

OREGON HEALTH & SCIENCE UNIVERSITY

# 2018 Trauma Program Report

## Transforming Trauma Care

OREGON TRAUMA SYSTEM  
CELEBRATES 30 YEARS





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Highlights

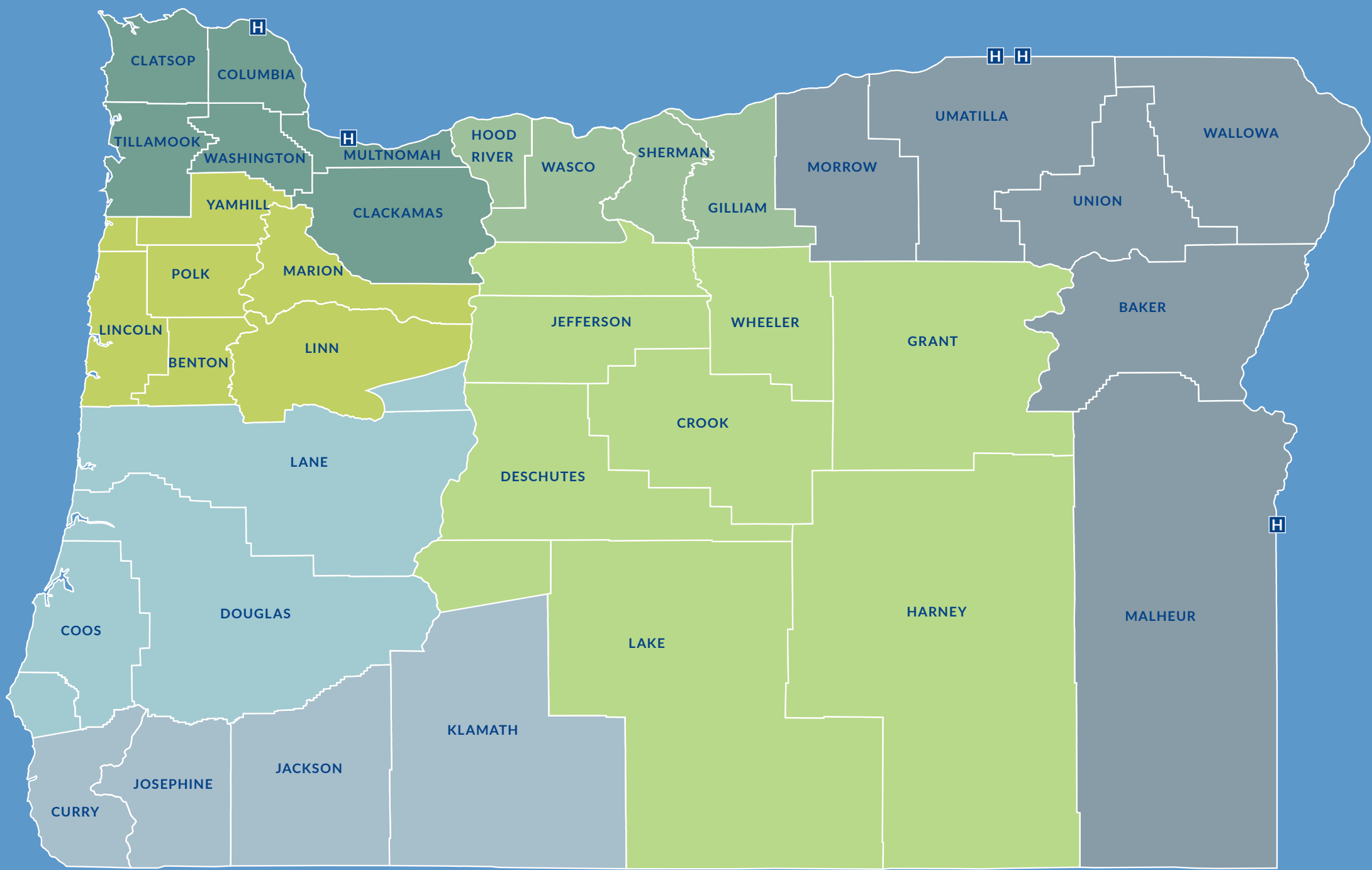
- **Celebrating 30 years:** 2018 marked the 30<sup>th</sup> anniversary of the Oregon State Trauma System. (You will see a photo spread of historical pictures throughout this issue to celebrate OHSU Trauma Program history.)
  - **Patient Care:** The OHSU Trauma Program treated 3,035 patients in 2018, 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.

The OHSU Trauma Program team, 2018.



# OHSU trauma system background

Oregon’s trauma advisory board regions by area



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.

MAP COURTESY OF OREGON DHS: <http://egov.oregon.gov/DHS/ph/ems/trauma/docs/hosp-map.pdf>



# 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.

Figure 1 | Patient volume 2016–2018

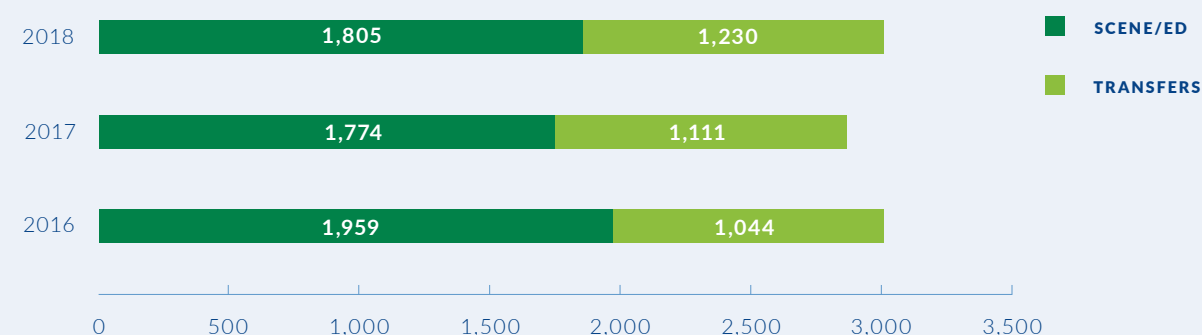


Figure 2 | Gender distribution of patients treated by the OHSU Trauma Program

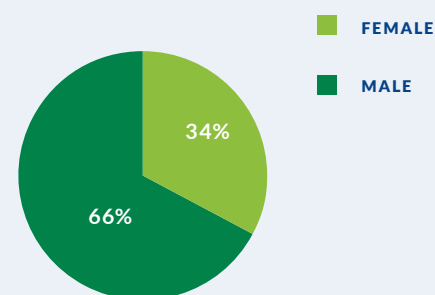


Figure 3 | Patients treated by the OHSU Trauma Program: blunt vs. penetrating injuries

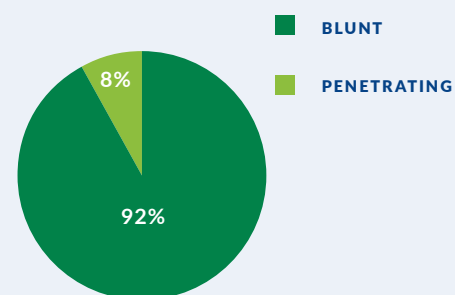


Figure 4 | Age distribution of patients treated by the OHSU Trauma Program

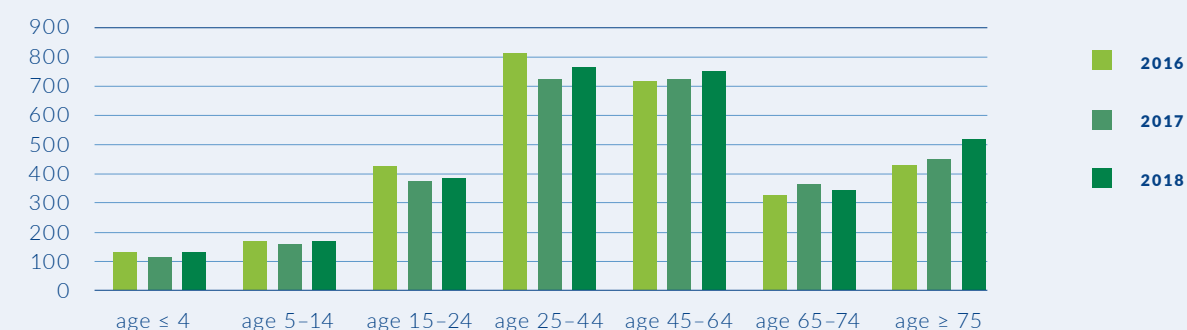


Figure 5 | Incidence by age of patients treated by the OHSU Trauma Program

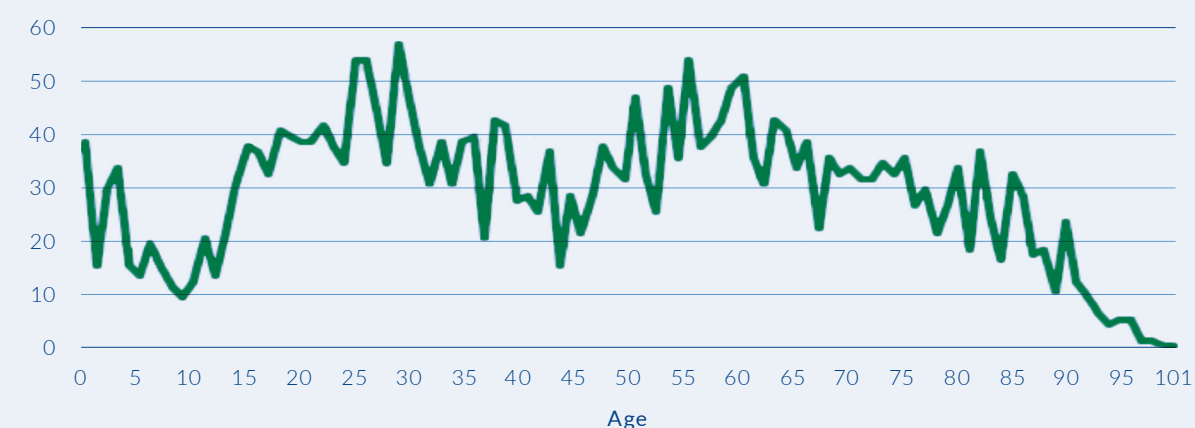


Figure 6 | Incidence by age and gender of patients treated by the OHSU Trauma Program

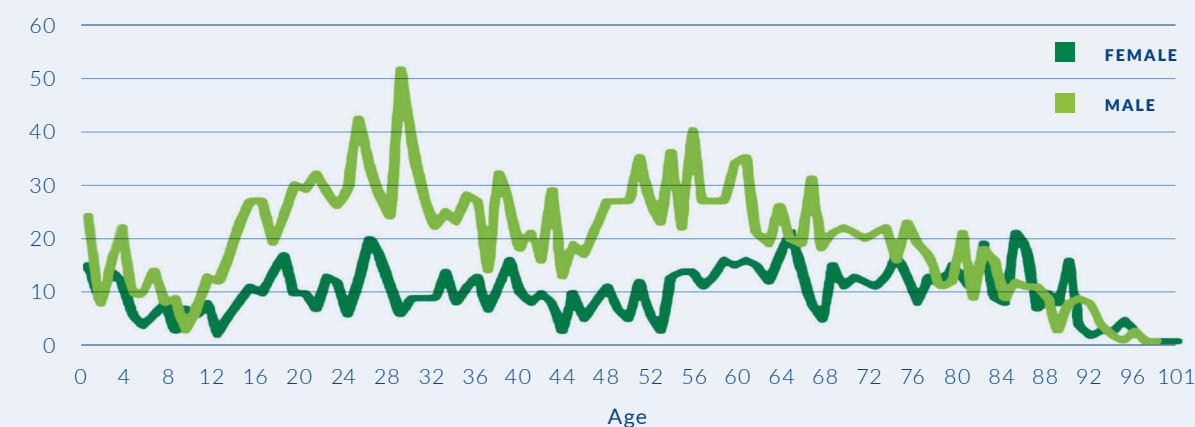


Figure 7 | Distribution of patients by month

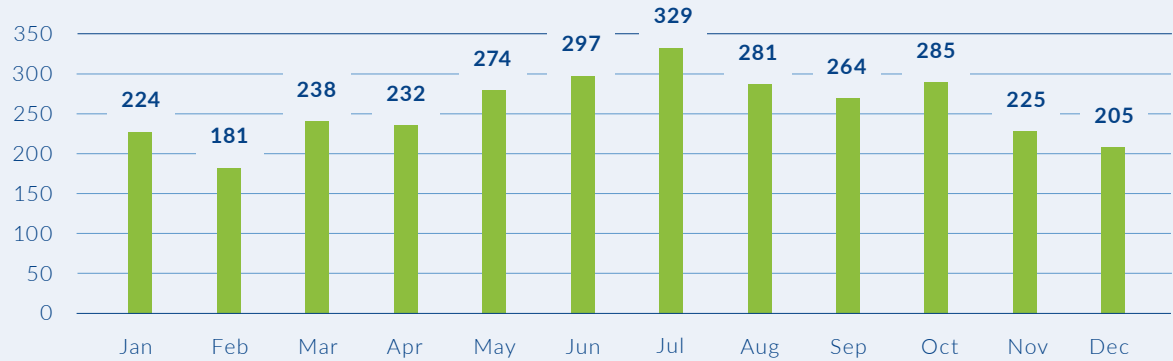


Figure 8 | Distribution of patients by day of week

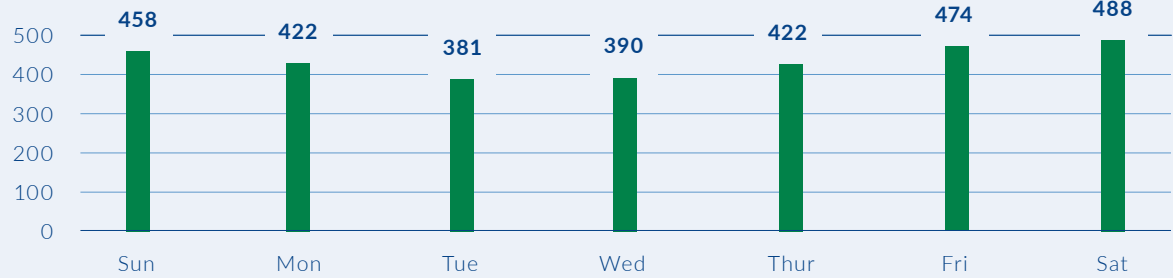


Figure 9 | Distribution of patients by time of arrival

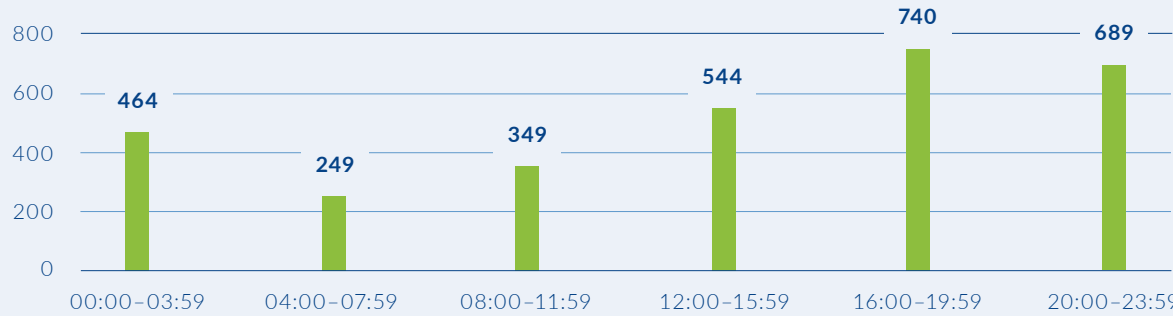


Figure 10 | Total hospital length of stay of admitted patients



## Trauma team response

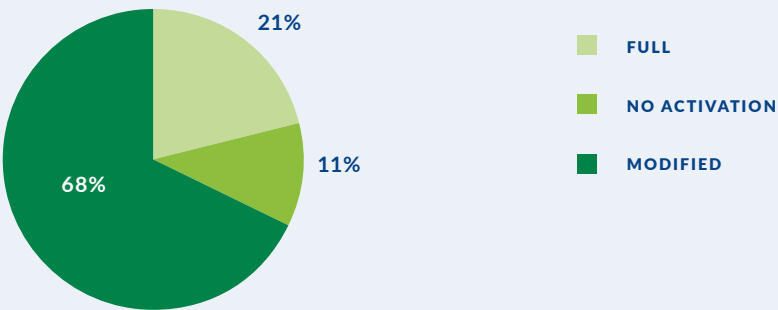
In 2018, the OHSU Trauma Program changed to a two-tiered system to evaluate injured patients. The level of activation is based on information provided by pre-hospital personnel (Tables I and II). In the Portland metropolitan area, paramedics evaluate patients at the scene of injury and enter them into 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

Full	Modified
Staff trauma surgeon	
Staff anesthesiologist	
Staff ED physician	Staff ED physician
Trauma chief resident	Trauma chief resident
Emergency medicine resident	Emergency medicine resident
Respiratory care practitioner	Respiratory care practitioner
Primary trauma nurse	Primary trauma nurse
Trauma recording nurse	
Procedure nurse	Procedure nurse
Transportation aide	

ED = EMERGENCY DEPARTMENT

Figure 11 | OHSU trauma team response by level of activation



## Mechanism of injury

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

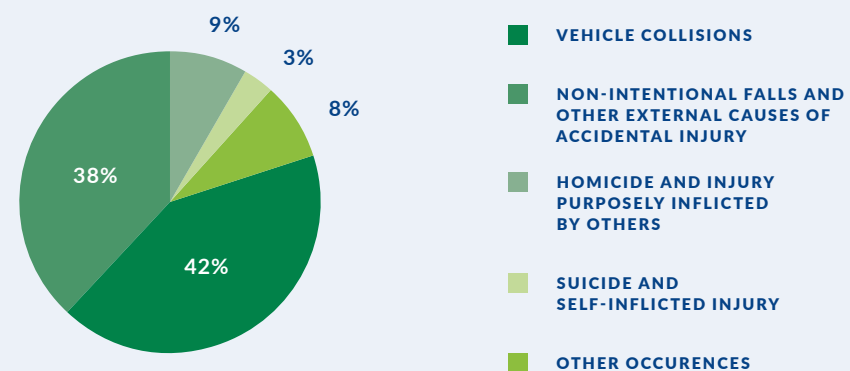


Figure 13 | Incidents by injury cause and age group

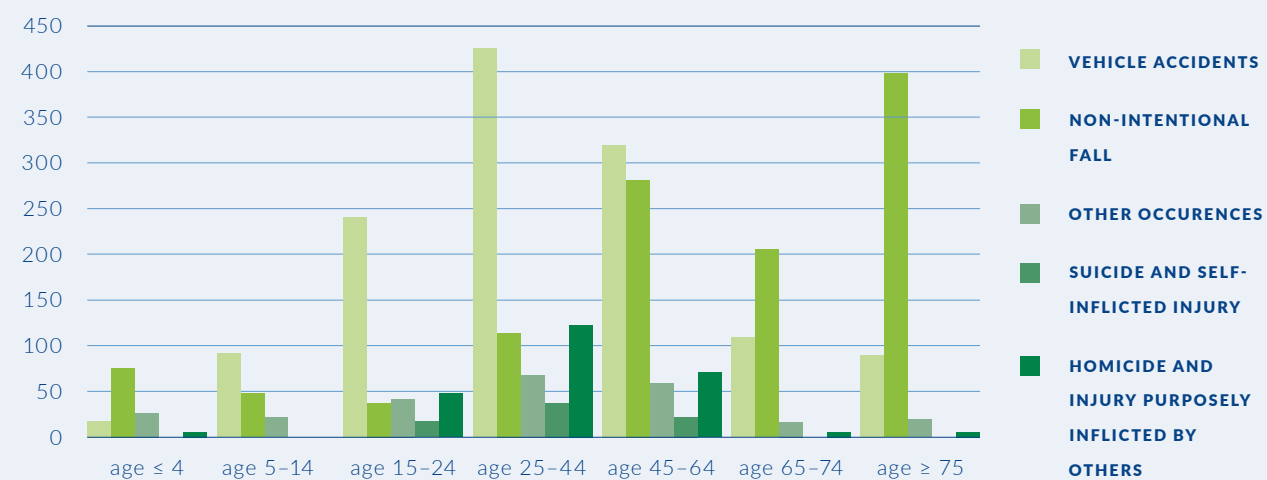
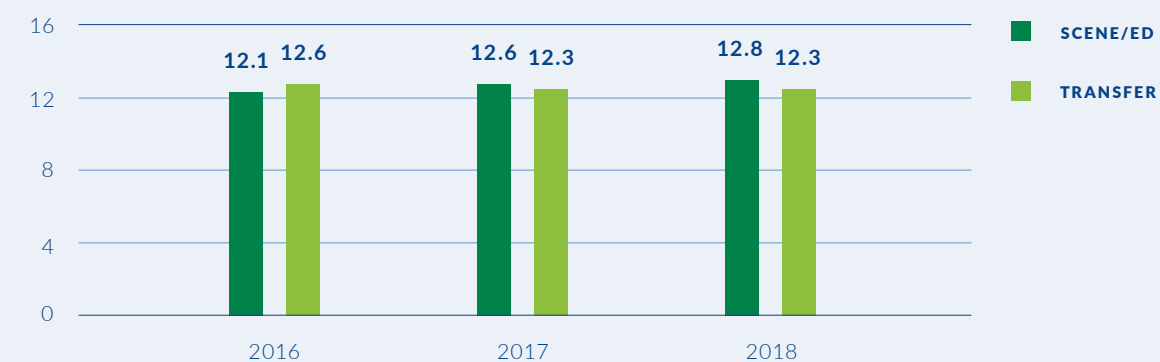


Figure 14 | Mean injury severity score of patients admitted to OHSU hospital

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).

Figure 15 | Patients requiring hospitalization after trauma team care

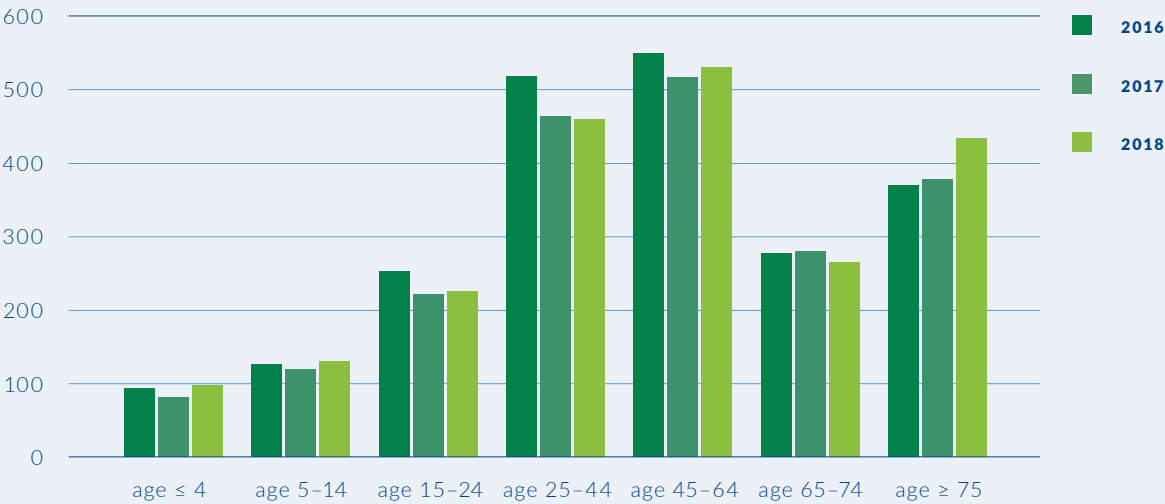
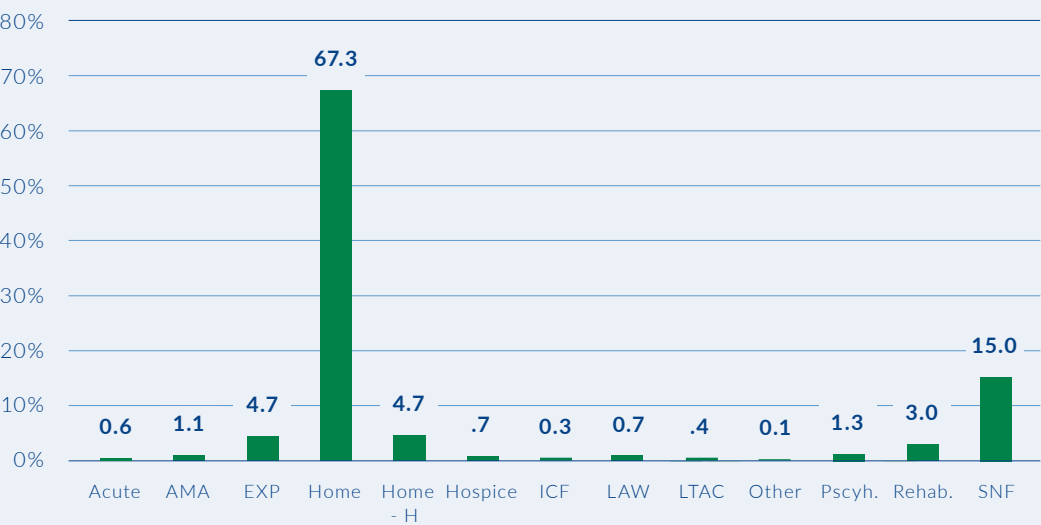


Figure 16 | Disposition of admitted patients after hospital discharge



# 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

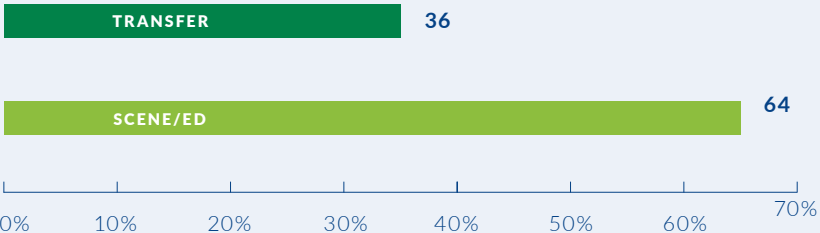
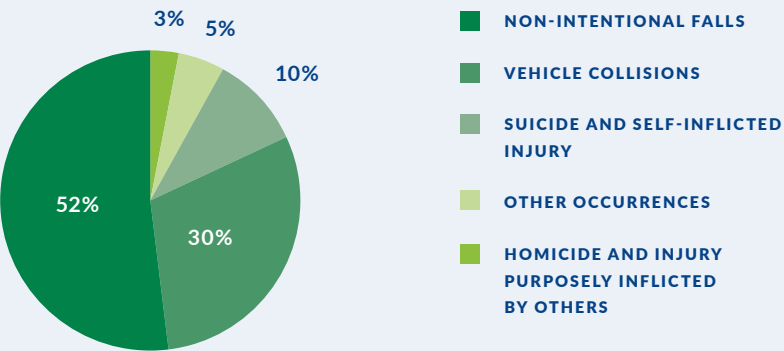


Figure 18 | Cause of death

Deaths from falls surpassed those from vehicle collisions this year.



Emergency Medicine physicians Robert Norton, M.D. and Jon Jui, M.D. circa 1980s.



Philbert Y. Van, M.D., F.A.C.S. leads rounds on the trauma ward in 2018.



# Care for patients older than 64

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.

Figure 19 | Patient volume, age 65 and older

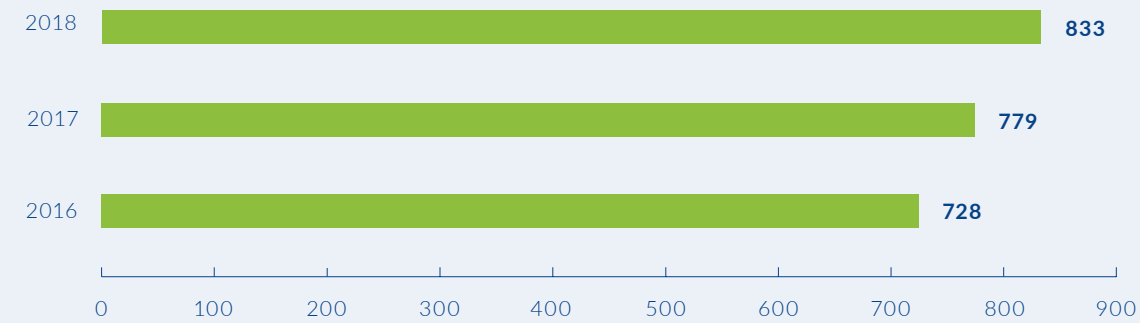
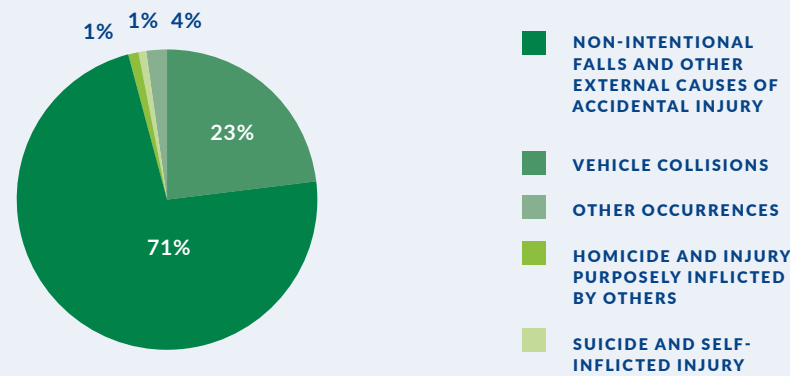


Figure 20 | Mechanism of injury, age 65 and older



## 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

Activity	Number of participants
Fall prevention seminar participants	135
Matter of Balance course participants	118
Coach training participants	19
Events and fall prevention collaboration	700
Community members reached	972



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.

Figure 21 | Patient volume, age 14 and younger

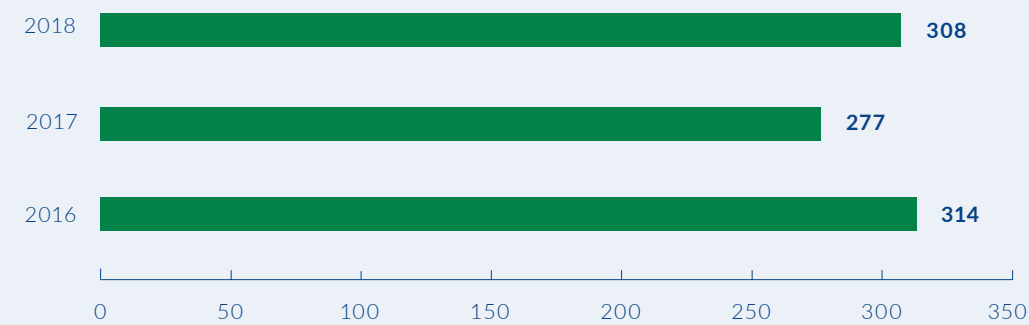


Figure 22 | Disposition from the Emergency Department, patients 14 and younger

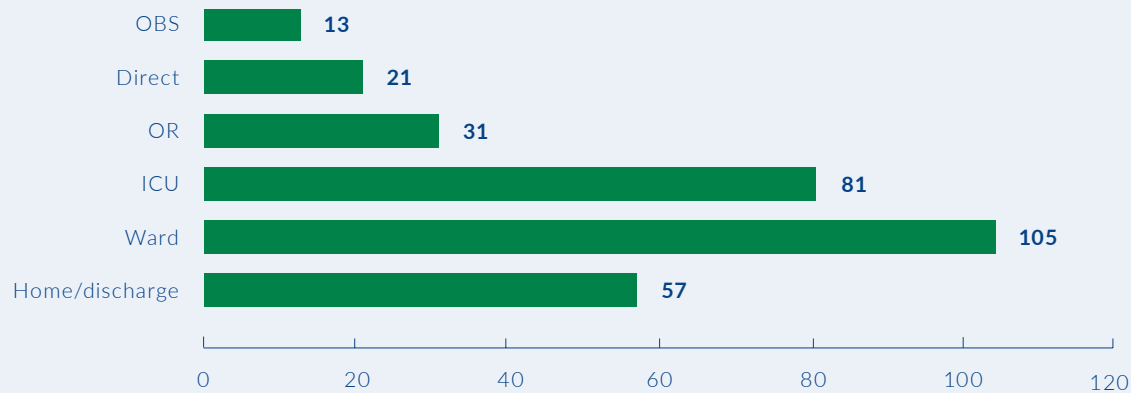


Figure 23 | Mechanism of injury, patients 14 and younger

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

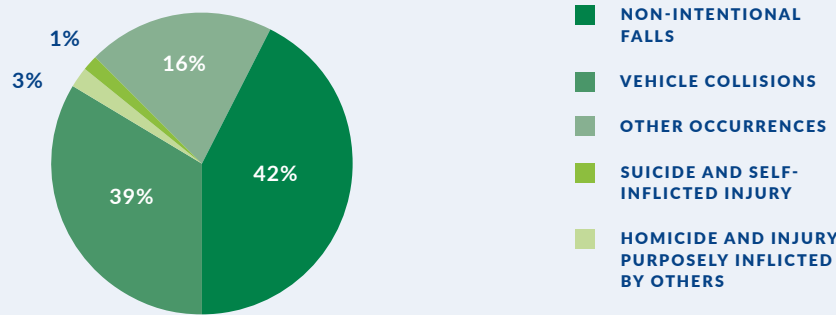
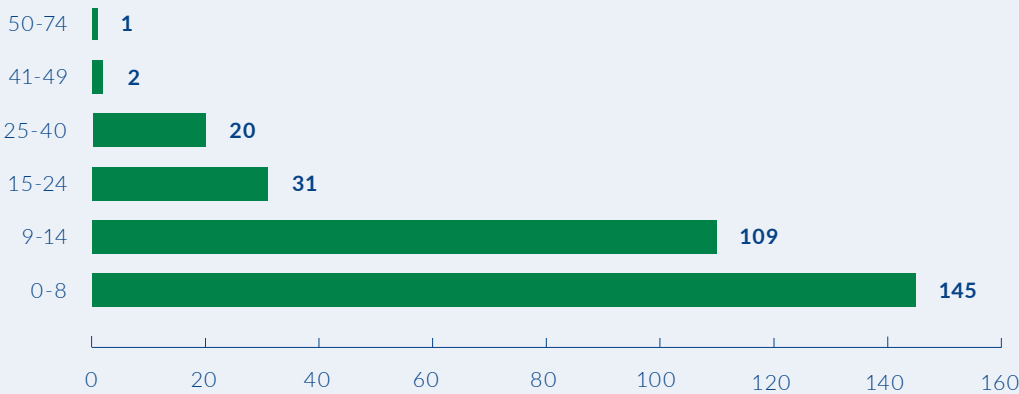


Figure 24 | Injury severity scores for patients 14 and younger



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.





## Stop the Bleed

The 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.



OHSU placed bleeding control kits in the AED boxes across the OHSU campus in October 2018

## Research

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 *Clostridioides 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



Address. He continues to push the boundaries of prosthetics as in his work with 3D printed upper extremity prosthetics for children. 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:

1. Barton, C. A., M. Hom, N. B. Johnson, J. Case, R. Ran and M. Schreiber (2018). "Protocolized warfarin reversal with 4-factor prothrombin complex concentrate versus 3-factor prothrombin complex concentrate with recombinant factor VIIa." *American Journal of Surgery* **215**(5): 775-779.
2. Biffl, W. L., E. E. Moore, D. V. Feliciano, R. M. Albrecht, M. A. Croce, R. Karmy-Jones, N. Namias, S. E. Rowell, M. A. Schreiber, D. V. Shatz and K. J. Brasel (2018). "Management of colorectal injuries: A Western Trauma Association critical decisions algorithm." *Journal of Trauma and Acute Care Surgery* **85**(5): 1016-1020.
3. Bommiasamy, A. K., C. Connelly, A. Moren, C. Dodgion, K. Bestall, A. Cline, R. G. Martindale, M. A. Schreiber and L. N. Kiraly (2018). "Institutional review of the implementation and use of a Clostridium difficile infection bundle and probiotics in adult trauma patients." *American Journal of Surgery* **215**(5): 825-830.
4. Bommiasamy AK, Opel D, McCallum R, Yonge JD, Perl VU, Connelly CR, Friess D, Schreiber MA, Mullins RJ. Conscious sedation versus rapid sequence intubation for the reduction of native traumatic hip dislocation. *Am J Surg.* 2018 Nov;**216**(5):869-873.
5. Bommiasamy, A. K., D. Opel, R. McCallum, J. D. Yonge, V. U. Perl, C. R. Connelly, D. Friess, M. A. Schreiber and R. J. Mullins (2018). "Conscious sedation versus rapid sequence intubation for the reduction of native traumatic hip dislocation." *American Journal of Surgery* **216**(5): 869-873.
6. Bonanno, A. M., T. L. Graham, L. N. Wilson, B. M. Madtson and J. D. Ross (2018). "Efficacy of the perfluorocarbon dodecafluoropentane as an adjunct to pre-hospital resuscitation." *PLoS ONE* **13**(11).
7. Bonanno, A. M., H. E. Hoops, T. Graham, B. L. Davis, B. H. McCully, L. N. Wilson, B. M. Madtson and J. D. Ross (2018). "Efficacy of the Abdominal Aortic Junctional Tourniquet-Torso Plate in a Lethal Model of Noncompressible Torso Hemorrhage." *Journal of special operations medicine : a peer reviewed journal for SOF medical professionals* **18**(4): 106-110.
8. Brasel, K. J. (2018). Hemorrhagic risk and blood components. *Fischer's Mastery of Surgery, Seventh Edition.* **1**: 103-109.
9. Brown, C. V. R., H. B. Alam, K. Brasel, C. J. Hauser, M. De Moya, M. Martin, E. E. Moore, S. Rowell, G. Vercruysse and K. Inaba (2018). "Western Trauma Association Critical Decisions in Trauma: Management of renal trauma." *Journal of Trauma and Acute Care Surgery* **85**(5): 1021-1025.
10. Byrge, N., M. Heilbrun, N. Winkler, D. Sommers, H. Evans, L. M. Cattin, T. Scalea, D. M. Stein, T. Neideen, P. Walsh, C. A. Sims, T. S. Brahmbhatt, J. M. Galante, H. H. Phan, A. Malhotra, R. T. Stovall, G. J. Jurkovich, R. Coimbra, A. E. Berndtson, T. A. O'Callaghan, S. F. Gaspard, M. A. Schreiber, M. R. Cook, D. Demetriades, O. Rivera, G. C. Velmahos, T. Zhao, P. K. Park, D. Machado-Aranda, S. Ahmad, J. Lewis, W. S. Hoff, G. Suleiman, J. Sperry, S. Zolin, M. M. Carrick, G. R. Mallory, J. Nunez, A. Colonna, T. Ennis and R. Nirula (2018). "An AAST-MITC analysis of pancreatic trauma: Staple or sew? Resect or drain?" *Journal of Trauma and Acute Care Surgery* **85**(3): 435-443.
11. Cannon, J., J. Pamplin, D. Zonies, P. Mason, C. Sine, L. Cancio, J. McNeill, C. Colombo, E. Osborn, R. Ricca, P. Allan, J. DellaVolpe, K. Chung and Z. Stockinger (2018). "Acute respiratory failure." *Military Medicine* **183**: 123-129.
12. Cap, A., J. Badloe, T. Woolley, N. Prat, R. Gonzales, W. Malloy, A. Taylor, J. Corley, H. Pidcoke, M. Reade and M. Schreiber (2018). "The use of frozen and deglycerolized red blood cells." *Military Medicine* **183**: 52-54.
13. Cap, A. P., H. F. Pidcoke, P. Spinella, G. Strandenenes, M. A. Borgman, M. Schreiber, J. Holcomb, H. C. N. Tien, A. N. Beckett, H. Doughty, T. Woolley, J. Rappold, K. Ward, M. Reade, N. Prat, F. Army, S. Ausset, B. Kheirabadi, A. Benov, M. E. P. Griffin, J. B. Corley, C. D. Simon, R. Fahie, D. Jenkins, B. J. Eastridge and Z. Stockinger (2018). "Damage control resuscitation." *Military Medicine* **183**: 36-43.
14. Chang, R., E. E. Fox, T. J. Greene, M. D. Swartz, S. M. DeSantis, D. M. Stein, E. M. Bulger, S. M. Melton, M. D. Goodman, M. A. Schreiber, M. D. Zielinski, T. O'Keeffe, K. Inaba, J. S. Tomasek, J. M. Podbielski, S. Appana, M. Yi, P. I. Johansson, H. H. Henriksen, J. Stensballe, J. Steinmetz, C. E. Wade, J. B. Holcomb, J. B. Holcomb, C. E. Wade, E. E. Fox, R. Chang, J. M. Podbielski, J. S. Tomasek, D. J. del Junco, M. D. Swartz, S. M. DeSantis, S. N. Appana, T. J. Greene, M. Yi, M. O. Gonzalez, S. Baraniuk, G. van Belle, B. G. Leroux, C. L. Howard, A. Haymaker, D. M. Stein, T. M. Scalea, B. Ayd, P. Das, A. V. Herrera, E. M. Bulger, B. R. H. Robinson, P. Klotz, A. Minhas, J. D. Kerby, S. M. Melton, C. R. Williams, S. W. Stephens, M. Goodman, J. A. Johannigman, J. McMullan, R. D. Branson, D. Gomaa, C. Barczak, M. A. Schreiber, S. J. Underwood, C. Watson, M. D. Zielinski, J. R. Stubbs, A. Headlee, T. O'Keeffe, P. Rhee, L. L. Rokowski, J. Santoro, A. Seach, D. Bradford, M. Fealk, F. Latifi, K. Inaba, H. Kim, C. Chudnofsky and M. D. Wong (2018). "Abnormalities of laboratory coagulation tests versus clinically evident coagulopathic bleeding: results from the prehospital resuscitation on helicopters study (PROHS)." *Surgery (United States)* **163**(4): 819-826.
15. Chang, R., J. B. Holcomb, P. I. Johansson, S. Pati, M. A. Schreiber and C. E. Wade (2018). "Plasma Resuscitation Improved Survival in a Cecal Ligation and Puncture Rat Model of Sepsis." *Shock* **49**(1): 53-61.
16. Clemens, M. S., M. C. Stull, J. M. Rall, I. J. Stewart, J. A. Sosnov, K. K. Chung and J. D. Ross (2018). "Extracorporeal Filtration of Potassium in a Swine Model of Bilateral Hindlimb Ischemia-Reperfusion Injury With Severe Acute Hyperkalemia." *Military Medicine* **183**(11-12): e335-e340.
17. Condrón, M., S. Rowell, E. Dewey, T. Anderson, L. Lealiiee, D. Farrell and H. Hinson (2018). "The procoagulant molecule plasminogen activator inhibitor-1 is associated with injury severity and shock in patients with and without traumatic brain injury." *Journal of Trauma and Acute Care Surgery* **85**(5): 888-893.
18. Cook, M. R., J. Badulak, B. Çoruh, L. N. Kiraly, D. Zonies, J. Cuschieri and E. M. Bulger (2018). "Fellowship training in extracorporeal life support: Characterization and educational needs assessment." *Journal of Critical Care* **46**: 159-161.
19. Cook, M. R., K. O'Connell, Q. Qiu, A. J. Riggle, T. H. Shoultz, R. G. Maine, S. Arbabi, G. E. O'Keefe, J. Cuschieri, R. V. Maier and B. R. H. Robinson (2018). "Duration of respiratory failure after trauma is not associated with increased long-term mortality." *Critical Care Medicine* **46**(8): 1263-1268.
20. Cook, M. R., C. E. Witt, R. H. Bonow, E. M. Bulger, K. F. Linnau, S. Arbabi, B. R. H. Robinson and J. Cuschieri (2018). "A cohort study of blunt cerebrovascular injury screening in children: Are they just little adults?" *Journal of Trauma and Acute Care Surgery* **84**(1): 50-57.
21. Cook MR, Witt CE, Bonow RH, Bulger EM, Linnau KF, Arbabi S, Robinson BRH, Cuschieri J. A cohort study of blunt cerebrovascular injury screening in children: Are they just little adults? *J Trauma Acute Care Surg.* 2018 Jan;**84**(1):50-57.
22. Cunningham, H. B., S. A. Scielzo, P. A. Nakonezny, B. R. Bruns, K. J. Brasel, K. Inaba, S. C. Brakenridge, J. D. Kerby, B. A. Joseph, M. J. Mohler, J. Cuschieri, M. E. Paulk, A. P. Ekeh, T. D. Madni, L. R. Taveras, J. B. Imran, S. E. Wolf and H. A. Phelan (2018). "Burn Surgeon and Palliative Care Physician Attitudes Regarding Goals of Care Delineation for Burned Geriatric Patients." *Journal of Burn Care and Research* **39**(6): 1000-1005.
23. Deal, S. B., M. R. Cook, D. Hughes, M. Sarap, T. G. Hughes, K. Brasel and A. A. Alseidi (2018). "Training for a Career in Rural and Nonmetropolitan Surgery—A Practical Needs Assessment." *Journal of Surgical Education* **75**(6): e229-e233.

24. Ferrada, P., R. A. Callcut, D. J. Skarupa, T. M. Duane, A. Garcia, K. Inaba, D. Khor, V. Anto, J. Sperry, D. Turay, R. M. Nygaard, M. A. Schreiber, T. Enniss, M. McNutt, H. Phelan, K. Smith, F. O. Moore, I. Tabas and J. Dubose (2018). "Circulation first - the time has come to question the sequencing of care in the ABCs of trauma; an American Association for the Surgery of Trauma multicenter trial." *World Journal of Emergency Surgery* **13**(1).
25. Graf, J., M. Cook, S. Schecter, K. Deveney, P. Hofmann, D. Grey, L. Akoko, A. Mwanga, K. Salum and W. Schecter (2018). "Coalition for Global Clinical Surgical Education: The Alliance for Global Clinical Training." *Journal of Surgical Education* **75**(3): 688-696.
26. Haisley, K. R., S. E. Drexel, J. M. Watters, J. G. Hunter and R. J. Mullins (2018). "Major Barbara Stimson: A Historical Perspective on the American Board of Surgery Through the Accomplishments of the First Woman to Achieve Board Certification." *Annals of Surgery* **267**(6): 1000-1006.
27. Hargarten, S. W., E. B. Lerner, M. Gorelick, K. Brasel, T. DeRoos-Cassini and S. Kohlbeck (2018). "Gun violence: A biopsychosocial disease." *Western Journal of Emergency Medicine* **19**(6): 1024-1027.
28. Herrera-Escobar, J. P., S. S. Al Rafai, A. J. Seshadri, C. Weed, M. Apoj, A. Harlow, K. Brasel, G. Kasotakis, H. M. A. Kaafarani, G. Velmahos, A. Salim, A. H. Haider and D. Nehra (2018). "A multicenter study of post-traumatic stress disorder after injury: Mechanism matters more than injury severity." *Surgery (United States)* **164**(6): 1246-1250.
29. Herrera-Escobar, J. P., M. Apoj, C. Weed, A. F. Harlow, S. S. Al Rafai, E. Lilley, G. Kasotakis, K. Brasel, H. M. A. Kaafarani, G. Velmahos, A. Salim and A. H. Haider (2018). "Association of pain after trauma with long-term functional and mental health outcomes." *Journal of Trauma and Acute Care Surgery* **85**(4): 773-779.
30. Hinson, H. E., S. Rowell, C. Morris, A. L. Lin and M. A. Schreiber (2018). "Early fever after trauma: Does it matter?" *Journal of Trauma and Acute Care Surgery* **84**(1): 19-24.
31. Hoareau, G. L., H. Kashtan, L. E. Walker, C. Beyer, A. Wishy, J. Kevin Grayson, J. D. Ross and I. J. Stewart (2018). "A novel perfusion system for damage control of hyperkalemia in swine." *Shock* **50**(6): 677-683.
32. Hodgman, E. I., M. W. Cripps, M. J. Mina, E. M. Bulger, M. A. Schreiber, K. J. Brasel, M. J. Cohen, P. Muskat, J. G. Myers, L. H. Alarcon, M. H. Rahbar, J. B. Holcomb, B. A. Cotton, E. E. Fox, D. J. Del Junco, C. E. Wade and H. A. Phelan (2018). "External validation of a smartphone app model to predict the need for massive transfusion using five different definitions." *Journal of Trauma and Acute Care Surgery* **84**(2): 397-402.
33. Hoops, H. E., M. R. Burt, K. Deveney and K. J. Brasel (2018). "What They May Not Tell You and You May Not Know to Ask: What is Expected of Surgeons in Their First Year of Independent Practice." *Journal of Surgical Education* **75**(6): e134-e141.
34. Hoops, H. E., C. Haley, L. N. Kiraly, E. An, K. J. Brasel and D. Spight (2018). "PGY-specific benchmarks improve resident performance on Fundamentals of Laparoscopic Surgery tasks." *American Journal of Surgery* **215**(5): 880-885.
35. Hunt, J. C., S. A. Chesney, K. Brasel and T. A. Deroos-Cassini (2018). "Six-month follow-up of the injured trauma survivor screen: Clinical implications and future directions." *Journal of Trauma and Acute Care Surgery* **85**(2): 263-270.
36. Jehan, F., M. Khan, J. V. Sakran, M. Khreiss, T. O'Keeffe, A. Chi, N. Kulvatunyou, A. Jain, E. R. Zakaria and B. Joseph (2018). "Perioperative glycemic control and postoperative complications in patients undergoing emergency general surgery: What is the role of Plasma Hemoglobin A1c?" *Journal of Trauma and Acute Care Surgery* **84**(1): 112-117.
37. Jones, A. R., R. P. Patel, M. B. Marques, J. P. Donnelly, R. L. Griffin, J. F. Pittet, J. D. Kerby, S. W. Stephens, S. M. DeSantis, J. R. Hess, H. E. Wang, J. B. Holcomb, C. E. Wade, D. J. del Junco, E. E. Fox, N. Matijevic, J. Podbielski, A. M. Beeler, B. C. Tilley, S. Baraniuk, H. Zhu, J. Nixon, R. Seay, S. N. Appana, H. Yang, M. O. Gonzalez, L. Baer, Y. W. W. Wang, B. S. Hula, E. Espino, A. Nguyen, N. Pawelczyk, K. D. Arora-Nutall, R. Sharma, J. C. Cardenas, E. Rahbar, T. Burnett, D. Clark, G. van Belle, S. May, B. Leroux, D. Hoyt, J. Powell, K. Sheehan, A. Hubbard, A. P. Arkin, J. R. Hess, J. Callum, B. A. Cotton, L. Vincent, T. Welch, T. Poole, E. G. Pivalizza, S. D. Gumbert, Y. Bai, J. J. McCarthy, A. Noland, R. Hobbs, E. M. Bulger, P. Klotz, L. Cattin, K. J. Warner, A. Wilson, D. Boman, N. White, A. Grabinsky, J. A. Daniel-Johnson, M. J. Cohen, R. A. Callcut, M. Nelson, B. Redick, A. Conroy, M. P. Steurer, P. C. Maxim, E. Fiebig, J. Moore, E. Mallari, P. Muskat, J. A. Johannigman, B. R. H. Robinson, R. D. Branson, D. Goma, C. Barczak, S. Bennett, P. M. Carey, C. N. Miller, H. Hancock, C. Rodriguez, K. Inaba, J. G. Zhu, M. D. Wong, M. Menchine, K. Katzberg, S. O. Henderson, R. McKeever, I. A. Shulman, J. M. Nelson, C. W. Tuma, C. Y. Matsushita, T. M. Scalea, D. M. Stein, C. K. Shaffer, C. Wade, A. V. Herrera, S. Kallam, S. E. Wade, S. M. Galvagno, M. J. Fontaine, J. M. Hunt, R. K. Cooke, T. C. Fabian, J. A. Weinberg, M. A. Croce, S. Wilson, S. Panzer-Baggett, L. Waddle-Smith, S. Flax, K. J. Brasel, P. Walsh, D. Milia, A. Nelson, O. Kaslow, T. P. Aufderheide, J. L. Gottschall, E. Carpenter, T. O'Keeffe, L. L. Rokowski, K. R. Denninghoff, D. T. Redford, D. J. Novak, S. Knoll, J. D. Kerby, J. F. Pittet, P. L. Bosarge, A. T. Pierce, C. R. Williams, S. W. Stephens, H. E. Wang, M. B. Marques, M. A. Schreiber, J. M. Watters, S. J. Underwood, T. Groat, C. Newgard, M. Merkel, R. M. Scanlan, B. Miller, S. Rizoli, H. Tien, B. Nascimento, S. Trpcic, S. Sobrian-Couroux, M. Reis, A. Pérez, S. E. Belo, L. Merkle and C. Colavecchia (2018). "Older Blood Is Associated With Increased Mortality and Adverse Events in Massively Transfused Trauma Patients: Secondary Analysis of the PROPPR Trial." *Annals of Emergency Medicine*.
38. Khan, M., F. Jehan, E. M. Bulger, T. O'Keeffe, J. B. Holcomb, C. E. Wade, M. A. Schreiber and B. Joseph (2018). "Severely injured trauma patients with admission hyperfibrinolysis: Is there a role of tranexamic acid? Findings from the PROPPR trial." *Journal of Trauma and Acute Care Surgery* **85**(5): 851-857.
39. Kiraly, L. (2018). "Discussion of "Instant replay: Evaluation of instant video feedback in surgical novices for a laparoscopic gallbladder dissection." *American Journal of Surgery* **215**(5): 948.
40. Kobayashi, L. M., A. Brito, G. Barmparas, P. Bosarge, C. V. Brown, M. Bukur, M. M. Carrick, R. D. Catalano, J. Holly-Nicolas, K. Inaba, S. Kaminski, A. L. Klein, T. Kopelman, E. J. Ley, E. M. Martinez, F. O.
41. Manero A, Smith P, Sparkman J, Dombrowski M, Courbin D, Kester A, Womack I, Chi A. Implementation of 3D Printing Technology in the Field of Prosthetics: Past, Present and Future. Int J Environ Res Public Health. 2019 May 10;16(9).
42. Moore, J. Murry, R. Nirula, D. Paul, J. Quick, O. Rivera, M. Schreiber and R. Coimbra (2018). "Laboratory measures of coagulation among trauma patients on NOAs: Results of the AAST-MIT." *Trauma Surgery and Acute Care Open* **3**(1).
43. Martin, M. J., C. V. R. Brown, D. V. Shatz, H. B. Alam, K. J. Brasel, C. J. Hauser, M. De Moya, E. E. Moore, S. E. Rowell, G. A. Vercruysse, B. J. Baron and K. Inaba (2018). "Evaluation and management of abdominal stab wounds: A Western Trauma Association critical decisions algorithm." *Journal of Trauma and Acute Care Surgery* **85**(5): 1007-1015.
44. McCully, B. H., S. J. Underwood, L. Kiraly, J. B. Holcomb, B. R. H. Robinson, J. P. Minei, R. M. Stewart, B. A. Cotton, N. T. Gordon, D. T. Martin, E. A. Rick, R. K. Dean, C. Wiles, N. Anderson and M. A. Schreiber (2018). "The effects of cryopreserved red blood cell transfusion on tissue oxygenation in obese trauma patients." *Journal of Trauma and Acute Care Surgery* **84**(1): 104-111.
45. Niemann, C. U., K. Broglio and D. Malinoski (2018). "Comments on "Impact of spontaneous donor hypothermia on graft outcomes after kidney transplantation." *American Journal of Transplantation* **18**(3): 763.
46. Nunn, A., P. Prakash, K. Inaba, A. Escalante, Z. Maher, S. Yamaguchi, D. Y. Kim, J. Maclel, W. C. Chiu, B. Drumheller, J. P. Hazelton, K. Mukherjee, X. Luo-Owen, R. M. Nygaard, A. P. Marek, B. C. Morse, C. A. Fitzgerald, P. L. Bosarge, R. S. Jawa, S. E. Rowell, L. J. Magnotti, A. W. Ong, T. S. Brahmhatt, M. D. Grossman and M. J. Seamon (2018). "Occupational exposure during emergency department thoracotomy: A prospective, multi-institution study." *Journal of Trauma and Acute Care Surgery* **85**(1): 78-84.
47. Polderman, K., D. Malinoski, S. Timmerman and T. Keeble (2018). "Current Advances in the Use of Therapeutic Hypothermia." *Therapeutic Hypothermia and Temperature Management* **8**(1): 9-13.
48. Potter, D. R., B. Y. Miyazawa, S. L. Gibb, X. Deng, P. P. Togaratti, R. H. Croze, A. K. Srivastava, A. Trivedi, M. Matthay, J. B. Holcomb, M. A. Schreiber and S. Pati (2018). "Mesenchymal stem cell-derived extracellular vesicles attenuate pulmonary vascular permeability and lung injury induced by hemorrhagic shock and trauma." *Journal of Trauma and Acute Care Surgery* **84**(2): 245-256.
49. Rao, A. J., A. L. Lin, C. Hilliard, R. Fu, T. Lennox, R. R. Barbosa and S. E. Rowell (2018). "Blood Ethanol Levels Are Not Related to Coagulation Changes, as Measured by Thromboelastography, in Traumatic Brain Injury Patients." *World Neurosurgery* **112**: e216-e222.

50. Robinson, B. R. H., M. J. Cohen, J. B. Holcomb, T. A. Pritts, D. Gooma, E. E. Fox, R. D. Branson, R. A. Callcut, B. A. Cotton, M. A. Schreiber, K. J. Brasel, J. F. Pittet, K. Inaba, J. D. Kerby, T. M. Scalea, C. E. Smith S, McCully B, Bommiasamy A, Murphy J, Behrens B, Pati S, Goodman A, Schreiber M. A combat relevant model for the creation of acute lung injury in swine. *J Trauma Acute Care Surg*. 2018 Jul;85(1S Suppl 2):S39-S43.
51. Wade and E. M. Bulger (2018). "Risk factors for the development of acute respiratory distress syndrome following hemorrhage." *Shock* **50**(3): 258-264.
52. Stein, D. M., R. A. Kozar, D. H. Livingston, F. Luchette, S. D. Adams, V. Agrawal, S. Arbabi, J. Ballou, R. D. Barraco, A. C. Bernard, W. L. Biffi, P. L. Bosarge, K. J. Brasel, Z. Cooper, P. A. Efron, S. M. Fakhry, C. A. Hartline, F. Hwang, B. A. Joseph, S. J. Kurek, F. A. Moore, A. C. Mosenthal, A. S. Pathak, M. S. Truitt and J. A. Yelon (2018). "Geriatric traumatic brain injury-What we know and what we don't." *Journal of Trauma and Acute Care Surgery* **85**(4): 788-798.
53. Swol, J., D. Brodie, L. Napolitano, P. K. Park, R. Thiagarajan, R. P. Barbaro, R. Lorusso, D. McMullan, N. Cavarocchi, A. A. Hssain, P. Rycus and D. Zonies (2018). "Indications and outcomes of extracorporeal life support in trauma patients." *Journal of Trauma and Acute Care Surgery* **84**(6): 831-837.
54. Taylor, J. R., E. E. Fox, J. B. Holcomb, S. Rizoli, K. Inaba, M. A. Schreiber, K. Brasel, T. M. Scalea, C. E. Wade, E. Bulger and B. A. Cotton (2018). "The hyperfibrinolytic phenotype is the most lethal and resource intense presentation of fibrinolysis in massive transfusion patients." *Journal of Trauma and Acute Care Surgery* **84**(1): 25-30.
55. Taylor, L. J., S. K. Johnson, M. J. Nabozny, J. L. Tucholka, N. M. Steffens, K. L. Kwekkeboom, K. J. Brasel, T. C. Campbell and M. L. Schwarze (2018). "Barriers to Goal-concordant Care for Older Patients with Acute Surgical Illness." *Annals of Surgery* **267**(4): 677-682.
56. Wang, Y., S. Pati and M. Schreiber (2018). "Cellular therapies and stem cell applications in trauma." *American Journal of Surgery* **215**(5): 963-972.
57. Wei, S., E. Gonzalez Rodriguez, R. Chang, J. B. Holcomb, L. S. Kao, C. E. Wade, J. B. Holcomb, C. E. Wade, D. J. del Junco, E. E. Fox, N. Matijevic, J. Podbielski, A. M. Beeler, B. C. Tilley, S. Baraniuk, H. Zhu, J. Nixon, R. Seay, S. N. Appana, H. Yang, M. O. Gonzalez, L. Baer, Y. W. Willa Wang, B. S. Hula, E. Espino, A. Nguyen, N. Pawelczyk, K. D. Arora-Nutall, R. Sharma, J. C. Cardenas, E. Rahbar, T. Burnett, D. Clark, G. van Belle, S. May, B. Leroux, D. Hoyt, J. Powell, K. Sheehan, A. Hubbard, A. P. Arkin, J. R. Hess, J. Callum, B. A. Cotton, L. Vincent, T. Welch, T. Poole, E. G. Pivalizza, S. D. Gumbert, Y. Bai, J. J. McCarthy, A. Noland, R. Hobbs, E. M. Bulger, P. Klotz, L. Cattin, K. J. Warner, A. Wilson, D. Boman, N. White, A. Grabinsky, J. A. Daniel-Johnson, M. J. Cohen, R. A. Callcut, M. Nelson, B. Redick, A. Conroy, M. P. Steurer, P. C. Maxim, E. Fiebig, J. Moore, E. Mallari, P. Muskat, J. A. Johannigman, B. R. Robinson, R. D. Branson, D. Gooma, C. Barczak, S. Bennett, P. M. Carey, C. N. Miller, H. Hancock, C. Rodriguez, K. Inaba, J. G. Zhu, M. D. Wong, M. Menchine, K. Katzberg, S. O. Henderson, R. McKeever, I. A. Shulman, J. M. Nelson, C. W. Tuma, C. Y. Matsushita, T. M. Scalea, D. M. Stein, C. K. Shaffer, C. Wade, A. V. Herrera, S. Kallam, S. E. Wade, S. M. Galvagno, M. J. Fontaine, J. M. Hunt, R. K. Cooke, T. C. Fabian, J. A. Weinberg, M. A. Croce, S. Wilson, S. Panzer-Baggett, L. Waddle-Smith, S. Flax, K. J. Brasel, P. Walsh, D. Milia, A. Nelson, O. Kaslow, T. P. Aufderheide, J. L. Gottschall, E. Carpenter, T. O'Keeffe, L. L. Rokowski, K. R. Denninghoff, D. T. Redford, D. J. Novak, S. Knoll, J. D. Kerby, J. F. Pittet, P. L. Bosarge, A. T. Pierce, C. R. Williams, S. W. Stephens, H. E. Wang, M. B. Marques, M. A. Schreiber, J. M. Watters, S. J. Underwood, T. Groat, C. Newgard, M. Merkel, R. M. Scanlan, B. Miller, S. Rizoli, H. Tien, B. Nascimento, S. Trpcic, S. Sobrian-Couroux, M. Reis, A. Pérez, S. E. Belo, L. Merkley and C. Colavecchia (2018). "Elevated Syndecan-1 after Trauma and Risk of Sepsis: A Secondary Analysis of Patients from the Pragmatic, Randomized Optimal Platelet and Plasma Ratios (PROPPR) Trial." *Journal of the American College of Surgeons* **227**(6): 587-595.
58. Yonge, J. D., P. K. Bohan, J. J. Watson, C. R. Connelly, L. Eastes and M. A. Schreiber (2018). "The Respiratory Rate: A Neglected Triage Tool for Pre-hospital Identification of Trauma Patients." *World Journal of Surgery* **42**(5): 1321-1326.
59. Zilberman-Rudenko, J., F. Z. Zhao, S. E. Reitsma, A. Mitrugno, J. Pang, J. J. Shatzel, B. Rick, C. Tyrrell, W. Hasan, O. J. T. McCarty and M. A. Schreiber (2018). "Effect of Pneumatic Tubing System Transport on Platelet Apheresis Units." *Cardiovascular Engineering and Technology* **9**(3): 515-527.
60. Zonies, D., J. Elterman, C. Burns, V. Paul, J. Oh and J. Cannon (2018). "Trauma patients are safe to fly 72 hours after tube thoracostomy removal." *Journal of Trauma and Acute Care Surgery* **85**(3): 491-494.



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 hemorrhage 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



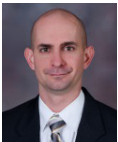
**Darren Malinoski, M.D.**

Speaking topics: General trauma; Organ donation



**Susan Rowell, M.D.**

Speaking topics: Traumatic brain injury; Tranexamic acid in trauma



**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 Kirker**

Trauma nurse practitioner



**Ryan McMahon**

Trauma physician assistant



**Scott Sherry**

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**Michelle Simons**

Trauma nurse practitioner



**Amanda Staudt**

Trauma nurse practitioner



**Jake Wheeler**

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**Kenneth Azarow, M.D.**



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**Sanjay Krishnaswami, M.D.**



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