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
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) where b=b_0+b_1(RTS) + b_2(ISS) + b_3(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 Trauma Registry

Statewide Quarter 1 Data Report
January 1, 2019—March 31, 2019
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

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

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

- **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, 2019
9,037 Incidents

ED LOS > 12 Hours, N=387

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

- Level I and II: 248
- Level III: 38
- Non-Trauma Center: 101

Falls were the most common cause of injury.

- 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 average patient age was 63 years.

Minimum Age: 0
Average Age: 63
Maximum Age: 99

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

- Ambulance: 296
- Private: 86
- Other: 4
- Police: 1

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 have an ISS score of 1-15.
ED LOS > 12 Hours, N=387

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.
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 1,771 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.

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.
## For Linked Transfer Patients:

<table>
<thead>
<tr>
<th>For Transfer Patients:</th>
<th>All Transfer Patients</th>
<th>Critical*</th>
<th>Physiological Critical**</th>
<th>ISS Critical***</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Patients</strong></td>
<td>588</td>
<td>216</td>
<td>176</td>
<td>62</td>
</tr>
<tr>
<td><strong>EMS Notified to Scene</strong></td>
<td>8.7 minutes</td>
<td>8.8 minutes</td>
<td>8.8 minutes</td>
<td>8.9 minutes</td>
</tr>
<tr>
<td><strong>EMS Scene Arrival to Departure</strong></td>
<td>16.9 minutes</td>
<td>15.3 minutes</td>
<td>15.2 minutes</td>
<td>15.1 minutes</td>
</tr>
<tr>
<td><strong>EMS Scene Departure to Initial Hospital ED Arrival</strong></td>
<td>18.7 minutes</td>
<td>16.7 minutes</td>
<td>16.9 minutes</td>
<td>16.8 minutes</td>
</tr>
<tr>
<td><strong>Initial Hospital ED Arrival to Departure</strong></td>
<td>3 hours 35 minutes</td>
<td>3 hours 21 minutes</td>
<td>3 hours 23 minutes</td>
<td>2 hours 53 minutes</td>
</tr>
<tr>
<td><strong>Initial Hospital ED Departure to Final Hospital ED Arrival</strong></td>
<td>56.2 minutes</td>
<td>56.7 minutes</td>
<td>60.1 minutes</td>
<td>49.2 minutes</td>
</tr>
<tr>
<td><strong>TOTAL TIME</strong></td>
<td>5 hours 15.5 minutes</td>
<td>4 hours 58.5 minutes</td>
<td>5 hours 4 minutes</td>
<td>4 hours 23 minutes</td>
</tr>
</tbody>
</table>

*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.
Indiana Trauma Registry

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For Transfer Patients:

<table>
<thead>
<tr>
<th>Public Health Preparedness District Initial Hospital</th>
<th>Public Health Preparedness District Final Hospital</th>
<th>Incident Counts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>27</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>115</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>72</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>34</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>26</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>86</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>Indiana</th>
<th>Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>50%</td>
<td>55%</td>
</tr>
<tr>
<td>Female</td>
<td>50%</td>
<td>45%</td>
</tr>
</tbody>
</table>
The final hospital has patients with higher injury severity score than the initial hospital.
Most transfers do not go to the ICU.

- No ICU Stay: 71.8%
- 1-2: 10.7%
- 3-7: 13.4%
- 8-14: 0.2%
- 15-30: 0.1%
- 31+: 0.0%

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

## Statewide Quarter 1 Data Report

**January 1, 2019—March 31, 2019**

**9,037 Incidents**

### 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

---

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

<table>
<thead>
<tr>
<th>Location</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor Bed</td>
<td>40%</td>
</tr>
<tr>
<td>ICU</td>
<td>23%</td>
</tr>
<tr>
<td>NK/NR/NA</td>
<td>17%</td>
</tr>
<tr>
<td>OR</td>
<td>9%</td>
</tr>
<tr>
<td>Home w/o Services</td>
<td>4%</td>
</tr>
<tr>
<td>Step-Down</td>
<td>4%</td>
</tr>
<tr>
<td>Observation</td>
<td>2%</td>
</tr>
</tbody>
</table>

---

15
A small portion of transfers had a delay indicated.
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Most delay reasons were not completed.

Delay in ED Decision 5.4%
Delay in Diagnosis 0.3%
Indiana Trauma Registry

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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

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

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.
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.
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:
\[ Ps = \frac{1}{1+e^{-b}} \] where \( b = b_0 + b_1(RTS) + b_2(ISS) + b_3(Age\ Index) \)
Total GCS = Verbal GCS + Motor GCS + Eye GCS
RTS = 0.94*GCS + 0.73*SBP + 0.29*RR
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ED LOS by District

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