Oregon Trauma Registry Report
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## Contents

- Acknowledgments .................................................................................................................. 2
- Contents ................................................................................................................................. 3
- Executive summary .................................................................................................................. 4
  - A. Trauma Registry findings ................................................................................................. 4
    - 1. Mechanism of injury ....................................................................................................... 4
    - 2. Mortality ......................................................................................................................... 4
    - 3. Alcohol and drug use associated with motor vehicle traffic injury cases.................. 5
    - 4. Fall injuries .................................................................................................................... 5
  - B. Recommendations ............................................................................................................ 5
    - 1. Trauma System ................................................................................................................ 5
    - 2. Injury prevention ........................................................................................................... 5
- II. Introduction ......................................................................................................................... 6
  - A. Trauma System services in Oregon .................................................................................. 6
  - B. Emergency medical services and the Trauma System ...................................................... 7
  - C. Oregon Trauma Registry .................................................................................................. 7
  - D. 2013–2014 Oregon Trauma Report .................................................................................. 7
- III. Methods ............................................................................................................................. 8
- IV. Results .................................................................................................................................. 9
  - A. Patient demographics by age, race and ethnicity ............................................................. 9
  - B. Motor vehicle traffic injury .............................................................................................. 10
  - C. Alcohol and drug involved motor vehicle traffic injury .................................................... 11
  - D. Fall injury .......................................................................................................................... 12
  - E. Emergency medical services response and patient transfers between area trauma advisory boards .................................................................................................................. 13
  - F. Patient injury severity and outcomes ............................................................................... 15
  - G. Trauma response and outcomes ....................................................................................... 17
  - H. Data reporting ................................................................................................................... 18
- V. Recommendations .............................................................................................................. 20
  - A. Trauma System ................................................................................................................ 20
  - B. Injury prevention ............................................................................................................. 20
Executive summary

Thirty to forty percent of all trauma deaths occur within hours of the injury. Many trauma deaths are preventable. Oregon's trauma care system provides emergency medical response, patient triage, patient transport, hospital transfers and trauma team activation to assure that patients have access to the care that they need. These services save lives and Oregonians expect a well-managed system of care.

By law, the Oregon Trauma Registry is mandated to collect data from 44 trauma hospitals to: 1) identify the causes of traumatic injury and recommend prevention activities; and 2) assure timely, quality treatment, education and research. Data collected meet these goals by: a) identifying patients who receive care in the system; b) assessing the level of care received; and c) tracking outcomes of patients in order to ensure high-quality trauma care throughout the state.

The purpose of this report is to provide information from the Oregon Trauma Registry from 2013–2014 to the state program, system and stakeholders, and policy-makers. This information increases understanding of the importance of the Trauma System, improves the Trauma Registry and targets injury prevention efforts.

A. Trauma Registry findings

In 2013–2014, 19,737 patients entered into the Oregon Trauma System. The number of patients in the Trauma System has increased by 17.5% from 8,410 per year (2003–2012) to 9,878 per year (2013–2014).

1. Mechanism of injury

In 2013–2014, the largest category of injuries related to motor vehicles. With 7,320 injuries, motor vehicles accounted for 37% of all injuries in the trauma registry. Included were 5,056 injuries to motor vehicle occupants, 1,022 injuries to motorcyclists, 751 to pedestrians and 362 to bicyclists. Falls at 6,534 were the second most common cause of injury to patients in the registry.

2. Mortality

In 2013–2014, 9% of trauma patients died. This is the same rate as for deaths among trauma patients in 2012. Asian patients were more likely to die than patients of another race or ethnicity.
3. Alcohol and drug use associated with motor vehicle traffic injury cases

In 2013–2014, alcohol tests were performed in 69% of trauma cases involved in motor vehicle traffic crashes. The results were positive in 37% of cases. Drug tests were performed in 28% of trauma cases involved in motor vehicle traffic crashes. The results were positive in 57% of cases.

4. Fall injuries

In 2013–2014, there were 6,534 trauma patients injured due to falls. Twenty-four percent of them had major trauma. Patients 65 years of age and older were three times more likely to die from a fall than patients who were less than 65 years of age.

B. Recommendations

1. Trauma System

The medical director of the EMS and Trauma Systems Programs should convene a meeting of the State Trauma Advisory Board Data Subcommittee and users of the Oregon Trauma Registry data to plan how to support and improve data quality, completion and use of data.

2. Injury prevention

1) Increase the number of clinicians in primary care who screen patients aged 55 years and older for falls, document the falls reported, and refer patients to community-based exercise and, if needed, home safety assessments, medication assessments, physical assessments, and physical therapy.

2) A substantial number of motor vehicle crash injuries occur when the vehicle operators drive under the influence of alcohol and other drugs. The State Trauma Advisory Board should partner with the state Injury Community Planning Group to support broad efforts to reduce injuries due to falls and motor vehicle crashes through community and statewide planning, research and policy development.
II. Introduction

Trauma is a leading cause of death and non-fatal injury among Oregonians. Receiving care for a severe injury at a designated trauma center can lower the risk of death by 25 percent. The Oregon Legislature established the Oregon Trauma System in 1985 (ORS 431.607–431.633). Oregon has been recognized as a leader in trauma systems development, trauma research and trauma care. Oregon was the second state to develop a statewide trauma system (Maryland was the first). Oregon was the first state to develop a system that included both small rural hospitals and large urban facilities, formally integrating hospitals across the state into the Trauma System. Today, all Oregonians have access to trauma care through a system of 44 trauma centers that participate in Oregon’s Trauma System Program.

A. Trauma System services in Oregon

The primary goal of the Trauma System in Oregon is to deliver the right care at the right time for every trauma patient. The Trauma System coordinates care for varying types and complexities of injuries. Trauma centers at the local, regional and state levels deliver this care. Oregon’s seven regional area trauma advisory boards (ATABs) develop a regional trauma plan that coordinates care across the region. ATABs meet to continuously evaluate quality and develop quality improvement measures and other aspects of trauma care in the region.

The Oregon Trauma System provides the infrastructure for trauma centers to provide varying levels of care and treatment for injured patients. The state designates trauma centers to provide trauma care, and meet specific benchmarks for a given level of care. There are two Level 1 trauma centers in Oregon, both located in Portland (ATAB 1). Oregon has four Level 2 trauma centers (two in ATAB 2, one in ATAB 3 and one in ATAB 7). Three trauma regions do not have a Level 1 or Level 2 hospital. There are 11 Level 3 trauma centers and 27 Level 4 trauma centers. Many Level 3 and Level 4 hospitals serve rural and frontier regions of Oregon. The two Level 1 centers provide specialty pediatric services and one is a verified burn center.
B. Emergency medical services and the Trauma System

Emergency medical services (EMS) play a critical role in the Oregon Trauma System. EMS includes dispatch centers (the initial 911 call point of contact), emergency medical response, field triage, treatment and stabilization, and transport by ground or air ambulance to a hospital. EMS provides inter-hospital transfers, providing transport by ground ambulance, helicopter or fixed-wing aircraft between hospitals. Inter-hospital transport (IHT) can span hundreds of miles and is an integral aspect of a functional trauma system for moving complex patients to higher levels of care. There are standardized protocols for the field triage of injured persons and for selecting transport destinations for trauma patients.

C. Oregon Trauma Registry

Injured patients are identified as trauma patients in one of four ways: 1) field (EMS) identification of patients meeting statewide field trauma triage criteria; 2) emergency department identification of patients with injuries warranting entry to the Trauma System; 3) retrospective identification following admission; and 4) trauma transfers. The report below is for the entire state of Oregon and by ATAB region. Grouping of patients by county of injury in the individual ATAB reports allows geographic representation of trauma across the different regions of Oregon.

The Trauma System tracks, measures and quantifies trauma care through systematic data reporting to the Oregon Trauma Registry. All trauma centers submit standardized data to the State EMS and Trauma Systems Office for all trauma patients. This systematic tracking of trauma care allows for assessment in quality assurance, continuous quality improvement, monitoring care, disaster and mass casualty event planning and response, trauma research, public health prevention, measuring the impact of modifications to the Oregon Trauma System, tracking patient outcomes, and ensuring high-quality trauma care throughout the state.

D. 2013–2014 Oregon Trauma Report

In 2013–2014, 44 hospitals submitted regular data to the Oregon Trauma Registry. To generate this report, the State EMS and Trauma Office processed and analyzed these data. An analyst matched and compiled record of patients who transferred between hospitals to provide a comprehensive patient level representation of trauma care. Injured patients are identified as trauma patients in one of four ways: 1) field (EMS) identification of patients meeting statewide field trauma triage criteria; 2) emergency department identification of patients with injuries warranting entry to the Trauma System; 3) retrospective identification following admission; and 4) trauma transfers. The report below is for the entire state of Oregon and by ATAB region.
Grouping of patients by county of injury in the individual ATAB reports allows geographic representation of trauma across the different regions of Oregon.
III. Methods

In 2013-2014, 44 hospitals submitted regular data to the Oregon Trauma Registry. To generate this report, the Oregon State Emergency Medical Services and Trauma Program Office processed and analyzed these data. An analyst matched and compiled records of patients who transferred between hospitals to provide a comprehensive patient-level representation of trauma care.

Oregon statute requires the 44 trauma hospitals to collect and submit data to the Oregon Trauma Registry. The system collects information including demographics of trauma patients, diagnostic codes, information about the injury (date, location, mechanism, severity and outcome of injury), and how the patient was injured.

The cases in this report include patients injured in Oregon, patients injured in Oregon and treated by a hospital in another state that participates in the Oregon Trauma System, and patients who were injured in another state and transported to trauma hospitals in Oregon for care.
IV. Results

A. Patient demographics by age, race and ethnicity

The highest rate of death was observed among trauma patients aged 65 years and older (Figure 1).

Figure 1. Mortality rate by age in years: Oregon Trauma Registry, all patients, 2013–2014

Figure 2. Mortality rate per 100,000 population by race/ethnicity: Oregon Trauma Registry, all patients, 2013–2014
B. Motor vehicle traffic injury

Of people in the Trauma Registry who had injuries due to a motor vehicle crash, most (67%) had minor injuries.

Table 1. Number and percentage of patients injured due to motor vehicle traffic crashes by Injury Severity Scores and age group in years: Oregon Trauma Registry, 2013–2014

<table>
<thead>
<tr>
<th>Injury Severity Score (ISS)</th>
<th>0–15</th>
<th>16–64</th>
<th>65+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
<td>Percent</td>
</tr>
<tr>
<td>ISS &lt;= 15</td>
<td>379</td>
<td>7.0%</td>
<td>4,342</td>
<td>80.2%</td>
</tr>
<tr>
<td>ISS &gt;=16</td>
<td>80</td>
<td>4.9%</td>
<td>1,259</td>
<td>77.2%</td>
</tr>
<tr>
<td>Missing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>459</td>
<td>6.2%</td>
<td>5,601</td>
<td>76.0%</td>
</tr>
</tbody>
</table>

Among those in the Trauma Registry who had injuries due to a motor vehicle crash, mortality was highest among people age 65 years and over.

Figure 3. Mortality rate among motor vehicle crash patients by age in years: Oregon Trauma Registry, 2013–2014
C. Alcohol and drug involved motor vehicle traffic injury

Tests for alcohol were done on almost 69% (5,053) of trauma patients involved in motor vehicle traffic crashes (7,370). Almost 37 percent (1,848) of those tested received a positive result.

There were tests for drugs on 28% (2,065) of trauma patients involved in motor vehicle traffic crashes (7,370). Almost 57 percent (1,171) of those tested received a positive result.
D. Fall injury

There were 6,534 trauma patients injured due to falls in 2013–2014. Among patients 65 years of age and older, 158 (6.3%) died.

Table 2. Number and percentage of patients injured due to falls by Injury Severity Scores (ISS) and age group in years: Oregon Trauma Registry, 2013–2014

<table>
<thead>
<tr>
<th>Age group in years</th>
<th>ISS &lt;= 15</th>
<th>ISS &gt;= 16</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
</tr>
<tr>
<td>0–15</td>
<td>470</td>
<td>84.2%</td>
<td>88</td>
</tr>
<tr>
<td>16–64</td>
<td>2,146</td>
<td>76.5%</td>
<td>658</td>
</tr>
<tr>
<td>65+</td>
<td>2,087</td>
<td>71.3%</td>
<td>840</td>
</tr>
<tr>
<td>Missing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4,703</td>
<td>72.0%</td>
<td>1,586</td>
</tr>
</tbody>
</table>

* There were 6,534 trauma patients due to falls in 2013–2014 with 245 patients that had missing values in age and Injury Severity Scores’ cross-tabulation.

Figure 4. Mortality rate for fall injuries by age group in years: Oregon Trauma Registry, 2013–2014
E. Emergency medical services response and patient transfers between area trauma advisory boards

**Figure 5.** Emergency medical services median response time and total time (notification to arrival at hospital) by area trauma advisory board region: Oregon Trauma Registry, 2013–2014

Commented [JN1]: Please remove the black outline on the chart below. The grid lines are darker on this chart than any other. The ATAB's are mislabeled. Should be labeled ATAB 1, 2, 3, 5, 6, 7, & 9 in that order.
One reason the Trauma System is in place is to monitor patient transfers. Figure 6 shows that there were very few transfers between hospitals of the same level of care, from one hospital to another of similar capacity. Most of those same-level transfers were in ATAB5.

**Figure 6.** Number of trauma patients transferred to same level of trauma centers by area trauma advisory board region: Oregon Trauma Registry, 2013–2014
F. Patient injury severity and outcomes

The mortality rate for among trauma patients who died on arrival or in the emergency department was 0.8%. Not surprisingly, people with major injuries were eight times more likely to die in transit or in the emergency department than people with minor injuries.

**Figure 7.** Mortality rate (among patients who died in the emergency department or were dead on arrival) by Injury Severity Score greater than or equal to 16 and less than or equal to 15: Oregon Trauma Registry, 2013–2014
Looking at all (major and minor) injuries, there was some variation in mortality rate among the ATAB regions.

**Figure 8.** Mortality rates for minor injuries (Injury Severity Score <=15) and major injuries (Injury Severity Score >=16) by ATAB: Oregon Trauma Registry, 2013–2014
G. Trauma response and outcomes

Figure 9. Patients with severe injury treated in a Level 1 or Level 2 trauma center by area trauma advisory board region, Oregon Trauma Registry, 2013–2014
H. Data reporting

Oregon Administrative Rule requires that Oregon trauma centers complete entry of patient data within 90 days of patient discharge. In 2016, the timeline changed to 60 days.

The time it takes a trauma episode to show up as an entry into the Trauma Registry varies among regions. ATAB Region 6 has the longest lag (an average of 95 days), and ATAB Region 6 has the most prompt data entry (an average of 34 days).

![Figure 10. Number of days for data completion](image)

Figure 10. Number of days for data completion by ATAB region: Oregon Trauma Registry, 2013–2014

The time it takes a trauma episode to show up as an entry into the Trauma Registry varies among regions. ATAB Region 6 has the longest lag (an average of 95 days), and ATAB Region 6 has the most prompt data entry (an average of 34 days).
Figure 11. Oregon Trauma System regions, 2016

Source: Oregon EMS and Trauma Systems Program.

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V. Recommendations

A. Trauma System

The medical director of the EMS and Trauma Systems Program should convene a meeting of the State Trauma Advisory Board Data Subcommittee and users of the Oregon Trauma Registry data. This meeting is to initiate the development of strategies to improve data quality and increase the use of data.

B. Injury prevention

Increase the number of clinicians in primary care who screen patients aged 55 years and older for falls. These clinicians should document the falls reported and refer patients with a fall history to community-based exercise, home safety assessments, medication assessments, physical assessments and physical therapy.

A substantial number of motor vehicle crash injuries occur when the vehicle operators drive under the influence of alcohol and other drugs. The State Trauma Advisory Board should partner with the state Injury Community Planning Group. This partnership should support broad efforts to reduce injuries due to falls and motor vehicle crashes through community and statewide planning, research and policy development.
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