



Iowa Trauma Registry Report 2019

Authorship - Bureau of Emergency and Trauma Services
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Iowa Department of Public Health
Protecting and Improving the Health of Iowans



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Executive Summary

The 2019 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
 - 119 reporting facilities due to Rock Rapids facility change
 - Still only 118 active hospitals
 - 24,309 incidents
 - 21,414 unique patients
 - 299/436 incidents of physical abuse investigated
 - 6.3% of incidents were work-related
 - 2.2% of incidents were farm-related
 - 54.3% of incidents were falls
 - 21.1% of incidents were motor vehicle crashes
 - 8,035 trauma alerts
 - 2,340 level 1
 - 5,695 level 2
 - 353 self-inflicted injuries
 - 1,670 assault injuries
 - 2,353 incidents of transfer delay
 - 44.4% female, 55.5% male, 0.1% unknown
- 411,765 EMS Incident Reports (an incident report occurs each time an EMS program is notified to respond)
 - 279,392 EMS transport incident reports
 - 99,559 trauma-related incident reports
 - 51,151 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

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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.

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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 February 2020.

Iowa Department of Public Health
Bureau of Emergency and Trauma Services
Iowa Trauma Facility Map
February 2020

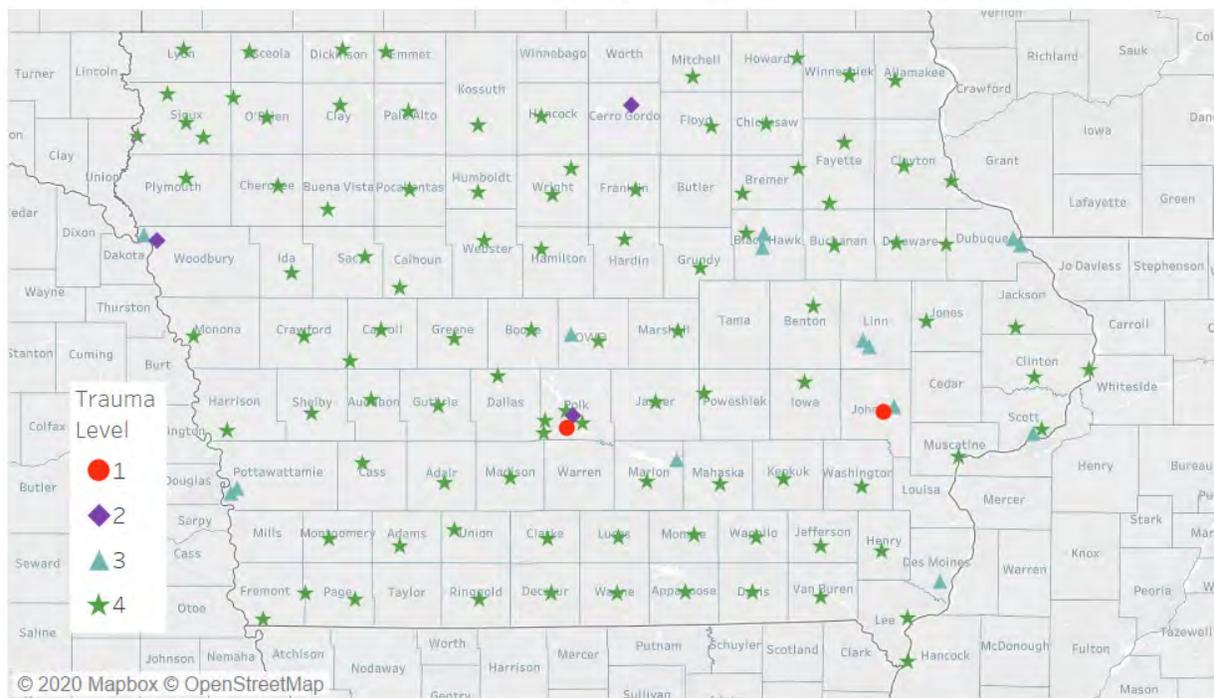


Figure 1: Map of trauma care facilities

Trauma Facility Level Count

Source: Iowa Department of Public Health | July 2020

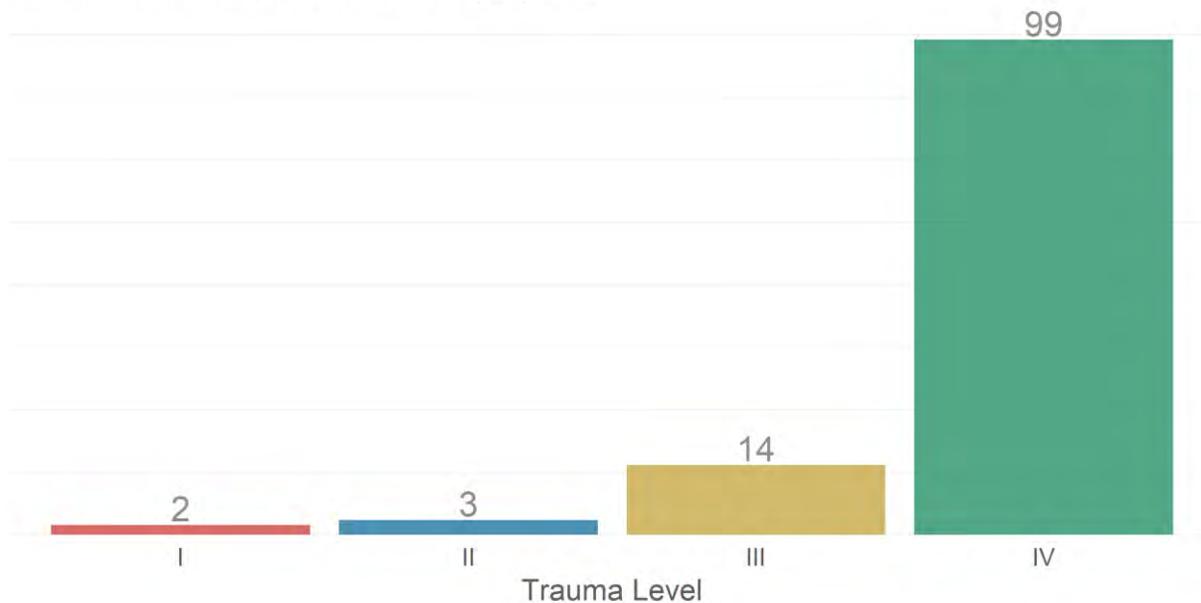


Figure 2: Number of facilities for each level of care

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.

Since last report, the state now has one less Level III facility, and one more Level IV facility. Compared to three years ago, there is now one less Level II facility, three fewer Level III facilities, and four more Level IV facilities. Also of note is the closing of a hospital in Rock Rapids, as well as the simultaneous opening of another hospital in the same city, both Level IV.

Count of Incidents by Trauma Facility Level

Source: Iowa Trauma Registry | 2019

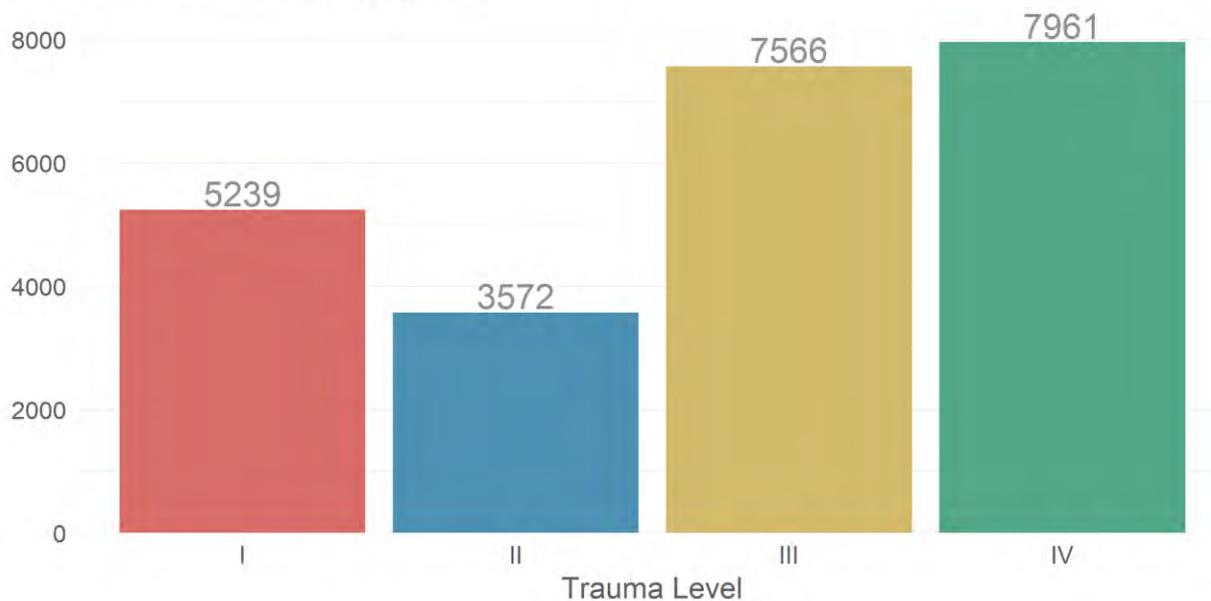


Figure 3: Number of trauma incidents reported through State Trauma registry in 2019

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 7,961 in 2019. This is the first year that Level IV facilities have cumulatively reported more incidents than Level III facilities. This is due at least in part to the increasing number of Level IV facilities. All facilities reported data for patients seen in 2019. The department continues to support hospital data reporting education and training.

Response to Trauma

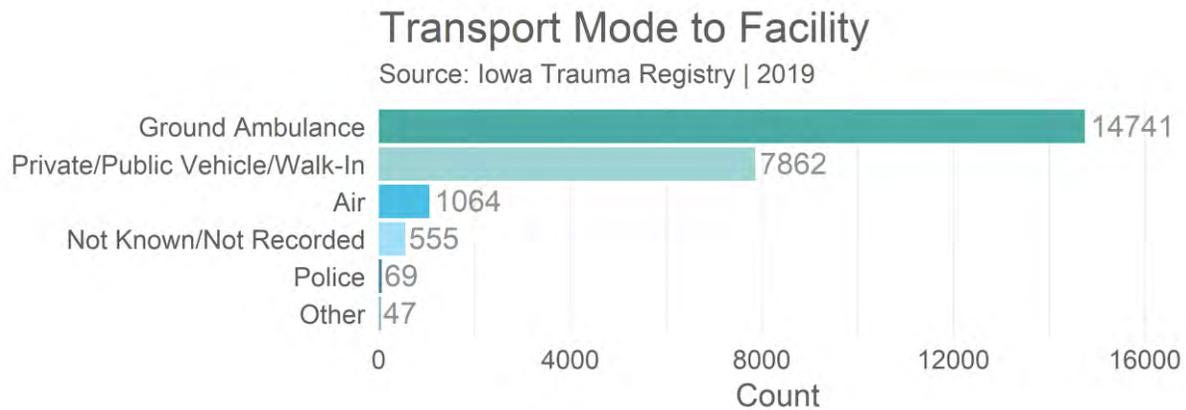


Figure 4: Method used to transport trauma patients to emergency care

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, 61% of patients were transported to the trauma care facility by ground ambulance; 32% of patients were transported by private/public vehicle/walk-in; 4% of patients were transported by air (helicopter or fixed-wing aircraft); the mechanism for transport for 2% of the patients is unknown (down from 4% in 2018); and less than 1% of trauma patients were transported by police or other.

Cause of Injury Frequency

Source: Iowa Trauma Registry | 2019

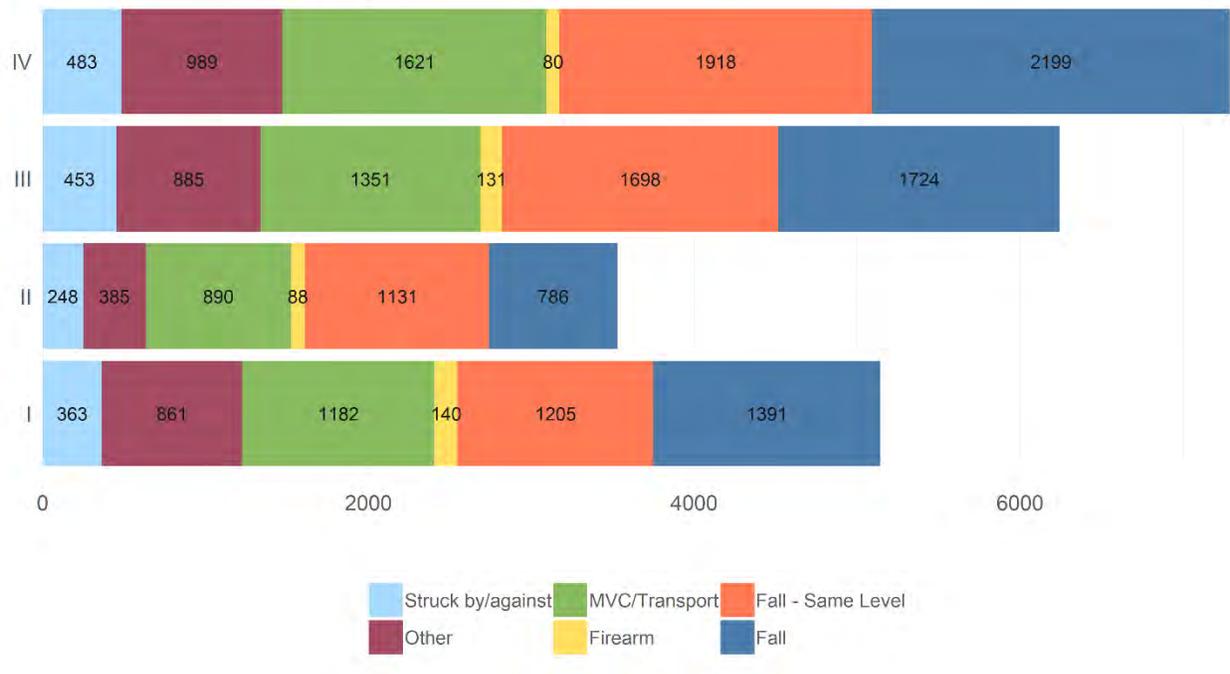


Figure 5: Incidents by cause of injury and trauma care level

Level III and IV facilities saw a greater percentage of their incidents as falls compared to level I and II facilities. The only significant changes from last year are that Level III facilities had a higher percentage of same-level falls and a lower percentage of “struck by/against” injuries. 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 burn patients at a rate about 3 to 4 times higher than the other levels. 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 7, albeit not split out by trauma level. Burn injuries are listed as Fire/Flame.

Cause of Injury Frequency

Source: Iowa Trauma Registry | 2019

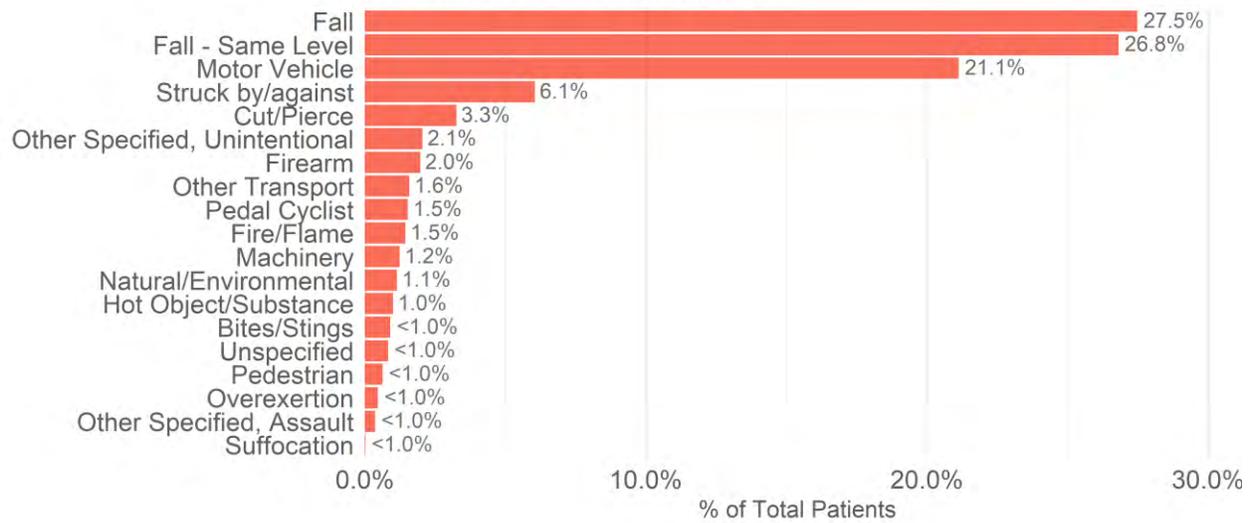


Figure 6: Percentage of registry incidents per cause of injury category

Non-same-level falls do outnumber the same-level falls, but the percentages are closer than last year. 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 | 2019



Figure 7: 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. Of these 6,051 transfers out, 71.4% are from level IV facilities, 24.3% are from level III facilities, and the remaining 4.3% are from level I and II facilities. 24.9% of the trauma registry incidents from 2019 were transfers out to definitive care. All levels had more transfers out than they did in 2018.



Figure 8: 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. There were slight increases for the average lengths of stay for trauma activations and non-activations for each year.

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 12,456 patients with a trauma diagnosis code as the admitting or principal diagnosis code for first-hospital admissions at Iowa facilities.

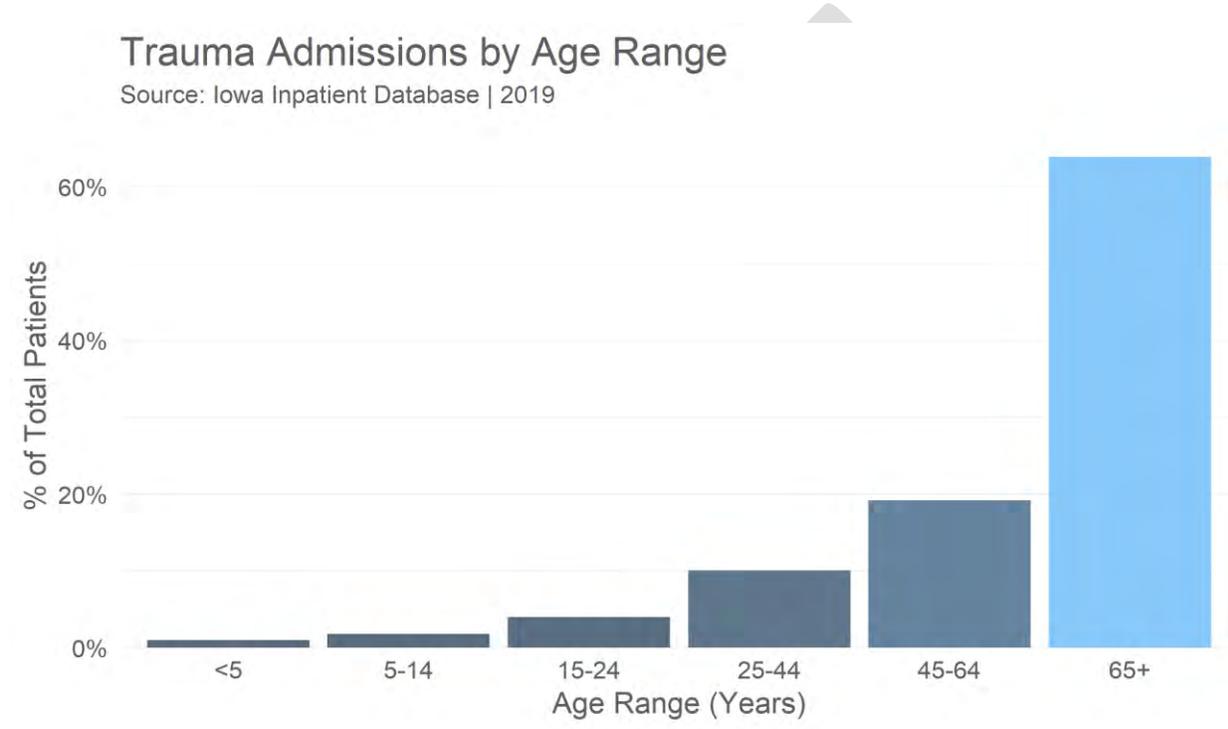


Figure 9: Percentage of trauma admissions by age range from Inpatient database

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 | 2019

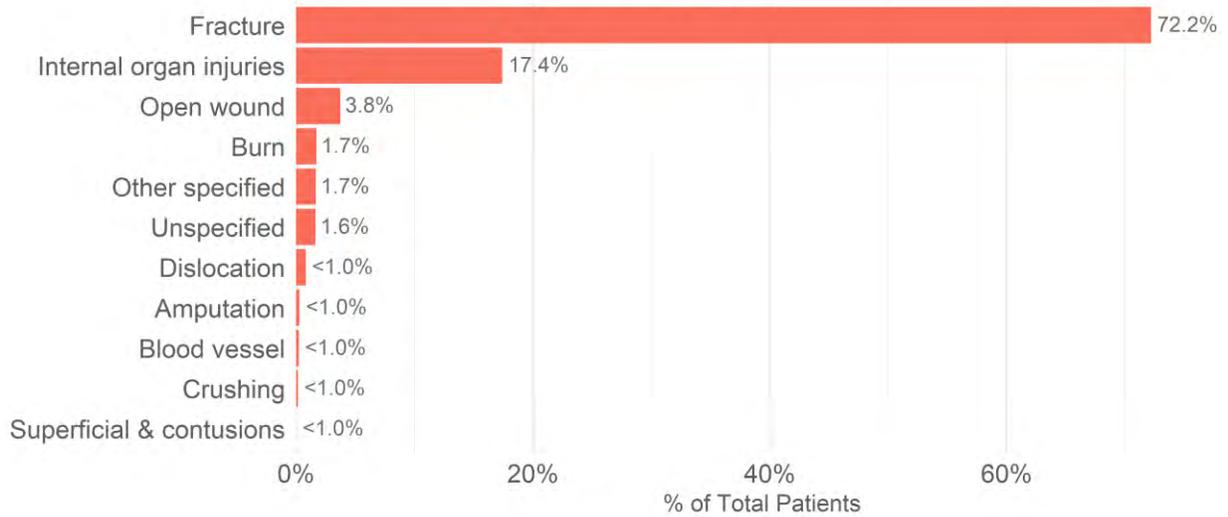


Figure 10: Percentage of trauma admissions by nature/type of injury

Fractures account for nearly three-quarters 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 | 2019

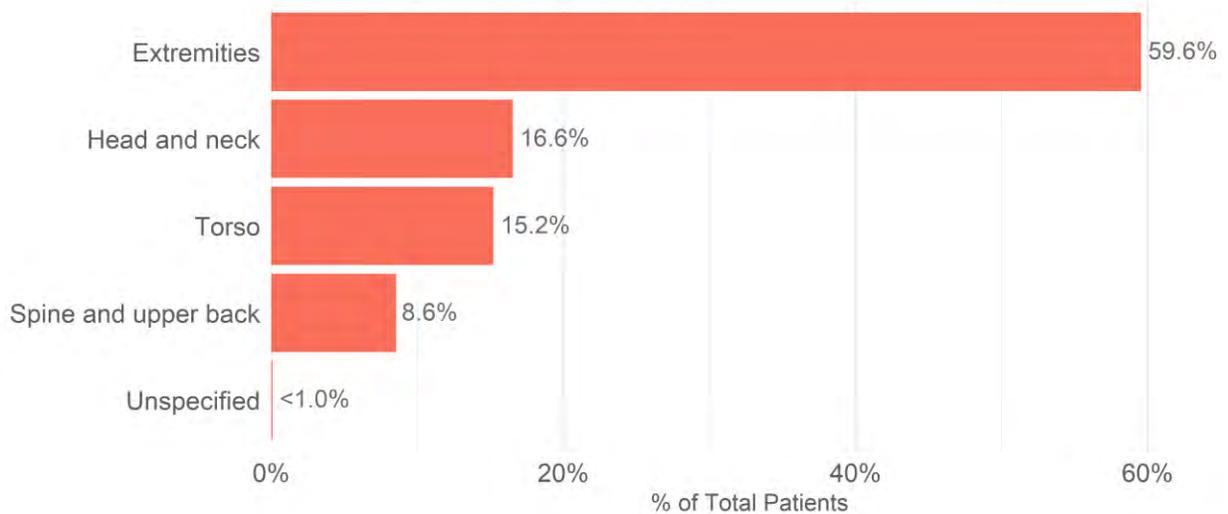


Figure 11: Percentage of trauma admissions by body region of primary diagnosis

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, which is continues the trend from last year.

Deaths

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

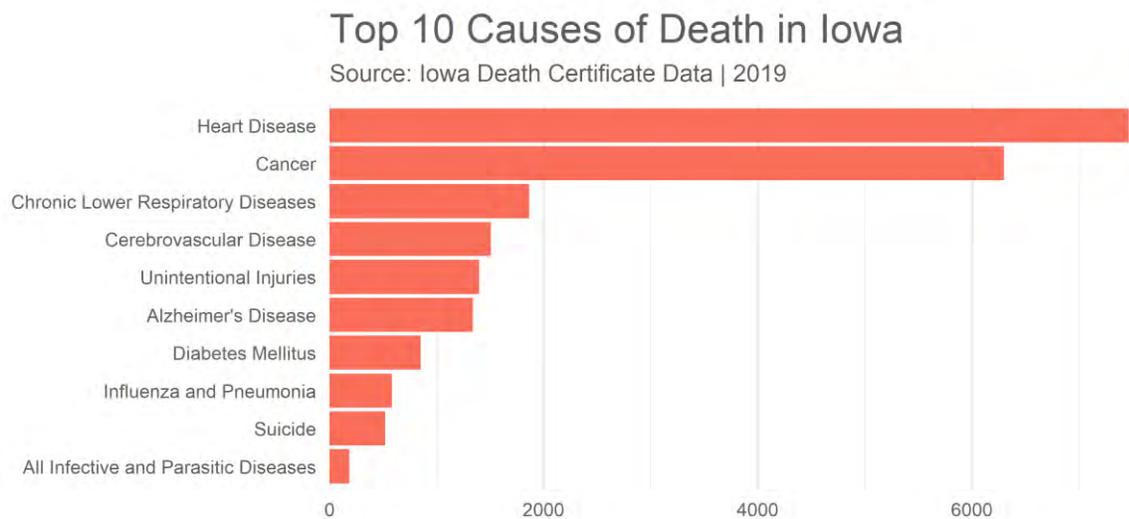


Figure 12: Top causes of death in Iowa

Unintentional injuries account for most trauma deaths in Iowa for 2019. The suicide category of this figure also includes trauma injuries. According to the CDC, injury is the leading cause of death among person 1-44 years of age (https://www.cdc.gov/injury/wisqars/overview/key_data.html).

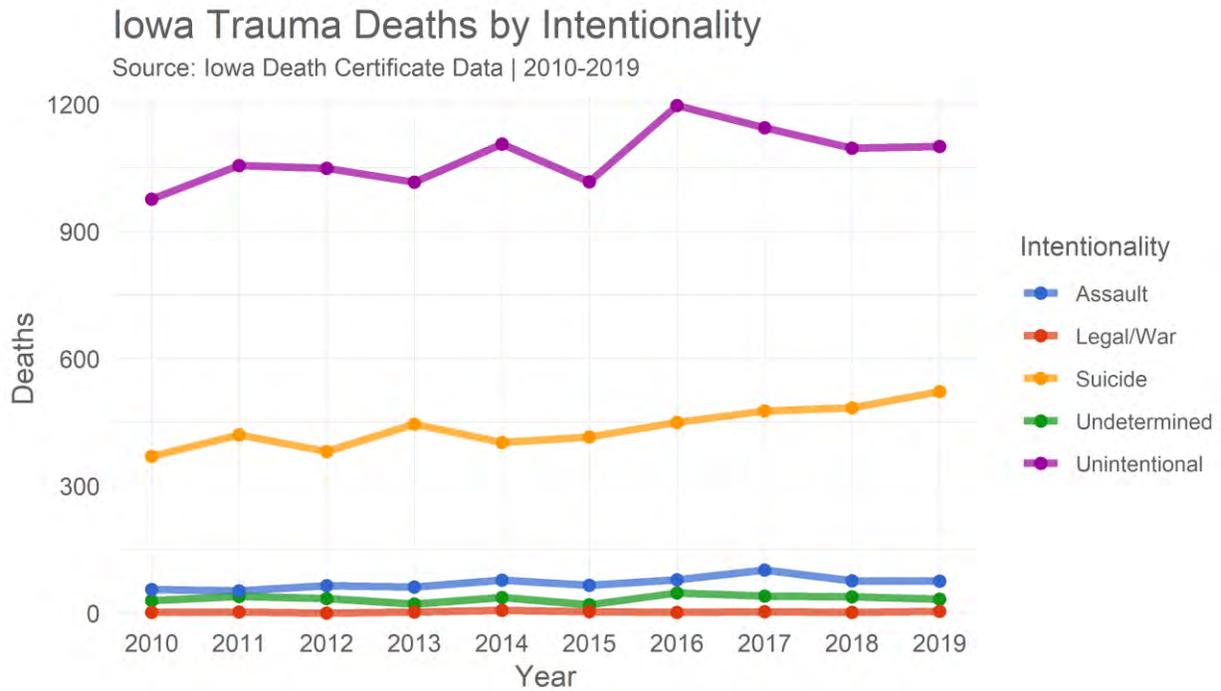


Figure 13: Trauma deaths in Iowa by intentionality

Unintentional injury deaths have remained lower since they spiked in 2016. Assault deaths also remained lower after the 2017 increase. Suicide deaths jumped from last year, and have increased each of the past five years from 402 in 2014 to 522 in 2019.

Iowa Unintentional Trauma Deaths by Cause

Source: Iowa Death Certificate Data | 2010-2019

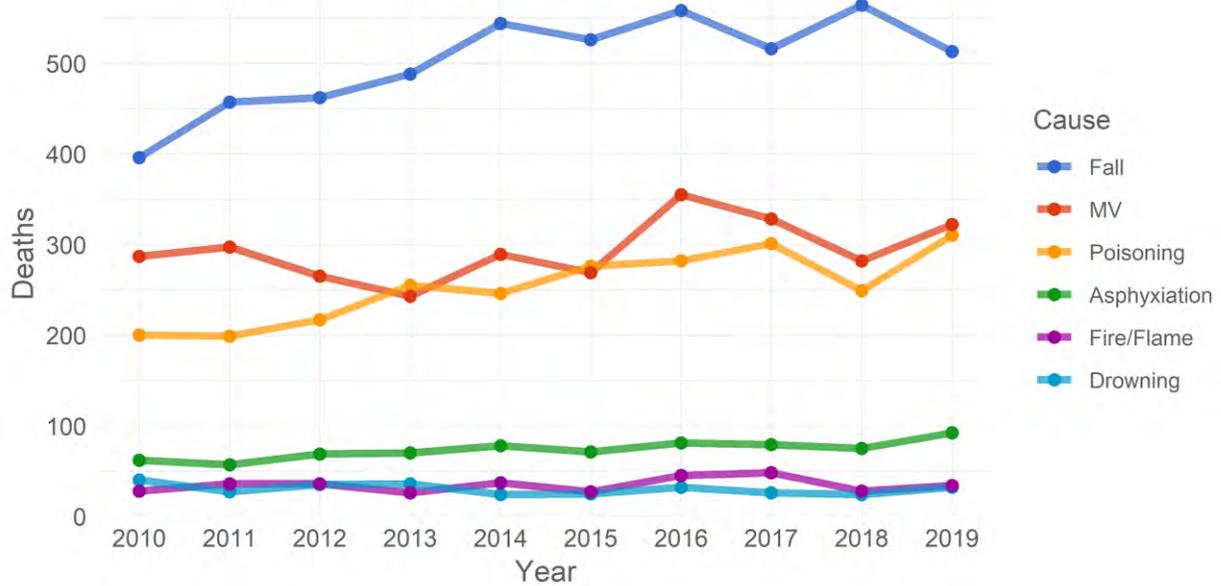


Figure 14: Unintentional trauma deaths in Iowa by cause of injury

Unintentional fall deaths have gone back down after the increase last year. The unintentional deaths due to poisonings and motor vehicle collisions both saw significant decreases last year, and are both back up again. Poisonings have reached a new high, as have unintentional asphyxiation deaths.

Iowa Trauma Suicides by Cause

Source: Iowa Death Certificate Data | 2010-2019

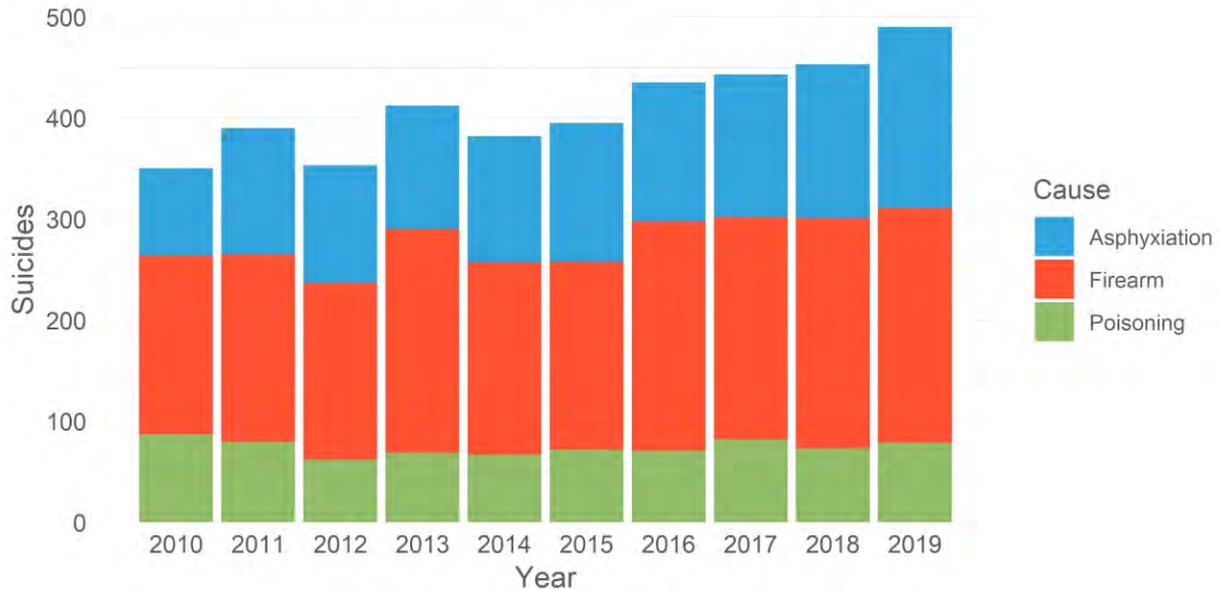


Figure 15: Trauma suicide counts in Iowa by method

Asphyxiation suicides are again at a record high after a jump from last year, and have generally been trending upward since 2010. Firearm suicides have remained steady for the past four years, although 2019 did reach a record high. Prior to the past four years, firearm suicides were significantly lower with the exception of a spike in 2013.

Cause	5-Year Average	2019 Deaths	% ↑/↓
Drowning	33	39	18.2%
Fall	546	518	-5.1%
Fire/Flame	42	51	21.4%
MV	308	325	5.5%
Poisoning	362	398	9.9%
Asphyxiation	222	275	23.9%

Table 1: Trends in Iowa trauma deaths

The above table shows deaths from the six listed categories, regardless of intentionality. The 2019 totals for all categories but one were higher than the 5-year trailing averages (2014 to 2018). Drowning deaths in 2019 are on par with some years in the past decade, and they're not close to the record. Fall deaths reached their lowest since 2013. Fire/flame deaths are higher than all years since 2010 except for 2017. Motor vehicle deaths are lower than 2016 and 2017, but higher than all other years since 2010. Poisoning deaths are close to the high seen in 2017. Asphyxiation deaths have been increasing every year since 2010, and spiked in 2019.

Iowa Unintentional Fall Deaths

Source: Iowa Death Certificate Data | 2002-2019

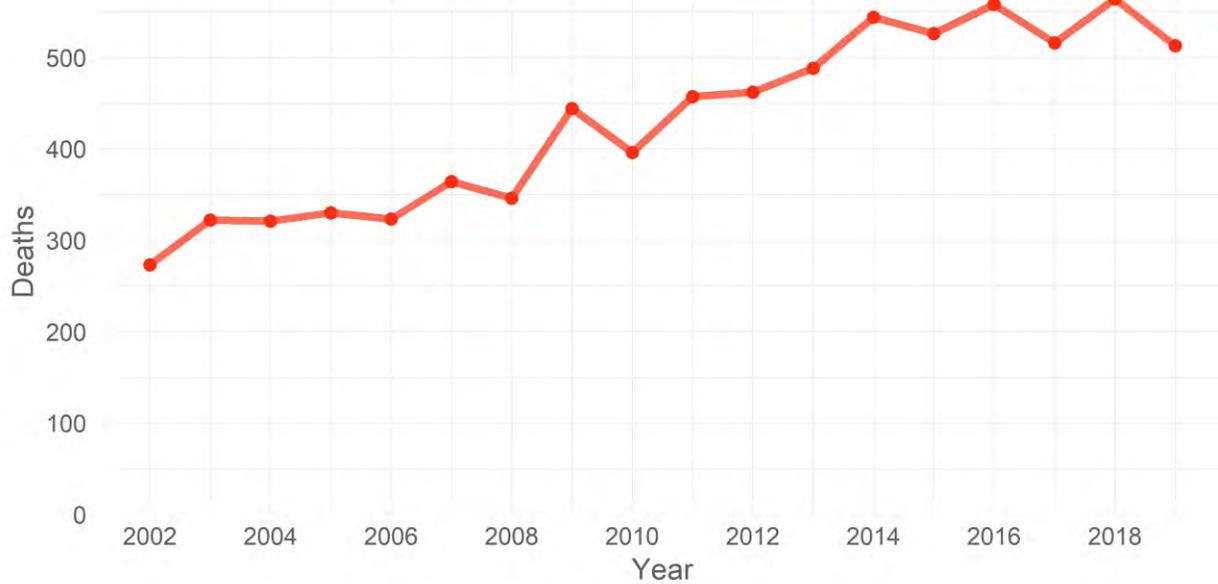


Figure 16: Unintentional fall deaths in Iowa since 2002

Deaths due to unintentional falls decreased from the new high seen in 2018. The 2019 total is close to the 2017 total, and is the lowest since 2013. Prior to 2014, unintentional fall deaths had never reached 500, and a clear upward trend can be seen in the graph, with some periods of stagnation and variability. The 2018 high was more than double the 2002 total, but there seems to be a new normal since 2014 with totals in the low- to mid-500 range.

Iowa Poisoning Deaths

Source: Iowa Death Certificate Data | 2002-2019

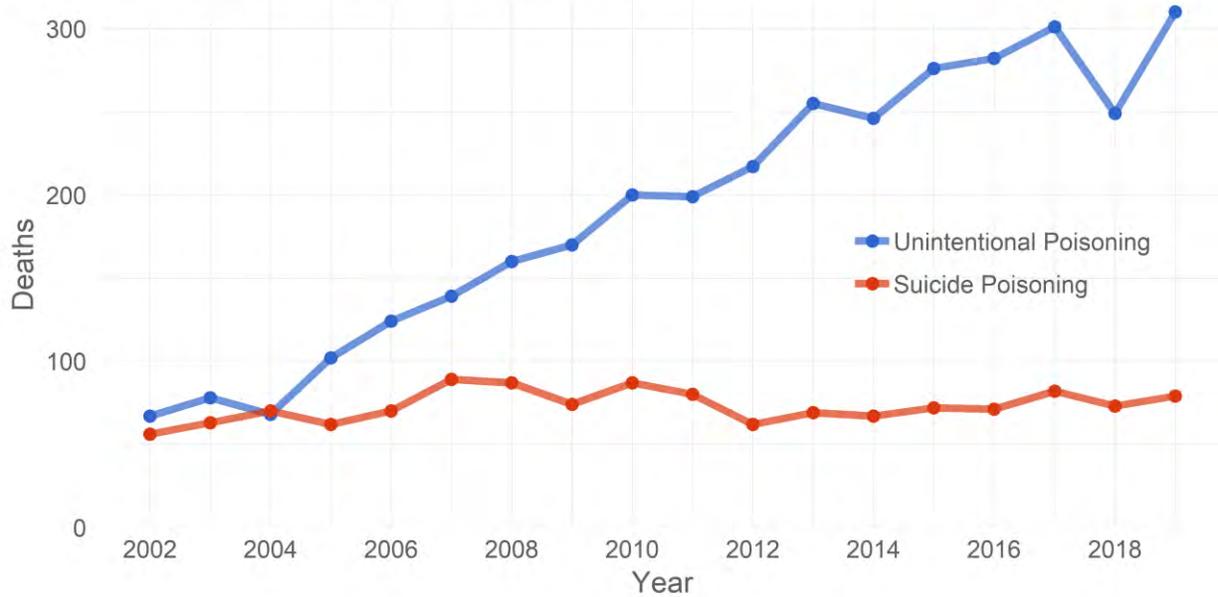


Figure 17: Suicide poisoning deaths in Iowa by intentionality since 2002

Poisonings saw an increase from 2018. Unintentional poisonings rose greatly, and are now back on track with the trend of increasing deaths. The total for 2019 is a new high. The large decrease in 2018 now looks like a fluke as opposed to reversing the trend. Suicides by poisoning have remained between 56 and 89 deaths per year since 2002, so the 79 deaths in 2019 continues a trend of little change, falling comfortably within the minimum and maximum figures in this timespan.

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 and trauma service areas on a quarterly basis. The data is used to drive performance improvement processes and prevention programs. The quarterly data reports assist hospitals and service areas in monitoring changes within the trauma system.

Indicators Calculated for 2019	Level I & II	Level III	Level IV	State	Goal
Indicator 1a - Trauma Surgeon Responding Within 15 Minutes	93.9%	68.6%	N/A	79.2%	80.0%
Indicator 1b - Trauma Surgeon Responding Within 30 Minutes	97.7%	90.5%	N/A	93.5%	80.0%
Indicator 1c - Trauma Surgeon Response Time Unknown	3.5%	6.7%	N/A	5.4%	0.0%
Indicator 1d - Physician Responding Within 5 Minutes	93.2%	51.3%	81.4%	67.6%	80.0%
Indicator 1e - Physician Responding Within 20 Minutes	98.0%	87.0%	94.0%	91.0%	100.0%
Indicator 1f - Physician Response Time Unknown	1.5%	3.5%	28.1%	11.0%	0.0%
Indicator 2 - Injury Time Blank	22.7%	15.9%	8.9%	15.5%	0.0%
Indicator 3 - Probability of Survival Calculated	91.5%	86.1%	75.6%	83.7%	100.0%
Indicator 4a - Deceased Trauma Patient Autopsied	25.2%	26.1%	36.4%	28.8%	N/A
Indicator 4b - No Autopsy On Death With LOS Greater Than 72 Hours	97.6%	95.5%	100.0%	97.0%	N/A
Indicator 5a - Blood ETOH Measured	43.7%	25.4%	17.2%	28.0%	N/A
Indicator 5b - Blood ETOH Positive	29.4%	54.4%	54.8%	42.9%	N/A
Indicator 6a - 1st Hospital Initial GCS Less Than 9 With No Head CT Before Transfer To Definitive Care	N/A	56.6%	66.3%	62.8%	100.0%
Indicator 6b - 1st Hospital Initial GCS Less Than 9 And Arrived To Definitive Care Over 3 Hours From Injury	23.6%	9.0%	4.3%	18.3%	0.0%
Indicator 7 - Patients To Definitive Care Greater Than 3 Hours	44.8%	19.2%	15.9%	27.8%	0.0%
Indicator 8 - Survival Rate For All Traumas	96.1%	98.7%	98.5%	97.9%	N/A

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Indicator 8 - Survival Rate For Low Risk Traumas	98.2%	99.2%	99.0%	98.9%	N/A
Indicator 8 - Survival Rate For Moderate Risk Traumas	92.4%	96.5%	96.9%	94.6%	N/A
Indicator 8 - Survival Rate For High Risk Traumas	39.6%	43.1%	53.2%	43.1%	N/A
Other Indicator 1 - Incidents Submitted Within 60 Days Of Patient Discharge	94.2%	93.5%	81.0%	88.8%	80.0%
Other Indicator 2 - Incidents With Validity Score Greater Than 84	99.8%	96.6%	98.9%	98.1%	90.0%

Table 2: SEQIS indicator results for 2019 by level and entire state

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

Indicators Calculated for 2019	A	B	C	D	E	F	G	Goal
Indicator 1a - Trauma Surgeon Responding Within 15 Minutes	67.7%	83.7%	*	70.7%	97.6%	61.8%	93.8%	80.0%
Indicator 1b - Trauma Surgeon Responding Within 30 Minutes	90.3%	94.2%	*	92.2%	98.8%	82.4%	98.5%	80.0%
Indicator 1c - Trauma Surgeon Response Time Unknown	9.5%	1.1%	*	1.3%	2.3%	13.0%	12.0%	0.0%
Indicator 1d - Physician Responding Within 5 Minutes	79.7%	81.9%	83.3%	47.9%	78.0%	72.4%	86.7%	80.0%
Indicator 1e - Physician Responding Within 20 Minutes	92.9%	94.9%	98.2%	86.6%	93.4%	91.1%	97.5%	100.0%
Indicator 1f - Physician Response Time Unknown	6.9%	9.2%	5.6%	4.6%	22.4%	9.2%	25.7%	0.0%
Indicator 2 - Injury Time Blank	14.7%	22.9%	12.8%	17.2%	12.9%	10.0%	14.6%	0.0%
Indicator 3 - Probability of Survival Calculated	85.5%	82.2%	70.6%	85.8%	88.1%	73.7%	73.7%	100.0%
Indicator 4a - Deceased Trauma Patient Autopsied	34.2%	3.3%	50.0%	23.2%	46.0%	35.0%	36.4%	N/A
Indicator 4b - No Autopsy On Death With LOS Greater Than 72 Hours	100.0%	100.0%	*	92.3%	92.3%	100.0%	100.0%	N/A

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Indicator 5a - Blood ETOH Measured	31.3%	17.4%	22.6%	28.1%	35.1%	18.4%	21.1%	N/A
Indicator 5b - Blood ETOH Positive	48.9%	48.9%	47.8%	47.5%	31.9%	42.2%	45.4%	N/A
Indicator 6a - 1st Hospital Initial GCS Less Than 9 With No Head CT Before Transfer To Definitive Care	71.9%	60.0%	50.0%	62.2%	68.0%	47.1%	71.4%	100.0%
Indicator 6b - 1st Hospital Initial GCS Less Than 9 And Arrived To Definitive Care Over 3 Hours From Injury	34.4%	6.9%	0.0%	8.2%	10.6%	0.0%	18.8%	0.0%
Indicator 7 - Patients To Definitive Care Greater Than 3 Hours	42.0%	18.3%	11.0%	16.9%	32.9%	18.3%	26.2%	0.0%
Indicator 8 - Survival Rate For All Traumas	97.6%	97.3%	96.4%	98.6%	97.7%	98.6%	97.2%	N/A
Indicator 8 - Survival Rate For Low Risk Traumas	99.1%	98.6%	97.8%	99.2%	98.6%	99.1%	98.2%	N/A
Indicator 8 - Survival Rate For Moderate Risk Traumas	94.2%	90.3%	95.2%	94.9%	97.6%	96.8%	90.3%	N/A
Indicator 8 - Survival Rate For High Risk Traumas	28.6%	48.4%	0.0%	56.8%	41.9%	44.4%	63.2%	N/A
Other Indicator 1 - Incidents Submitted Within 60 Days Of Patient Discharge	92.3%	70.9%	76.9%	91.0%	91.0%	95.2%	94.6%	80.0%
Other Indicator 2 - Incidents With Validity Score Greater Than 84	92.5%	98.8%	99.2%	99.9%	99.2%	99.2%	98.1%	90.0%

Table 3: SEQIS indicator results for 2019 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. This is the finalized data for 2019.

Iowa EMS Registry: This registry contains the EMS run reports for the state of Iowa in 2019. During this year, the registry transitioned from www.iowafirebridge.com to www.imagetrendelite.com/Elite/?organizationId=iowa. Data is pulled from both sources to complete the year's data.

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.

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