2018 Trauma Program Report
Transforming Trauma Care

OREGON HEALTH & SCIENCE UNIVERSITY
OREGON TRAUMA SYSTEM
CELEBRATES 30 YEARS
Celebrating 30 years: 2018 marked the 30th anniversary of the Oregon State Trauma System. (You will see a photo spread of historical pictures throughout this issue to celebrate OHSU Trauma Program history.)

- Patient Care: The OHSU Trauma Program treated 3,035 patients in 2018, a 5 percent increase in patient volume.
- Research and Funding: The Trauma Research Laboratory had another productive year, publishing 60 research papers and receiving more than $3 million in funding, totaling nearly $15 million for the year.
- Fall prevention education: OHSU led fall prevention seminars attended by 972 community members.
- Outreach: The OHSU Trauma Program taught Stop the Bleed to 671 individuals throughout the state.
Oregon’s statewide trauma system is based on landmark legislation. The Legislature passed statutory authority in 1985 as ORS 431.607 – 431.633, under the leadership of the president of the Oregon Senate, John Kitzhaber, M.D., and signed into law by Governor Victor Atiyeh. With the implementation of the trauma system in May 1988, only two Oregon hospitals, OHSU and Legacy Emanuel Medical Center, were designated as Level I trauma centers. Injured individuals in the four-county metropolitan region identified by pre-hospital rescue personnel or emergency medical technicians as meeting the criteria for severe injury are transported to one of these Level I centers.

Published research comparing interhospital transfer practices before and after implementation showed improvement in rapid transfer of critically injured patients to Level 1 and 2 trauma centers as well as improved outcomes.
Summary of OHSU Trauma Program’s 2018 statistics

- 1,805 patients (59.4 percent) were brought to OHSU directly from the scene of injury; 1,230 (40.5 percent) were transferred from another hospital.
- Falls were the most common mechanism of injury for those at the extremes of age.
- Patients were more injured overall than in previous years.
- Deaths from falls surpassed those from vehicle collisions.
In 2018, the OHSU Trauma Program changed to a two-tiered system to evaluate injured patients. The level of activation is based on information provided by pre-hospital personnel (Tables I and II). In the Portland metropolitan area, paramedics evaluate patients at the scene of injury and enter them into the trauma system if they meet established triage criteria for serious injury. Analyses by OHSU indicate patients can be safely and efficiently treated with a limited team response, saving full trauma team activations for critically injured patients.

### Table I  |  OHSU trauma team configuration based on triage criteria

<table>
<thead>
<tr>
<th>Level</th>
<th>Staff trauma surgeon</th>
<th>Staff anaesthesiologist</th>
<th>Staff ED physician</th>
<th>Trauma chief resident</th>
<th>Emergency medicine resident</th>
<th>Respiratory medicine resident</th>
<th>Primary trauma nurse</th>
<th>Trauma recording nurse</th>
<th>Procedure nurse</th>
<th>Transportation aide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Modified</td>
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</tr>
</tbody>
</table>

### Figure 11 | OHSU trauma team response by level of activation

- **Full**: 21%
- **Modified**: 68%
- **No Activation**: 11%
Although motor vehicle crashes remain the most common mechanism of injury overall, falls continue to be a significant source of trauma. Falls are the leading mechanism of injury for those at the extremes of age.

**Figure 12 | Causes of injury for patients seen by the OHSU trauma team**

- **Vehicle Collisions**: 9%
- **Non-intentional Falls and Other External Causes of Accidental Injury**: 38%
- **Homicide and Injury Purposely Inflicted by Others**: 42%
- **Suicide and Self-inflicted Injury**: 8%
- **Other Occurrences**: 3%

**Figure 13 | Incidents by injury cause and age group**

- **Vehicle Accidents**:
  - Age 0-4: 50
  - Age 5-14: 200
  - Age 15-24: 400
  - Age 25-44: 450
  - Age 45-64: 350
  - Age 65-74: 250
  - Age 75+
- **Non-intentional Fall**
- **Other Occurrences**
- **Suicide and Self-inflicted Injury**
- **Homicide and Injury Purposely Inflicted by Others**

**Figure 14 | Mean injury severity score of patients admitted to OHSU hospital**

On average, patients transferred from other hospitals were slightly less injured than those admitted directly from the scene, representing a change from previous years. However, patients were more injured overall than in previous years.

**OHSU Emergency Department entrance circa 1974.**
Hospital admissions via OHSU trauma program

In 2018, the OHSU Trauma Program admitted 2,135 patients (70 percent) to OHSU (Figure 15). Elderly patients were more likely to require hospital admission. Most of these patients were able to return home after admission (Figure 16).

Mortality

In 2018, 110 patients (3.6 percent) died. Nine patients died in the Emergency Department and 101 died after hospital admission.

Figure 17 | Total deaths by arrival status

Figure 18 | Cause of death

Deaths from falls surpassed those from vehicle collisions this year.


Philbert Y. Van, M.D., F.A.C.S. leads rounds on the trauma ward in 2018.
In 2018, the OHSU Trauma Program treated 833 patients older than 64, a 7 percent increase. Of these, 413 (50 percent) were transferred to OHSU from another hospital or clinic. Most of the patients were injured in falls. Of the 833 injured patients, 678 (81 percent) required hospital admission.

Figures 19-20 provide additional information regarding trauma team care for patients older than 64 at OHSU.

### Fall prevention

OHSU offers the Matter of Balance course, which is designed to reduce the fear of falling and increase activity levels among older adults. The course includes eight two-hour sessions for a small group led by a trained facilitator. This nationally recognized program was developed at Boston University following a randomized, single-blind controlled trial that was conducted to test the efficacy of a community-based group intervention to reduce fear of falling and associated restrictions in activity levels among older adults. The goals of the course are to reduce fear of falling, increase activity levels, and reduce fall risk factors in the environment and increase strength and balance. OHSU also offers a two-hour fall prevention seminar for those unable to commit to an eight-week course.

### Table II | Fall prevention activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number of participants</th>
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<tbody>
<tr>
<td>Fall prevention seminar participants</td>
<td>135</td>
</tr>
<tr>
<td>Matter of Balance course participants</td>
<td>118</td>
</tr>
<tr>
<td>Coach training participants</td>
<td>19</td>
</tr>
<tr>
<td>Events and fall prevention collaboration</td>
<td>700</td>
</tr>
<tr>
<td>Community members reached</td>
<td>972</td>
</tr>
</tbody>
</table>

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**Figure 19 | Patient volume, age 65 and older**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Patients</th>
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<tbody>
<tr>
<td>2018</td>
<td>833</td>
</tr>
<tr>
<td>2017</td>
<td>779</td>
</tr>
<tr>
<td>2016</td>
<td>728</td>
</tr>
</tbody>
</table>

**Figure 20 | Mechanism of injury, age 65 and older**

- **Non-intentional falls and other external causes of accidental injury**: 1%
- **Vehicle collisions**: 1%
- **Other occurrences**: 4%
- **Homicide and injury purposely inflicted by others**: 23%
- **Suicide and self-inflicted injury**: 71%

A patient arrives in the OHSU Emergency Department circa 1980s.
Care for patients 14 years and younger

Following visits from the American College of Surgeons, OHSU Doernbecher Children’s Hospital is now verified as a Level 1 pediatric trauma center and a Level 1 site for children’s surgery.

In 2018, the OHSU Trauma Program evaluated 308 patients aged 14 and younger. Of these, 197 (64 percent) were transferred to OHSU from hospitals around the Pacific Northwest. Patient disposition included 241 (78 percent) admitted to Doernbecher Children’s Hospital: 81 (34 percent) to the ICU, 105 (44 percent) to the ward, 31 (13 percent) to the OR, and 21 (8 percent) as direct admissions. Three children (1.0 percent) died as a result of their injuries.

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**Figure 21 | Patient volume, age 14 and younger**

<table>
<thead>
<tr>
<th>Year</th>
<th>Volume</th>
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</thead>
<tbody>
<tr>
<td>2018</td>
<td>308</td>
</tr>
<tr>
<td>2017</td>
<td>277</td>
</tr>
<tr>
<td>2016</td>
<td>314</td>
</tr>
</tbody>
</table>

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**Figure 22 | Disposition from the Emergency Department, patients 14 and younger**

- OBS: 13
- Direct: 21
- OR: 31
- ICU: 81
- Ward: 105
- Home/discharge: 57

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**Figure 23 | Mechanism of injury, patients 14 and younger**

- Non-intentional falls: 3%
- Vehicle collisions: 42%
- Other occurrences: 39%
- Suicide and self-inflicted injury: 16%
- Homicide and injury purposely inflicted by others: 1%

The “other occurrences” category includes patients with sports-related injuries, those struck by a falling object, and those with injuries accidentally inflicted by others.

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**Figure 24 | Injury severity scores for patients 14 and younger**

- 0-8: 120
- 9-14: 160
- 25-40: 31
- 41-49: 20
- 50-74: 1

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Pediatric neurosurgeon Nathan Selden, M.D., Ph.D., F.A.C.S., F.A.A.P. (right) in the Doernbecher operating room.

Surgery at Doernbecher circa 1940s.
Pediatric injury prevention

ThinkFirst Oregon

ThinkFirst is an organization dedicated to reducing brain, spinal cord and other traumatic injuries and fatalities by educating youth, parents and community members across Oregon. ThinkFirst programs help students understand the importance and basic anatomy of the brain and spinal cord, and how a traumatic brain injury or spinal cord injury could permanently affect their lives.

ThinkFirst developed programs to provide age-appropriate injury prevention for students of all ages. ThinkFirst for Kids was developed in 1994 for grades 1 through 3. It provides information about the structure and function of the brain and spinal cord, motor vehicle and pedestrian safety, bicycling, water play, playgrounds, recreation and sport activities, as well as teaching about the dangers of weapons and conflict resolution skills.

ThinkFirst for Youth was started in 2007 and includes presentations and classroom curricula for grades 4 through 8. Anatomy lessons and classroom activities help students develop a practical understanding of their bodies’ abilities, limitations and vulnerability to injuries. Exercises build communication and conflict resolution skills, increasing self-confidence and students’ ability to make safe choices when on their own or in the face of peer pressure.

In 2014, ThinkFirst about Concussion was offered for teen presentations. This program teaches teenagers to prevent, recognize and respond to concussion symptoms in the context of sports and recreation. It also teaches vehicle safety, how to prevent falls and avoid violence.

Tom Sargent Safety Center

The OHSU Doernbecher Tom Sargent Safety Center is dedicated to reducing preventable injuries in children throughout the Pacific Northwest by:

- Providing public and professional education and training.
- Increasing access to low-cost safety supplies and resources.
- Encouraging healthcare providers, families and community leaders to get involved in finding ways to reduce injury.
- Supporting safety-related advocacy in the Pacific Northwest.

A key part of its mission is partnering with other local, state and federal agencies to promote injury prevention education. As a part of this mission, it operates a Safety Resource Center that sells low-cost home safety supplies, sport helmets and sleep sacks. Educational materials to help keep children safe at home and on the go are also available. The center offers low-cost helmets for biking, skiing and other sports and makes sure the helmets fit properly. Families can also purchase low-cost home safety gates, electrical outlet covers, cabinet latches/locks, window stops and guards, and toilet locks. The center offers the Oregon Department of Transportation grant to low-income families that need a car seat. This requires the family to participate in installation and positioning education. Any community family can make an appointment at the safety center to learn how to install and properly use their car seat or they can attend a weekend event that the center supports. The Tom Sargent Safety Center has also partnered with Cribs for Kids to supply education and a low-cost Graco Pack-N-Play to any family that needs a safe place for their infant to sleep.

All educational materials are available in English and Spanish, and helmet and safe sleep materials come in multiple languages. Gun trigger locks are available through Project Child Safe.
The Trauma Research Laboratory (TRL) received $3,052,365 in new and continued funding to bring its overall research funding to $14,902,990 for 2018.

TRL continues its work with LITES, SIREN and CLOTT groups. The LITES SWAT project launched to compare patients receiving whole blood transfusions to those who receive only component therapy transfusions. CLOTT began looking at the epidemiology of venous thromboembolisms in trauma patients. All three consortiums will debut new projects in 2019.

New projects for 2018 included “Developing a National Trauma Research Action Plan (NTRAP) for the United States.” Karen J. Brasel, M.D., M.P.H. and Craig Newgard, M.D., M.P.H. are collaborating with other investigators at the National Trauma Institute and academic institutions across the country. The project aims to develop a national plan unifying the entire U.S. trauma medical community around a prioritized, comprehensive research agenda. Mackenzie R. Cook, M.D. obtained funding to evaluate what leads to burnout in surgical trainees and protecting the privacy of trainees in medical education research.

OHSU and the University of Oregon (UO) launched an opportunity for the two institutions to collaborate in research, which may lead to federal funding from the National Institutes of Health (NIH) or the Department of Defense (DOD). Belinda McCully, Ph.D. and Laszlo N. Kiraly, M.D. received funding through this collaboration that should provide preliminary data for a larger NIH R01 or DOD grant. McCully collaborated with Ashley Walker, Ph.D. at UO to study the vascular mechanisms linking obesity and hypercoagulability after traumatic hemorrhage. Specifically, their study aims to evaluate the hypercoagulable and prothrombotic state of obesity and how it may contribute to the poor outcomes in trauma patients. Kiraly is co-investigator with Robert G. Martindale, M.D., Ph.D., principal investigator (PI), on a grant to look at environmental sources that might contribute to health care-associated infections. The study is specifically looking at predicting health care-associated Clostridiodes difficile infection based on hospital unit and overall location of the unit within the hospital.

In addition to research grants, Albert Chi, M.D. was invited to present his work on “Bionics and Man” at the April 2018 TEDxPortland event and the Calvin and Mayho Tanabe Stop the Bleed campaign raises awareness of life-saving strategies, provides public access to bleeding control tools, and empowers bystanders to act as immediate responders.

Massive bleeding from any cause can result in death, especially from an active shooter or explosive event where response is delayed. Victims can die from uncontrolled bleeding within five to 10 minutes.

In the same way that the general public learns and performs CPR, the public can learn proper bleeding control techniques, including how to use their hands, dressings and tourniquets. Anyone at the scene can act as an immediate responder and save lives if they know what to do.

In 2018, the OHSU Trauma Program taught Stop the Bleed to 671 individuals throughout the state, totaling 1,608 since we began training in 2017. Of these students, 369 were health care providers, who went on to become instructors with the ability to teach Stop the Bleed in their own communities.

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Address. He continues to push the boundaries of prosthetics as in his work with 3D printed upper extremity prosthetics. He will begin evaluating the use of these prosthetics in 2019. There will also be more results from his modular prosthetic limb work and 3D printed prosthetic studies in 2019.

The American Heart Association presented Martin A. Schreiber, M.D. with the 2018 Lifetime Achievement Award in Trauma Resuscitation Science. He was also assigned as a member of the Food and Drug Administration Blood Product Advisor Council and the Tactical Combat Casualty Care Subject Matter Expert Panel.

The following are publications from the faculty in the Trauma Research Laboratory:


### Trauma Faculty

**Martin Schreiber, M.D., Chief of Trauma**  
Speaking topics: Transfusion; Resuscitation; What you need to know about DVTs; Lessons learned in the War on Terror; Modern methods of hemorhage control; Blast injury; Novel blood products; Modulation of coagulation; Thromboelastometry and trauma

**Karen Brasel, M.D.**  
Speaking topics: Post-traumatic stress disorder; Ethics in trauma

**Albert Chi, M.D.**  
Speaking topics: Targeted muscle re-innervation and advanced prosthetics

**Mackenzie Cook, M.D.**  
Speaking topics: Long term outcomes after injury; Curriculum development in surgical education and optimizing autonomy for trainees

**Arvin Gee, M.D.**  
Speaking topics: Utilizing minimally invasive surgical techniques in trauma and emergency general surgery; Management of appendicitis and diverticulitis

**Bruce Ham, M.D.**  
Speaking topics: Rural trauma team development course; Rural trauma, rib fractures

**Nick Jaszczak, M.D.**  
Speaking topics: Rural trauma team development course; General trauma

**Laszlo Kiraly, M.D.**  
Speaking topics: Surgical nutrition; Education of medical students and residents

**Darren Malinoski, M.D.**  
Speaking topics: General trauma; Organ donation

**Susan Rowell, M.D.**  
Speaking topics: Traumatic brain injury; Tranexamic acid in trauma

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**Mitch Sally, M.D.**  
Speaking topics: Inflammation and response to injury; Organ donation; Mechanical ventilation

**Phil Van, M.D.**  
Speaking topics: Military trauma care; General trauma

**David Zonies, M.D.**  
Speaking topics: ECMO; Military trauma care; Advanced ventilator management

### Trauma Advanced Practice Providers

**Kristy Aghayan**  
Trauma physician assistant

**Diana Clapp**  
Trauma nurse practitioner

**Staci Colovos**  
Trauma nurse practitioner

**Laura Dillon**  
Trauma physician assistant

**Mindy Hamilton**  
Trauma physician assistant

**Jessica Jurkovich**  
Trauma nurse practitioner

**Nicole Kiker**  
Trauma nurse practitioner

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**Ryan McMahon**  
Trauma physician assistant

**Scott Sherry**  
Emergency General Surgery physician assistant

**Michelle Simons**  
Trauma nurse practitioner

**Amanda Staudt**  
Trauma physician assistant

**Jake Wheeler**  
Trauma physician assistant

**Mitch Sally**  
Trauma nurse practitioner

**Phil Van**  
Trauma nurse practitioner

**David Zonies**  
Trauma nurse practitioner

**Bruce Ham**  
Emergency General Surgery physician assistant

**Michelle Simons**  
Trauma nurse practitioner

**Amanda Staudt**  
Trauma physician assistant

**Phil Van**  
Trauma physician assistant

**David Zonies**  
Trauma physician assistant

**Bruce Ham**  
Emergency General Surgery physician assistant

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### Pediatric Trauma Faculty

**Kenneth Azarow, M.D.**

**Marilyn Butler, M.D.**

**Elizabeth Fialkowski, M.D.**

**Cynthia Gingalewski, M.D.**

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### Trauma Nursing Faculty

**Lynn Frees, M.S., RN, ACNP-BC**  
Trauma program manager

**Pam Bilyeu, MN, RN, TCRN**  
Trauma coordinator

**Lori Moss, BSN, RN, CCRN**  
PEDIATRIC TRAUMA PROGRAM MANAGER

**Elizabeth Fialkowski, M.D.**

**Cynthia Gingalewski, M.D.**

**Mindy Hamilton, M.D.**