

»» Oregon Trauma Registry 2020 Annual Report

Oregon
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Executive summary

The Oregon Trauma Program is responsible for development, implementation and ongoing monitoring of the state’s trauma system. This includes:

- Establishing system standards
- Designating trauma hospitals to care for injured patients, and
- Collecting trauma registry data.

The Trauma Program ensures that Oregon has high quality community resources to respond to traumatically injured individuals. It does this by maintaining an integrated statewide system of resources through the establishment of trauma regions and designation of trauma care hospitals. The program collects and manages Oregon Trauma Registry data to provide summary and record level information to hospital trauma programs and EMS agencies to improve trauma system performance and patient outcomes. Additionally, Oregon contributes trauma data to the National Trauma Data Bank for national trauma system use. The 2020 annual report of Oregon Trauma Registry data covers trauma records from 2017-2018.

Trauma system

Forty-three out of 55 of Oregon’s acute care hospitals participate in the trauma system. Each regional Area Trauma Advisory Board (ATAB) has at least one high level trauma hospital (level I or II) except for ATAB 9 in eastern Oregon; ATAB 9 is serviced by level II trauma hospitals in Washington and Idaho. Most hospitals in the trauma system are level IV trauma hospitals and critical access hospitals that provide vital links for catching rural traumas and conveying them to higher-level trauma hospitals in urban centers. The volume of trauma continues to grow at both urban and rural trauma hospitals by approximately 9% per year with 15,944 patients treated in 2018. Approximately two-thirds of trauma patients in Oregon are seen in the higher-level trauma hospitals. Additionally, Oregon’s overall volume of trauma patients follow the national trend of peaking in summer. Trauma is an expensive disease in Oregon; charges exceed \$800 million annually.

Demographics

As the population ages, the 65 and above demographic have become the fastest growing group. Their rate increased by 15.2% per year compared to 12.6% for the below 65 group. This is consistent with national trends over the past decade, in which elderly falls have displaced adult motor vehicle trauma as the dominant cause of trauma in the system. Falls rose 12.1% and motor vehicle collisions decreased by 5.5%. Although most of these patients are seen in urban ATABs, the greatest percentage increase is in rural ATABs; falls have nearly doubled on the eastern side of the state. In keeping with previous years, most trauma patients are male, and the majority are White/non-Hispanic (15,057) followed by Other/Hispanic (1,237).

Injuries

As stated earlier, falls are the most common cause of injury at 6,974 and increasing yearly. The next most common cause is motor vehicle collision (MVC) related injuries at 5,461 and decreasing yearly. "Other transportation," at 1,182, is the mechanism with the largest increase, rising 164% over the two years. The majority of these "other transport" injuries are represented by off road vehicles and watercraft. The falls, MVC, ATV crashes resulted in mostly blunt trauma. When including all causes of injury, penetrating trauma only made up 6.6%. Two percent of injuries were self-inflicted, and 6.5% percent were assaults. The remainder were accidents or unknown. Most of the increase in trauma volume between 2017 and 2018 was minor and moderate injuries with injury severity scores (ISS) below 6.

Performance

Two-thirds of patients in the trauma system were admitted, transferred or died, indicating good sensitivity for triage criteria. However, 34% were discharged from the emergency department or had no injuries, indicating poor specificity. Of all trauma system entries, 15% received full trauma team activations and 66% received modified activations. For patients admitted to the hospital, the average length of stay in the emergency department shortened from 2017 to 2018 to about three hours. Many severely injured patients who eventually went to the ICU stayed in the emergency department longer than two hours, although this effect was seen less at level one trauma hospitals than in level twos and threes.

There was an overall decrease in transfers between trauma hospitals from 2017 to 2018 despite the increase in volume. This was especially seen in the pediatric cohort and could be an indication of more appropriate initial triage or increasing resources at level 3 and 4 trauma hospitals. Pediatrics made up 12% of the transfers while geriatrics represented 34% of the transfers. The median length of stay at the initial hospital for the transfers was stable from 2017 to 2018 at just over 3 hours. In 2018, 48% of transfers into trauma hospitals were from non-trauma hospitals which raises the question as to whether these were mis-triaged by EMS or were patients that self-referred to a non-trauma hospital.

Outcomes

The trauma registry only represents the proportion of trauma patients for whom resuscitation was attempted and who were subsequently transported to a trauma hospital, and patients who were identified as a trauma case and treated at a trauma hospital regardless of hospital transport mode. This excludes traumatic deaths where no hospital transport occurred.

Overall survival of patient's in Oregon's trauma system was 97.6% compared to 95.6% reported in the national trauma databank's 2016 report. Level one and two trauma centers are overrepresented in the national report, so the real numbers are likely closer. Of those survivors:

- About 44% went home without assistance
- 32% have an unknown outcome, and
- The remaining 16% went to some sort of skilled nursing, rehab or other specialty hospital.

Of the 1,019 who died in 2017–2018:

- About 10% arrived at the hospital without signs of life
- 17% died in the emergency department, and
- The remainder died after they were admitted to the hospital.

Three-fifths of those who died were seriously injured with an injury severity score of 15 or higher. The lack of timely autopsy reports may cause the group with low injury severity scores to be overrepresented in this sample, as patients who have fatal injuries often die before their injuries can be catalogued completely. This would be especially true in the 10% of trauma deaths that arrived at the hospital with no signs of life.

Those over 65 years of age represented the largest portion of traumatic deaths at 54%. Those under 14 years of age represented the smallest portion with 3%. Young adults between 15 and 65 were more likely to be dead on arrival or die in the emergency department, while older adults over age 65 comprised most hospitalized deaths.

Refer questions about this report to Oregon EMS and Trauma Systems
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Introduction

The Oregon Trauma System reports are part of the EMS and Trauma Systems Program's continuing commitment to assess and reshape Oregon's trauma system and to improve patient care. These reports are intended to:

- assist health professionals who provide public education
- assist local and state leaders in understanding and evaluating the delivery of trauma care in Oregon

- provide a resource for those interested in learning more about one of the most serious public health problems in the State of Oregon.

In general, data are presented in aggregate at the state level, but some data are reported by trauma center level or Area Trauma Advisory Board (ATAB) region. Trauma regions are defined in Oregon Administrative Rules¹ 333-200-0040. The functions, rules and policy, and guidelines for the Area Trauma Plan are outlined in OAR 333-200-0050 through 333-200-0080 for each Area Trauma Advisory Board (ATAB). This annual report complies with ORS 431A.090(6) (formerly ORS431.627) by providing a summary of data collected in the Oregon Trauma Registry.

Data details and data quality caveats

This OTR annual report contains two years of data from 33,058 trauma records with system admissions between January 01, 2017 and December 31, 2018. About 1% of records contain one of the following types of error in the trauma band number entered:

- 39 records had no trauma band number entered
- 78 records contained an ill-formatted entry, and
- 205 records share a non-unique trauma band number.²

To address these inconsistencies, this report specifies where counts are based on availability of trauma record information. Where information was not documented in the data, the report specifies the count and approximate percentage of records excluded. Furthermore, to avoid confusion over the units and respective percentages being summarized in this report, the first section on data demographics shows counts of records before delving into patient counts for patient demographics (percentages reported for patient counts have a smaller denominator than percentages reported for record counts due to the nature of transfers within the system).

Data demographics

Oregon trauma system

Forty-three hospitals contributed data to the OTR in 2017 and 2018. These trauma centers are broken into regions by ATAB and designations by trauma level. The following tables show by year:

- The number of trauma centers by level and ATAB, and
- The volume of trauma records associated with each.

¹ <https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=1352>

² One record from 2018 did not contain the hospital identifier field and was not included in the trauma center demographic counts. For further explanation at the patient count level, see the section on patient demographics

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NOTE: These counts represent historic data. They are different from the current arrangement of level designations. The following table shows the status of trauma center ATAB and level designations at the beginning of 2018. The two level 1 pediatric trauma centers are **not** reported as separate trauma centers because they appear in the data by the name of their respective main level 1 trauma center.

Table 1: Oregon trauma center count by level and ATAB, 2018

Level	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9	Total by level
Level 1	2							2
Level 2		2	1	1		1		5
Level 3			3	2	2	2	1	10
Level 4	2	8	3	2		5	6	26
Total by ATAB	4	10	7	5	2	8	7	43

The following table shows the OTR trauma record count in 2017 and 2018 with the percent change from 2017 to 2018.

Table 2: OTR record count by hospital level and ATAB

Year	Level	Level total	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
2017	Level 1	5,534	5,534						
	Level 2	4,617		2,306	1,285			1,026	
	Level 3	2,842			1,101	693	333	610	105
	Level 4	2,867	286	983	221	650		334	393
2018	Level 1	5,853	5,853						
	Level 2	5,244		2,273	1,364	445		1,162	
	Level 3	2,724			1,365	236	308	729	86
	Level 4	3,377	291	1,052	275	675		504	580
Percent change	Level 1	5.8%	5.8%						
	Level 2	13.6%		-1.4%	6.1%			13.3%	

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Year	Level	Level total	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
	Level 3	-4.2%			24.0%	-65.9%*	-7.5%	19.5%	-18.1%
	Level 4	17.8%	1.7%	7.0%	24.4%	3.8%		50.9%	47.6%

*In 2018 Asante Rogue Regional Medical Center upgraded from a level 3 to a level 2 trauma center. This change is reflected in the 66% drop in records for level 3 trauma centers in ATAB 5, because Asante Rogue Regional Medical Center records are listed in level 2 for 2018. No percent change is recorded for ATAB 5 level 2. The 2017 to 2018 percent change for non-level-IV trauma centers in ATAB 5 was 1.7%

Trauma record total financial charges

Table 3: Annual total financial charges for trauma records by level

Year	Level 1	Level 2	Level 3	Level 4
2017	\$428,216,310	\$187,975,599	\$81,661,476	\$65,540,683
2018	\$495,604,562	\$232,725,161	\$58,055,191	\$47,286,646
Percent change	15.7%	23.8%	-28.9%	-27.9%

Trauma records and date/time aspects

The following graphs show monthly occurrences of trauma records.³

For the first set of figures showing monthly record volume by ATAB, the areas are sorted into two categories:

- Those with any monthly volume greater than 200 records, which includes ATAB 1, ATAB 2, ATAB 3, and ATAB 7, and
- Those where all monthly volume counts were less than 200, which includes ATAB 5, ATAB 6, and ATAB 9.

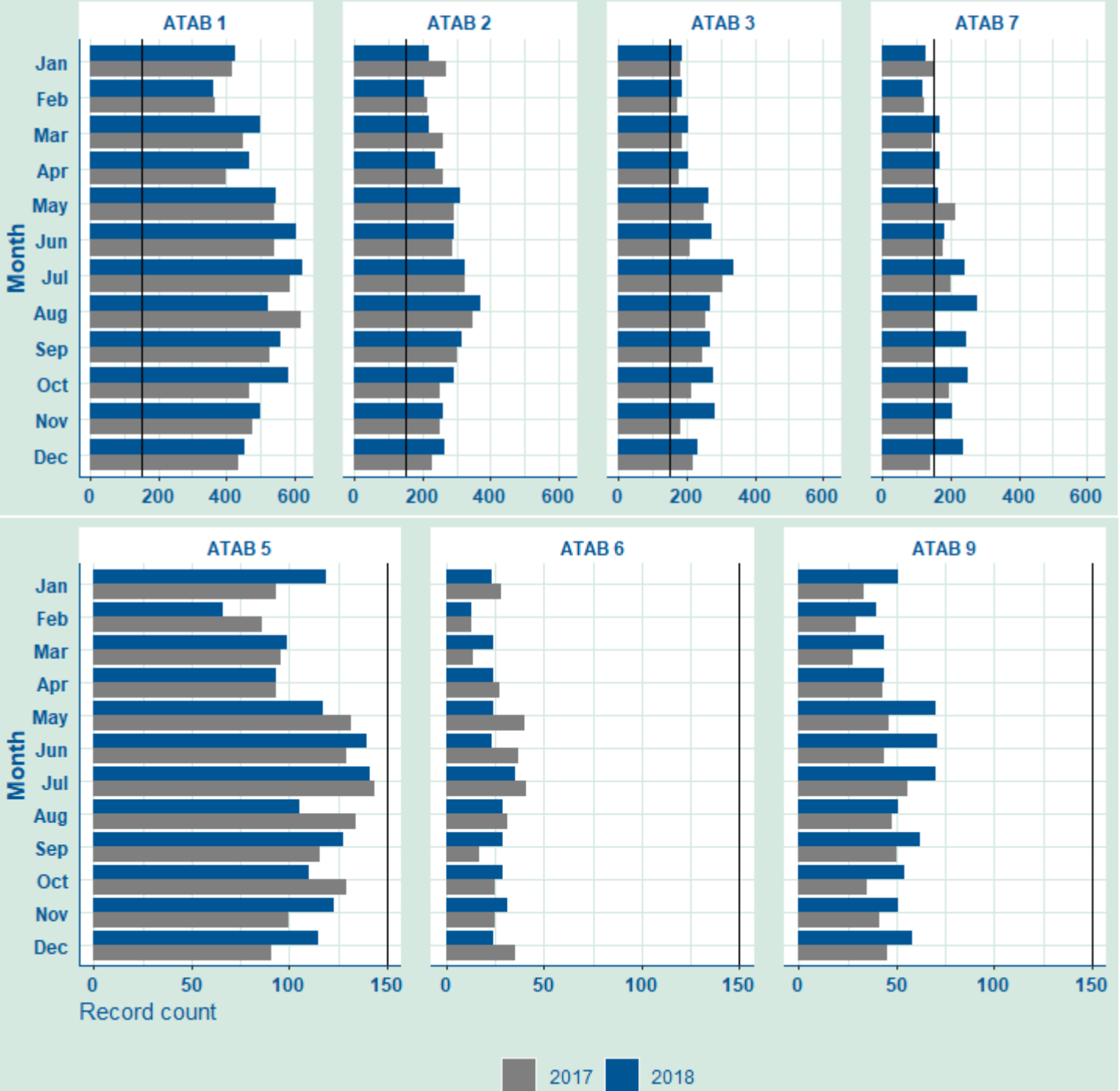
To show these counts in better detail, the ATABs with lower volume are displayed on a scale that is one-fourth the scale for the larger volume ATABs. This smaller scale is illustrated by the vertical line on the graphs for the larger volume ATABs.

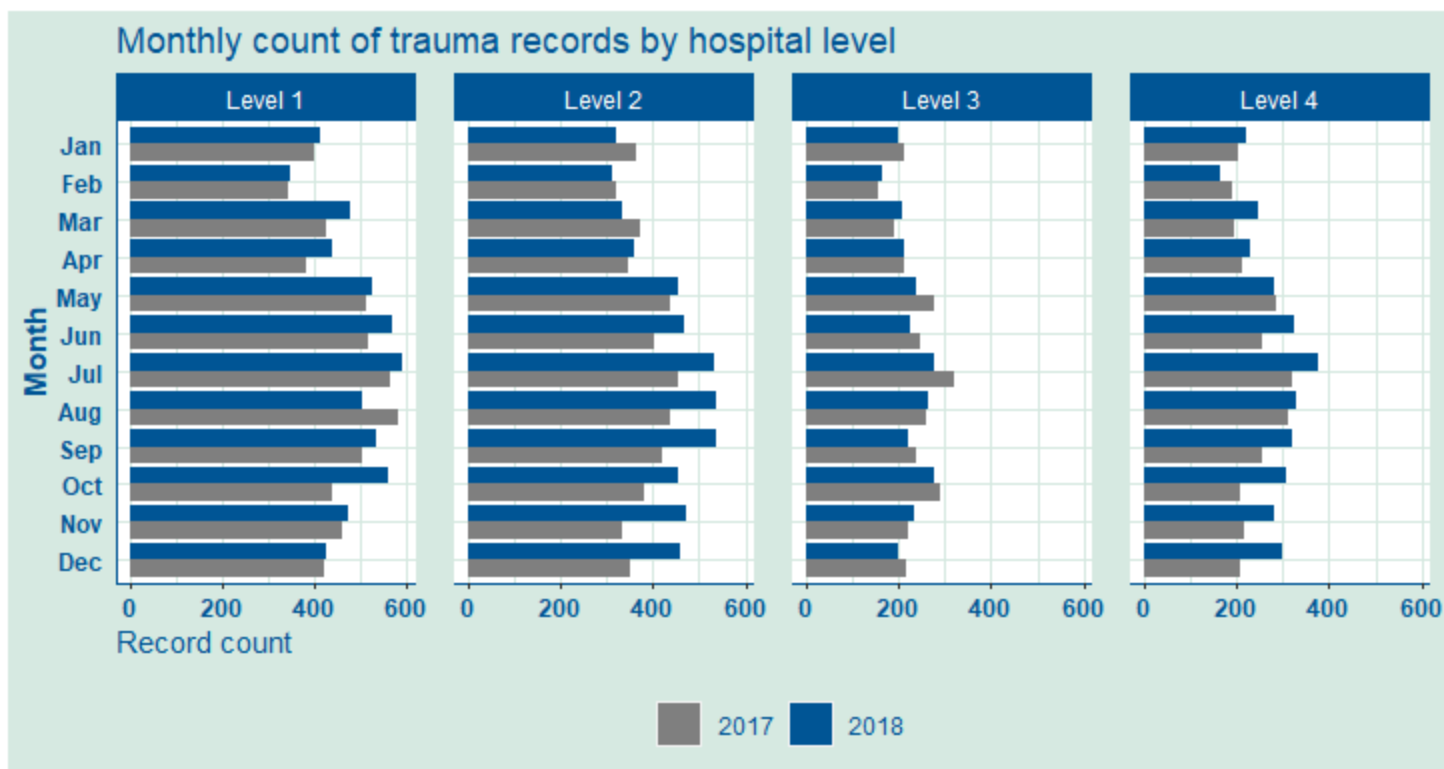
³ NOTE: In 2017 there were 4 level 2 trauma centers, and in 2018 there were 5. In 2017 there were 10 level 3 centers, and in 2018 there were 9 level 3 centers. For both years in the data there were 27 level 4 trauma centers.

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Monthly count of trauma records by ATAB region

ATABs 5, 6, and 9 shown on a smaller scaled axis





Trauma patient demographics

To illustrate this difference between counting records of the patient flow through the system and counting the patients themselves, the summary table for patients by ATAB and level is below.

Table 4: OTR non-transferred-in patient count by hospital level and ATAB

Year	Level	Level total	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
2017	Level 1	5,376	5,376						
	Level 2	4,147		2,012	1,275			860	
	Level 3	2,587			979	663	291	566	88
	Level 4	2,429	207	818	184	557		285	378
2018	Level 1	5,775	5,775						
	Level 2	4,802		2,008	1,357	438		999	
	Level 3	2,485			1,243	226	250	696	70

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Year	Level	Level total	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
	Level 4	2,884	190	872	222	588		453	559
Percent change	Level 1	7.4%	7.4%						
	Level 2	15.8%		-0.2%	6.4%			16.2%	
	Level 3	-3.9%			27.0%	-65.9%	-14.1%	23.0%	-20.5%
	Level 4	18.7%	-8.2%	6.6%	20.7%	5.6%		58.9%	47.9%

Age

The following table shows the patient count by level and ATAB for age groups defined in Exhibit 4⁴ of the [ORS Statute](#).

Table 5: OTR non-transferred-in patient count by age group

Age group*	Count 2017	Proportion 2017	Count 2018	Proportion 2018	Percent change
Pediatric	1,138	0.078	1,195	0.075	5.0%
Adult	9,071	0.624	9,761	0.612	7.6%
Geriatric	4,329	0.298	4,988	0.313	15.2%
Total record count	14,538	1.000	15,944	1.000	9.7%

*Exhibit 4 age definitions: Pediatric is 0—14 years, adult is 15–64 years, and geriatric is 65 and older

Pediatric patients

Table 6: OTR non-transferred-in pediatric patient count by ATAB

Year	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
2017	590	167	125	71	21	118	46
2018	583	194	158	61	23	129	47
Percent change	-1.2%	16.2%	26.4%	-14.1%	9.5%	9.3%	2.2%

Geriatric patients

Table 7: OTR non-transferred-in geriatric patient count by ATAB

Year	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
2017	1,367	1,044	838	358	85	529	108
2018	1,541	935	1,039	341	75	842	215
Percent change	12.7%	-10.4%	24.0%	-4.7%	-11.8%	59.2%	99.1%

Gender

Table 8: OTR patient sex by ATAB

Year	Sex	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
2017	F	1,868	1,183	943	396	110	608	175
	M	3,715	1,646	1,495	823	181	1,102	290
2018	F	1,982	1,117	1,154	420	100	872	271
	M	3,982	1,763	1,665	832	150	1,263	358
Percent change	F	6.1%	-5.6%	22.4%	6.1%	-9.1%	43.4%	54.9%
	M	7.2%	7.1%	11.4%	1.1%	-17.1%	14.6%	23.4%

Ethnicity

The Oregon Department of Human Services and Oregon Health Authority are engaging in an effort to increase and standardize the collection of race, ethnicity, language, and disability (REALD or sometimes called REAL+D). House Bill 2134, passed by the Oregon Legislature in 2013, led to the codification of standardized methodology in the Oregon Revised Statutes [413.042](#) and [413.161](#), and Oregon Administrative Rules (OARs) [943-070-0000](#) thru [943-070-0070](#). Oregon begins phase 1 implementation of REALD in January 2021.

Table 9: OTR patient ethnicity by ATAB

Ethnicity	Count 2017	Proportion 2017	Count 2018	Proportion 2018	Percent change
Hispanic	1,115	0.08	1,196	0.079	7.3%
non-Hispanic	12,792	0.92	13,932	0.921	8.9%
Total record count	13,907	1.00	15,128	1.000	8.8%

Race

Table 10: OTR patient race

Race	Count 2017	Proportion 2017	Count 2018	Proportion 2018	Percent change
AMERICAN INDIAN	202	0.01463	272	0.01782	34.7%
ASIAN	177	0.01282	218	0.01428	23.2%
BLACK	353	0.02557	409	0.02679	15.9%
NATIVE HAWAIIAN	55	0.00398	75	0.00491	36.4%
OTHER	909	0.06585	1,209	0.07919	33.0%
WHITE	12,109	0.87715	13,084	0.85701	8.1%
Total record count	13,805	1.00000	15,267	1.00000	10.6%

Completed records and days to submit completed records

Oregon Administrative Rules 333-200-0265(7)(a) specifies hospitals must report OTR data within 60 days of death or patient discharge. Additionally, the OAR amendment [Exhibit 4](#) requires that at least 80% of trauma records be completed within the 60—day window required by the statute.

The following summary table shows the overall annual percentage of records completed within the 60-day window by hospital level. The percent change here is the difference of the annual rates of record completion.

Table 11: Percentage of OTR records completed within 60 days by hospital level

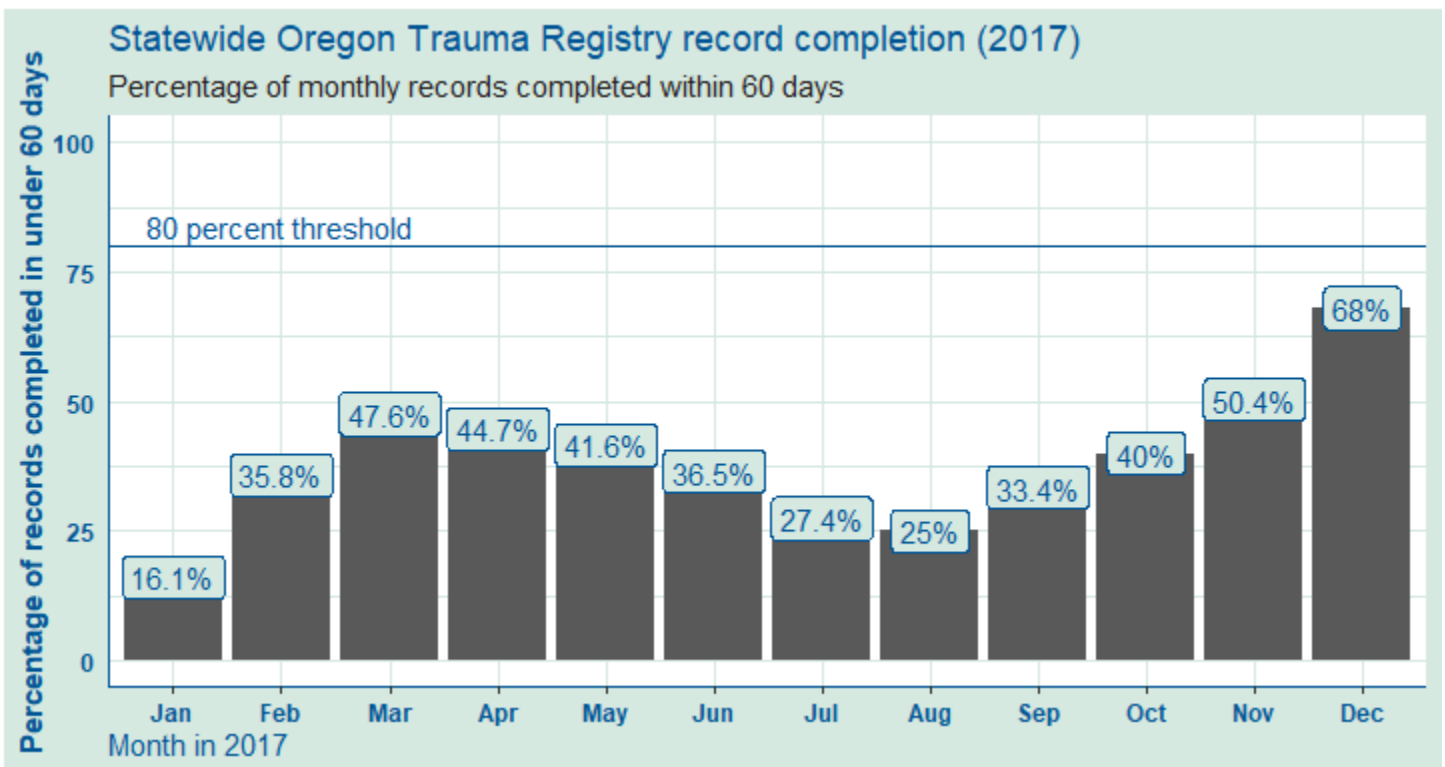
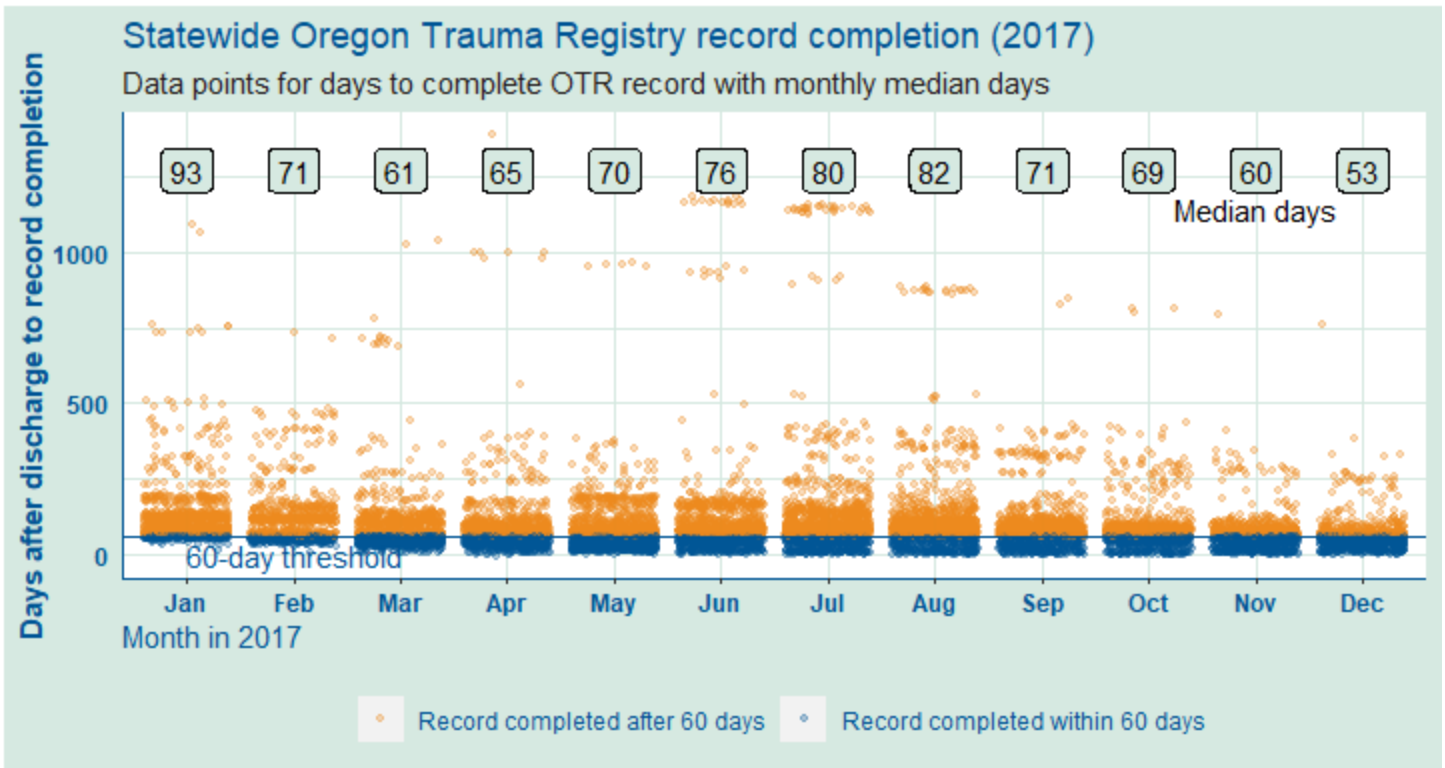
Year	Level 1	Level 2	Level 3	Level 4
2017	23.7%	41.0%	51.4%	45.8%
2018	82.4%	61.8%	76.8%	72.8%
Percent change	58.7%	20.8%	25.4%	27.0%

The following record completion figures show statewide record completion data on a monthly basis for each year. The monthly median days to record completion is shown above the monthly data distribution and the percentage of records completed within the target timeframe.

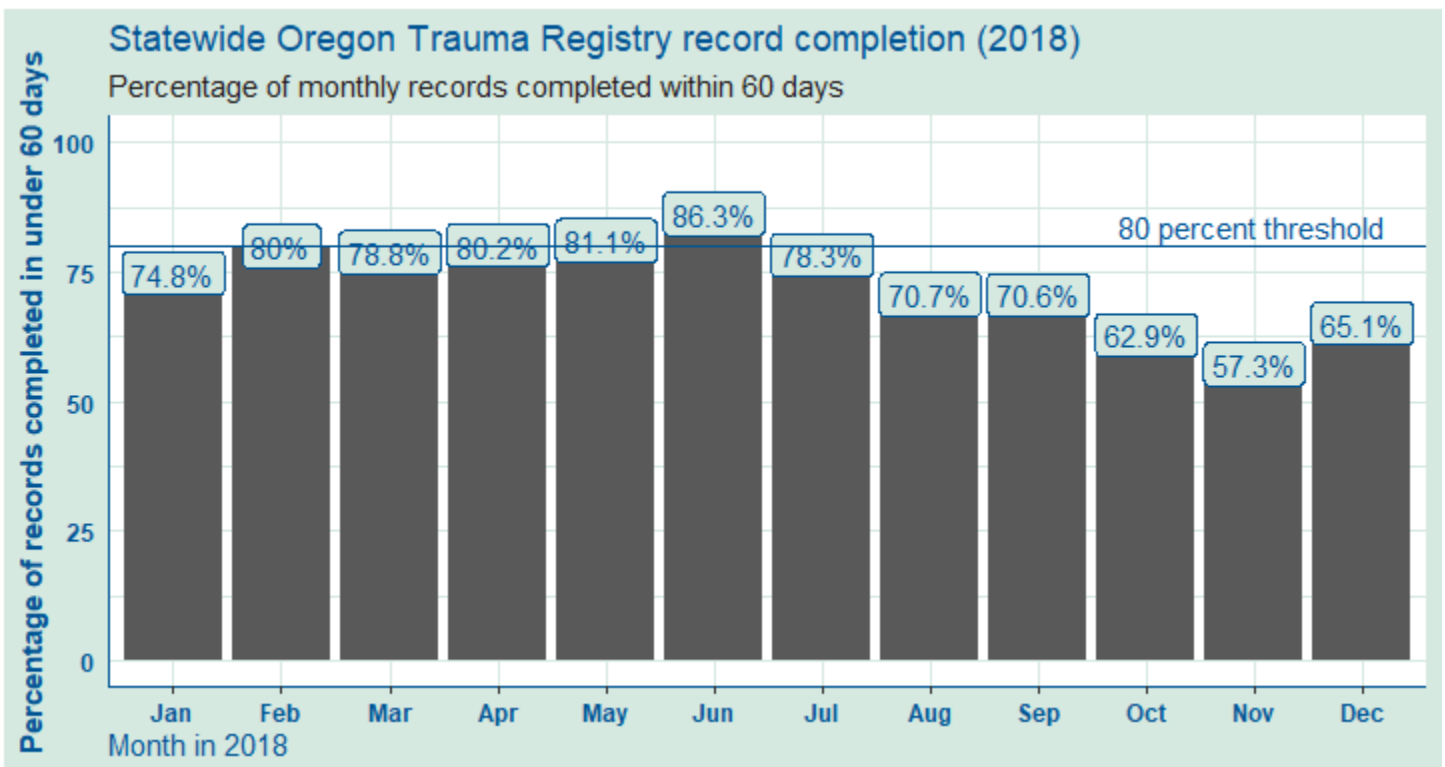
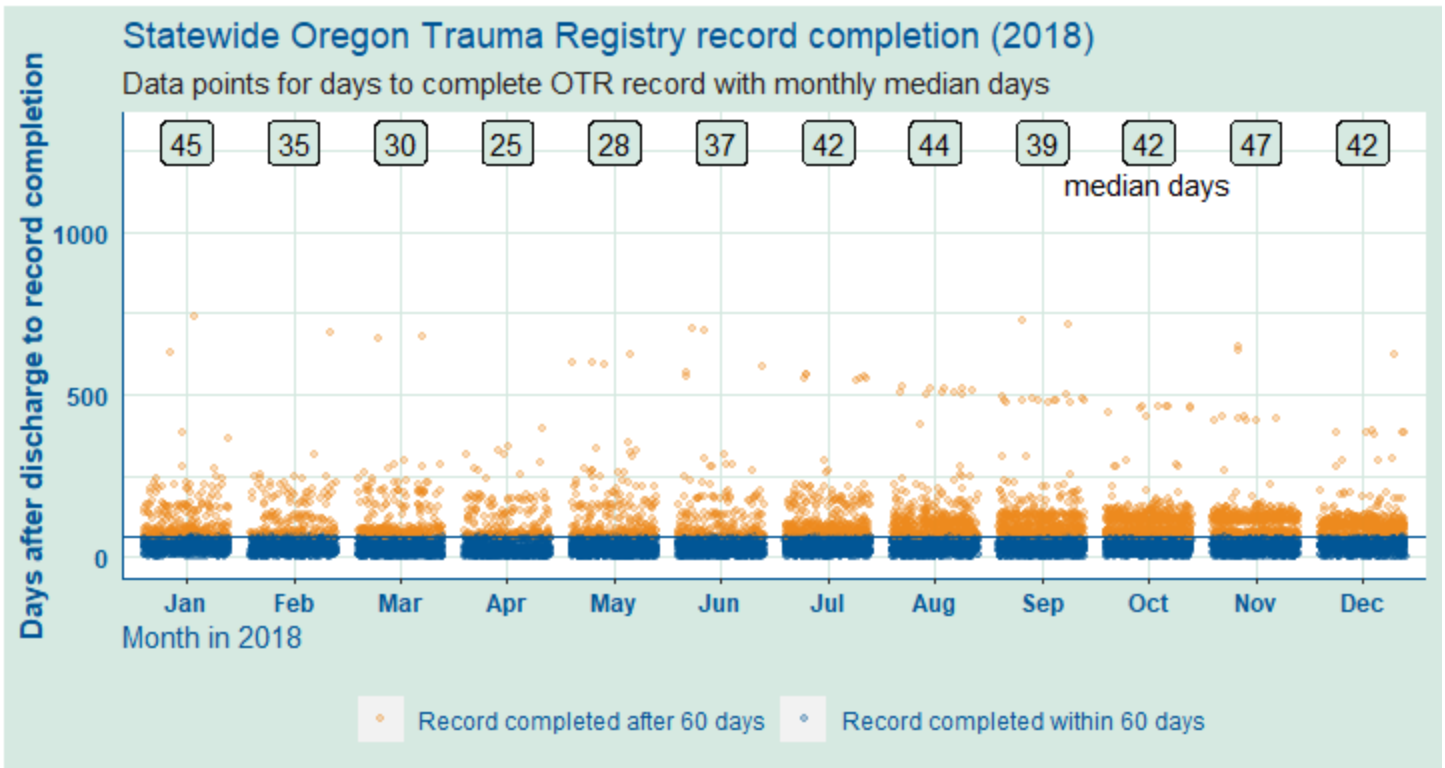
The graphs show the data in two ways. In the first graph all records marked as *complete* are represented as a dot in a scatterplot to display the days to record completion arranged by the month of hospital admission. Points representing records completed within 60 days of hospital discharge are marked in blue. The second barplot shows the percentage of records completed within 60 days for each month shown in the scatterplots. The figures for each year display all completed records statewide. Rates of completing records within the 60—day requirement are broken out by ATAB and trauma center level in the following table.⁵

⁵ There were 314 records that were not marked “Y” complete and are excluded from the following figures and summary table. Additionally, one outlier in 2018 was removed to accommodate a better scale for rendering the scatterplot.

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Injury classification

In this section, injury data is reported by occurrence in a record. This means the totals reported will be larger than the total count of records because multiple injuries can be documented in a record. The following tables summarize injuries by the Centers for Disease Control (CDC) injury mechanism and intent. Table 12 highlights the prevalence of overall motor vehicle injuries by showing various motor vehicle related injury mechanisms grouped together. Table 13 presents the same information on mechanisms of injury documented in the data but retains counts of the different types of motor vehicle related injury mechanisms. Tables for injury intent and injury class (blunt versus penetrating injuries) are also included in this section.

Centers for Disease Control – Mechanism of injury (CDC – MOI)

Table 12: Annual counts and changes by CDC - mechanism of injury with grouped motor vehicle related injuries

Injury grouping	2017	2018	Percent change
Fall	6,220	6,974	12.1%
Motor vehicle related	5,779	5,461	-5.5%
Other transport	447	1,182	164.4%
Struck by or against	839	1,016	21.1%
Cut/pierce	571	645	13.0%
Pedalcyclist - other	474	506	6.8%
Firearm	409	444	8.6%
Other specified, NEC	218	429	96.8%
Other specified, classifiable	241	275	14.1%
Natural/environmental	152	170	11.8%
Pedestrian- other	169	156	-7.7%
Unspecified	66	117	77.3%
Machinery	65	77	18.5%
Fire/flame	80	62	-22.5%
Other land transport	149	52	-65.1%
Hot object/substance	32	29	-9.4%

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Table 13: Annual counts and changes by CDC - mechanism of injury (all categories)

CDC_MOI	2017	2018	Percent change
Fall	6,220	6,974	12.1%
Motor vehicle traffic - occupant	3,362	3,485	3.7%
Other transport	447	1,182	164.4%
Struck by or against	839	1,016	21.1%
Motor vehicle traffic - motorcycle	610	782	28.2%
Cut/pierce	571	645	13.0%
Motor vehicle traffic - pedestrian	487	522	7.2%
Pedalcyclist - other	474	506	6.8%
Firearm	409	444	8.6%
Other specified, NEC	218	429	96.8%
Other specified, classifiable	241	275	14.1%
Motor vehicle nontraffic	890	246	-72.4%
Motor vehicle traffic - pedal cyclist	212	241	13.7%
Motor vehicle traffic - unspecified person	218	185	-15.1%
Natural/environmental	152	170	11.8%
Pedestrian- other	169	156	-7.7%
Unspecified	66	117	77.3%
Machinery	65	77	18.5%
Fire/flame	80	62	-22.5%
Other land transport	149	52	-65.1%
Hot object/substance	32	29	-9.4%

Intent of injury

Table 14: Annual counts and changes by CDC-intent of injury

CDC intent	Count 2017	Proportion 2017	Count 2018	Proportion 2018	Percent change
Unintentional	14,434	0.906	15,909	0.902	10.2%
Assault	1,015	0.064	1,174	0.067	15.7%
Self-inflicted	349	0.022	389	0.022	11.5%
Undetermined	90	0.006	126	0.007	40.0%
Other	34	0.002	31	0.002	-8.8%
No intent assigned	6	0.000	<5	0.000	-83.3%
Total record count	15,928	1.000	17,630	1.000	10.7%

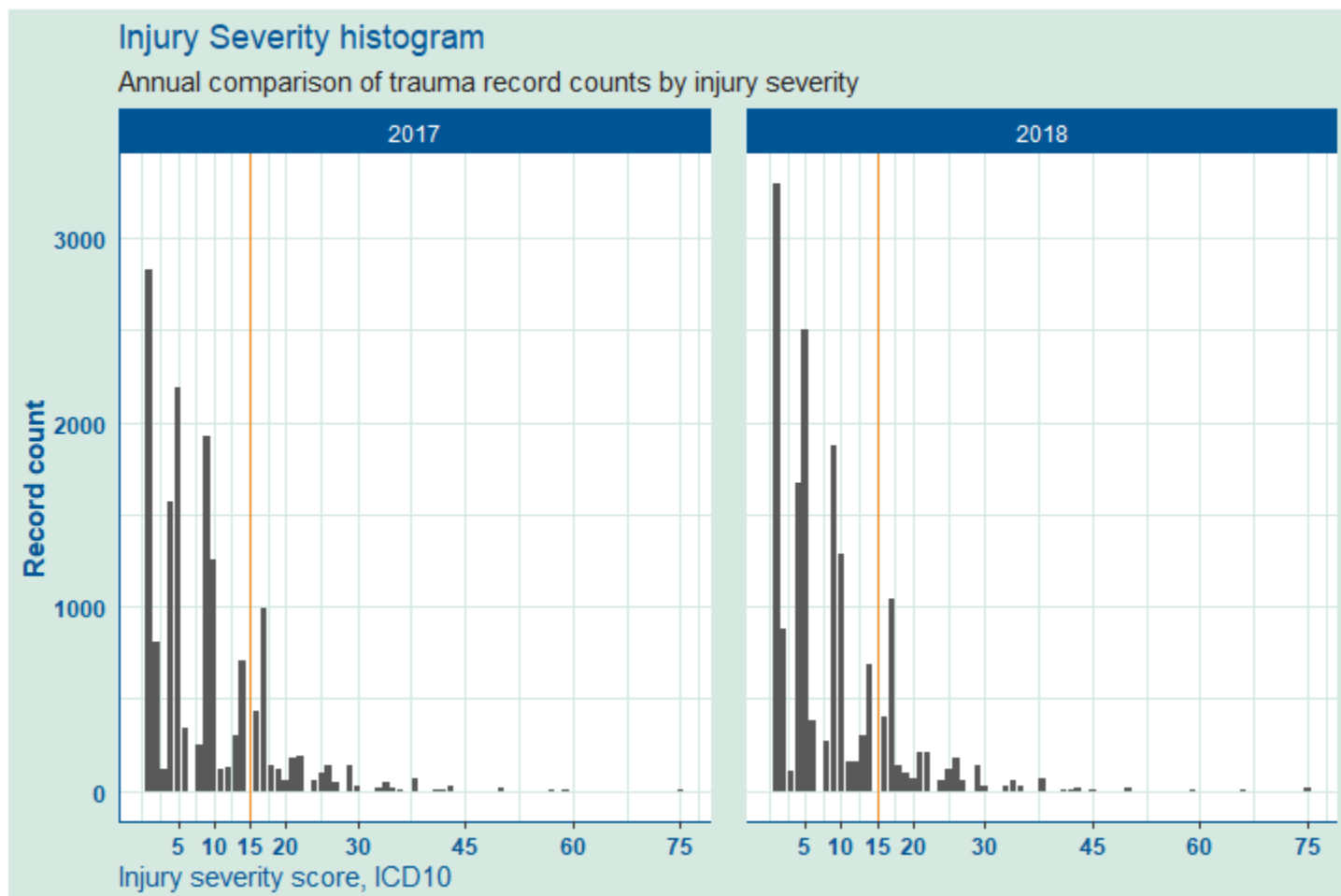
Injury class (mechanism)

Table 15: Injury classification: annual record counts and changes

Injury classification	2017	2018	Percent change
Blunt	12,840	14,432	12.4%
Other	1,744	1,509	-13.5%
Penetrating	1,072	1,120	4.5%
Burn w/trauma	131	80	-38.9%
(Missing)	71	50	-29.6%

Injury severity score (ISS) and length of stay (LOS)

The following sections illustrate injury severity and lengths of stay in different areas of care.⁶

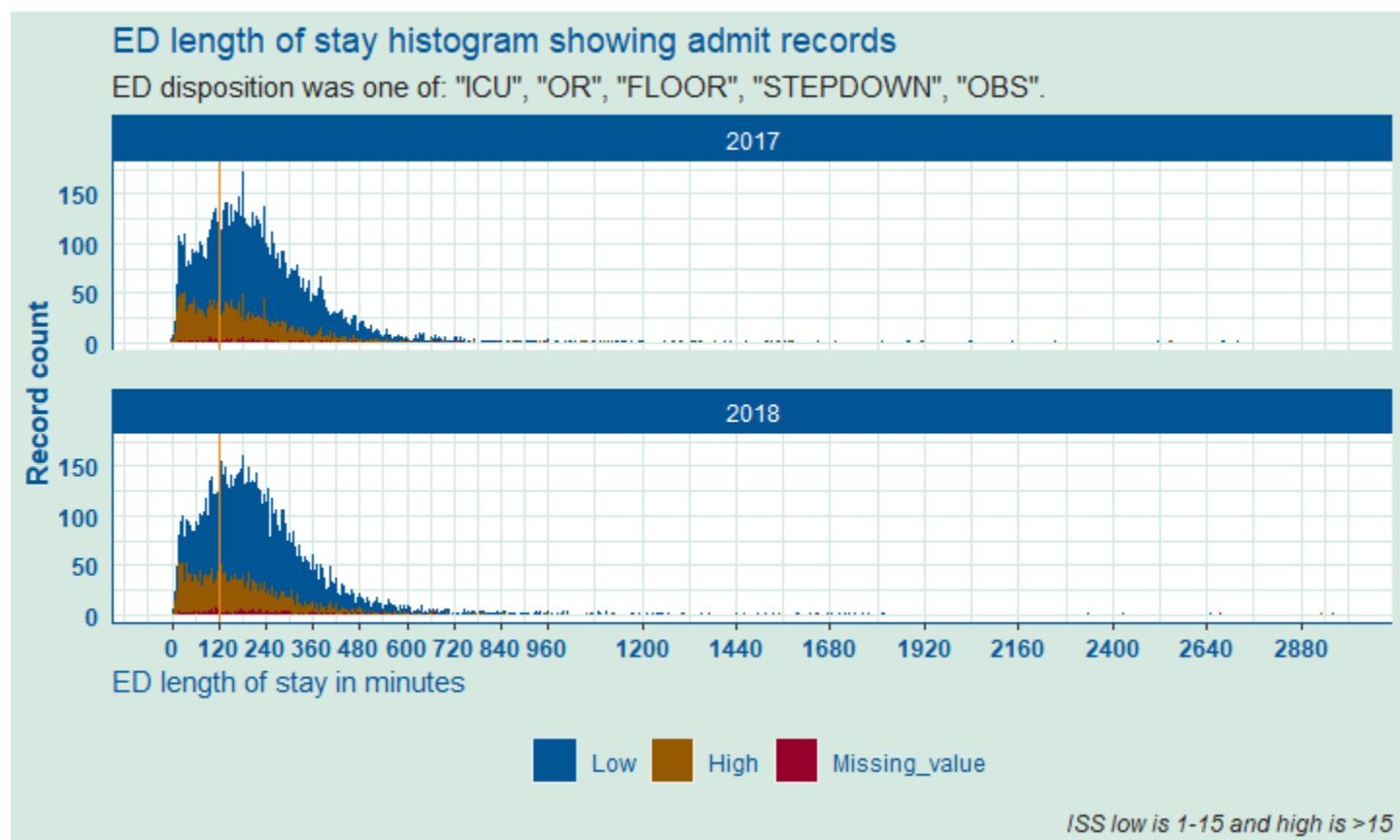


⁶ The histogram of the records in each year by ICD10 injury severity score is set with the binwidth of 1. The 1059 (or 3.2% of) records that did not have an injury severity score recorded are not included in this figure. The remarkable similarity in the shape of the histogram is due to the algorithm that generates the ICD10 ISS score by combining other more specific injury severity assessments. Overall, there are more trauma records in 2018 which translates to greater numbers for most lower ISS scores and relatively similar numbers for higher scores.

Emergency department (ED) LOS

The next series of figures show the trauma record **counts** for each year by ED length of stay minutes, broken out by the ED disposition: admitted, transferred or discharged from the ED.⁷ Additional information on this measure is included in the ACS guide.⁸ Additionally, the following 1999 (6.05% of all) records were excluded:

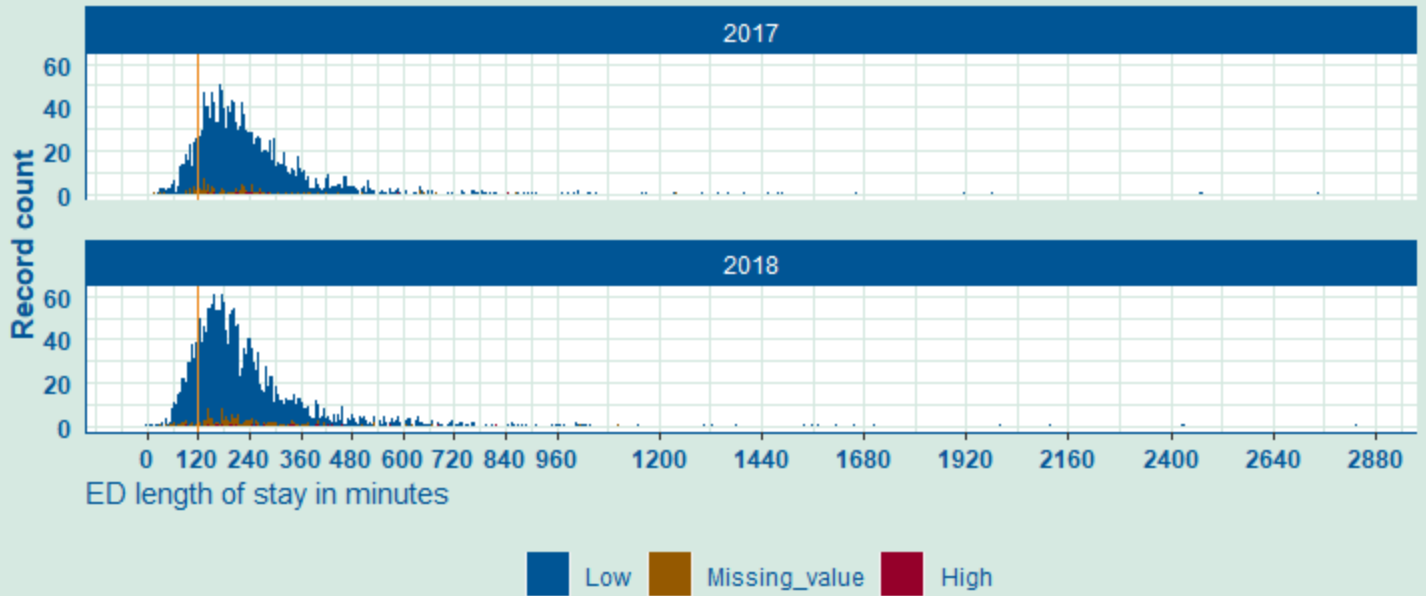
- 1621 records where ED length of stay is not documented
- 4 records where ED length of stay is less than zero (0) minutes
- 278 records where ED length of stay is equal to zero (0) minutes
- 74 records where the ED length of stay is recorded as more than 2880 minutes (2 days), and
- and 22 records where the hospital discharge date occurs prior to the ED discharge date and the patient has no documented readmission. For the 278 records where the ED length of stay was recorded as 0 minutes, 1 record was documented as a death, 3 were transfers, 16 were seen and discharged from ED, 27 had no ED disposition documented and 231 were admitted.



⁷ Each set of figures is shown on an x-axis in minutes covering the equivalent of 0–48 hours. The graph uses a 5-minute binwidth to display the volume of records. Color is used to indicate record volume for the high, low and missing injury severity scores.

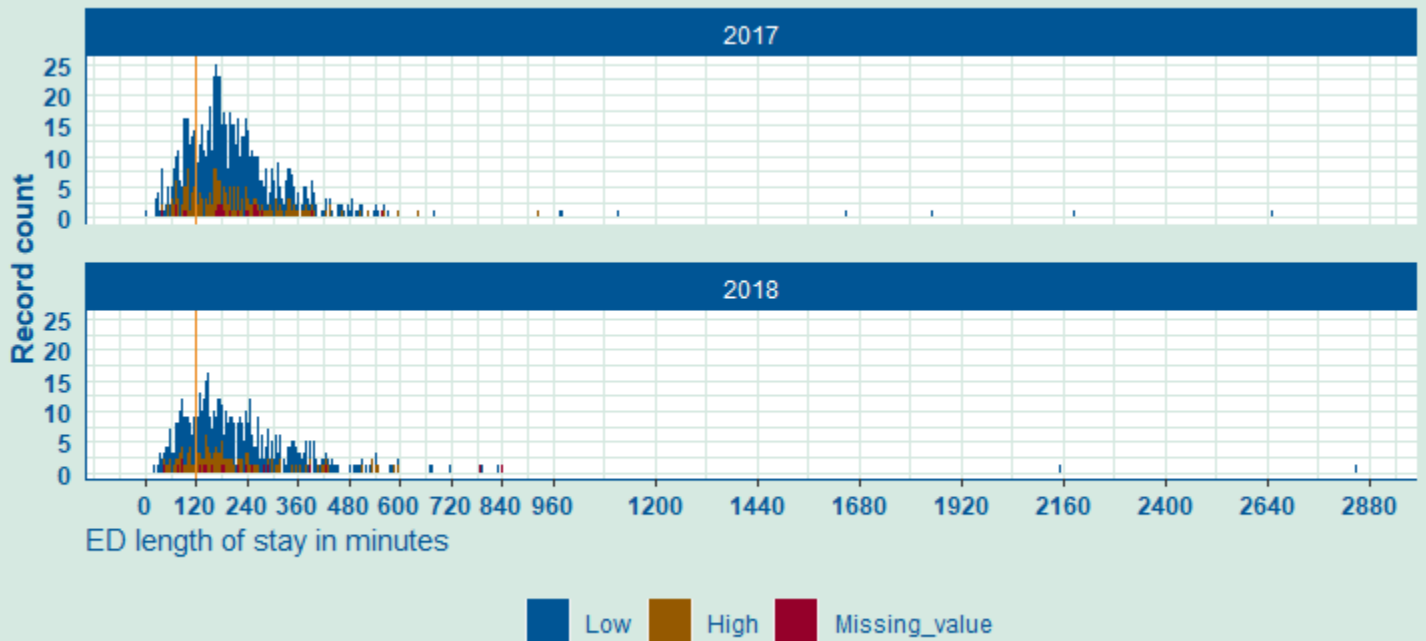
ED length of stay histogram showing non-admit/left the ED records

ED disposition was one of: "AMA", "HOME", "HOME SERV", "OTHER".



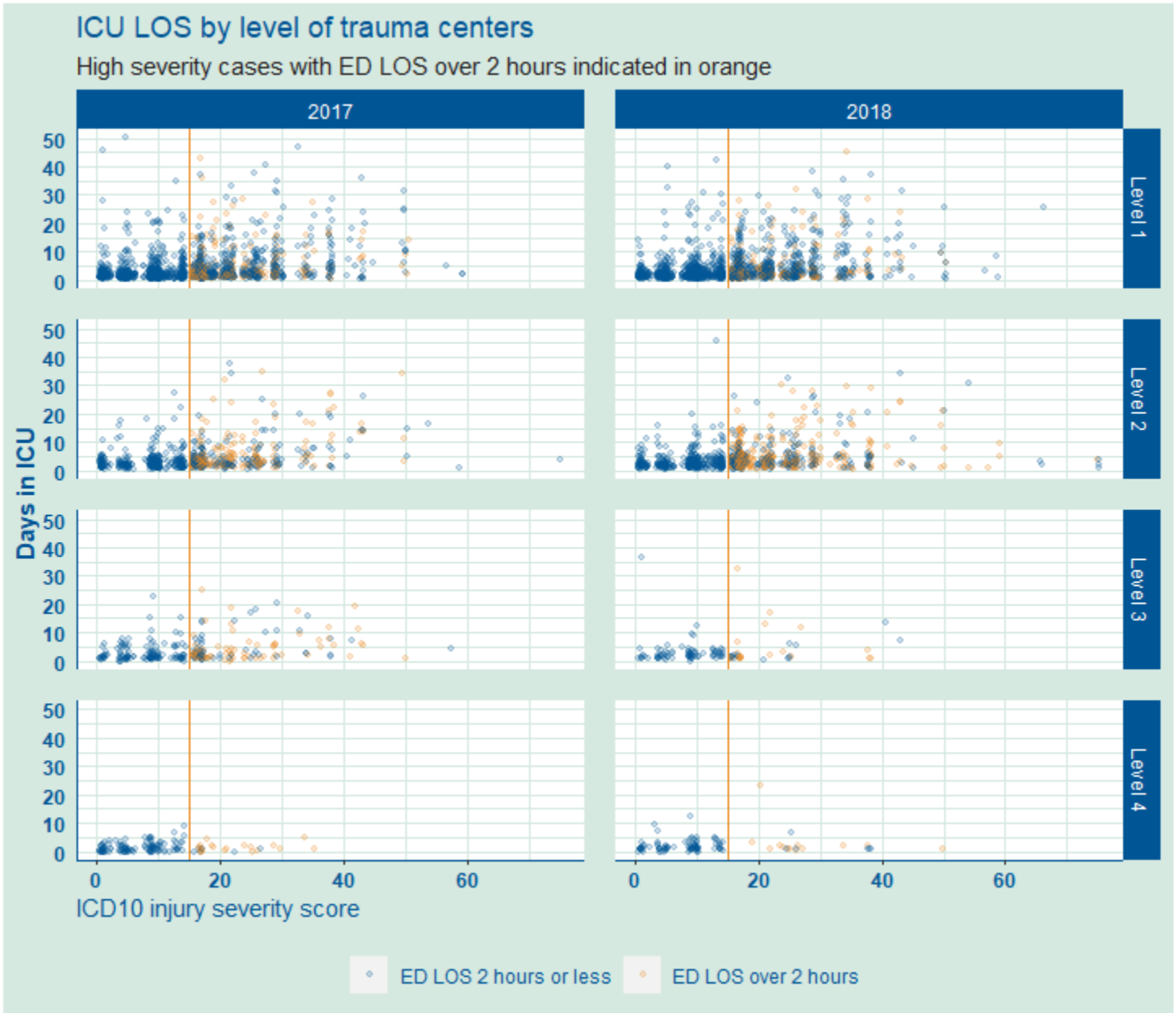
ISS low is 1-15 and high is >15

ED length of stay histogram showing transfer (out from ED) records



ISS low is 1-15 and high is >15

Intensive care unit length of stay (ICU LOS)



Trauma admit and activations

Admissions status

The following table shows annual record counts and overall change for admission status.

Table 16: Annual count of trauma admissions

Admission status on record	2017	2018	Percent change
Admitted through ED at your hospital	8,163	8,527	4.5%
Seen in your ED and released	4,443	5,646	27.1%
Seen in your ED then transferred out by EMS	1,839	1,885	2.5%
Direct admit	743	741	-0.3%
Entered into trauma but has no injuries	203	224	10.3%
DOA or died in ED	122	106	-13.1%
Arrived at ED and left against medical advice	31	53	71.0%

Trauma team activation

Trauma team activation levels show the trauma response protocols and trauma team response to patient injury diagnoses. Refer to the ACS resources and OAR Exhibit 3 for activation definitions and activation level performance measures for different trauma center levels of care. All activations in the data have been coded to fit one of the following activation levels: full, modified, no activation or retroactive. Data are reported as *(Missing)* where no activation data was entered in the trauma record.

Table 17: Annual record count of trauma team activation level

Activation	Count 2017	Proportion 2017	Count 2018	Proportion 2018	Percent change
Full	2,241	0.14	2,591	0.15	15.6%
Modified	10,616	0.67	11,499	0.67	8.3%
Retroactive	459	0.03	397	0.02	-13.5%
None	2,285	0.14	2,437	0.14	6.7%
(Missing)	259	0.02	274	0.02	5.8%

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Activation	Count 2017	Proportion 2017	Count 2018	Proportion 2018	Percent change
Total record count	15,860	1.00	17,198	1.00	8.4%

Table 18: Annual record count of trauma team specialty

Trauma Team Specialty	2017	2018	Percent change
ED attending	12,308	13,456	9.3%
Trauma surgeon	5,880	6,188	5.2%
Trauma nurse 1	3,513	5,617	59.9%
Physician assistant	1,507	1,742	15.6%
(Missing)	1,694	1,728	2.0%
Anesthesia	1,269	1,623	27.9%
Trauma nurse 2	983	1,163	18.3%
Radiology	967	1,101	13.9%
Orthopedic surgeon	849	908	6.9%
Neurosurgeon	879	867	-1.4%
Laboratory	789	861	9.1%
Non-surgical	819	825	0.7%
Respiratory	625	724	15.8%
Nursing supervisor	374	455	21.7%
Recorder	285	369	29.5%
Oral-maxillofacial surgeon (includes ENT & dental)	341	321	-5.9%
Specialty RN	256	272	6.2%
Admitting staff	871	251	-71.2%

Trauma Team Specialty	2017	2018	Percent change
Other specialty physician/surg	209	193	-7.7%
Pediatric surgeon	120	88	-26.7%

Transfers

When a patient is transported from one hospital to another trauma center for continued care, they are considered a transfer. The following tables summarize patients transferred out of trauma centers and patients transferred-in to trauma centers. In addition to summarizing all trauma transfers, subsets of pediatric and geriatric trauma are also shown in separate tables for transfers in and transfers out of trauma centers⁸.

Transferred out

All trauma transfer out records

Table 19: Annual record count of all patients transferred out by ATAB and level

Year	Level	Level total	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
2017	Level 1	49	49						
	Level 2	225		165	30			30	
	Level 3	540			220	57	100	138	25
	Level 4	1,216	132	504	68	188		161	163
2018	Level 1	44	44						
	Level 2	223		167	11	15		30	
	Level 3	520			245	22	95	135	23
	Level 4	1,227	144	451	83	203		173	173
Percent change	Level 1	-10.2%	-10.2%						
	Level 2	-0.9%		1.2%	-63.3%			0.0%	

⁸ There are 72 records that do not appear in the data for transfers (possibly an artifact of data entry when a registrar does not view or open the "Refer In" tab). Additionally, 29 records indicated a patient was transferred more than once. Records where a transfer of care was indicated are shown in the following tables.

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Year	Level	Level total	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
	Level 3	-3.7%			11.4%	-61.4%	-5.0%	-2.2%	-8.0%
	Level 4	0.9%	9.1%	-10.5%	22.1%	8.0%		7.5%	6.1%

Pediatric transfers out

Table 20: Annual record count of pediatric patients transferred out by ATAB and level

Year	Level	Level total	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
2017	Level 1								
	Level 2	73		60	9			<5	
	Level 3	63			24	10	9	12	8
	Level 4	98	9	33	6	12		17	21
2018	Level 1	<5	<5						
	Level 2	64		43	<5	<5		13	
	Level 3	57			26	7	8	14	<5
	Level 4	90	6	32	8	12		15	17
Percent change	Level 1								
	Level 2	-12.3%		-28.3%	-	-		-	
	Level 3	-9.5%			8.3%	-30%	-11.1%	16.7%	-
	Level 4	-8.2%	-33.3%	-3%	33.3%	0%		-11.8%	-19%

Geriatric transfers out

Table 21: Annual record count of geriatric patients transferred out by ATAB and level

Year	Level	Level total	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
2017	Level 1	19	19						
	Level 2	39		33	<5			<5	

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Year	Level	Level total	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
2017	Level 3	180			76	11	39	50	<5
	Level 4	458	40	227	24	59		56	52
	Level 1	18	18						
	Level 2	45		38	<5	<5		<5	
2018	Level 3	169			78	6	28	55	<5
	Level 4	465	59	194	24	65		55	68
	Level 1	-5.3%	-5.3%						
	Level 2	15.4%		15.2%	-66.7%			0.0%	
Percent change	Level 3	-6.1%			2.6%	-45.5%	-28.2%	10.0%	-
	Level 4	1.5%	47.5%	-14.5%	0.0%	10.2%		-1.8%	30.8%

Transferred in

All trauma transfer-in records

Table 22: Annual record count of all patients transferred-In by ATAB and level

Year	Level	Level total	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
2017	Level 1	2,068	2,068						
	Level 2	907		313	366			228	
	Level 3	98			<5	74	<5	20	
	Level 4	7	<5	<5				<5	<5
2018	Level 1	2,146	2,146						
	Level 2	913		255	408	51		199	
	Level 3	46			7	20	<5	17	<5
	Level 4	9	<5	<5				<5	<5
	Level 1	3.8%	3.8%						

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Year	Level	Level total	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
Percent change	Level 2	0.7%		-18.5%	11.5%			-12.7%	
	Level 3	-53.1%			-	-73.0%	-	-15.0%	
	Level 4	28.6%	-	-				-	-

Pediatric transfers in

Table 23: Annual record count of pediatric patients transferred in by ATAB and level

Year	Level	Level total	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
2017	Level 1	350	350						
	Level 2	35		7	14			14	
	Level 3	<5				<5			
	Level 4	<5						<5	
2018	Level 1	330	330						
	Level 2	36		<5	21	<5		10	
	Level 3	<5				<5			
	Level 4	<5		<5					<5
Percent change	Level 1	-5.7%	-5.7%						
	Level 2	2.9%		-	50%			-	
	Level 3	-				-			
	Level 4	-							

Geriatric transfers in

Table 24: Annual record count of geriatric patients transferred in by ATAB and level

Year	Level	Level total	ATAB 1	ATAB 2	ATAB 3	ATAB 5	ATAB 6	ATAB 7	ATAB 9
2017	Level 1	623	623						
	Level 2	355		125	154			76	
	Level 3	51			<5	40		10	
	Level 4	0							
2018	Level 1	703	703						
	Level 2	367		117	159	19		72	
	Level 3	13			<5	<5		6	
	Level 4	<5		<5					<5
Percent change	Level 1	12.8%	12.8%						
	Level 2	3.4%		-6.4%	3.2%			-5.3%	
	Level 3	-74.5%			-	-		-40.0%	
	Level 4								

Discharge

Trauma patient discharge is the process of completing the care in the trauma center and documenting the outcome upon transferring the patient out of the trauma system. Typically, this is documented in the emergency department disposition field. Occasionally hospital discharge is also documented in the trauma record. The following tables summarize annual counts of statewide emergency department and hospital discharge outcomes in the OTR.

Emergency department discharge

Table 25: Annual trauma record counts by emergency department disposition

Documented ED disposition	2017	2018	Percent change
Home without services	4,355	5,389	23.7%
Floor bed (general admission, non-specialty unit bed)	3,955	3,736	-5.5%

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Documented ED disposition	2017	2018	Percent change
Intensive care unit (ICU)	2,365	2,397	1.4%
Transferred to another hospital	1,861	1,873	0.6%
Telemetry/step-down unit (less acuity than ICU)	1,253	1,285	2.6%
Operating room	950	941	-0.9%
Observation unit (unit that provides < 24-hour stays)	375	703	87.5%
(Missing)	378	483	27.8%
Other (jail, institutional care, mental health, etc.)	123	159	29.3%
Died	122	115	-5.7%
Left against medical advice	70	77	10.0%
Home with services	53	40	-24.5%

Hospital discharge

Table 26: Annual trauma record counts by hospital disposition

Documented hospital disposition	2017	2018	Percent change
Discharged to home or self-care (routine discharge)	6,892	7,708	11.8%
Hospital disposition information not recorded	4,885	5,537	13.3%
Discharged/Transferred to skilled nursing facility	1,710	1,630	-4.7%
Discharged/Transferred to a short-term general hospital	722	605	-16.2%
Discharged/Transferred to home under supervised care	459	483	5.2%
Deceased/Expired	406	411	1.2%
Discharged/Transferred to inpatient rehab unit	331	361	9.1%
Left against medical advice or discontinued care	113	140	23.9%
Discharged/Transferred to court/law enforcement	75	73	-2.7%
Discharged/Transferred to hospice care	59	78	32.2%
Discharged/Transferred to other type of institution	61	59	-3.3%

Documented hospital disposition	2017	2018	Percent change
Discharged/Transferred to long term care hospital	66	41	-37.9%
Discharged/Transferred to psych hospital/unit	44	47	6.8%
Discharged/Transferred to an intermediate care facility	37	25	-32.4%

Trauma deaths

Deaths can be recorded in several fields within TraumaOne:

- When a patient arrives in the ED, they are observed for signs of life (recorded as SIGNS or NO SIGNS).
- The admission status of a patient recorded on the “demographics” page can record “DOA.”
- The ED disposition field can report “DIED.”
- The hospital disposition field can report “EXPIRED.”
- The patient final outcome “Live/Died” can report “D.”
- The “Outcome at Hospital Discharge” field can denote the outcome “Dead.”
- A patient readmitted after being discharged can have a readmission status as “D” (similar to live/die in final outcome on the discharge page).
- A record can also contain a death location recorded on the discharge page.

Annual count of deaths

Table 27: Oregon trauma deaths, 2017-2018

Year	Total death count	Death location	n	Percent of total deaths
2017	512	DOA	49	9.57%
		ED	90	17.58%
		Hospital	373	72.85%
2018	507	DOA	46	9.07%
		ED	87	17.16%
		Hospital	374	73.77%

Injury severity and patient demographics for reported trauma deaths

The table below shows data on total trauma deaths by injury severity score (ISS) groups. The groups are arranged using a qualitative injury severity category where ISS scores of less than 15 are labeled “low” and ISS scores of 15 and higher are labeled “high.”. Deaths where no ISS score was documented are included here in the “Missing value” category.

Table 28: Trauma deaths by qualitative injury severity categories

Qualitative ISS	Count 2017	Proportion 2017	Count 2018	Proportion 2018	Percent change
Low	200	0.39	167	0.33	-16.5%
High	292	0.57	313	0.62	7.2%
(Missing)	20	0.04	27	0.05	35.0%
Total record count	512	1.00	507	1.00	-1.0%

Trauma deaths by age group

The age group is defined as follows:

- Pediatric is ages 0—14 years
- Adult is all ages 15 to 64 years, and
- Geriatric is ages 65 and older.

The following tables show statewide counts for DOA, ED deaths, and hospital deaths for these age groups. Proportions within each table are included for reporting consistency and are specific to the subgroup as labeled in the table.

Table 29: Total trauma deaths by age group

Age group	Count 2017	Proportion 2017	Count 2018	Proportion 2018	Percent change
Pediatric	17	0.033	10	0.020	-41.2%
Adult	219	0.428	224	0.442	2.3%
Geriatric	276	0.539	273	0.538	-1.1%
Total trauma deaths	512	1.000	507	1.000	-1.0%

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Table 30: Trauma deaths indicating DOA by age group

Age group	Count 2017	Proportion 2017	Count 2018	Proportion 2018	Percent change
Pediatric	4	0.082	2	0.043	-50.0%
Adult	34	0.694	34	0.739	0.0%
Geriatric	11	0.224	10	0.217	-9.1%
Total DOA deaths	49	1.000	46	0.999	-6.1%

Table 31: Trauma deaths in ED by age group

Age group	Count 2017	Proportion 2017	Count 2018	Proportion 2018	Percent change
Pediatric	5	0.056	3	0.034	-40.0%
Adult	48	0.533	46	0.529	-4.2%
Geriatric	37	0.411	38	0.437	2.7%
Total ED deaths	90	1.000	87	1.000	-3.3%

Table 32: Trauma deaths in hospital by age group

Age group	Count 2017	Proportion 2017	Count 2018	Proportion 2018	Percent change
Pediatric	8	0.021	5	0.013	-37.5%
Adult	137	0.367	144	0.385	5.1%
Geriatric	228	0.611	225	0.602	-1.3%
Total hospital deaths	373	0.999	374	1.000	0.3%

Appendix

References

For additional information on trauma systems data and quality measures, refer to: **American College of Surgeons Resources for Optimal Care of the Injured Patient** 2014. <https://www.facs.org/-/media/files/quality-programs/trauma/vrc-resources/resources-for-optimal-care.ashx>

This report was compiled and published using R version 4.0.2 in RStudio Version 1.3.1056 along with the following R packages:

Table 33: R package citation list

name	citation
DBI	DBI: R Database Interface, R Special Interest Group on Databases (R-SIG-DB), aut, Hadley, Wickham, aut, Kirill, Müller, aut, cre, krlmlr+r@mailbox.org, 0000-0002-1416-3412, 2021, R package version 1.1.1, https://CRAN.R-project.org/package=DBI
dbplyr	dbplyr: A 'dplyr' Back End for Databases, Hadley, Wickham, aut, cre, hadley@rstudio.com, Maximilian, Girlich, aut, Edgar, Ruiz, aut, 2021, R package version 2.1.0, https://CRAN.R-project.org/package=dbplyr
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officedown	officedown: Enhanced 'R Markdown' Format for 'Word' and 'PowerPoint', David, Gohel, aut, cre, cph, david.gohel@ardata.fr, Noam, Ross, aut, noam.ross@gmail.com, rmarkdown implementation for rvg, 2021, R package version 0.2.1, https://CRAN.R-project.org/package=officedown
RColorBrewer	RColorBrewer: ColorBrewer Palettes, Erich, Neuwirth, aut, cre, erich.neuwirth@univie.ac.at, 2014, R package version 1.1-2, https://CRAN.R-project.org/package=RColorBrewer
rebus	rebus: Build Regular Expressions in a Human Readable Way, Richard, Cotton, aut, cre, richierocks@gmail.com, 2017, R package version 0.1-3, https://CRAN.R-project.org/package=rebus
rlang	rlang: Functions for Base Types and Core R and 'Tidyverse' Features, Lionel, Henry, aut, cre, lionel@rstudio.com, Hadley, Wickham, aut, hadley@rstudio.com, 2020, R package version 0.4.10, https://CRAN.R-project.org/package=rlang
tidyverse	Welcome to the {tidyverse}, Hadley, Wickham, Mara, Averick, Jennifer, Bryan, Winston, Chang, Lucy, D'Agostino, McGowan, Romain, François, Garrett, Grolemund, Alex, Hayes, Lionel, Henry, Jim, Hester, Max, Kuhn, Thomas, Lin, Pedersen, Evan, Miller, Stephan, Milton, Bache, Kirill, Müller, Jeroen, Ooms, David, Robinson, Dana, Paige, Seidel, Vitalie, Spinu, Kohske, Takahashi, Davis, Vaughan, Claus, Wilke, Kara, Woo, Hiroaki, Yutani, 2019, Journal of Open Source Software, 4, 43, 1686, 10.21105/joss.01686