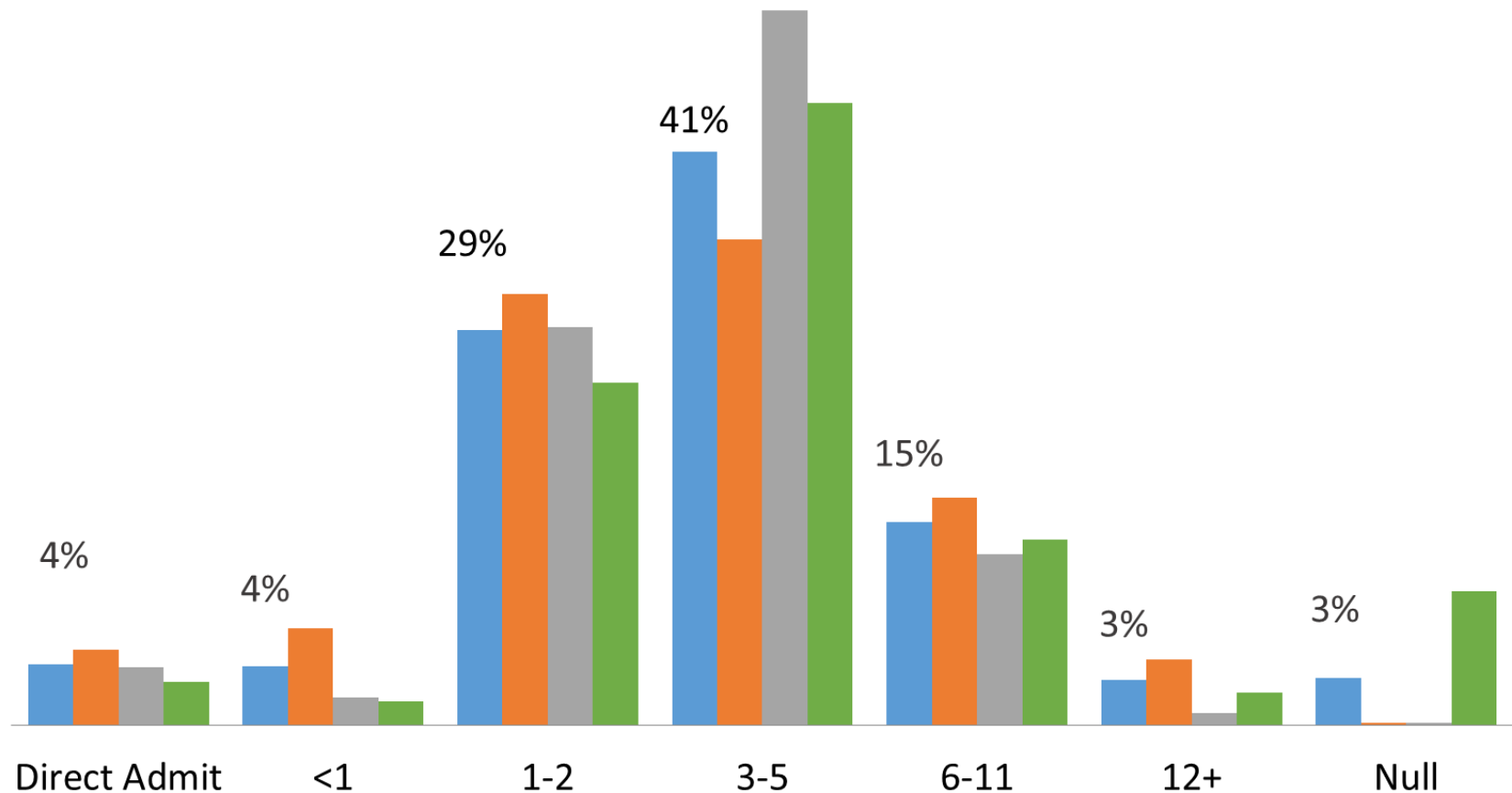**January 1, 2019—March 31, 3019**
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The majority of patients in the ED stay for **1-5 hours**.

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

Indiana Trauma Registry

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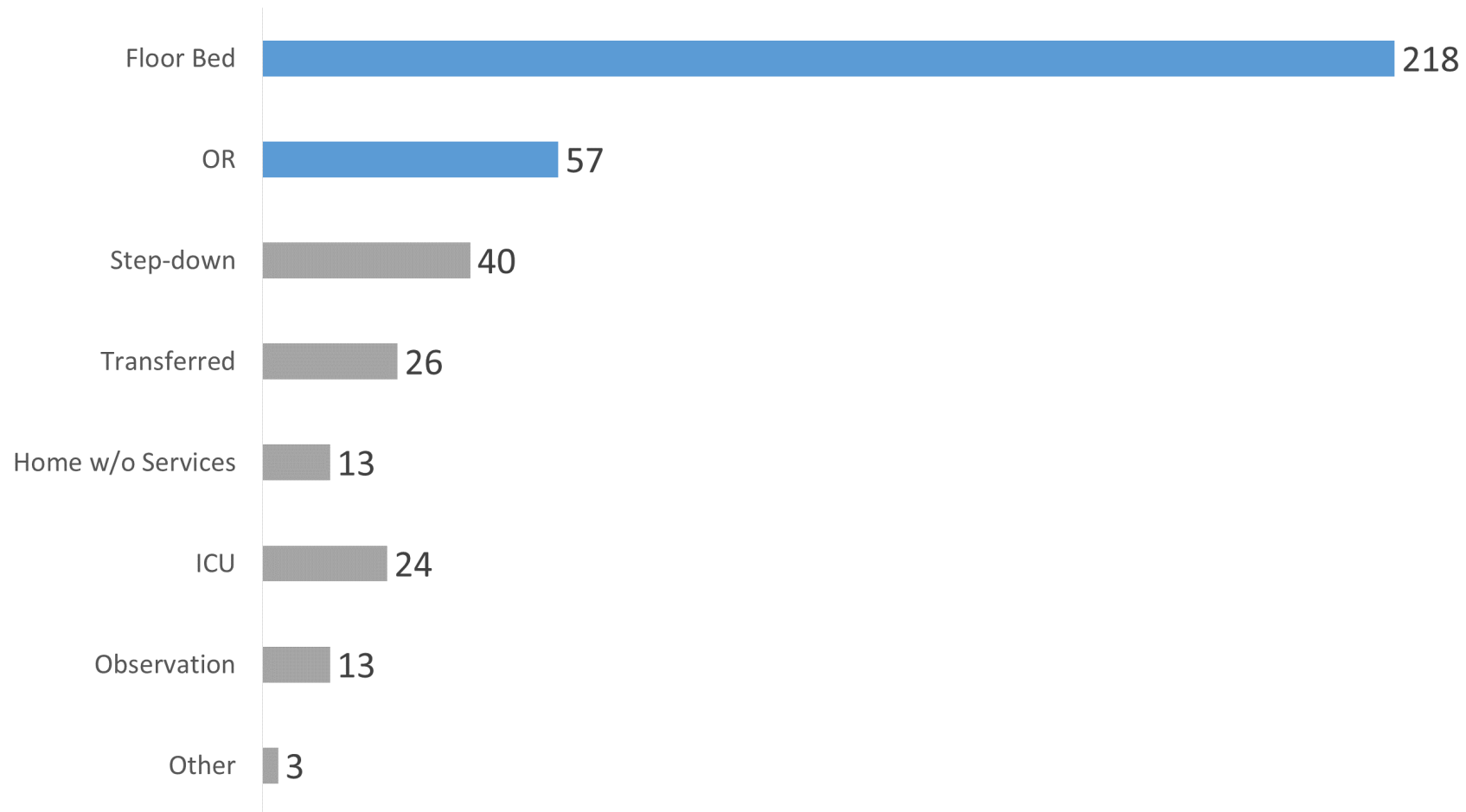**January 1, 2019—March 31, 3019**
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Most patients in the ED>12 hours go to a **floor bed** or the **OR**.

Disposition	Count
Floor Bed	218
OR	57
Step-down	40
Transferred	26
Home w/o Services	13
ICU	24
Observation	13
Other	3

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

Indiana Trauma Registry

Statewide Quarter 1 Data Report
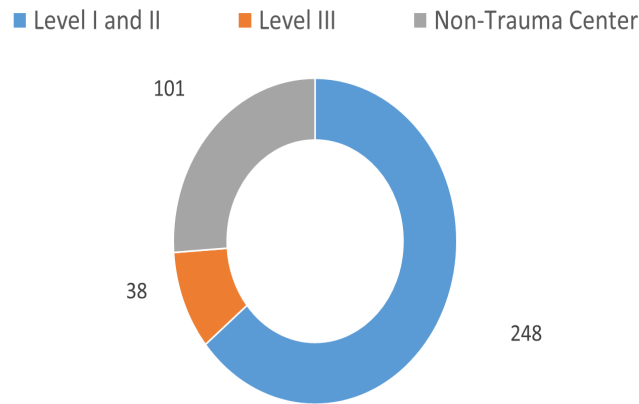### January 1, 2019—March 31, 3019
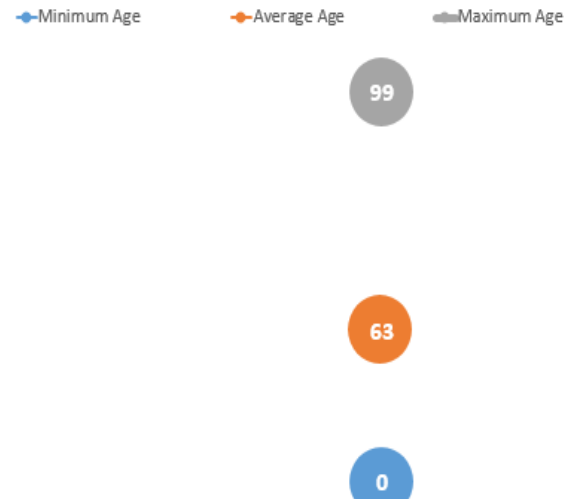### 9,037 Incidents

104 Total Hospitals Reporting

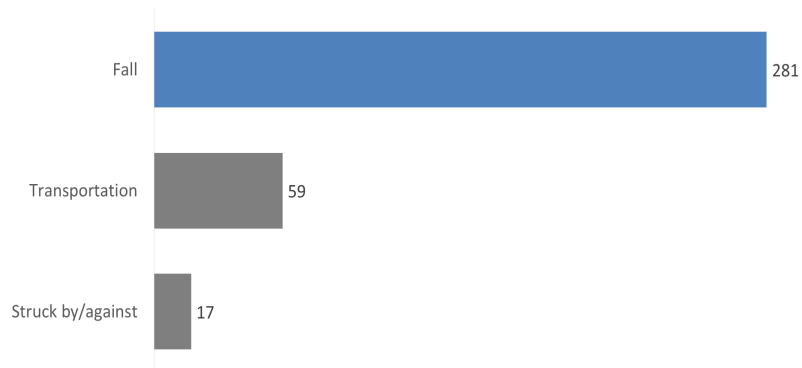|		
Level I and II:	10 facilities	45.2% of data
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ED LOS > 12 Hours, N=387

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

Legend: ■ Level I and II ■ Level III ■ Non-Trauma Center

- 101
- 38
- 248

The average patient age was 63 years.

Legend: Minimum Age Average Age Maximum Age

- 99
- 63
- 0

Falls were the most common cause of injury.

Cause	Count
Fall	281
Transportation	59
Struck by/against	17

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

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

Transport	Count
Ambulance	296
Private	86
Other	4
Police	1

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ED LOS > 12 Hours, N=387

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

1-8	9-15	16-24	25-44	No ISS
182	170	22	3	10

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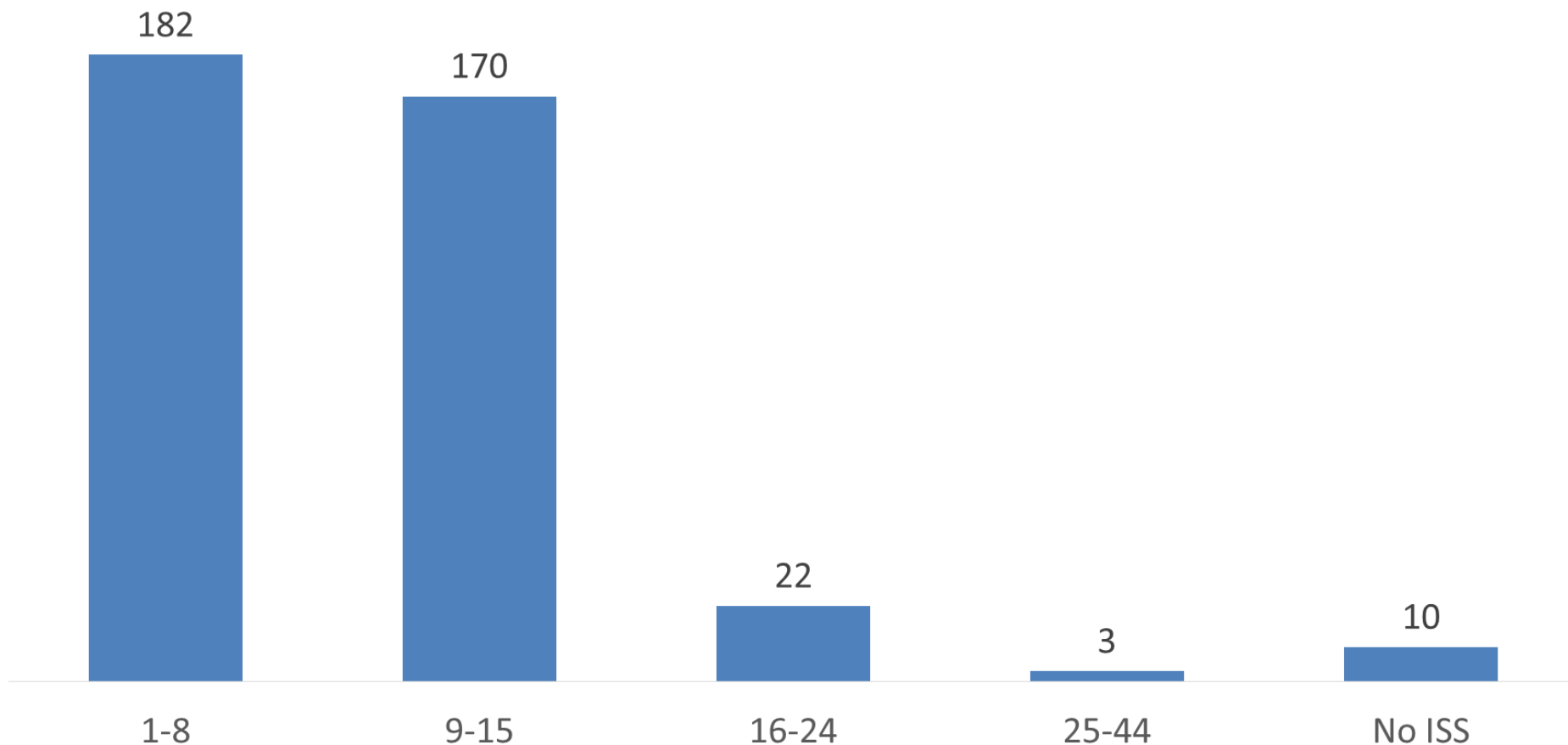
ED LOS > 12 Hours, N=387

RTS Respiratory

Category	Value
Category 1	0
Category 2	0
Category 3	354
Category 4	7
Category 5	0
Category 6	0
Unknown	26
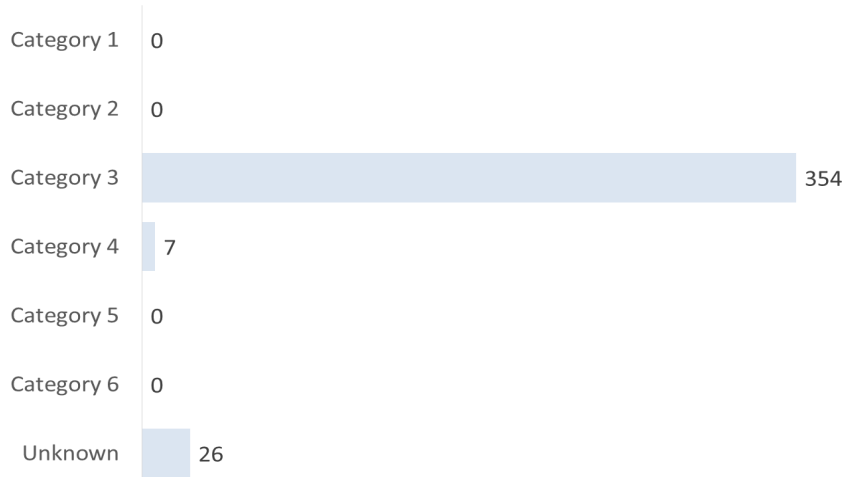
Interpretation: revised trauma scores (RTS) are based on the patient's severity of injury. Higher categories indicate a lower chance of mortality. The majority of patients had a moderate RTS respiratory category, a moderate systolic blood pressure, and an unknown GCS motor score.

RTS Systolic

Category	Value
Category 1	0
Category 2	1
Category 3	3
Category 4	360
Category 5	0
Category 6	0
Unknown	23

GCS Motor

Category	Value
Category 1	0
Category 2	0
Category 3	1
Category 4	1
Category 5	6
Category 6	344
Unknown	35

Indiana Trauma Registry

Statewide Quarter 1 Data Report

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For Quarter 1 2019 of the 9,037 incidents reported to the Indiana Trauma Registry, 1,532 cases that had an ED Disposition of "Transferred to another acute care facility" at the initial facility and 1771 had the Inter-Facility Transfer equal to "Yes" at the Trauma Center. Of those transferred, 558 cases were probabilistically matched. The linked cases make up 18% of the Q1 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.

Initial Facility:
1,532 Incidents

Matched:
558 Incidents

Final Facility:
1,771 Incidents
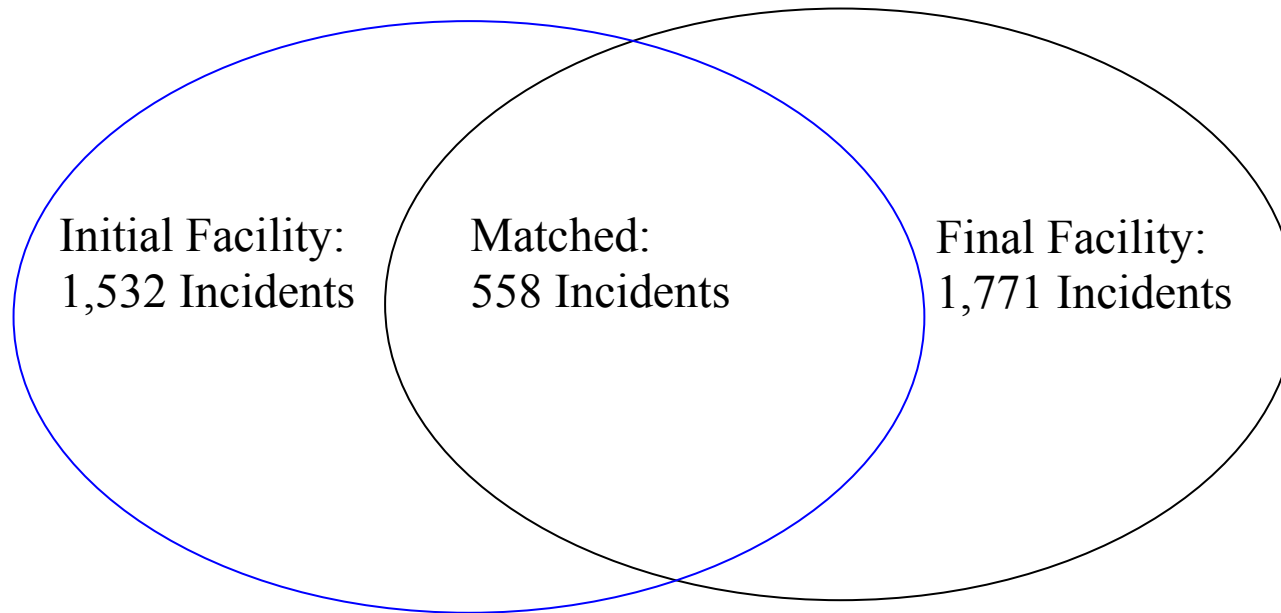
The initial facility in which transfers come from may be considered Critical Access Hospitals (CAHs). All Indiana CAHs are considered Rural, and must meet additional requirements to have a CAH designation, such as having no more than 25 inpatient beds and being located in a rural area.

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	588	216	176	62
EMS Notified to Scene	8.7 minutes	8.8 minutes	8.8 minutes	8.9 minutes
EMS Scene Arrival to Departure	16.9 minutes	15.3 minutes	15.2 minutes	15.1 minutes
EMS Scene Departure to Initial Hospital ED Arrival	18.7 minutes	16.7 minutes	16.9 minutes	16.8 minutes
Initial Hospital ED Arrival to Departure	3 hours 35 minutes	3 hours 21 minutes	3 hours 23 minutes	2 hours 53 minutes
Initial Hospital ED Departure to Final Hospital ED Arrival	56.2 minutes	56.7 minutes	60.1 minutes	49.2 minutes
TOTAL TIME	5 hours 15.5 minutes	4 hours 58.5 minutes	5 hours 4 minutes	4 hours 23 minutes

*Critical patient is defined as having a GCS ≤ 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 ≤ 12 at the initial hospital.

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

9

Indiana Trauma Registry

Statewide Quarter 1 Data Report
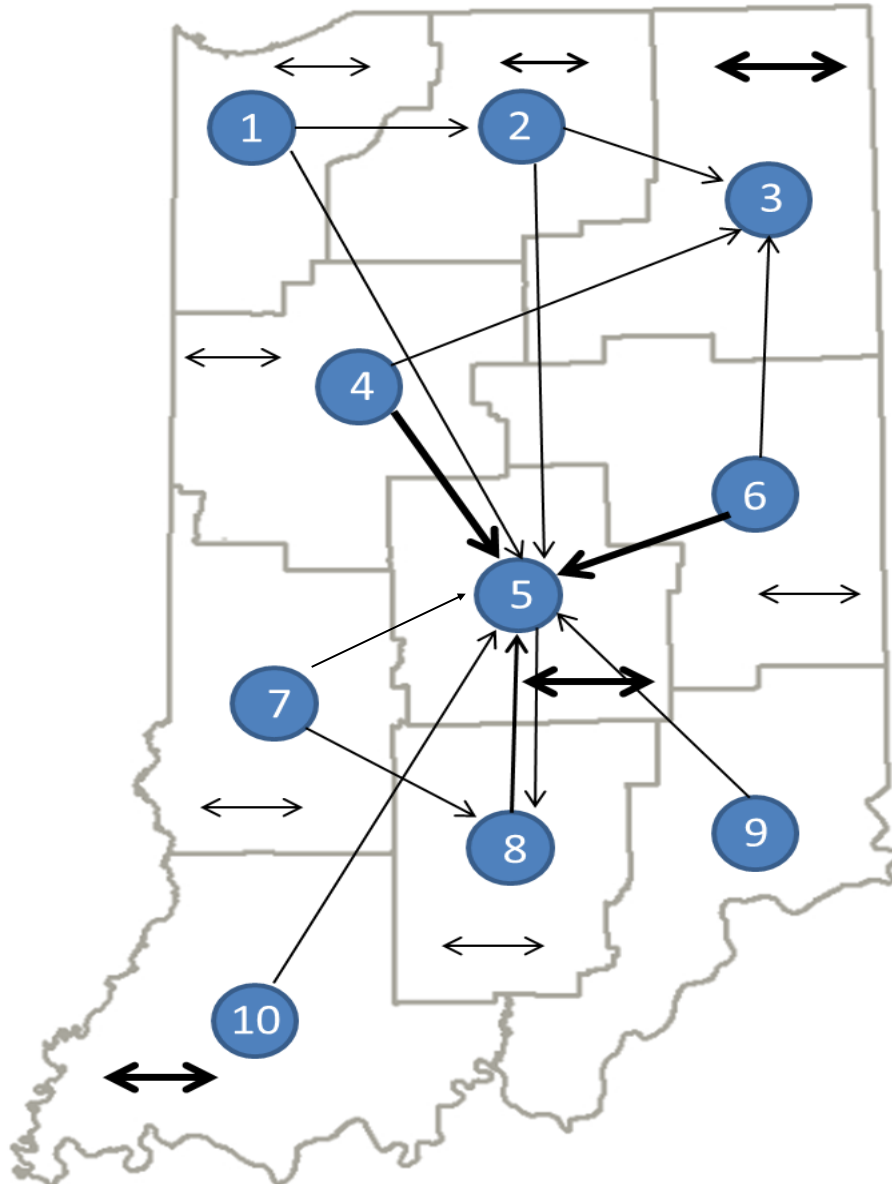January 1, 2019—March 31, 3019
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For Transfer Patients:		
Public Health Preparedness District Initial Hospital	Public Health Preparedness District Final Hospital	Incident Counts
1	1	4
1	2	19
1	4	8
1	5	3
2	2	14
2	3	1
2	5	2
3	3	95
3	5	3
4	4	12
4	5	27
5	5	115
6	3	9
6	5	72
6	6	10
7	5	34
7	7	26
8	5	25
8	8	8
8	10	1
9	5	5
10	5	9
10	10	86

*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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Transfers have a higher percent of male patients than Indiana.

■ Indiana ■ Transfer

Male — Indiana: 50%, Transfer: 55%
Female — Indiana: 50%, Transfer: 45%

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

Legend: ■ Initial Hospital ■ Final Hospital

ISS	Initial Hospital	Final Hospital
1-8	44%	39%
9-14	41%	42%
15-24	8%	13%
25-44	3%	6%
45-74		
75		
No ISS		

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Most transfers do not go to the ICU.

No ICU Stay	71.8%
1-2	10.7%
3-7	13.4%
8-14	
15-30	
31+	

Indiana Trauma Registry

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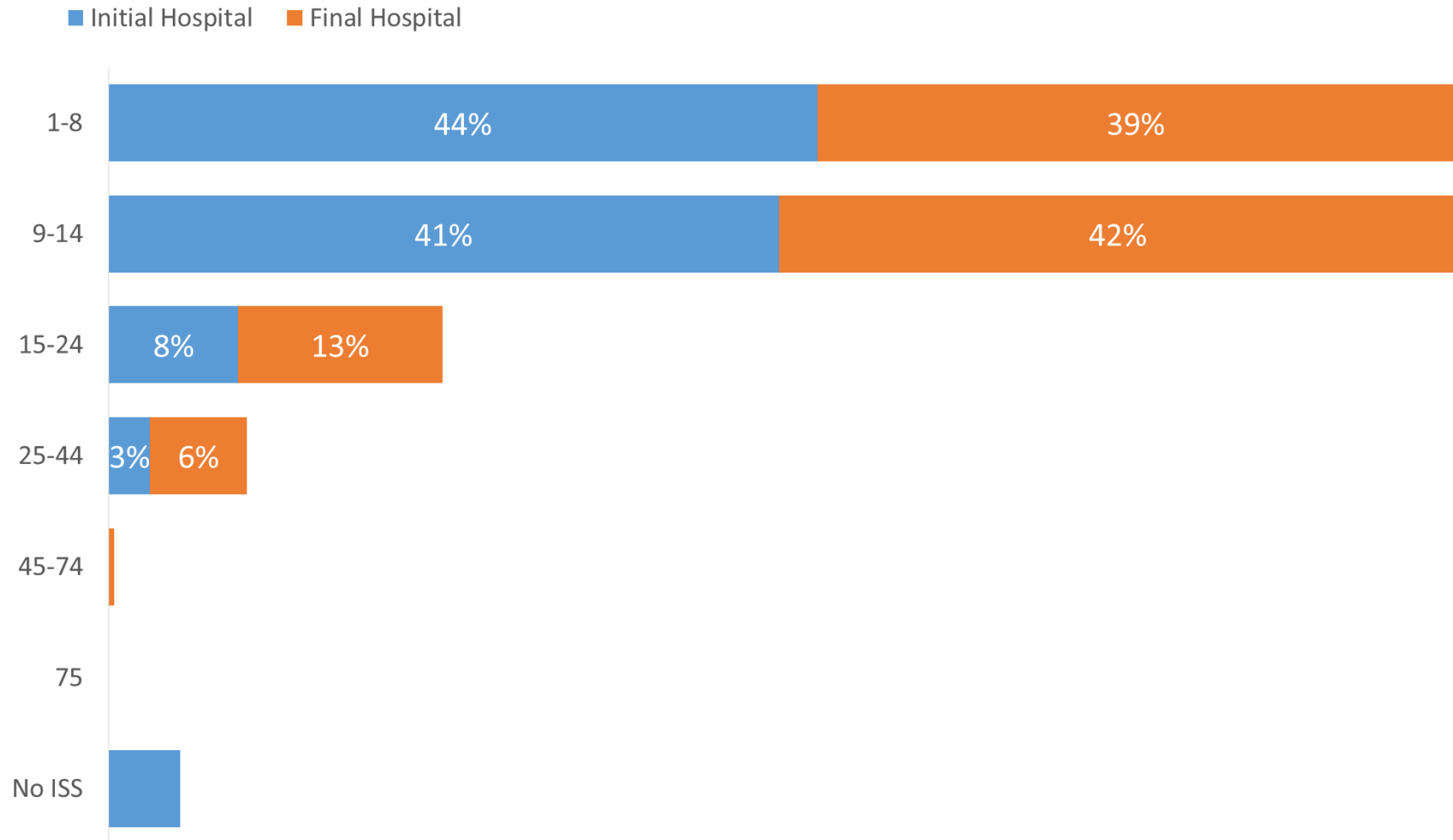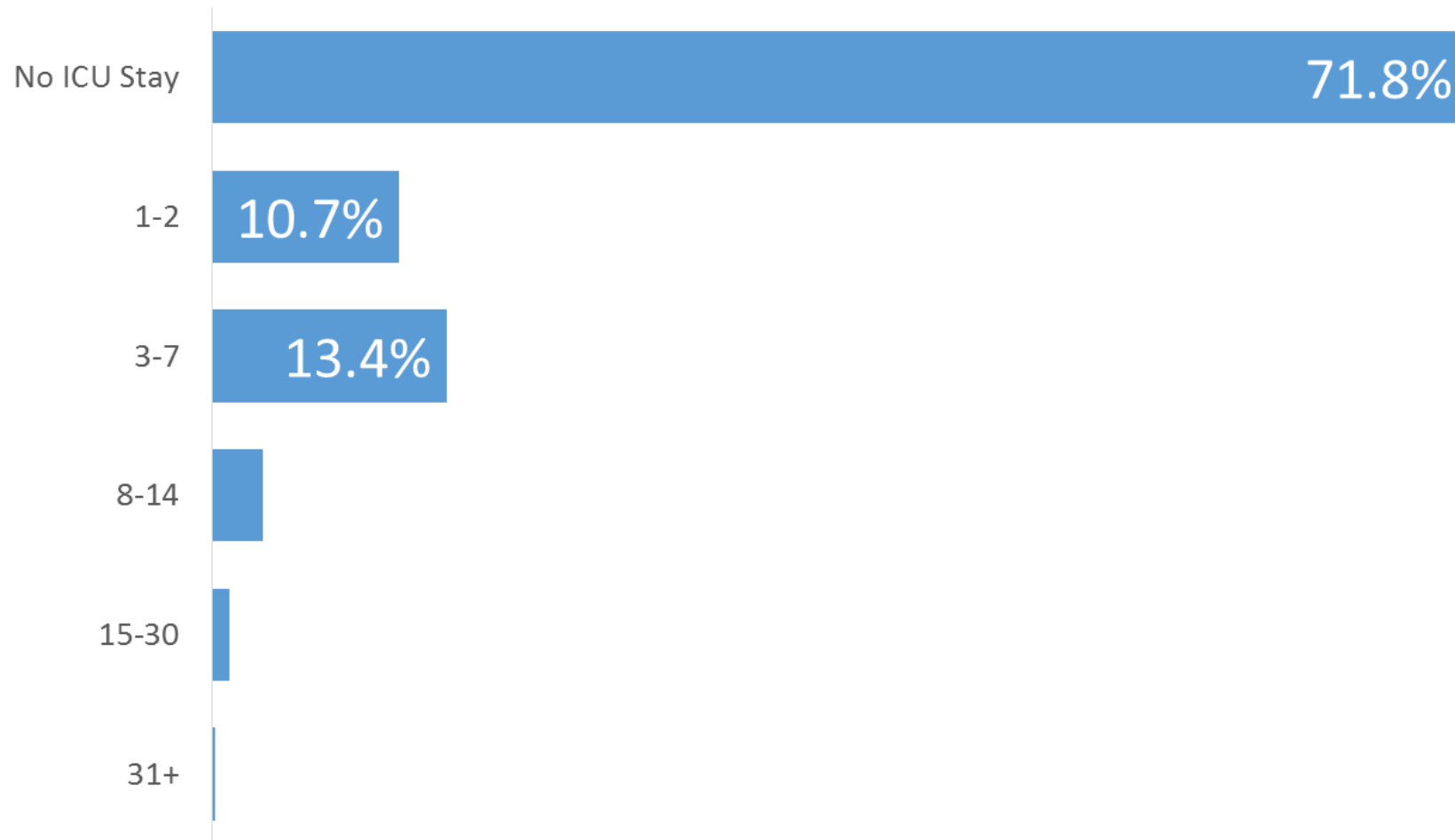**104 Total Hospitals Reporting**
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Most transfer patients are in the ED for **1-5 hours** at the final hospital.

Category	Percentage
Direct Admit	17%
<1	8%
1-2	32%
3-5	27%
6-11	11%
12+	5%
Null	%

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

Category	Percentage
Floor Bed	40%
ICU	23%
NK/NR/NA	17%
OR	9%
Home w/o Services	4%
Step-Down	4%
Observation	2%

Indiana Trauma Registry

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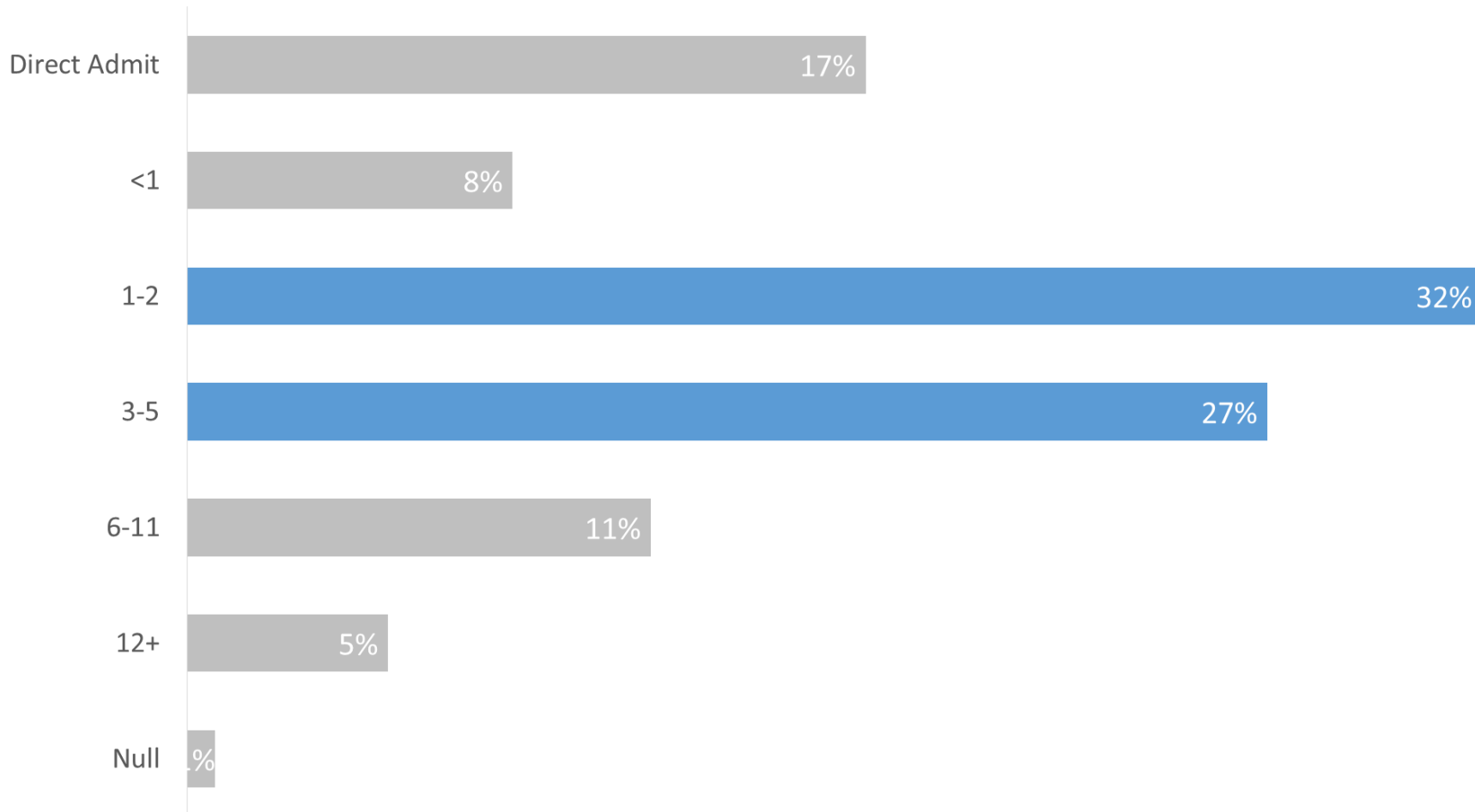**9,037 Incidents**
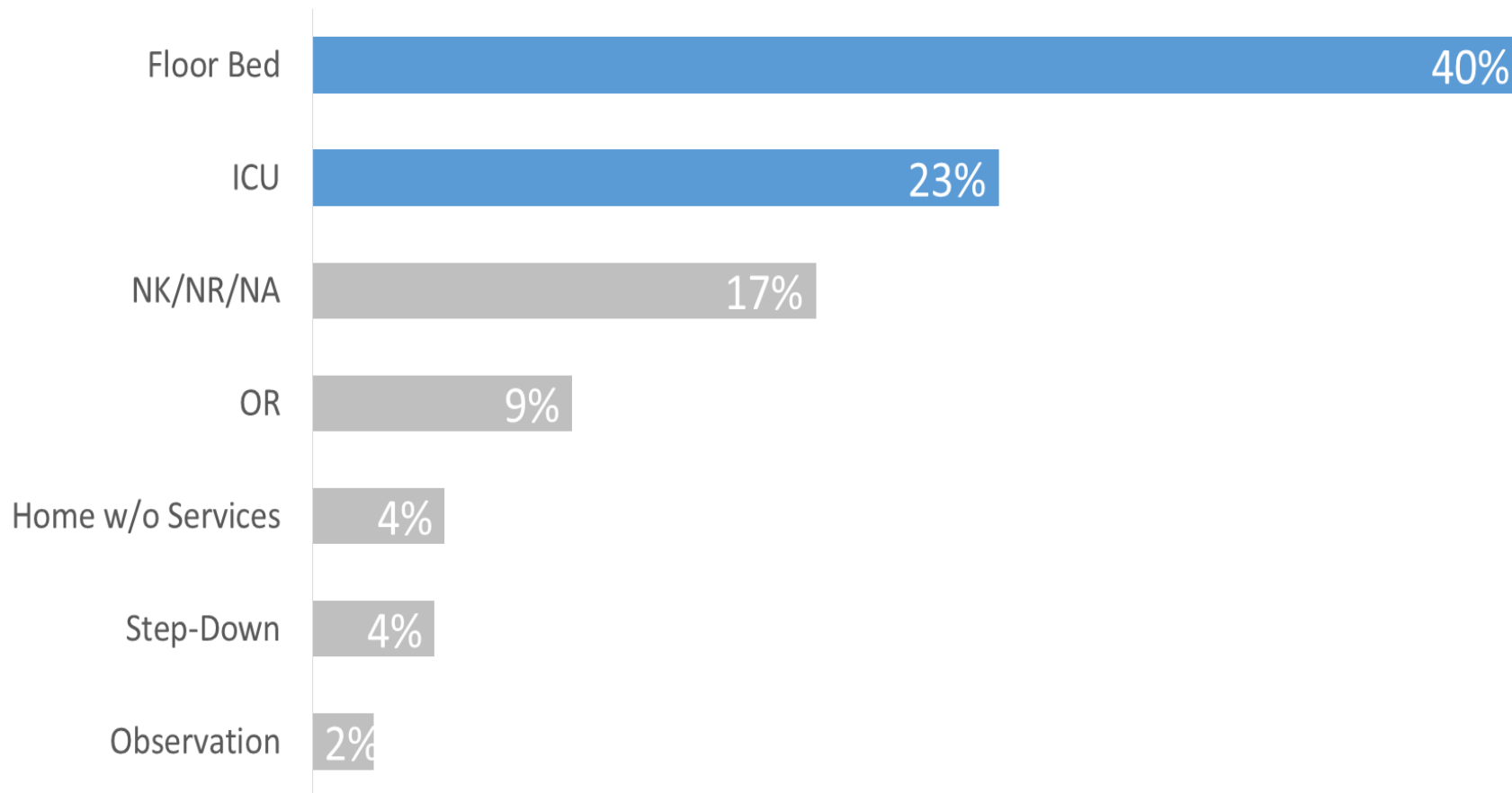
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A small portion of transfers had a **delay indicated**.

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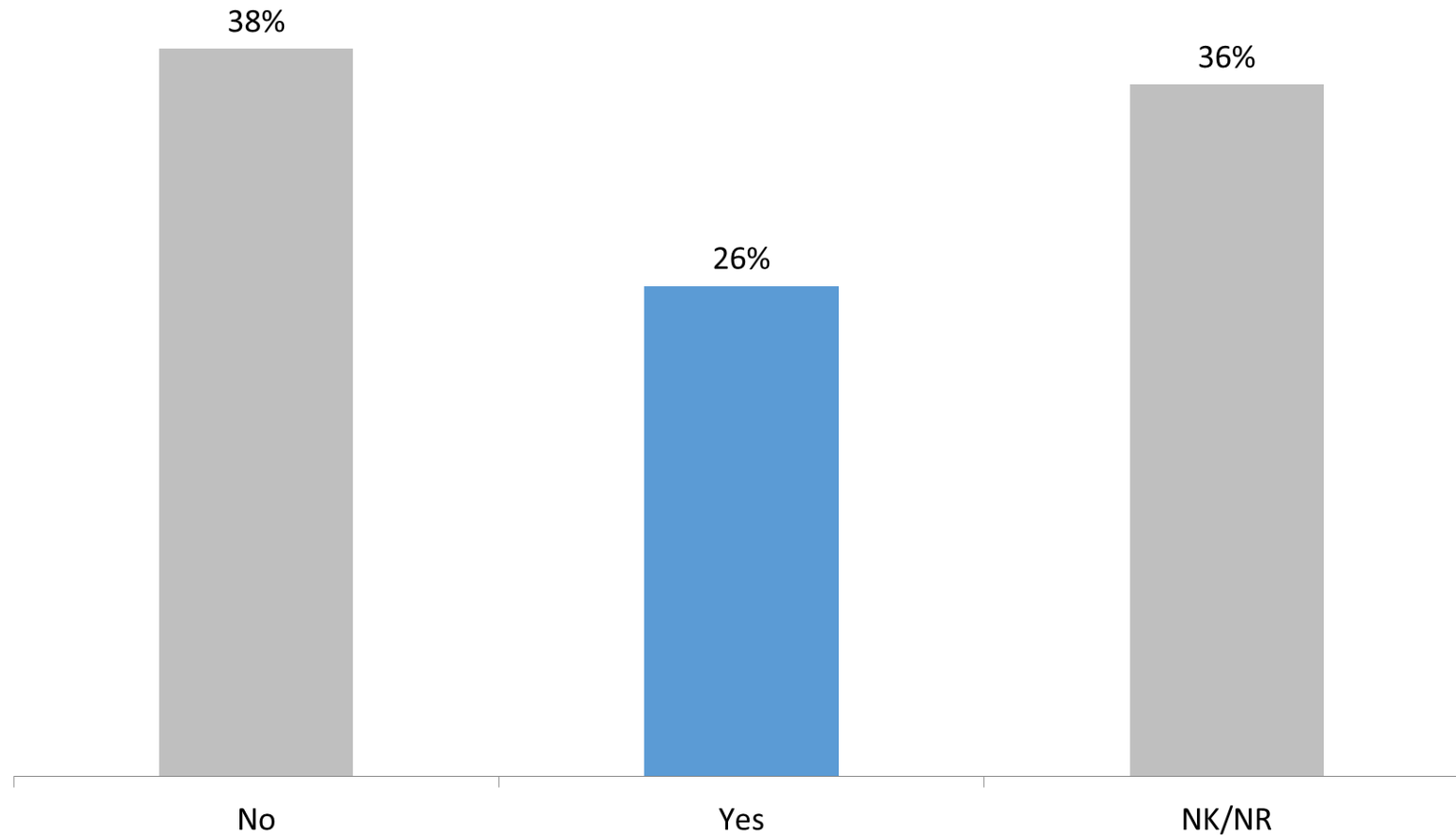
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Most delay reasons were not completed.
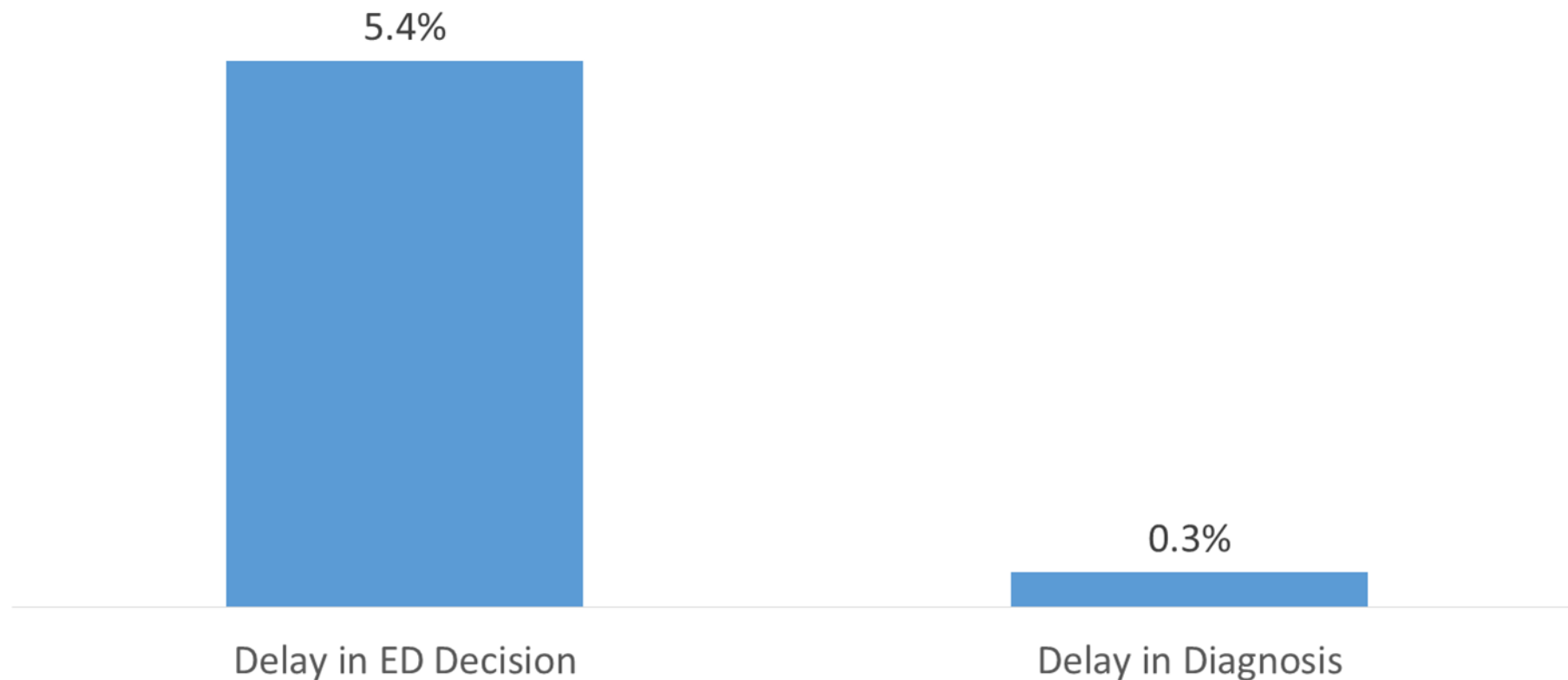
5.4% — Delay in ED Decision
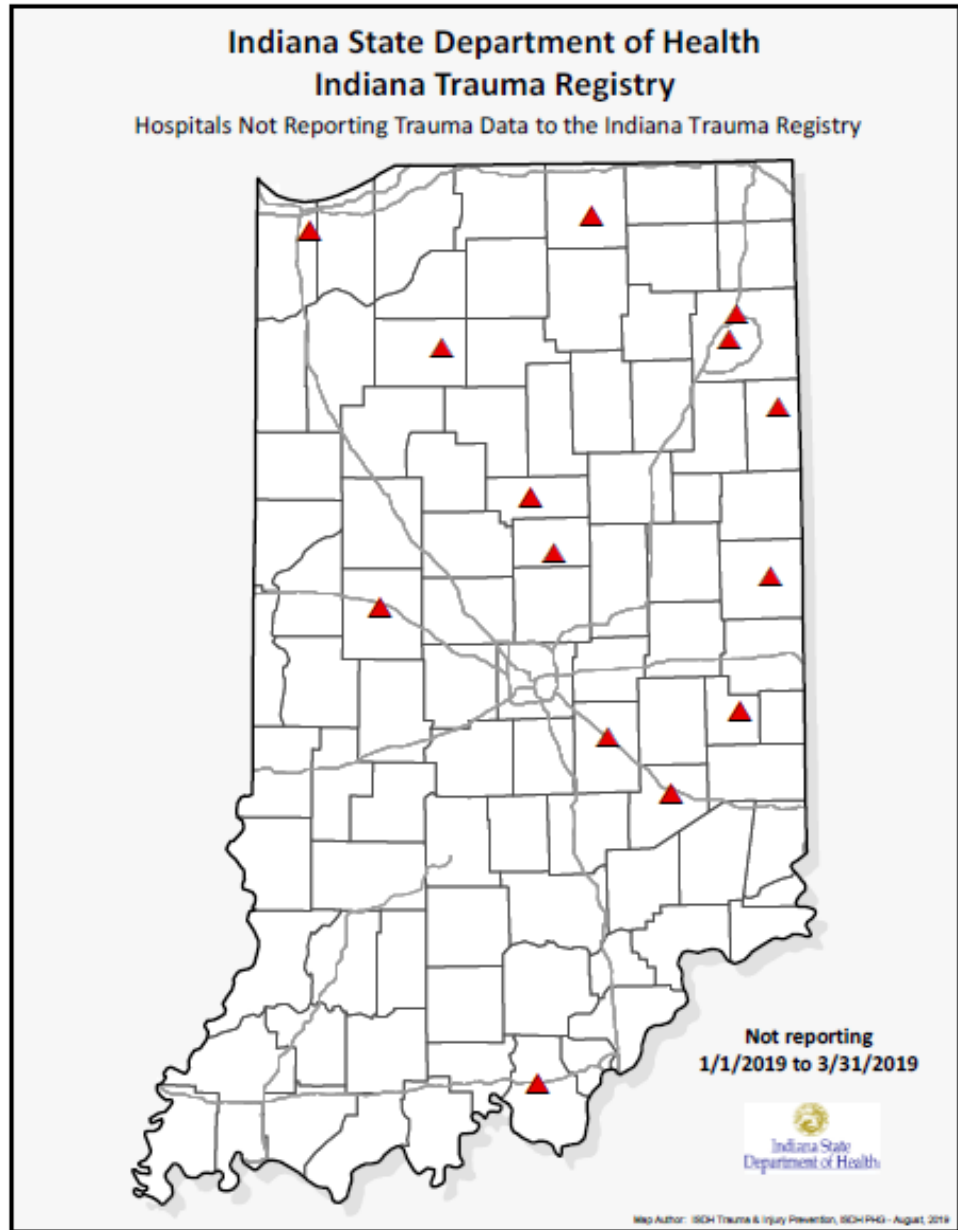
0.3% — Delay in Diagnosis

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Indiana State Department of Health
Indiana Trauma Registry
Hospitals Not Reporting Trauma Data to the Indiana Trauma Registry

Not reporting
1/1/2019 to 3/31/2019

Indiana State
Department of Health

Map Author: ISDH Trauma & Injury Prevention, ISDH PHG - August, 2019

Hospital that did not report during Q1 2019:
- Adams Memorial Hospital
- Decatur County Memorial
- Dupont Hospital
- Fayette Regional Health
- Franciscan Health Crawfordsville
- Goshen Hospital
- Harrison County
- IU Health Tipton
- Major Hospital
- Pulaski Memorial
- Riverview Health
- St. Joseph Hospital (Fort Wayne)
- St. Mary Medical Center—Hobart
- St. Vincent Kokomo
- St. Vincent Randolph

Indiana State Department of Health
Indiana Trauma Registry

Hospitals Reporting Trauma Data Quarter 1
January 1, 2019 to March 31, 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 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

81 Non-Trauma Hospitals

Hospital categories include Verified and "In the Process"
Trauma Centers as of December 31, 2018.
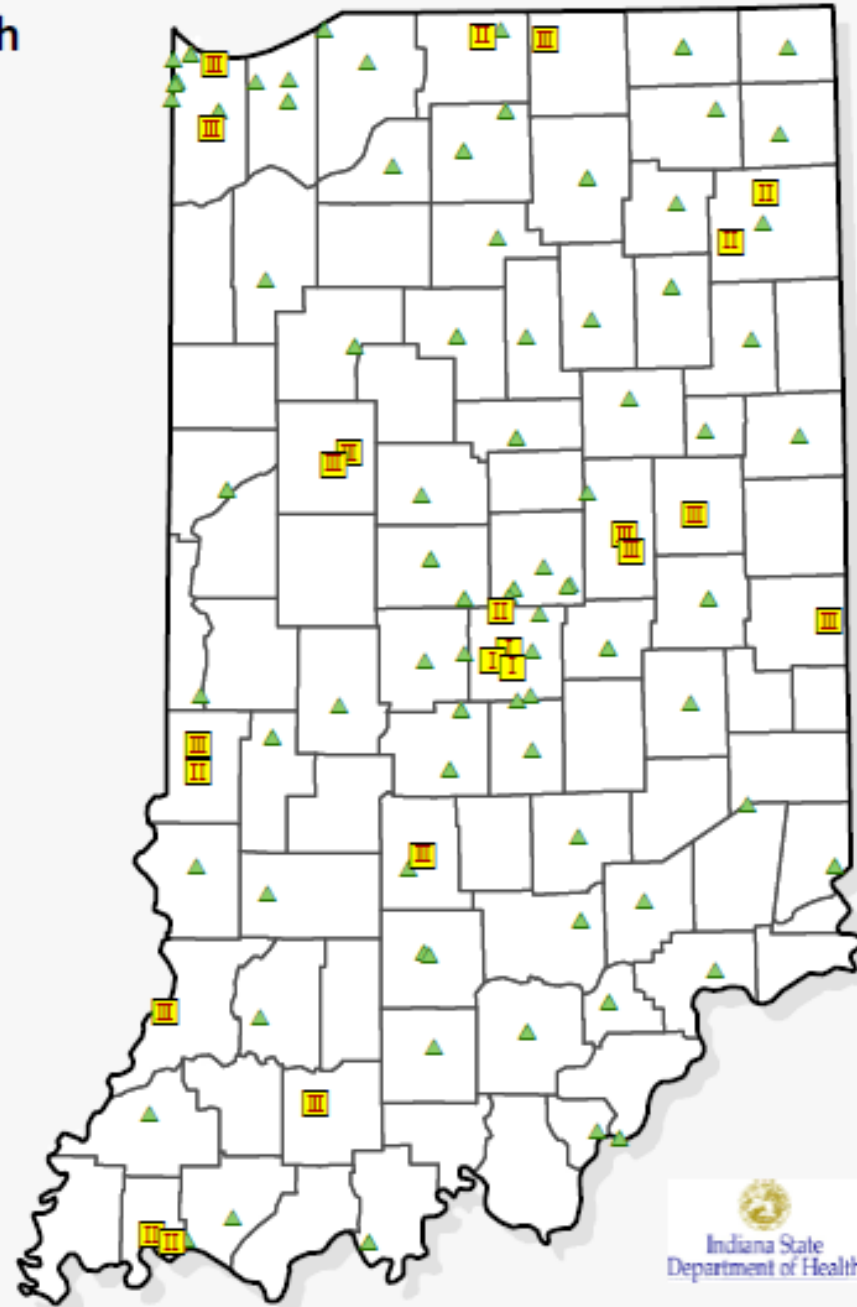
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Requests and Changes to the Report from Trauma Care Committee members at the August 2018 ISTCC meeting:

- 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.
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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 $b=b_o+b1(RTS) + b2(ISS) + b3(Age\ Index)$
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

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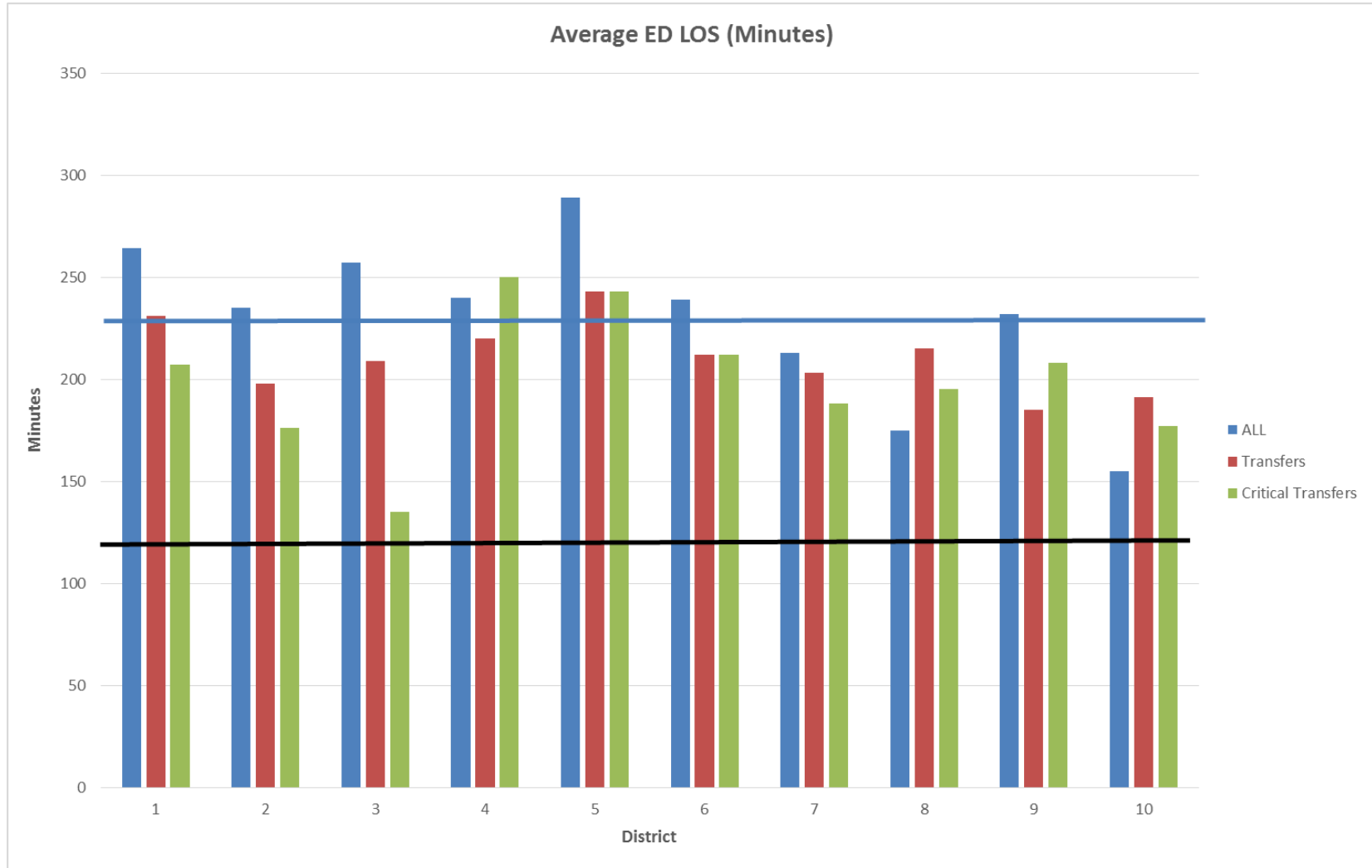**January 1, 2019—March 31, 3019**
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ED LOS by District

Average ED LOS (Minutes)

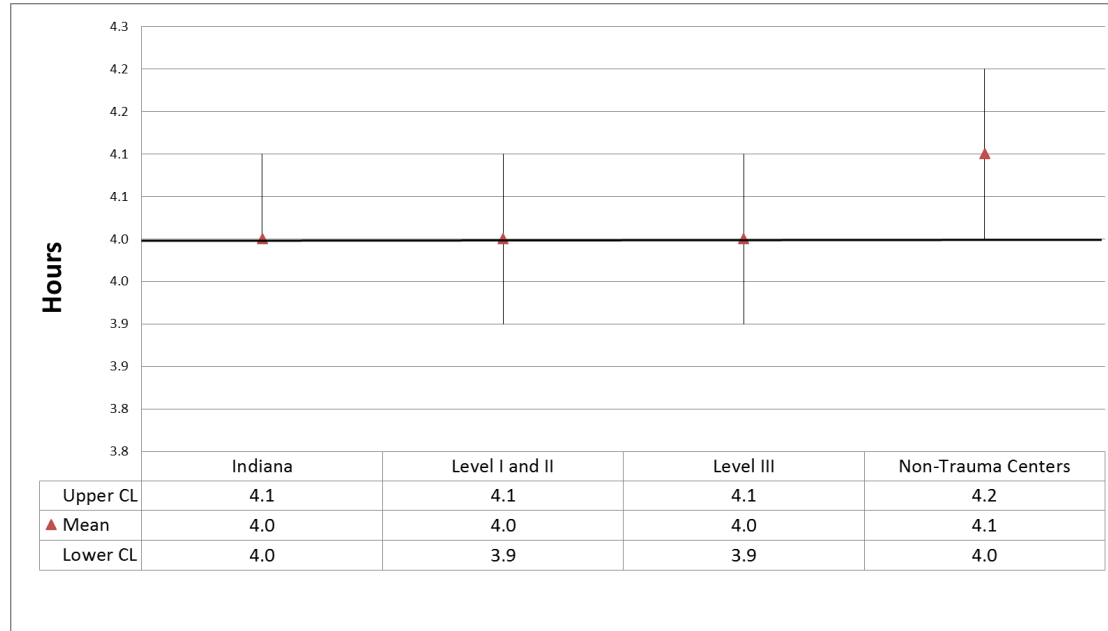*Black line represents the 120 minute performance improvement filter
**Blue line represents the state average

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All Patients
Average ED LOS (Hours)

	Indiana	Level I and II	Level III	Non-Trauma Centers
Upper CL	4.1	4.1	4.1	4.2
▲ Mean	4.0	4.0	4.0	4.1
Lower CL	4.0	3.9	3.9	4.0

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.