



Iowa Trauma Registry Report 2021

**Bureau of Emergency and Trauma Services
August 2022**

Iowa Department of Public Health
Protecting and Improving the Health of Iowans

IDPH
IOWA Department
of **PUBLIC HEALTH**

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Executive Summary

The 2021 Iowa Trauma Registry Report provides an analysis of data reported to the Iowa Trauma Registry, inpatient and outpatient data, and death data. The development of this report assists in understanding the state of Iowa's trauma system. This report supports data driven decision making for developing improvements within the trauma system to reduce morbidity and mortality from trauma.

The following is an overview of data from the report:

- All hospitals reporting to the Trauma Registry
 - Data retrieved from the Iowa Trauma Registry
 - 117 reporting facilities (1 facility did not report 2021 data)
 - 24,968 incidents
 - 22,062 unique patients
 - 5.1% of incidents were work-related
 - 1.9% of incidents were farm-related
 - 58.8% of incidents were falls
 - 19.2% of incidents were motor vehicle crashes
 - 8,613 trauma alerts
 - 2,551 level 1
 - 6,062 level 2
 - 427 self-inflicted injuries
 - 1,381 assault injuries
 - 2,545 reported incidents of transfer delay
 - 44.9% female, 54.9% male, 0.2% unknown
- 446,241 EMS Incident Reports, an increase from 2020 (an incident report occurs each time an EMS program is notified to respond)
 - 297,815 EMS transport incident reports
 - 104,784 trauma-related incident reports
 - 52,196 trauma-related transport incident reports

List of Acronyms

ACS	American College of Surgeons
AIS.....	Abbreviated Injury Scale
ATLS.....	Advanced Trauma Life Support
CDC.....	Centers for Disease Control and Prevention
GCS	Glasgow Coma Scale
IDPH	Iowa Department of Public Health
ISS	Injury Severity Score
RTS.....	Revised Trauma Score
SEQIS.....	System Evaluation Quality Improvement Subcommittee
TSAC.....	Trauma System Advisory Council

Trauma in Iowa

Overview

In 1995, the state legislature established the Iowa Trauma Care System Development Act. The Act designated the Iowa Department of Public Health (IDPH) as the lead agency for system development and implementation, and established the Trauma System Advisory Council (TSAC) to advise the department and to evaluate system effectiveness. The legislation also established the State Trauma Registry for statewide injury reporting as a reportable condition. On January 1, 2001, the Iowa Trauma System became fully operational. The committee structure for oversight and evaluation was established and the State Trauma Registry was in place. An all-inclusive system engages the participation of hospitals, transporting ambulance services and rehabilitation centers.

In 2015, the American College of Surgeons-Committee on Trauma (ACS) completed a trauma system consultation visit to assess Iowa's trauma system. The ACS review team made multiple recommendations for improvement, including improving the use of data to drive and document changes in the trauma system. The full ACS Trauma System Consultation Report is available at <https://idph.iowa.gov/Portals/1/userfiles/61/Iowa%20TSC%20Report%20Final.pdf>. Significant progress has been made in meeting the data reporting and other recommendations identified by ACS.

The continuing goal of the trauma system is to provide timely, specialized care by matching trauma patient needs to appropriate resources, from the time of injury through rehabilitation. Meeting this goal requires the cooperation of trauma care providers and resources throughout the state along each phase of trauma care. A systems approach recognizes this continuum of care and has been shown to reduce overall costs, disability and death associated with traumatic injury. To accelerate the progress already being made in reducing morbidity and mortality of traumatic injuries, the three injury control components of prevention, acute care and rehabilitation must work together.

State Trauma Registry

Iowa Code Chapter 147A and Iowa Administrative Code 641 Chapter 136 (IAC 641-136) established the State Trauma Registry in 1996. Trauma was identified as a reportable condition. A "trauma patient" is defined as a victim of an external cause of injury that results in major or minor tissue damage or destruction caused by intentional or unintentional exposure to thermal, mechanical, electrical or chemical energy, or by the absence of heat or oxygen. Chapter 136-Trauma Registry was updated in July 2018. The registry collects and can be used to analyze reportable patient data on the incidence, severity and causes of trauma. The Iowa Trauma Patient Data Dictionary (January 2017) specifies the inclusion criteria and reportable patient data to be reported to the trauma registry.

Iowa Trauma Registry Report

The data collected is compiled in this annual report, which includes the magnitude of injuries in Iowa, the organization of trauma care, the performance of care, and outcomes of injured patients in Iowa. The Trauma System Advisory Council's System Evaluation and Quality Improvement Subcommittee routinely reviews the data for system improvement recommendations. The data is used by hospitals to drive performance improvement and injury prevention activities. Aggregate data from the registry is used by the trauma service areas to help inform overall improvements to the trauma system. The data has been used for the Burden of Injury Report, statewide injury prevention efforts and research.

Trauma Hospitals

Iowa has an inclusive trauma system. All 118 hospitals in Iowa are verified as a trauma care facility at some level. There are four levels of trauma care facilities in Iowa. Level I facilities have the resources necessary to provide trauma care to patients with significant traumatic injuries and conduct trauma research. Level II facilities have similar resources for care of the trauma patient, but may not actively conduct research activities. Level III facilities have surgical capabilities 24/7/365 including orthopedic surgery, but may not have the resources needed to provide definitive care for the most significantly injured trauma patients. Level IV facilities have the resources and training needed to stabilize traumatically-injured patients and provide definitive care for those with minor injuries. The following map shows the location and level of all Iowa trauma care facilities as of July 2021.

Iowa Department of Public Health
Bureau of Emergency and Trauma Services
Iowa Trauma Facility Map
July 2021

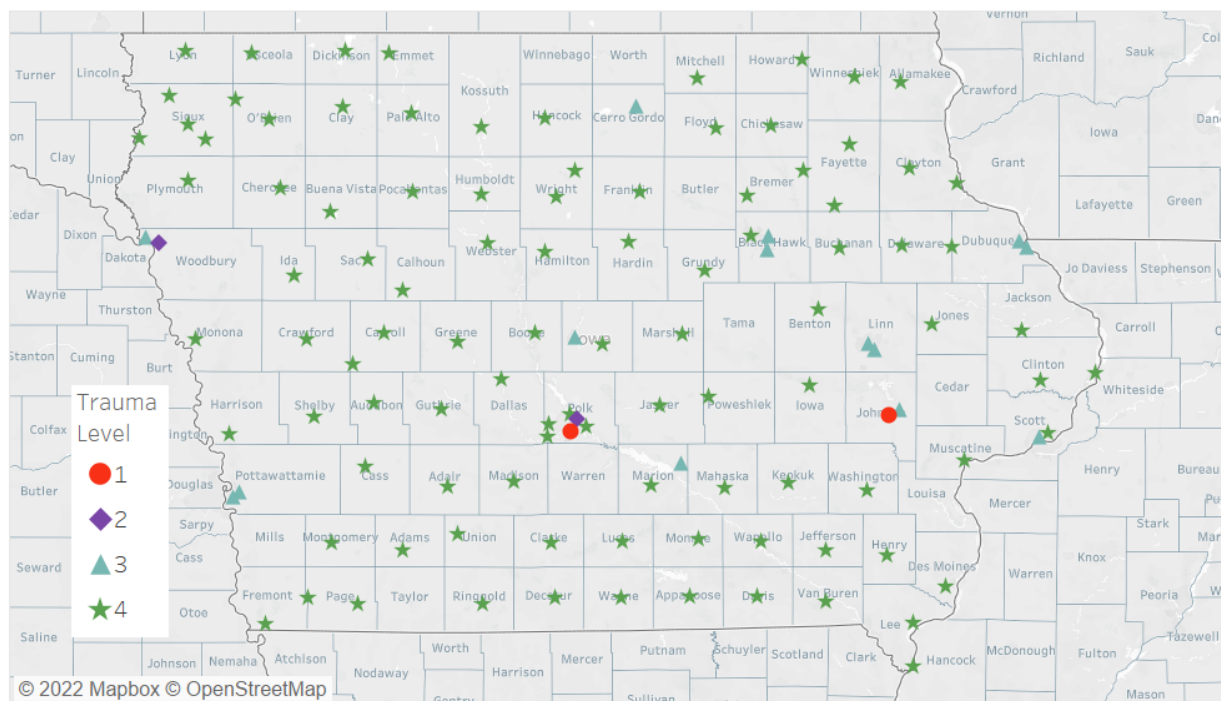


Figure 1: Map of trauma care facilities

Trauma Facility Level Count

Source: Iowa Department of Public Health | 2021 Levels

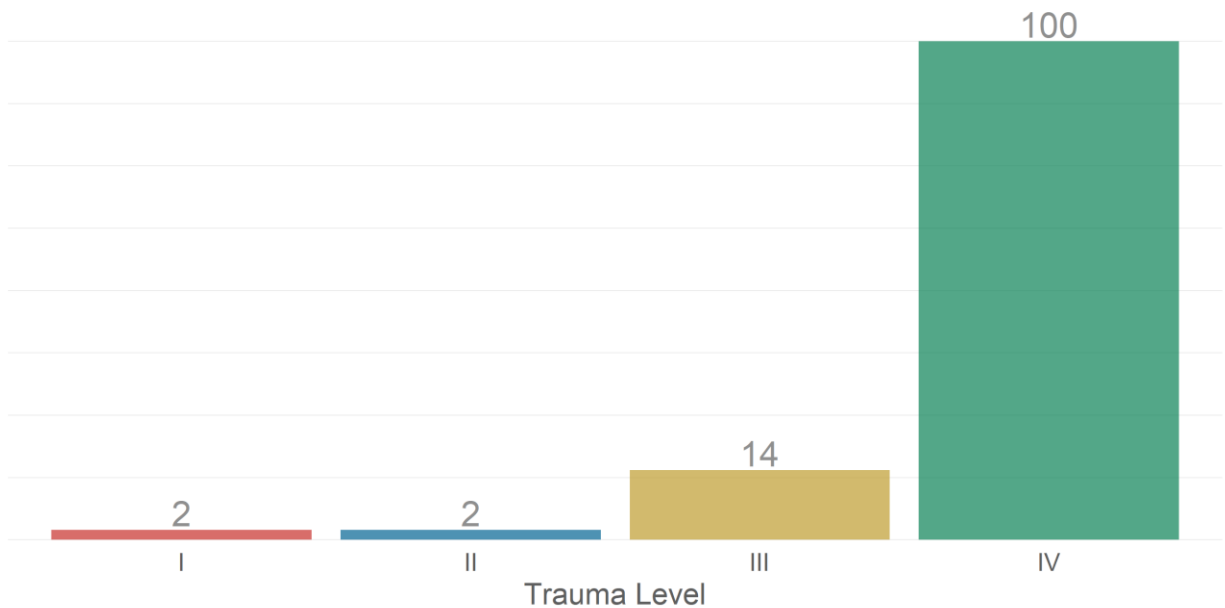


Figure 2: Number of facilities for each level of care

All 118 trauma care facilities in Iowa are required to submit data to the state trauma registry. Both Level I and II of the four Level II facilities are verified as trauma care facilities by the American College of Surgeons (ACS). The remaining hospitals in Iowa are verified as trauma care facilities by the Iowa Department of Public Health and the Iowa Trauma Survey Team. The trauma survey team is a group of health care providers contracted by IDPH to assist in verifying trauma care facilities' compliance with trauma criteria. This group of health care providers is made up of trauma surgeons, emergency medicine physicians and trauma nurses from across the state. The trauma survey team uses the criteria adopted in Iowa Administrative Code 641 Chapter 134-Trauma Care Facility Categorization and Verification to assess the hospitals.

Count of Incidents by Trauma Facility Level

Source: Iowa Trauma Registry | 2021

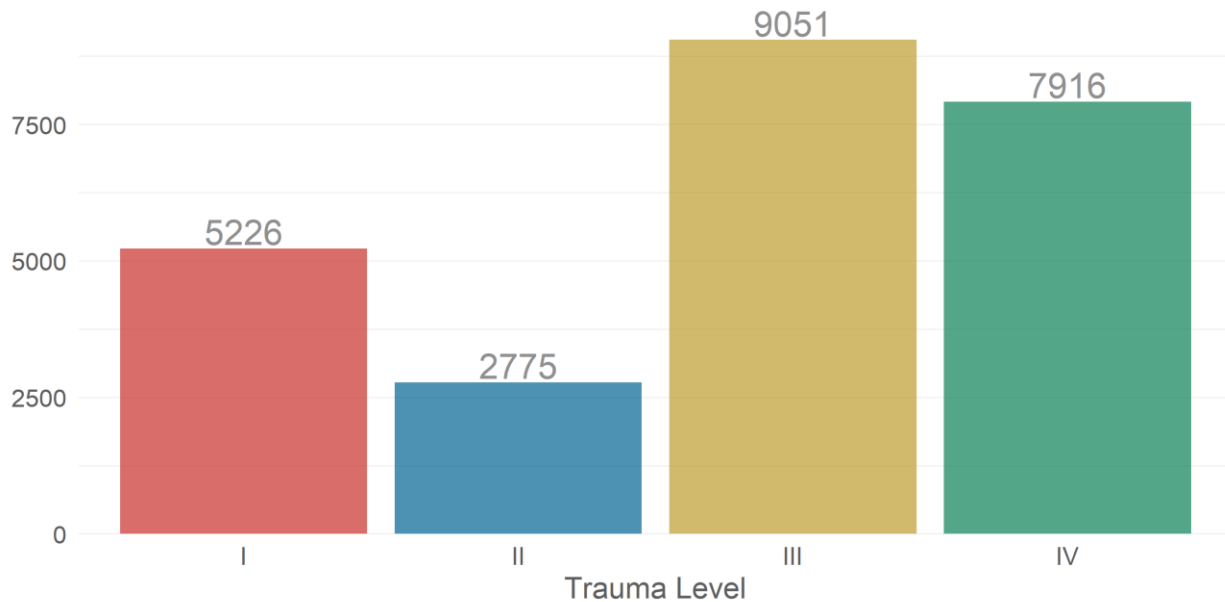


Figure 3: Number of trauma incidents reported through State Trauma registry in 2021

The Iowa Department of Public Health transitioned the trauma registry to a new vendor in 2015. At that time, department staff provided training to hospital staff in multiple locations across the state. This has resulted in more incidents being reported to the state trauma registry. In 2014, Level IV facilities reported 2,005 incidents, as compared to 7,916 in 2021. The trend of hospitals moving from Level II to Level III and from III to IV has shifted the incident counts so that Level III facilities have the highest total incident count, which was not the case prior to 2020. All facilities but one reported data for patients seen in 2021. The department continues to support hospital data reporting education and training.

The total number of incidents reported is higher in 2021 than it has ever been, although it has remained approximately the same for the past three years.

Response to Trauma

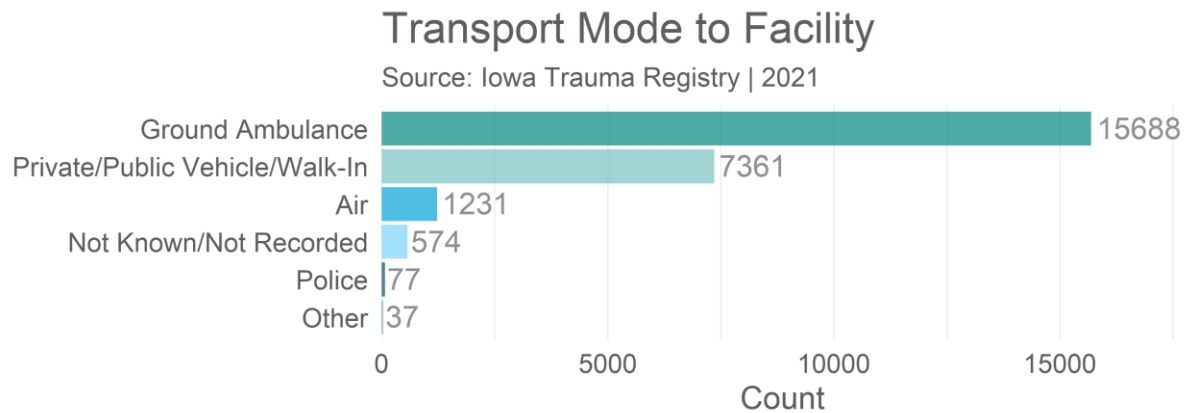


Figure 4: Method used to transport trauma patients to emergency care

The data depicted in this table shows the mode or mechanism of transport of trauma patients for trauma care. Based on the Iowa Trauma Registry, 63% of patients were transported to the trauma care facility by ground ambulance; 29% of patients were transported by private/public vehicle/walk-in; 5% of patients were transported by air (helicopter or fixed-wing aircraft); the method of transport for 2% of the patients is unknown (same as 2019 and 2020, and down from 4% in 2018); and less than 1% of trauma patients were transported by police or other. These numbers are very close to what was seen in the past two years.

Incident Count by ISS Range

Source: Iowa Trauma Registry | 2021

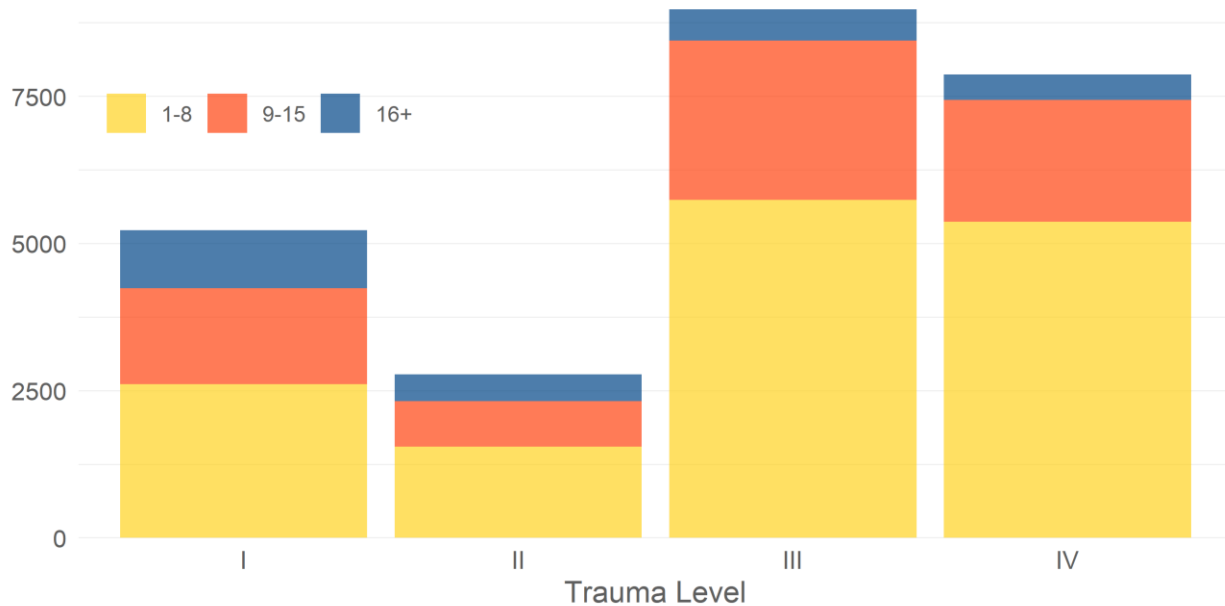


Figure 5: Incidents by trauma care level within each Injury Severity Score (ISS) range

The Injury Severity Score, or ISS, is a method used to rate the severity of the patient’s injury. It correlates with morbidity, mortality and hospital length of stay for injured patients. This score is based on the patient’s diagnosed injuries. ISS scores can range from 0 to 75. Any score greater than 15 is considered major trauma, also known as polytrauma. A score of 1-8 is considered minor trauma, and scores ranging from 9-15 are considered moderate trauma.

The data in the chart is from all levels of hospitals, and does not solely depict data from hospitals that provided definitive care for the trauma patient. Level IV and some Level III facilities provide stabilizing care for significantly injured trauma patients before transferring that patient to a definitive care hospital that is able to perform a higher level of stabilizing treatment. The ISS is retrospective and based on all the patient’s diagnosed injuries. The ISS ratings for patients seen at Level IV and Level III facilities is likely to be artificially low. The Level IV and Level III facilities may not identify all of the trauma patient’s injuries before transport. Level IV and Level III facilities may only identify the most critical injuries that require stabilization before transport. This may impact the reported ISS of some patients seen at Level IV and Level III facilities who are then transported to a definitive care facility for a higher level of treatment.

Trauma registry data shows 50% of incidents at Level I facilities had an ISS over 8 and Level II facilities had 44% of incidents with an ISS over 8. Level III and Level IV facilities had 36% and 32% of incidents with an ISS over 8, respectively. These percentages are all slightly lower than in 2020, but most had increased from 2019, so there is no significant trend here.

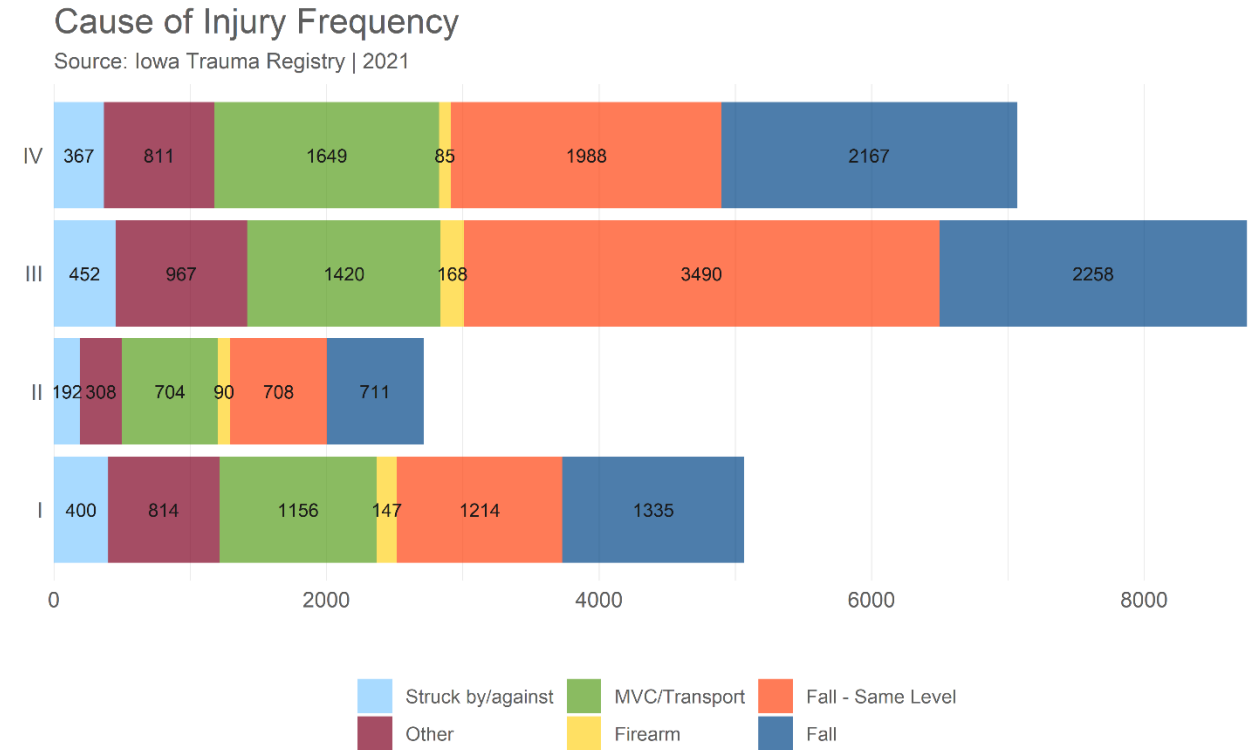


Figure 6: Incidents by cause of injury and trauma care level

Level IV facilities saw a greater percentage of their incidents as falls compared to Level I and II facilities. Firearm injuries account for less than half the rate of injuries at Level IV facilities compared to the Level I and II facilities. An injury type that is not shown as its own category in the table is burn injuries; they are in the “Other” category due to relatively small counts. Level I facilities see about as many burn patients as the other levels combined. The state’s only verified burn center is a Level I trauma care facility. The subcategories of the Other category in Figure 6 are expanded out to greater specificity in Figure 6, albeit not split out by trauma level. Burn injuries are listed as Fire/Flame.

Cause of Injury Frequency

Source: Iowa Trauma Registry | 2021

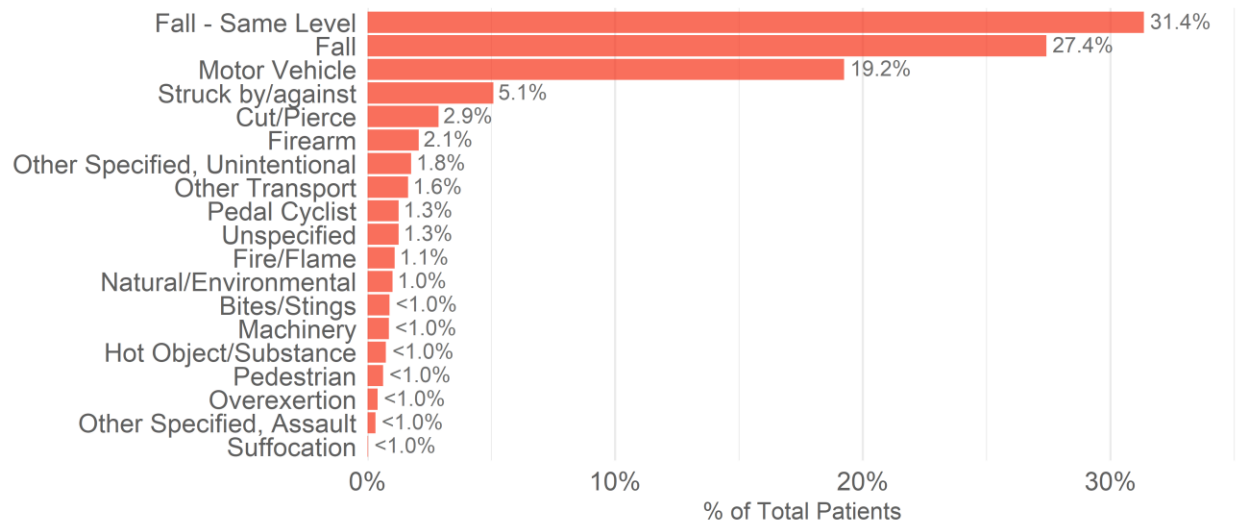


Figure 7: Percentage of registry incidents per cause of injury category

Same-level falls outnumber the non-same-level falls, which is a change from the last few years. All falls account for over half of all the injuries in the registry. Since the trauma registry inclusion criteria do not require registrars to submit isolated hip fractures due to same-level falls, this percentage is significantly lower than the numbers from the Iowa Hospital Association’s Inpatient and Outpatient Data Registry.

Transfers Out by Trauma Facility Level

Source: Iowa Trauma Registry | 2021

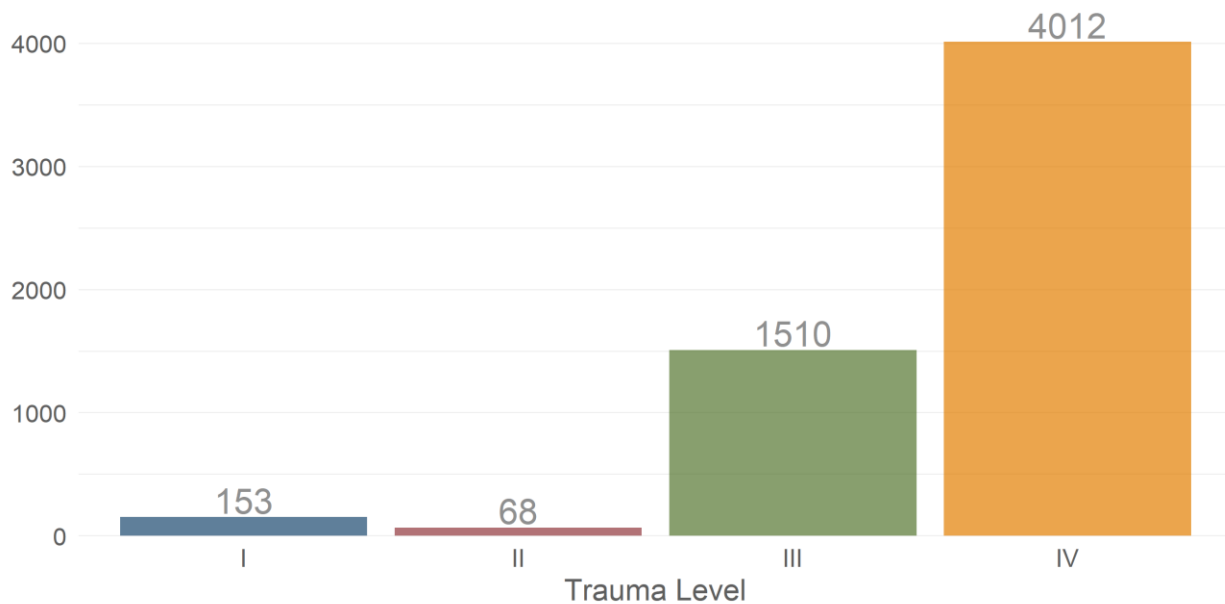


Figure 8: Number of transfers out to definitive care from each trauma care level

When a trauma patient requires resources that are unavailable at the initial facility, the patient is transferred to a trauma facility capable of providing definitive care for their injuries. Since Level I and II facilities generally have the highest level of care possible, transfers out are rare, and are often due to unavailability of a certain type of specialist. There were 5,743 transfers out in the trauma registry for 2021, 6 fewer than 2020, and about 300 fewer than the 2019 total. Of these 5,743 transfers out, 69.9% are from Level IV facilities, 26.3% are from Level III facilities, and the remaining 3.8% are from Level I and II facilities.

Average ED Stay Prior to Transfer by ISS Range

Source: Iowa Trauma Registry | 2021

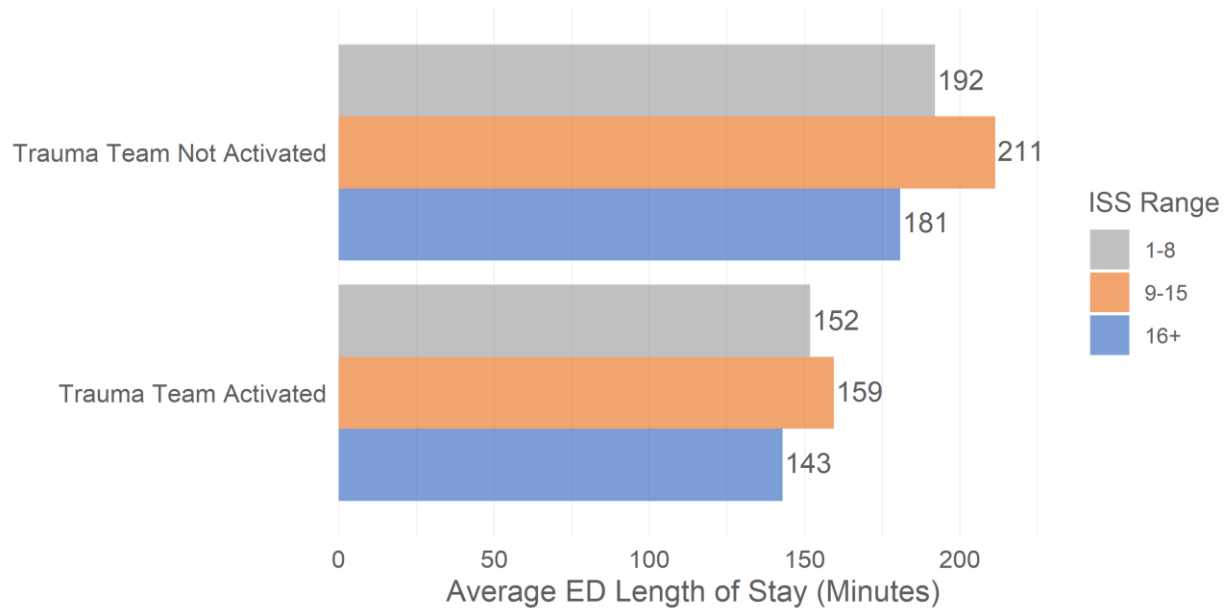


Figure 9: Average length of stay in emergency department for patients transferred to subsequent definitive care facility

On average, patients who were transferred to a subsequent trauma care facility for definitive care stayed in the initial hospital’s emergency department for 3 hours and 4 minutes. Of these transfers, 28.2% had trauma teams activated, 3.6% higher than in 2020. When the trauma team was activated, patients stayed 44 fewer minutes in the emergency department on average compared to patients who did not have a trauma team activation.

When split into the given ISS ranges, it’s clear that patients of all injury severities have shorter stays in the emergency department when the trauma team is activated. Patients with an ISS between 1 and 8 had lengths of stay decreased by 40 minutes on average when the trauma team was activated. For ISS between 9 and 15, the difference was 52 minutes, and 38 minutes for ISS of 16 or greater. It is worth noting that all 6 subcategories shown in the graph had longer times than in 2020.

Average ED Stay Prior to Transfer by ISS and Trauma Level

Source: Iowa Trauma Registry | 2021

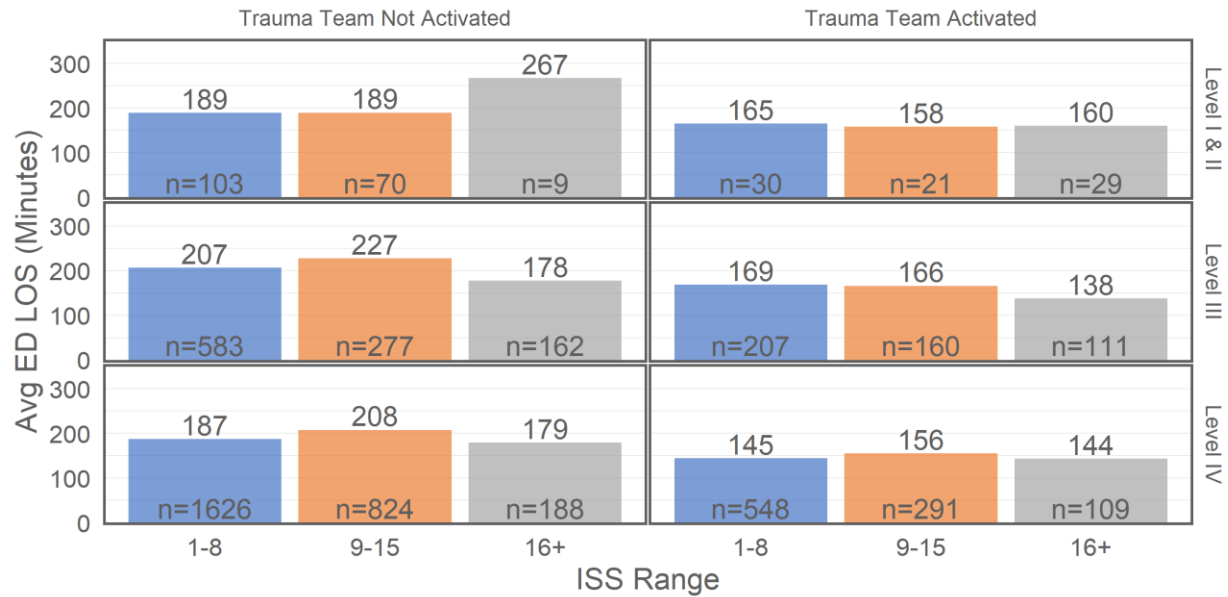


Figure 10: Same as the previous figure, but split out by trauma level

When split out by trauma level, it is clear that the average emergency department length of stay prior to transfer is consistently lower when the trauma team is activated. When the trauma team is activated, the ISS 16+ patients at Level III and IV facilities averaged the shortest stays of the ISS ranges, but this was not the case for the Level I and II facilities, as the ISS 9-15 patients had the shortest average length of stay. It's worth noting that the sample sizes for the Level I and II facilities are relatively small, as most trauma patients are admitted to the facility, i.e. transfers out of Level I and II facilities rarely occur.

Average ED Stay Prior to Transfer

Source: Iowa Trauma Registry | 2016-2021

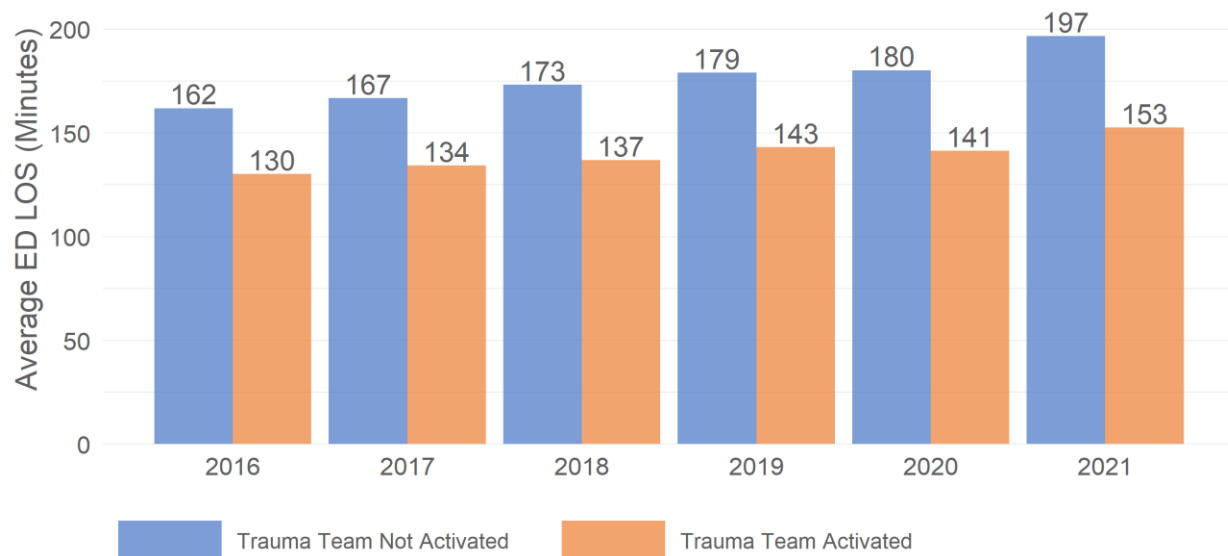


Figure 11: Average length of stay in the emergency department since 2016 split by trauma team activation

The average length of stay in the emergency department for transfers out of the emergency department has increased since 2016, with the sole exception being patients for whom the trauma team was activated in 2021. There were slight increases for the average lengths of stay for trauma activations and non-activations for each year, however 2021 was a significant increase. When the trauma team was activated, an average length of stay in the emergency department of 153 minutes was seen in 2021, which is 23 minutes more than in 2016. The increase from 2016 for the average length of stay in the ED in cases where the trauma team was not activated was 35 minutes.

Hospital Admissions

Hospital admissions data are obtained from the Iowa Hospital Association’s Inpatient and Outpatient Data Registry. A trauma injury must be either the admitting or principal diagnosis to be included in this data set. A trauma injury has a diagnosis code that falls within the ICD-10 ranges shown starting on page 10 of the Iowa Trauma Patient Data Dictionary (https://idph.iowa.gov/Portals/1/userfiles/43/Trauma%20Registry%20Data%20Dictionary%20Jan_%202017.pdf). Based on these criteria, there were 11,309 patients with a trauma diagnosis code as the admitting or principal diagnosis code for first-hospital admissions at Iowa facilities. This total is 349 fewer than in 2020 and over 1,000 fewer than in 2019.

Trauma Admissions by Age Range

Source: Iowa Inpatient Database | 2021

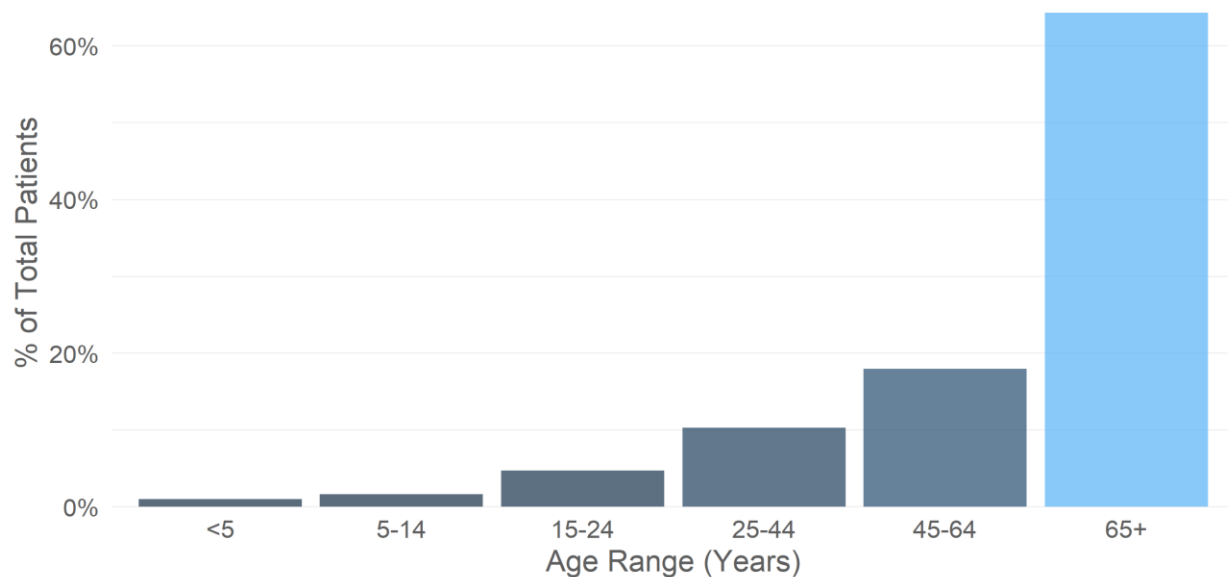


Figure 12: Percentage of trauma admissions by age range from Inpatient database

Patients 65 and older accounted for the majority of trauma admissions. Note that the age ranges are not of equal length; there are 5-, 10- and 20-year ranges, as well as the open-ended 65+ range. Since the inpatient database does not exclude isolated hip fractures due to same-level falls like the state trauma registry, the inpatient database has more patients in the 65+ range.

Nature of Injury Frequency

Source: Iowa Inpatient Database | 2021

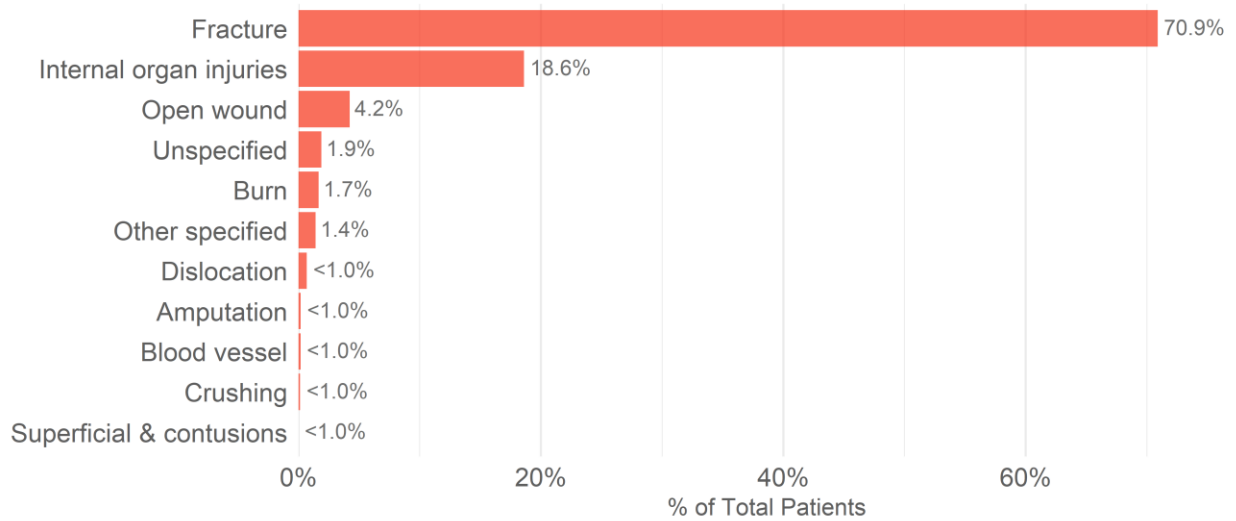


Figure 13: Percentage of trauma admissions by nature/type of injury

Fractures account for over two thirds of the primary trauma diagnoses for admitted patients. The nature of injury is derived from the ICD-10 diagnosis code.

Injury Body Region Frequency

Source: Iowa Inpatient Database | 2021

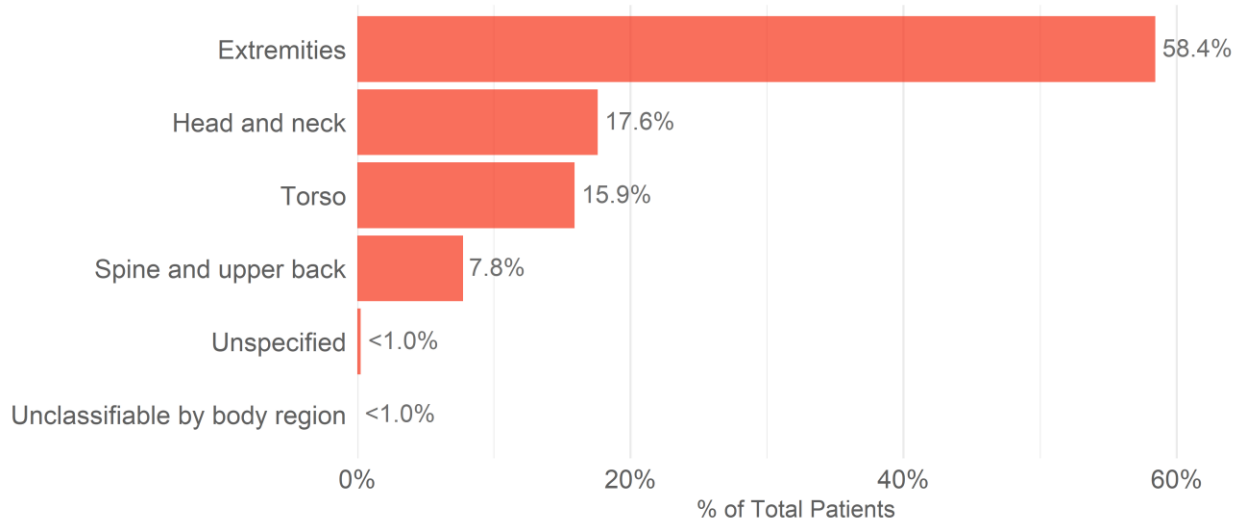


Figure 14: Percentage of trauma admissions by body region of primary diagnosis

The body region is also derived from the ICD-10 diagnosis code. Most primary diagnosis codes for trauma injuries are for the extremities. Under 1% of the admissions had unspecified body regions for the primary diagnoses.

Deaths

Death data was compiled from publicly available reports from the Iowa Bureau of Health Statistics, as well as data requests from that Bureau (see Iowa Death Certificate Data in Data Sources).

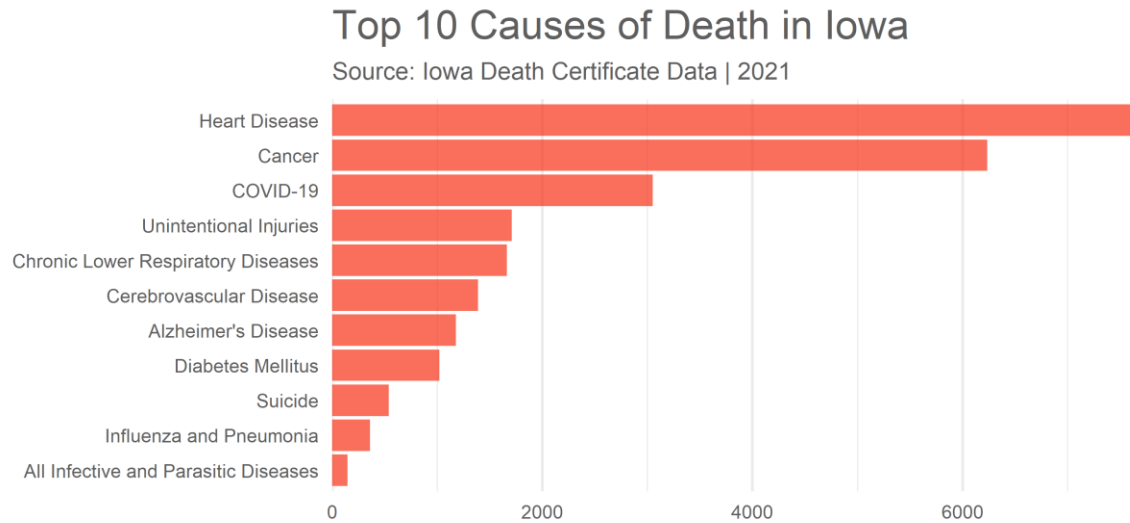


Figure 15: Top causes of death in Iowa

Unintentional injuries account for most trauma deaths in Iowa for 2021. The suicide category of this figure is partially composed of trauma injuries. One major change for 2021 data is the 29% drop in COVID-19 deaths. Along with the large decrease in COVID-19 deaths, a 27% decrease in Alzheimer's deaths contributed to an overall 5% decrease in total deaths in the state of Iowa. There was, however, a 17% increase in unintentional injury deaths, as well as a 3% increase in the largest category, heart disease. The total deaths in Iowa jumped from 30,860 in 2019 to 35,965 in 2020, so the 2021 total of 34,201 is still abnormally high. According to the CDC, injury is the leading cause of death among persons 1-44 years of age (most recent data available: https://www.cdc.gov/injury/wisqars/pdf/leading_causes_of_death_by_age_group_2018-508.pdf).

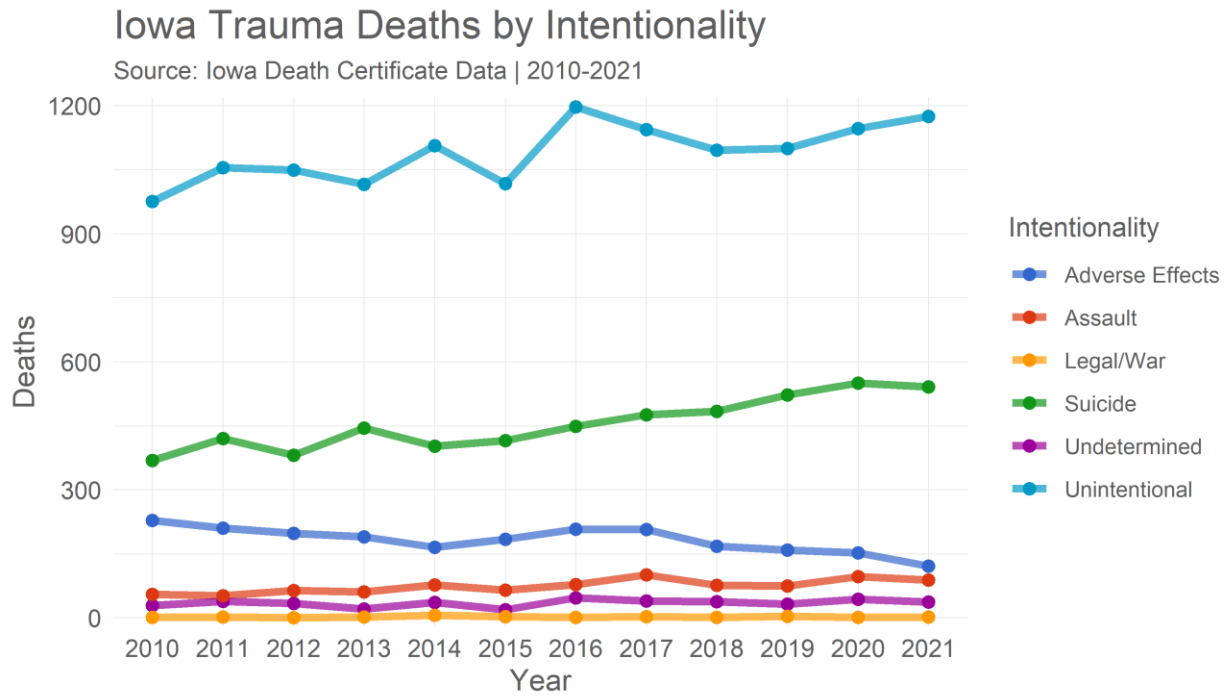


Figure 16: Trauma deaths in Iowa by intentionality

Unintentional injury deaths increased slightly, but still number fewer than the 2016 high. Assault and suicide deaths both had slight decreases from 2020 following increases from 2019. Deaths due to adverse effects decreased to their lowest level in the history of this data; these deaths include allergic reactions, as well as complications from medical and surgical procedures.

Iowa Unintentional Trauma Deaths by Cause

Source: Iowa Death Certificate Data | 2010-2021

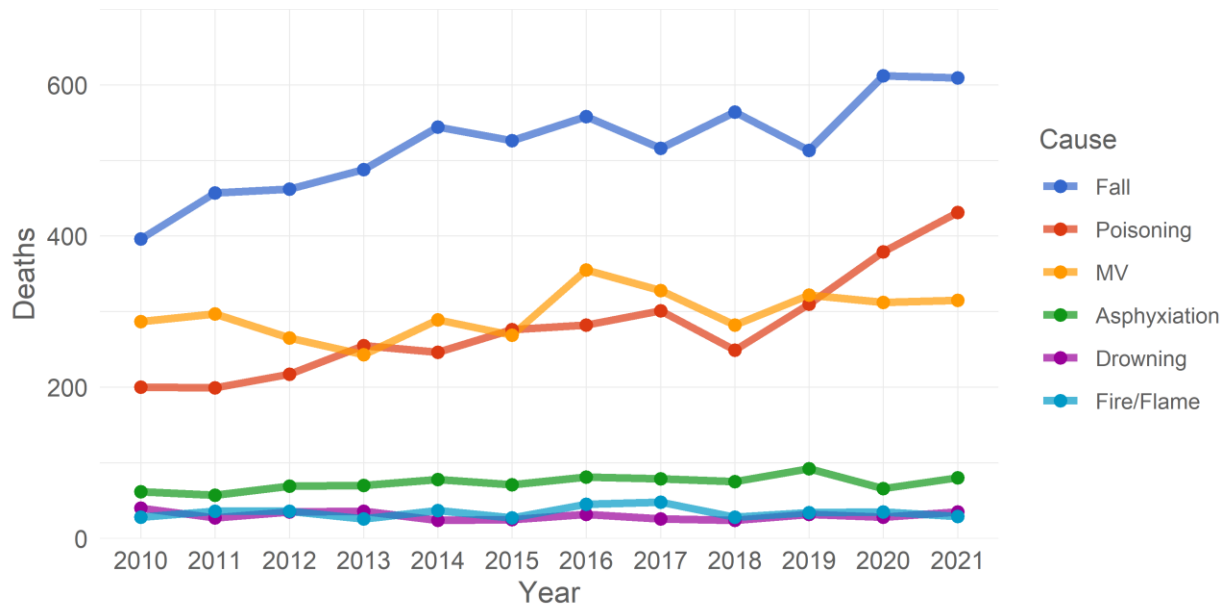


Figure 17: Unintentional trauma deaths in Iowa by cause of injury

Unintentional fall deaths leveled out just below the all-time high after a large increase from 2019 to 2020. The unintentional deaths due to poisoning increased for the third straight year, setting its third straight maximum in this data's history.

Iowa Trauma Suicides by Cause

Source: Iowa Death Certificate Data | 2010-2021

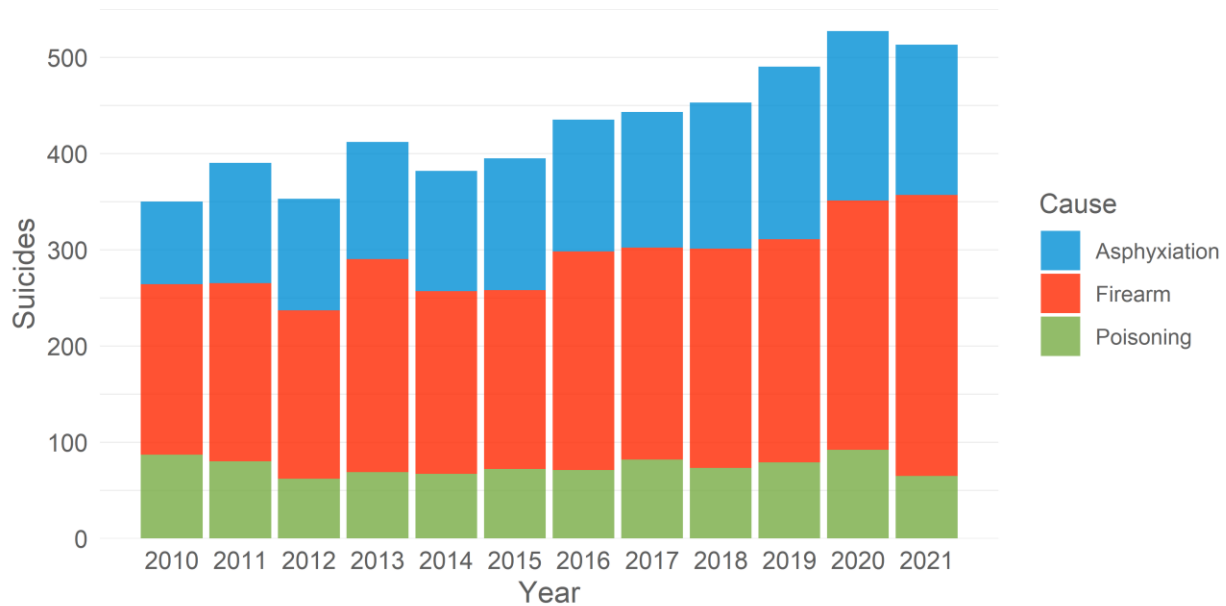


Figure 18: Trauma suicide counts in Iowa by method

Asphyxiation suicides decreased again this year, and poisoning suicides decreased by almost a third to nearly reach its minimum for this date range. Firearm suicides increased by 13% from 2020 to a new maximum; this is an increase of 67% from the 2012 minimum. Overall, there was a minor decrease in suicides from 2020 in the state of Iowa.

Trends in Causes of Death

Cause	5-Year Average	2021 Deaths	% 1/↓
Drowning	38	44	15.8%
Fall	558	610	9.3%
Fire/Flame	46	29	-37.0%
MV	324	318	-1.9%
Poisoning	401	513	21.8%
Asphyxiation	242	243	0.4%

Table 1: Trends in Iowa trauma deaths

The above table shows deaths from the six listed categories, regardless of intentionality. The 2021 totals for drownings, falls, and poisonings were significantly higher than the 5-year trailing averages (2016 through 2020). The record high of poisonings was the most significant outlier. Fire/Flame deaths decreased by a large percentage, but it is not uncommon to see larger percentage changes with smaller numbers, as seen with burns in our state.

Iowa Unintentional Fall Deaths

Source: Iowa Death Certificate Data | 2002-2021

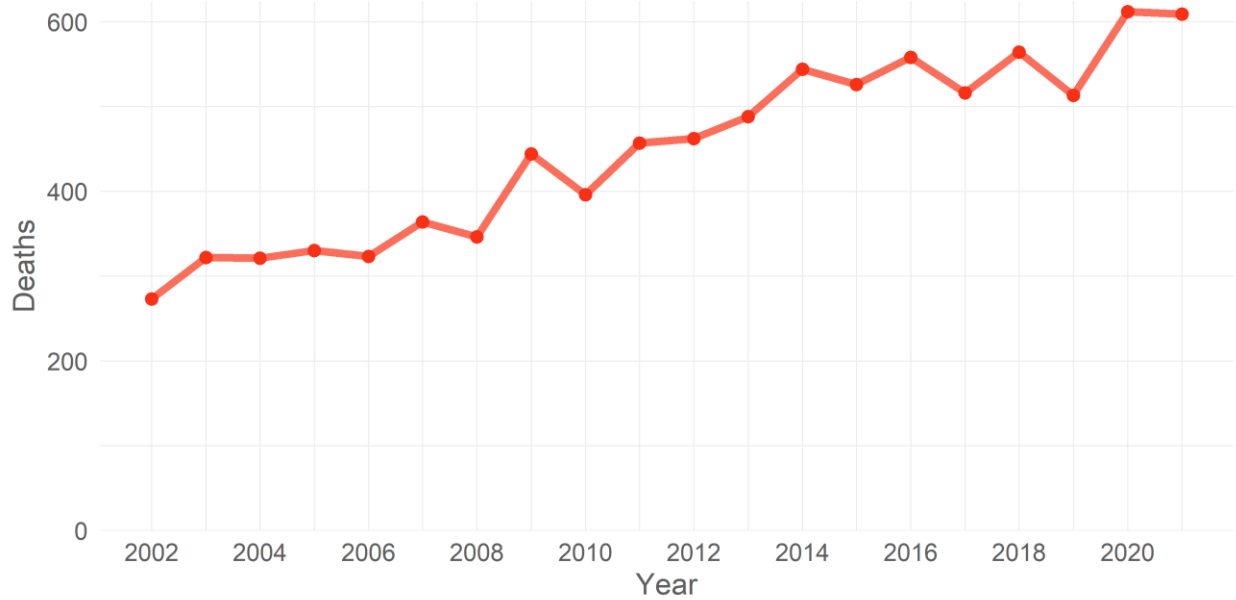


Figure 19: Unintentional fall deaths in Iowa since 2002

As earlier stated, deaths due to unintentional falls decreased to just below the all-time high reached last year. Prior to 2014, unintentional fall deaths had not reached 500, and a clear upward trend can be seen in the graph, with some periods of stagnation and variability. The 2021 figure of 609 is still more than double the 2002 total, and was a notable increase from the new normal since 2014 with totals in the low- to mid-500 range.

Iowa Poisoning Deaths

Source: Iowa Death Certificate Data | 2002-2021

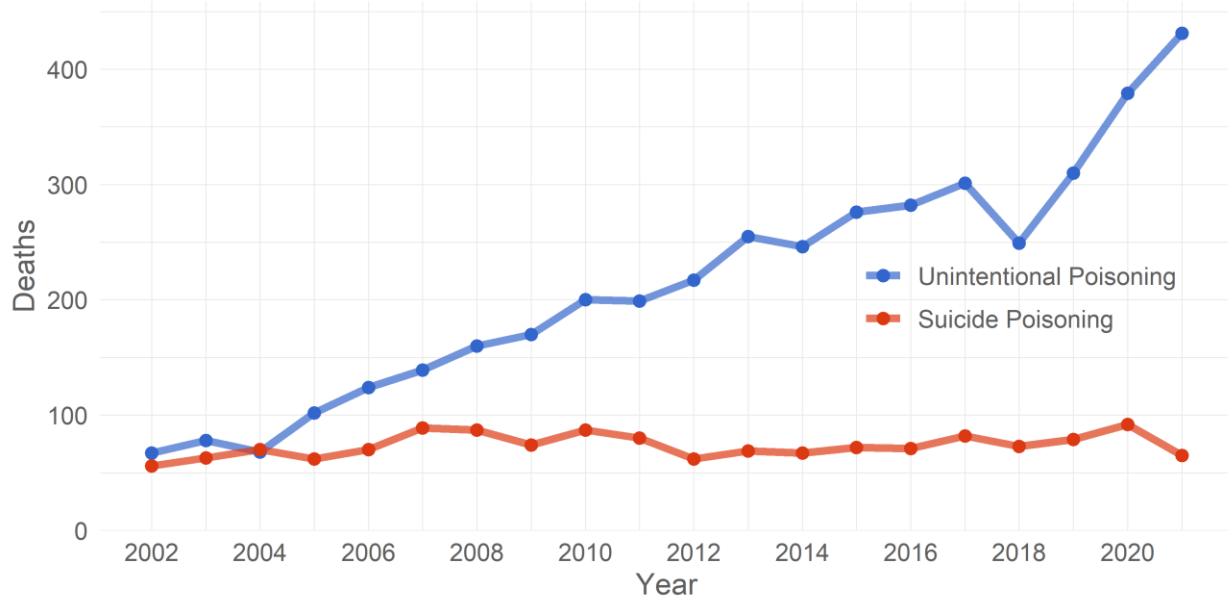


Figure 20: Suicide poisoning deaths in Iowa by intentionality since 2002

There were over 500 total unintentional and suicide poisoning deaths in 2021, a new high. Even with the decrease in suicides by poisoning, the large increase in unintentional poisonings was a greater change.

Performance Indicators

The System Evaluation and Quality Improvement Subcommittee (SEQIS) of the Trauma System Advisory Council (TSAC) established a set of indicators to measure the trends in performance of the statewide trauma system. In order to calculate these indicators, data is extracted from the state trauma registry, processed according to the accompanying Hospital System State Indicators document (Attachment 1), and distributed to all reporting facilities. Using these indicators, trauma programs are able to see their own performance compared to other hospitals of the same level, as well as compared to the state as a whole. Below are the indicator results for the state in the far right column, as well as divided by trauma facility level (with levels I and II combined).

Trauma indicator data is provided to all Iowa hospitals on an annual basis. The data is used to drive performance improvement processes and prevention programs. The data reports assist hospitals and service areas in monitoring changes within the trauma system.

Indicators Calculated for 2021	Level I & II	Level III	Level IV	State	Goal
Indicator 1a - Trauma Surgeon Responding Within 15 Minutes	95.0%	71.7%	N/A	81.0%	80.0%
Indicator 1b - Trauma Surgeon Responding Within 30 Minutes	99.6%	93.2%	N/A	95.8%	80.0%
Indicator 1c - Trauma Surgeon Response Time Unknown	1.0%	5.6%	N/A	3.9%	0.0%
Indicator 1d - Physician Responding Within 5 Minutes	95.0%	52.5%	71.5%	67.0%	80.0%
Indicator 1e - Physician Responding Within 20 Minutes	98.7%	86.8%	91.5%	90.6%	100.0%
Indicator 1f - Physician Response Time Unknown	0.8%	5.4%	6.6%	5.0%	0.0%
Indicator 2 - Injury Time Blank	28.2%	15.6%	10.4%	18.6%	0.0%
Indicator 3 - Probability of Survival Calculated	32.2%	79.5%	81.4%	63.7%	100.0%
Indicator 4a - Deceased Trauma Patient Autopsied	25.5%	21.4%	36.7%	26.9%	N/A
Indicator 4b - No Autopsy On Death With LOS Greater Than 72 Hours	91.1%	93.0%	100.0%	92.6%	N/A
Indicator 5a - Blood ETOH Measured	52.4%	24.6%	21.7%	33.4%	N/A
Indicator 5b - Blood ETOH Positive	27.7%	46.6%	52.4%	37.4%	N/A
Indicator 6a - 1st Hospital Initial GCS Less Than 9 With No Head CT Before Transfer To Definitive Care		57.1%	60.8%	59.1%	100.0%
Indicator 6b - 1st Hospital Initial GCS Less Than 9 And Arrived To Definitive Care Over 3 Hours From Injury	30.7%	7.9%	6.8%	24.9%	0.0%
Indicator 7 - Patients To Definitive Care Greater Than 3 Hours	52.9%	22.0%	13.0%	32.3%	0.0%
Indicator 8 - Survival Rate For All Traumas	96.1%	98.5%	98.3%	97.6%	N/A
Indicator 8 - Survival Rate For Low Risk Traumas	98.6%	99.1%	98.9%	98.9%	N/A

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Indicator 8 - Survival Rate For Moderate Risk Traumas	93.1%	93.0%	90.0%	92.7%	N/A
Indicator 8 - Survival Rate For High Risk Traumas	44.2%	47.1%	61.0%	46.7%	N/A
Other Indicator 1 - Incidents Submitted Within 60 Days Of Patient Discharge	93.4%	86.2%	81.0%	85.5%	80.0%
Other Indicator 2 - Incidents With Validity Score Greater Than 84	100.0%	97.5%	98.6%	98.2%	90.0%

Table 2: SEQIS indicator results for 2021 by level and entire state

The indicator results are listed below for the hospital preparedness service areas as well, anonymized with letters. Cells with a * did not contain enough data to meet reporting requirements.

Indicators Calculated for 2021	A	B	C	D	E	F	G	Goal
Indicator 1a - Trauma Surgeon Responding Within 15 Minutes	69.3%	81.7%	79.4%	80.0%	98.2%	*	72.0%	80.0%
Indicator 1b - Trauma Surgeon Responding Within 30 Minutes	93.5%	98.6%	92.1%	90.0%	99.5%	*	93.9%	80.0%
Indicator 1c - Trauma Surgeon Response Time Unknown	2.2%	3.9%	8.2%	0.0%	0.0%	*	9.9%	0.0%
Indicator 1d - Physician Responding Within 5 Minutes	51.2%	74.8%	91.2%	70.6%	74.4%	87.9%	71.4%	80.0%
Indicator 1e - Physician Responding Within 20 Minutes	87.6%	91.7%	98.6%	83.5%	94.3%	99.5%	88.4%	100.0%
Indicator 1f - Physician Response Time Unknown	1.8%	6.7%	10.2%	3.8%	1.5%	3.9%	14.1%	0.0%
Indicator 2 - Injury Time Blank	15.9%	37.2%	18.0%	14.0%	22.8%	11.5%	11.8%	0.0%
Indicator 3 - Probability of Survival Calculated	88.2%	86.9%	80.3%	39.0%	58.0%	81.1%	42.5%	100.0%
Indicator 4a - Deceased Trauma Patient Autopsied	22.9%	13.1%	32.0%	27.3%	37.0%	0.0%	28.3%	N/A
Indicator 4b - No Autopsy On Death With LOS Greater Than 72 Hours	93.8%	100.0%	77.8%	100.0%	88.2%	*	100.0%	N/A

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Indicator 5a - Blood ETOH Measured	25.6%	19.1%	23.9%	25.2%	35.0%	29.8%	47.0%	N/A
Indicator 5b - Blood ETOH Positive	41.7%	57.8%	39.3%	39.3%	36.1%	40.4%	33.0%	N/A
Indicator 6a - 1st Hospital Initial GCS Less Than 9 With No Head CT Before Transfer To Definitive Care	61.4%	59.1%	60.0%	76.9%	60.0%	40.0%	45.2%	100.0%
Indicator 6b - 1st Hospital Initial GCS Less Than 9 And Arrived To Definitive Care Over 3 Hours From Injury	9.6%	6.7%	6.7%	7.1%	10.7%	0.0%	36.7%	0.0%
Indicator 7 - Patients To Definitive Care Greater Than 3 Hours	20.4%	16.9%	28.5%	17.0%	33.2%	6.6%	47.4%	0.0%
Indicator 8 - Survival Rate For All Traumas	98.6%	97.3%	97.7%	98.9%	97.4%	99.3%	96.6%	N/A
Indicator 8 - Survival Rate For Low Risk Traumas	99.3%	98.5%	98.4%	99.3%	98.8%	99.5%	98.8%	N/A
Indicator 8 - Survival Rate For Moderate Risk Traumas	92.0%	89.4%	91.5%	95.8%	94.4%	95.7%	91.8%	N/A
Indicator 8 - Survival Rate For High Risk Traumas	52.4%	50.0%	64.3%	44.4%	50.4%	100.0%	39.3%	N/A
Other Indicator 1 - Incidents Submitted Within 60 Days Of Patient Discharge	89.7%	83.6%	91.0%	56.5%	82.9%	90.0%	94.6%	80.0%
Other Indicator 2 - Incidents With Validity Score Greater Than 84	100.0%	94.7%	98.8%	91.2%	98.9%	99.6%	99.8%	90.0%

Table 3: SEQIS indicator results for 2021 by service area

Data Sources

IHA Inpatient and Outpatient Data Registry: These are patients who were admitted to a given facility. The incidents used for analysis were the patients whose admitting or principal diagnosis was a trauma diagnosis code based on the state's trauma registry inclusion criteria.

Iowa Death Certificate Data: The Bureau of Health Statistics provides the trauma program with trauma-related death statistics.

Iowa EMS Registry: This registry contains the EMS run reports for the state of Iowa in 2021. Data is pulled from our state registry at <https://iowa.imagetrendelite.com/elite/organizationiowa/>.

Iowa Trauma Registry: This is the trauma registry that hospitals are required to submit data to as defined by the inclusion criteria on page 10 of the Iowa Trauma Registry Data Dictionary (https://idph.iowa.gov/Portals/1/userfiles/43/Trauma%20Registry%20Data%20Dictionary%20Jan_%202017.pdf). Note that some facilities track same-level falls resulting in isolated hip fractures, but this data is not required. The information is collected on <https://iowa.imagetrendregistry.com/>.

Attachment 1 – Hospital System State Indicators

Details regarding the calculation of the performance indicators are described below.

- Indicator 1a – Trauma surgeon present in ED within 15 mins. of patient arrival
 - For level 1 trauma activations, how often did the first responding trauma surgeon arrive within 15 minutes of the arrival of the patient.
 - Trauma surgeons are defined as trauma team members who have “Surgery/Trauma” selected for the Trauma Team Member Service Type on the incident form.
 - The response time is calculated as the minutes from the ED/Acute Care Admission Time to the Trauma Team Member Arrived Time.
 - 15 minutes is the indicator for Level I and II facilities.
 - This indicator disregards incidents for which there was no calculable response time for a “Surgery/Trauma” trauma team member.
- Indicator 1b – Trauma surgeon present in ED within 30 mins. of patient arrival
 - Calculated the same as 1a, but 30 minutes is the indicator for Level III facilities.
- Indicator 1c – Trauma surgeon response time unknown
 - For level 1 trauma activations, how often are we unable to calculate the response time of the trauma surgeon.
 - If we are unable to calculate the response time, the incident is missing at least one of ED/Acute Care Admission Date/Time or Trauma Team Member Arrived Date/Time.
- Indicator 1d – 1st physician (Trauma surgeon or ED physician) present in ED within 5 mins. of patient arrival
 - For level 1 and 2 trauma activations, how often did the first responding physician arrive within 5 minutes of the arrival of the patient.
 - Physicians are defined as trauma team members who have “Surgery/Trauma,” “Emergency Medicine,” or “Surgery Senior Resident” selected for the Trauma Team Member Service Type on the incident form.
 - The response time is calculated as the minutes from the ED/Acute Care Admission Time to the Trauma Team Member Arrived Time.
 - 5 minutes is the indicator for Level I and II facilities.
 - This indicator disregards incidents for which there was no calculable response time for a “Surgery/Trauma” or “Emergency Medicine” trauma team member.
- Indicator 1e – 1st physician (Trauma surgeon or ED physician) present in ED within 20 mins. of patient arrival
 - Calculated the same as 1d, but 20 minutes is the indicator for Level III and IV facilities.
- Indicator 1f – Physician response time unknown

- For level 1 and 2 trauma activations, how often are we unable to calculate the response time of the physician.
- If we are unable to calculate the response time, the incident is missing at least one of ED/Acute Care Admission Date/Time or Trauma Team Member Arrived Date/Time.
- Indicator 2 – Missing injury time
 - Calculated as the number of incidents with a missing injury time divided by the total number of incidents for the period.
- Indicator 3 – Trauma patient had a Probability of Survival (Ps) score calculated
 - Calculated as the number of incidents with a valid Probability of Survival score divided by the total number of incidents for the period.
 - Probability of Survival is calculated using the following factors:
 - Injury Severity Score (ISS): Derived from the AIS codes associated with the diagnosis codes.
 - Revised Trauma Score (RTS): Derived from Glasgow Come Scale, systolic blood pressure, and respiratory rate.
 - Patient age.
 - Trauma type: Derived from the injury code (found on the Injury tab in ImageTrend) and its associated trauma type.
 - If any of those factors are missing, the Probability of Survival score will not be calculated.
 - Injuries with a trauma type of burn are excluded from this calculation.
- Indicator 4a – Deceased trauma patient was autopsied
 - Calculated as the number of incidents with a “Yes” value for Autopsy divided by the number of incidents with a value of “Deceased/Expired” for either ED/Acute Care Disposition or Hospital Discharge Disposition.
- Indicator 4b – No autopsy done on death with stay greater than 72 hours
 - Calculated as the number of deceased patients who were at the facility for over 72 hours and did not have an autopsy performed divided by all deceased patients who were at the facility for over 72 hours.
- Indicator 5a – Blood ETOH was measured
 - Calculated as the number of patients who had blood ETOH measured divided by all patients.
 - This does not exclude any patients, so pediatric patients are included.
- Indicator 5b – Blood ETOH was positive
 - Calculated as the number of patients who had a positive blood ETOH divided by the number of patients who had blood ETOH measured.
- Indicator 6a – 1st hospital initial GCS < 9 with no head CT done before transfer to definitive care

- Calculated as the number of patients with a GCS less than 9 at the first hospital who did not have a head CT prior to transfer divided by the number of patients with a GCS less than 9 at the first hospital who were transferred.
- The numbers for your hospital are only for patients who were not transferred out of your facility, so this indicator for your facility is for patients who received definitive care at your facility.
- Indicator 6b – 1st hospital initial GCS < 9 arrived to definitive care > 3 hours in transferred patients
 - Calculated as the number of patients with a GCS less than 9 at the first hospital who arrived to definitive care over 3 hours from injury time divided by the number of patients with a GCS less than 9 who were transferred.
- Indicator 7 – SEQIC population that arrived to definitive care in > 3 hours from injury time
 - Calculated as the number of patients who took more than 3 hours to arrive at the definitive care facility from injury time divided by all patients.
 - Definitive care is determined the same as in 6a, i.e. patient is not transferred out.
- Indicator 8 – Survival rate by risk for death (high, moderate, and low) stratified by trauma hospital level
 - The definitions for risk levels are as follows (Abnormal Physiology thresholds also listed):
 - Abnormal Physiology
 - GCS 3-5
 - Respiration <5 or >30 respirations per minute
 - Systolic Blood Pressure <60 mm Hg
 - Risk Definitions
 - High
 - Probability of Survival <2 **OR**
 - ISS >41 **OR**
 - ISS >24 if Abnormal Physiology
 - Moderate
 - Probability of Survival 0.2-<0.5 **OR**
 - ISS 16-41
 - Low
 - Probability of Survival 0.5-1.0 **OR**
 - ISS <16 **OR**
 - Normal range physiology
 - All survival rates are calculated as the number of patients who do not have an ED/Acute Care Disposition or Hospital Discharge Disposition of “Deceased/Expired” divided by all patients.

- Other Indicator 1 – Incident submitted within 60 days of patient discharge
 - Calculated as the number of incidents entered in the trauma registry within 60 days of patient discharge divided by the number of all incidents.
 - The data dictionary specifies that 80% of incidents should be entered within 60 days of patient discharge, and 100% of incidents should be entered within 120 days of patient discharge.
 - The patient discharge date is the later of ED/Acute Care Admission Date and Hospital Discharge Date.
- Other Indicator 2 – Incident has validity score of 85% or greater
 - Calculated as the number of incidents with a validity score of 85% or greater divided by all incidents.