Iowa Trauma System
Ten Year Report

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Introduction

A Trauma System is:

- An organized approach to the acutely injured patient that provides personnel, facilities, and equipment for optimal care on an emergency basis within a defined geographic area.

- An integrated and systematic structure designed to provide optimal care to injured patients from onset of injury through rehabilitation.

1995 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 the System Evaluation Quality Improvement Committee (SEQIC) to evaluate system effectiveness. The legislation also established the State Trauma Registry (STR) for statewide injury-reporting.

1997 Implementation began in January of 1997 with the categorization and verification of all hospitals as trauma care facilities based on availability of resources. Statewide transport protocols were developed for all transporting ambulance services. Emergency medical technicians, nurses and physicians were required to obtain specialized trauma education.

2001 On January 1, 2001 the Iowa Trauma System became fully operational. Hospitals in Iowa were reviewed, verified and categorized, and had at least one physician with Advanced Trauma Life Support (ATLS) training. The committee structure for oversight and evaluation was established and the State Trauma Registry was in place. The all-inclusive system required the participation of Iowa hospitals, transporting ambulance services, and rehabilitation centers.

2010 The Iowa Trauma System has been in operation for ten years. The passing of this milestone is a time to reflect on the accomplishments of the past decade and review the trends in trauma injury and treatment to determine upcoming challenges. 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.
Magnitude of Trauma

Trauma in Iowa

Traumatic injury is a major public health concern that affects the lives of all Iowans. Trauma is the leading cause of death for Iowans from birth to age 40 and the fifth leading cause of death for all age groups combined. Over the past ten years, there has been an average of 1,715 deaths each year due to trauma.

Figure 1-1: The deaths are the tip of the iceberg of the hospitalizations, Emergency Department (ED) visits, and untreated trauma injuries each year.

Based on hospital discharge data, half of the hospitalized patients with trauma-related injuries are age 65 or older. The patterns of injury are even more evident by looking at the types of injury by age. Figure 1-2: Illustrates that the primary mechanism of injury varies with age. Falls are the primary cause of injury for those 45-64 (40.9%), as well as those older than 65 (82%). Falls are also the main cause of injury in those younger than 15 years old. However, for those in the two age groups 15-24 (36.2%) and 25-44 (32.4%), the dominant mechanism of injury is suicide/suicide attempt. Analyzing data such as this is invaluable to the trauma system and injury prevention programs.
Looking back over the past several years, falls is the number one cause of trauma injury resulting in hospitalization. Fall injuries ranged from a high of 8806 in 2001, to its lowest number of 5857 patients in 2009. While the number of patients hospitalized from motor vehicle/traffic crashes has decreased with time, the number of patients hospitalized due to poisoning showed a 38% increase since the trauma system began in 2001. Figure 1-4) shows the wide variety of injuries caused by trauma. Over the past 13 years, the leading nature of injury, which resulted in hospitalization, has been hip fractures. It is interesting to note that the number of hip fractures has declined with time while poisonings have increased. In 2009, hip fractures and poisonings each represented 19% of patients.
In general, traumatic injuries over the life of the trauma system have become more severe (Figure 1-5). Although the majority of patients have Injury Severity Scores (ISS)* less than 15, the percentage of patients has decreased. At the same time those with scores from 16 to 23 have nearly doubled. The most severe cases, those with scores 24 or greater have remained fairly level. (ISS=0, denotes that the patient did not have any valid ICD-9 codes.)

* An anatomical scoring system that provides an overall score for patients with multiple injuries (Baker SP et al, 1974).

Deaths due to falls and poisonings have increased, while those due to motor vehicle crashes have declined (Figure 1-6). Data indicates that motor vehicle related deaths appear to be decreasing the most in the less populous counties (populations less than 10,000). For the first time in 2009, falls became the number one cause of trauma related death. Trends in data can indicate where the Trauma System response is working and where changes need to be made. The trends can be useful in identifying locations where trauma resources need to be allocated and in identifying opportunities for injury prevention programs.
As shown in the previous graph, Figure 1-6, deaths due to poisoning have more than doubled in the past decade. Figure 1-7 demonstrates that the greatest increase has been in adult patients aged 25 to 64. Those in the 45 to 64 year old range have had a 325% increase in the number of deaths over the seven years shown. Figure 1-8: Displays a breakdown of the substances resulting in the poisonings. The majority of deaths resulted from substances in one of two categories: narcotics/hallucinogens and other/unspecified drugs, medication, and biological substances. Further analysis is needed to determine the source and legality of the drugs used.
In 2009, falls became the number one cause of trauma-related death in Iowa. In addition, since 2000 the age-adjusted rate of those injured by falls was higher in Iowa than the national rate. Further analyses have examined fall injuries by gender, age, location, mechanism, and level. As shown below (Figure 1-9) the type of fall differed by age. The younger an injured patient was, the more likely they fell from a different level. Toddlers and young children, males and females, most commonly fell from playground equipment. The older a patient is, the more likely the fall occurred on the same level and was due to a slip or trip. This was true for both genders and the majority of the falls occurred in the home.

![Fall-Related Injuries Age by Fall Type](image)

**Figure 1-9**

Up to age 55, a higher percentage of males had fall-related injuries. The greatest difference was from the age of 15 to 24 when 73% of fall-related injuries were males and 27% females. However, by the age of 75 and older this trend was reversed with 73% female compared to 27% male. In addition, the older the patient the more severe the fall-related injury.

The causes and effects of trauma-related injury in Iowa are continuously evolving. By analyzing and studying trauma as a disease, the Iowa Trauma System can be better prepared for and respond to injuries. This information is invaluable for public health injury prevention programs.
The goal in establishing the Iowa Trauma System was to match injured patients needs to facility resources. Iowa’s Trauma System is designed to assure that all people throughout the state have access to an organized delivery system and all time-critical injured patients are rapidly stabilized and transported to the facility which can provide appropriate treatment. The all-inclusive system requires the participation of all hospitals, transporting ambulance service programs, and rehabilitation centers.

**Trauma Care Facilities**

Each hospital or Trauma Care Facility (TCF) is categorized into one of four levels by their availability of resources to provide trauma care. Hospitals must recertify every three years. The four levels of TCF are:

- **Resource (Level I) TCF:** a tertiary care facility capable of providing highly specialized care involving advanced and complex procedures and treatments. In addition to acute care, Level I trauma centers have the major responsibility of providing leadership in education, research, and system planning.
- **Regional (Level II) TCF:** a facility capable of providing definitive trauma care, regardless of the severity of injury.
- **Area (Level III) TCF:** may be located in rural or urban areas and have the resources to provide stabilization for all trauma patients and may provide surgical and/or critical care when appropriate.
- **Community (Level IV) TCF:** most often located in rural areas and has the resources to provide initial stabilization for all trauma patients while preparing the patient for transfer when appropriate.

(Adapted from Iowa Administrative Code 641—134.2(147A) Trauma care facility categorization and verification.)

<table>
<thead>
<tr>
<th>Level</th>
<th>Number in State (2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I: Resource</td>
<td>1</td>
</tr>
<tr>
<td>Level II: Regional</td>
<td>6</td>
</tr>
<tr>
<td>Level III: Area</td>
<td>20</td>
</tr>
<tr>
<td>Level IV: Community</td>
<td>91</td>
</tr>
</tbody>
</table>

Table 2-1

While the total number of hospitals in the state has held steady over the past ten years, there has been a shift in the level of care. The number of Level I/II facilities has dropped from 12 to 7. Each Level III/IV facility should have direct linkage to a Level I/II facility to facilitate the expeditious transfer of seriously injured patients who require a higher level of care.
Triage & Transfer Protocol

In an emergency, a decision is made by responding emergency medical services (EMS) based on state-wide triage and transfer protocols to insure injured patients are transported to the hospital which has the most appropriate care for the patient’s needs. Separate guidelines have been developed for adult and pediatric patients. Decisions follow criteria laid out in four steps:

Step 1: Assess for time-critical injuries-level of consciousness and vital signs.
Step 2: Assess for time-critical injuries- anatomy of an injury. For example penetrating injuries, fractures (2+ long bone or pelvic), or burns (body surface >20% or face/neck).
Step 3: Consider mechanism of injury and high energy transfer. For example falls or motor vehicle crashes.
Step 4: Consider risk factors. For example age (<5 or >60), pregnancy, or bleeding disorders.

These criteria are used to assist EMS providers in identifying time critical injuries, method of transport and trauma care facility resources necessary for treatment of those injured. Guidelines have also been developed to assist physicians and facilities in early identification and transfer of patients with serious injuries which may require more definitive or specialized care provided by another trauma care facility. These protocols have been revised and improved over the years the trauma system has been in place.

Education

The principles of trauma care are introduced in medical and nursing school. Physicians involved in the care of injured patients receive additional instruction in the Advanced Trauma Life Support Course (ATLS). The Rural Trauma Team Development Course (RTTDC) is another trauma-specific educational course, both sponsored by the American College of Surgeons. Nurses involved in trauma care receive the Trauma Nursing Core Course (TNCC), sponsored by the Emergency Nurses Association or an equivalent course. In addition to these courses, specific instruction in pediatrics, as well as training for other specialized personnel, has been developed. Although many health care professionals were trained prior to the establishment of the trauma system, the system provided the structure for specific educational requirements and renewal. By establishing educational standards, the trauma system ensures consistency in the quality of care throughout the system.

System Evaluation

The trauma system is evaluated annually by the System Evaluation and Quality Improvement Committee (SEQIC). SEQIC advises the Iowa Department of Public Health on system effectiveness. The Trauma System Advisory Council (TSAC) is responsible for the overall review and operation of the trauma system. The main roles of the council include: hospital categorization and verification, triage and transfer protocols, injury registry (out-of-hospital and hospital databases), education and training, public information and education, rehabilitation, and injury prevention. TSAC and SEQIC have members across various disciplines who are both experts and stakeholders in the trauma system.

Members represent the following organizations:
- American Academy of Pediatrics - Iowa Chapter
- American College of Emergency Physicians - Iowa Chapter
- American College of Surgeons - Iowa Chapter
- Iowa Governor’s Traffic Safety Bureau (TSAC only)
- Iowa Medical Society, Neurosurgeon (SEQIC only)
- American Academy of Orthopedic Surgeons - Iowa Chapter (SEQIC only)
- Iowa Hospitals Association (Rural) (TSAC only)
- Iowa Hospitals Association (Urban) (TSAC only)
- Iowa Trauma Nurse Coordinators Association
- University of Iowa, Injury Prevention Center (TSAC only)
- Iowa Foundation for Medical Care (SEQIC only)
- State Trauma System Coordinator (SEQIC only)
- Iowa Academy of Family Physicians
- Iowa Emergency Nurses Association
- Iowa EMS Association
- Iowa Medical Society (TSAC only)
- Iowa Osteopathic Association (TSAC only)
- Iowa Physician Assistant Society
- Iowa Society of Anesthesiologists
- Iowa Orthopedic Society (TSAC only)
- Rehabilitation Services (TSAC only)
- State EMS Medical Director
- State Medical Examiner (TSAC only)
- Iowa Department of Public Health (TSAC only)

The trauma system structure has provided the means for collaborative effort and communication to advance trauma patient care in Iowa. By including members who work directly with patients, TSAC and SEQIC can receive and act on feedback to develop policy recommendations to improve the system.
Response to Trauma

The Bellevue Heritage Day parade is a decades-old tradition. Thousands lined the parade route on July 4th, 2010 when two horses pulling a wagon bolted, charging down the street and into the crowd. The horses ran for more than a quarter mile before they were stopped. In the ensuing chaos 28 people, many of them children were injured and one person was killed.

Nearly all of the town’s emergency workers were helping with the parade. Within minutes the festive parade route became an emergency response site; a triage and rapid transport situation. The EMS workers were joined by other physicians, nurses, and paramedics who had been in the parade or spectators. Bellevue’s two ambulances, along with twelve from nearby communities, transported victims to Dubuque, Maquoketa, Clinton, and Iowa City hospitals. These hospitals represent Level I, III, and IV trauma care facilities. The quick response resulted in all patients transported by ambulance, en route to emergency rooms, arriving in under the “Golden Hour” or the first 60 minutes after traumatic injury. EMS personnel cited the trauma training they had received in helping prepare them for responding to a large scale emergency. The response to this tragedy symbolizes the purpose and successful operation of the Iowa Trauma System.

Trauma by Hospital Level

When a trauma injury occurs, the patient is transported to the facility which has the appropriate resources for treatment. In many cases, the patient is in need of further care and must be admitted to the hospital. Based on hospital discharge data, the number of trauma patients admitted to the hospital per year ranged from a low of 17,859 in 1998 to a high of 20,320 in 2001. The total number of patients held steady from 2002 to 2006, with an increase in 2007 and 2008.
The percent of trauma patients by hospital level showed admissions have increased in Level I and Level III, but have steadily decreased in Level II. Trauma patients admitted to a Level I hospital have increased from 15% to 21%, while the number of Level I hospitals dropped from two to one facility. Since 2006, the highest percentage of patients was admitted to a Level III hospital. The percentage of patients admitted to Level III hospitals has increased since 1997, but has had a recent decline. The greatest change has been in the percent of patients admitted to Level II hospitals, decreasing from 39% to 27% across time. This may be due to the fact that the number of Level II hospitals decreased from ten to six in that time. Level IV facilities had the least change from 18% to 21% of patients while increasing in number from 83 to 89.

In 2009, at hospitals Level I through Level III, the number one cause of traumatic injury was falls and the second leading cause was motor vehicle crashes. These two causes accounted for 67% or more of all injuries by hospital level. At the Level III hospitals, falls accounted for 57% of trauma patient injuries. In contrast, the Level III hospitals saw fewer motor vehicle crash patients (13.1%) than the Level I hospital (29.6%).
Head injuries were the leading nature of injury at the Level I and Level II hospitals. Small bone fractures (not including leg, spinal cord, and arm) were the top nature of injury at Level III.

The distribution of patient age is older in the Level III hospitals. At all levels there were more male patients than female, with the largest difference at Level I with 63% male and 37% female.
The intention of the trauma system is to have the more severely injured patients cared for at a facility with greater resources, as needed. The 2009 Hospital Discharge (Inpatient) Data showed this was true in operation. Those with an ISS of 16 or greater were more likely to be treated at a Level I hospital (48.3%) when compared to the other hospital levels. While the highest percentage of patients with an ISS below or equal to 15 were seen at Level III hospitals, there was little difference between the percentage of patients at Levels II and IV.

While 45.4% of trauma patients with an ISS of 16 or greater were discharged to their home, only 25.2% of those with an ISS from 9 to 15 went home. The majority of these patients (64.4%) were discharged to skilled nursing, intermediate care, rehabilitation facility, or other facility. This analysis does not address if the patient was living at home prior to the injury.
Hospital System Indicators
The performance of the trauma system is evaluated by collecting and analyzing data covering a number of treatment factors. Over the ten years, revisions to the indicators have been made due to feedback from trauma system providers and in response to data analysis. Two of the care-related hospital system indicators have achieved high performance with consistent results in 95% or greater of trauma patients:

Indicator 3 – Trauma patient with GCS* < 8 had airway control established before departing from ED
Indicator 4 – Trauma patients with an ISS > 8 with vascular access established before departing from ED

In 2007, it was decided these indicators no longer needed to be monitored and indicators 10, 11, and 12 were added:

Indicator 10 – 1st hospital initial GCS < 8 with no head computed tomography (CT) done before transfer to definitive care
Indicator 11 – 1st hospital initial GCS < 8 then arrived to definitive care at final hospital > 4 hours
Indicator 12 – Monitor hospital survival by risk for death

*GCS: The Glasgow Coma Scale or GCS is a neurological scale with intent to give a reliable, objective way of recording the conscious state of a person for initial as well as subsequent assessment.

Another care related factor in trauma system operation is the response time of the trauma surgeon and/or Emergency Department (ED) physician. The following chart (Figure 3-8) shows the percentage of trauma patients seen by a trauma surgeon within 5 minutes of arrival in the emergency department in Level I and Level II hospitals. The percent of patients seen increased from 67.9% in 2002 to 77% in 2004, but then dropped back to 71% in 2009. The second chart (Figure 3-9) is similar but accounts for the first physician, trauma surgeon or ED physician, within 20 minutes, at Level III hospitals. The percent of patients seen within these parameters increased from 73.8% in 2004 to 86.1% in 2009.
Reducing the Impact of Trauma

Trauma is the leading cause of death for Iowans from birth to age 40 (CDC WISQARS, Iowa Burden of Injury Report 2008 and Death Certificate data.) and the fifth leading cause of death for all age groups combined. Over the past ten years, there has been an average of 1,715 deaths each year due to trauma. An analysis of patient deaths in the STR, Pre-Trauma System (1997 - 1998) versus Post-Trauma System (2002 - 2004) showed a significant decrease in mortality:

- 49% decrease in Traumatic Brain Injury (TBI) non-transfer patients
- 46% decrease in Traumatic Brain Injury (TBI) transfer patients
- 43% decrease in Spinal Cord Injury (SCI) transfer patients
- 35% decrease in Chest Injury non-transfer patients
- 20% decrease in overall mortality non-transfer patients
- 39% decrease in overall mortality transfer patients

Transfer patients are those who transferred from one trauma care facility to another. The logistic regression showed no significant results for SCI non-transfer patients, chest injury transfer patients, and patients with pelvic and ocular injury. It would appear that the beginning operation of the Trauma System had an immediate positive impact on the health of the state (Tiesman H, Young, T, Torner JC, et al. 2007).

![Trauma Deaths in Hospitalized Patients](image)

**Figure 4-1**

Figure 4-1: Total number of trauma deaths in hospitalized patients by year and by Injury Severity Score (ISS). The number of deaths has decreased to less than 400 since 2006. The years 2003 and 2005 seem to be uncommon years,
with especially low and high numbers of deaths. This reflects only patients with deaths before discharge which represents approximately 25% of all trauma deaths; this reflects the acute trauma care outcomes only.

![Figure 4-2](image)

**Figure 4-2**

Trauma mortality rate for hospitalized patients with ISS greater than 16 (Figure 4-2). The mortality rate for those with ISS scores from 16 to 23 decreased over the past ten years of the trauma system, with a rate per 100 patients of 7 in 2001 to 4.6 in 2009. This is an important population to focus on. Recall that the number of trauma patients with ISS scores of 16 to 23 have nearly doubled since the trauma system began. In addition, Level I hospitals treat the majority of patients with ISS scores greater than 16. This indicates the trauma system is seeing success in these patients.

To predict the impact the trauma system has made over the past ten years, a comparison of the observed or actual mortality versus the expected or calculated probability of death is made. In this graph, as the expected probability of death increased, the percent mortality increased for the three time periods plotted (Pre-Trauma System, 2002 to 2005, and 2006 to 2009). The greatest difference between these time periods was seen in the high risk patients, whose probability of death was greater than 0.5. The percent mortality is higher for the pre-system patients versus both post-trauma system time periods.

![Figure 4-3](image)

**Figure 4-3**

When the rates were compared by year, the expected mortality rate was greater than the observed mortality rate. There was a distinct difference in the change in rate prior to 2005 and after 2005. The percent mortality is plotted below divided into two four-year periods. The percent mortality, both expected and observed, was considerably lower in the 2006 to 2009 time period.

Based on the difference between the expected mortality rate and the observed mortality rate, an average of 43 lives were saved per year after the trauma system was established in those patients admitted to Iowa’s trauma hospitals.

Deaths due to traumatic injuries have a tremendous impact on the state economy. Based on data from 2005, the Centers for Disease Control (CDC) provided estimates of the cost for that year:

- $18,720,000 Medical Cost
- $1,052,339,000 Work Loss Cost
- $1,071,059,000 Combined Cost

(http://www.cdc.gov/injury/wisqars/cost/cost-learn-more.html)
Keep in mind the tremendous economic impact for those treated and hospitalized for traumatic injury was not included. These include hospital and rehabilitation (disability), long term care, and change in employment costs. The trauma system has proven successful in saving lives and improving the treatment and response of those suffering from traumatic injury. Improving the trauma system and increasing injury prevention programs will be needed to combat these financial losses.
Summary

The Iowa Trauma System has been in operation for ten years. The system is designed to assure that all people, throughout the state, have access to an organized delivery system and that all time-critically injured patients are rapidly stabilized and provided with the appropriate care. Trauma is the leading cause of death for Iowans from birth to age 40 and is the fifth leading cause of death for all age groups combined. Because trauma is a disease of the young, it takes a higher toll on society than heart disease, cancer, and stroke combined.

The trauma system has seen great success and has many accomplishments. The trauma system provided:

- Mandated education and training which has been invaluable in streamlining the processes and operation of trauma care response. All providers, throughout the system now use the same protocols and speak the same language.
- Structure for the categorization and verification of all hospitals.
- The State Trauma Registry (STR) for statewide injury-reporting.
- Methods for feedback, collaboration, and evaluation. The Trauma System Advisory Council (TSAC) advises the IDPH and the System Evaluation Quality Improvement Committee (SEQIC) evaluates system effectiveness.
- Formalized Triage and Transfer Protocols for efficient evaluation of patient injury and timely stabilization and delivery to the facility with the applicable resources for care.

Moving forward there are areas which will be challenges for the trauma system. These include:

- Maintaining Infrastructure. During the first ten years of the trauma system the number of Level I/II facilities dropped from 12 to 7. As facilities are recertified, it is a challenge to ensure that all Iowa citizens have facilities with the resources for appropriate care when time is critical.
- Leadership. There is a continuing need for involved, dedicated individuals to take leadership roles in injury prevention, emergency response, public policy, research, and stakeholders in both the public and private sector. Many accept and remain in these roles on a voluntary basis, and it is through their dedication that the trauma system functions and excels.
- Data Collection. Consistency in data gathering and entry is a challenge. In addition, data is needed on patient rehabilitation to provide a more comprehensive view of patient care.
- Quality of Care. There is a continuous need to improve the care provided through feedback, communication, education and training.
- Dedicated and consistent funding, in both the public and private sector, to support trauma system maintenance and improvement.

The Iowa Trauma System has accomplished a great deal in its first ten years. Although traumatic injuries in the state are increasing in severity, the system is producing a greater positive outcome for high risk patients and has decreased the number of patient deaths. The state-wide injury reporting and data analysis provide invaluable feedback to stakeholders. Trends indicate that falls and unintentional poisonings are increasing. Through continuous efforts to improve the quality of care, providers will need to adapt to the evolving needs of the patient.

The Iowa Trauma System performance is equal to that on the national level. That is extraordinary for a rural state with the challenges of distance and time, to definitive trauma care. On-going commitment from stakeholders in the public and private sectors, public policy makers, the research community, and citizens throughout the state will assure Iowa’s trauma system provides maximum benefits to the people it serves.
Appendix

A) Data Sources
Data used in this report were primarily comprised of Death Certificate Data (2000-2009), Hospital Discharge Data (Inpatient-2000-2009 and State Trauma Registry Data (2002-2009)

1. **Death Certificate data (includes Iowa residents and nonresidents that died in Iowa):**
The Bureau of Vital Statistics at the Iowa Department of Public Health collects and compiles Iowa residents’ and nonresidents (those that died in Iowa, but were residents of other states) death certificates, which are classified by external cause of death. In compliance with the CDC recommendations, this report used the underlying-cause-of-death field to identify the injury deaths (decedents that had an external cause of death code based on ICD-10 (International Classification of Diseases-10th Revision).

2. **Hospital Discharge Data (Inpatient; includes Iowa residents and nonresidents seen at Iowa hospitals):**
The CDC recommends using the principal diagnostic field to identify injury hospitalizations (see table below) and searching all the other diagnostic fields to select the External cause of injury codes (E-codes).

<table>
<thead>
<tr>
<th>ICD-9-codes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 800</td>
<td>Non-injury or poisoning</td>
</tr>
<tr>
<td>909.3</td>
<td>Late effects of complications of surgical and medical care</td>
</tr>
<tr>
<td>909.5</td>
<td>Late effects of adverse effects of drug, medicinal, or biological substance</td>
</tr>
<tr>
<td>995.0-995.4</td>
<td>Other anaphylactic shock</td>
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<tr>
<td>995.6-995.7</td>
<td>Angioneurotic edema</td>
</tr>
<tr>
<td>995.86</td>
<td>Effect of drug, medicinal, or biological substance</td>
</tr>
<tr>
<td>995.89</td>
<td>Allergy, unspecified</td>
</tr>
<tr>
<td></td>
<td>Shock due to anesthesia</td>
</tr>
<tr>
<td></td>
<td>Anaphylactic shock due to adverse food reaction</td>
</tr>
<tr>
<td></td>
<td>Malignant hyperpyrexia or hypothermia due to anesthesia</td>
</tr>
<tr>
<td>996-999</td>
<td>Complications due to certain specified procedures</td>
</tr>
<tr>
<td></td>
<td>Complications affecting specified body systems NEC</td>
</tr>
<tr>
<td></td>
<td>Other complications of procedures NEC</td>
</tr>
<tr>
<td></td>
<td>Complications of medical care NEC</td>
</tr>
</tbody>
</table>

STIPDA = State and Territorial Injury Prevention Directors Association (now referred to as Safe States Alliance)  
ICD-9 = International Classification of Diseases, Ninth Revision  
NEC = Not elsewhere classified

The injury and external cause of injury codes were classified according to the 9th Revision of the International Classification of Diseases Clinical Modification (ICD-9-CM).

3. **State Trauma Registry:**
The State Trauma Registry provides information about who becomes injured and how, and about the eventual outcome of each patient’s care in Iowa, which assists the evaluation of trauma care for the injured persons. Injured patients from Level I – III hospitals (2002-2009) are included in this report.

<table>
<thead>
<tr>
<th>ICD-9 External cause of injury codes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E849</td>
<td>Place of occurrence</td>
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<tr>
<td>E869.4</td>
<td>Second-hand tobacco smoke</td>
</tr>
<tr>
<td>E870-E879</td>
<td>Surgical and medical care misadventures</td>
</tr>
<tr>
<td>E930-E949</td>
<td>Adverse effects - Drugs, medicinal, and biological substances</td>
</tr>
<tr>
<td>E967</td>
<td>Perpetrator of child and adult abuse</td>
</tr>
</tbody>
</table>

It should be noted that hospital discharge data is record-based; a patient may have multiple visits (records) for the same injury. Thus, the numbers presented in this report were from a patient’s first visit only.