



2024

ANNUAL REPORT



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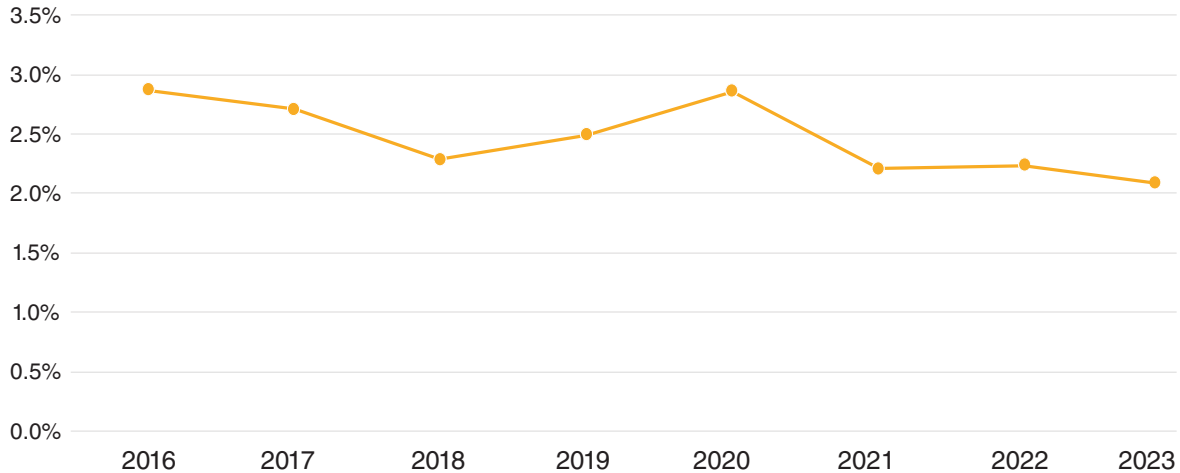
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MISSION STATEMENT

RIGHT PATIENT. RIGHT PLACE. RIGHT TIME.

To Provide the Highest Quality of Care to Trauma Patients Across the Region by Rigorously Evaluating and Improving Outcomes, Optimizing Resources, and Providing Education across the Region Utilizing a Collaborative Approach with Hospitals, Emergency Medical Services and the Public Health Services.

OVERALL MORTALITY FOR THE NOTS REGION



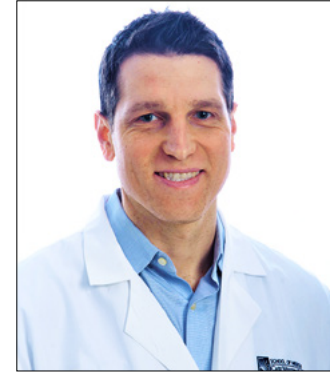
EXECUTIVE SUMMARY

GREETING FROM OUR MEDICAL DIRECTOR

I am excited to share with you the 2024 Northern Ohio Trauma System annual report. I would first like to thank my predecessor, Glen Tinkoff, who was immensely helpful to me as I transitioned into the role as NOTS trauma medical director earlier this year. I would also like to thank our NOTS Director, Danielle Rossler, and our Trauma Data Specialist, Sara Arida, who both have worked extremely hard putting this report together. Through the collaboration of the three hospital systems that comprise the Northern Ohio Trauma System, we continue to fulfill our mission of providing the highest quality of care to trauma patients across the region by rigorously evaluating and improving outcomes, optimizing resources and providing education across the region. The 2024 report provides an annual accounting of all patients that were treated at our regional trauma centers who met trauma activation criteria during 2023, as well as patients treated at

our region's Adult and Pediatric Burn Center. We are proud to see a decrease in overall mortality in 2023 compared to 2022, including a decrease in mortality due to gunshot wounds, often the most severe traumas. However, the report also shows that gun violence continues to be a significant problem in our region, with adolescents and young adults affected the most, leading to significant loss of years of potential life. We also continue to see an increase in the number of elderly falls that lead to hospitalization. Both of these problems will require a multidisciplinary and collaborative approach utilizing education and advocacy for the most vulnerable citizens in our region. We hope you find the report informative and evidence of our commitment to serving the citizens of Northeast Ohio.

Sincerely,
Justin Dvorak, MD



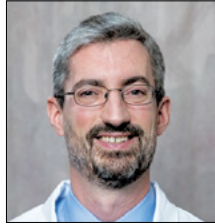
JUSTIN DVORAK, MD
Trauma Medical Director, NOTS

"We continue to fulfill our mission of providing the highest quality of care to trauma patients across the region..."

NOTS STAFF



JUSTIN DVORAK, MD
Trauma Medical Director, NOTS



**MICHAEL DINGELDEIN,
MD, FACS, FAAP, FCCM**
Trauma Pediatric
Medical Director, NOTS



**DANIELLE ROSSLER,
MBA, BSN, RN**
Director, NOTS



**MONI JAMES,
EMSI, BPH**
EMS/ATLS Coordinator



**SARA ARIDA,
CSTR, CAISS, RHIT**
Data Specialist



CURRENT NOTS HOSPITALS

LEVEL I

1. Cleveland Clinic Akron General
2. MetroHealth Medical Center (Adult)
3. University Hospitals Cleveland Medical Center
4. University Hospitals Rainbow Babies & Children's Hospital

LEVEL II

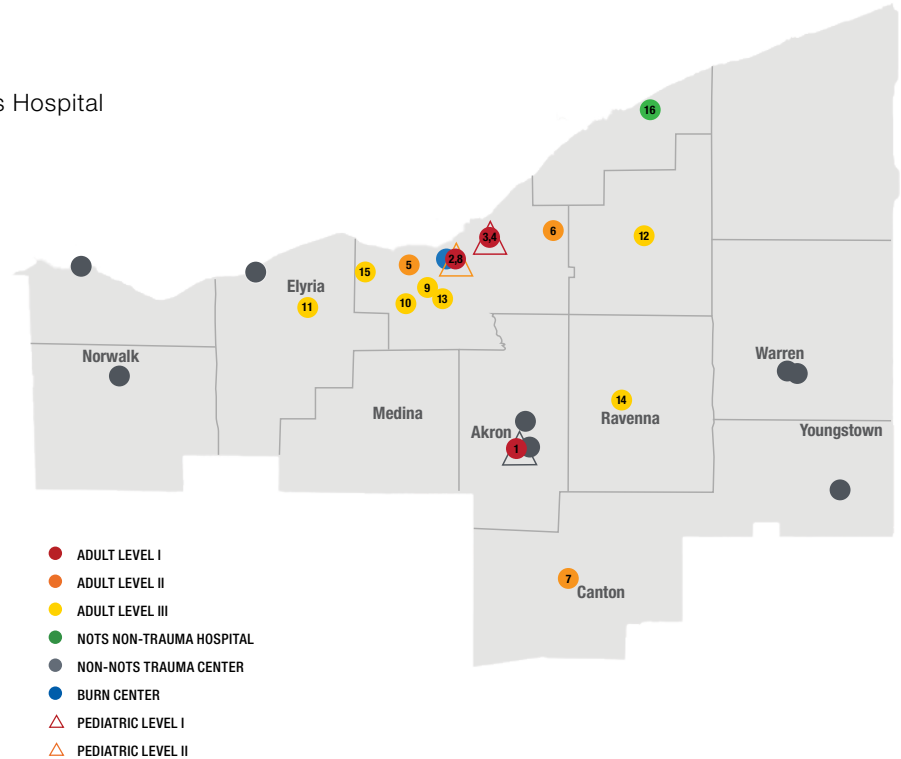
5. Cleveland Clinic Fairview Hospital
6. Cleveland Clinic Hillcrest Hospital
7. Cleveland Clinic Mercy Hospital - Canton
8. MetroHealth Medical Center (Pediatric)

LEVEL III

9. MetroHealth Parma Medical Center
10. Southwest General Health Center
11. UH Elyria Medical Center
12. UH Geauga Medical Center
13. UH Parma Medical Center
14. UH Portage Medical Center
15. UH St. John Medical Center
16. UH Lakewest Medical Center

BURN CENTER

17. MetroHealth Medical Center

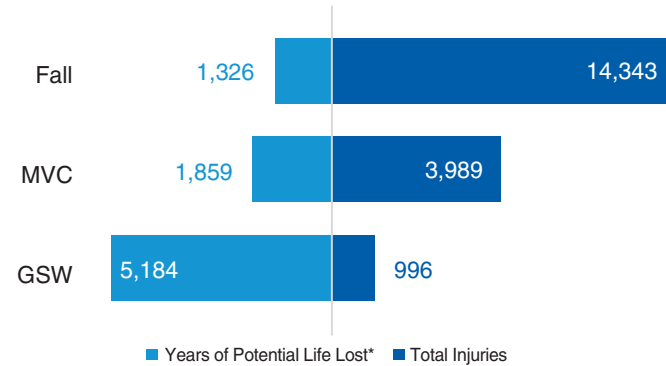


YEARS OF POTENTIAL LIFE LOST

Years of potential life lost (YPLL) is measure by the years a person would have lived had they not died prematurely. This is used to give an idea of the population burden of disease. For example, a high amount of YPLLs can point to lost contributions a person could have made to society. In these calculations, 75 years was used as the reference life expectancy.

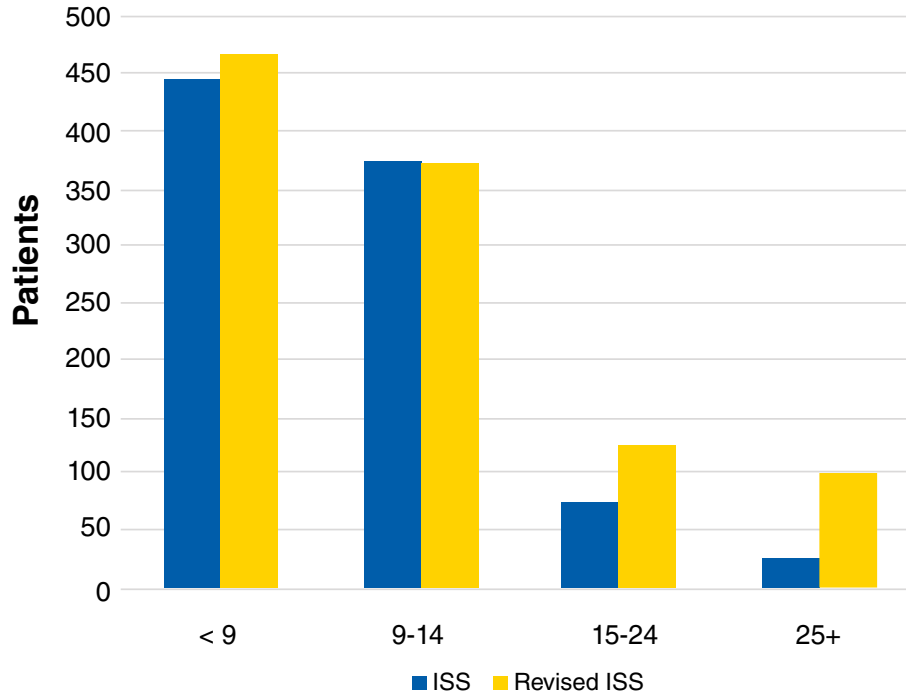
We looked at YPLLs for the top three mechanisms of injury in 2023: falls, motor vehicle collisions (MVC) and gunshot wounds (GSW). YPLLs were inversely proportional to total injuries of that mechanism, with falls having the most injuries but fewest YPLLs and GSWs having to least injuries but highest YPLLs. This is because falls tend to be more fatal in older individuals and GSWs in general occur more often in younger individuals.

YEARS OF POTENTIAL LIFE LOST FOR TOP THREE MECHANISMS OF INJURY



	TOTAL INJURIES	DEATHS	MORTALITY	YPLL*	MEAN YPLL PER DEATH	TOTAL YPLL PER DEATH
FALL	14,343	228	1.6%	1,326	5.8	1,326
MVC	3,989	70	1.8%	1,859	26.6	1,859
GSW	996	125	12.6%	5,184	41.5	5,184

ISS VS REVISED ISS

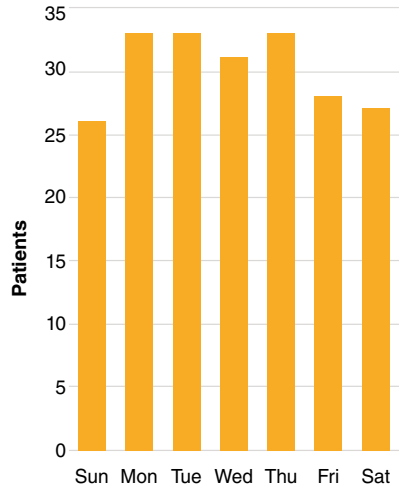


The graph on the left shows the original ISS* for patients' injuries, calculated at the outside facility within the NOTS region. Once the patient is transferred to the appropriate level trauma center, the receiving NOTS facility calculates a revised ISS based on further investigation into the patient's injuries. This graph shows the importance of having a regional trauma system, getting the right patients to the right place, at the right time.

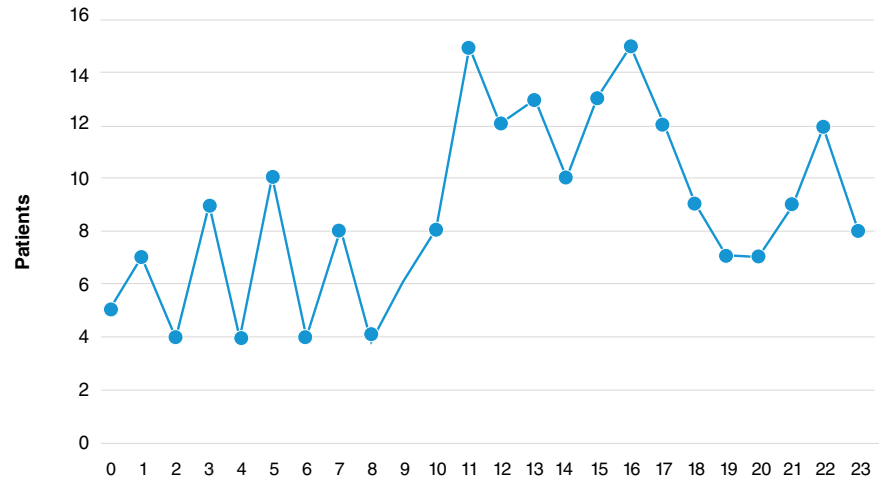
*The Injury Severity Score (ISS) is an established medical score to assess trauma severity. It correlates with mortality, morbidity and hospitalization time after trauma. It is used to define the term major trauma. A major trauma (or polytrauma) is defined having an Injury Severity Score greater than 15.

NOTS REGIONAL BURN CENTER, METROHEALTH MEDICAL CENTER

BY DAY OF WEEK

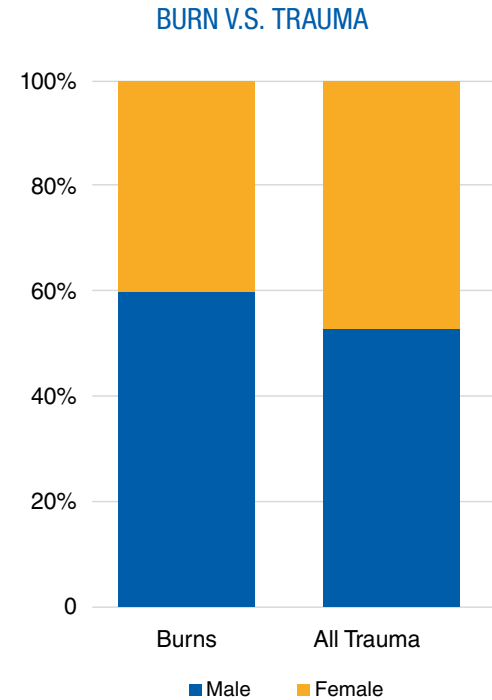
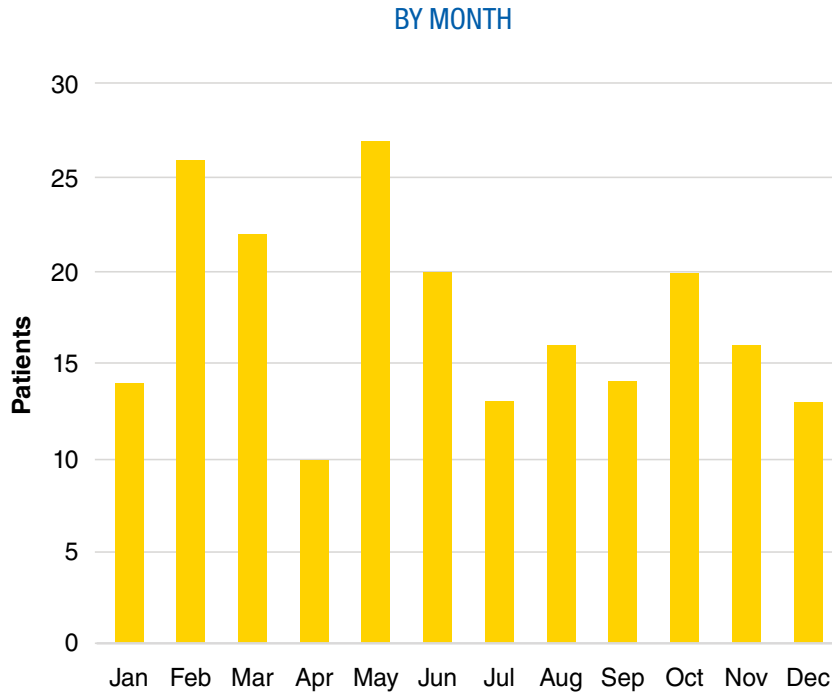


BY HOUR OF DAY

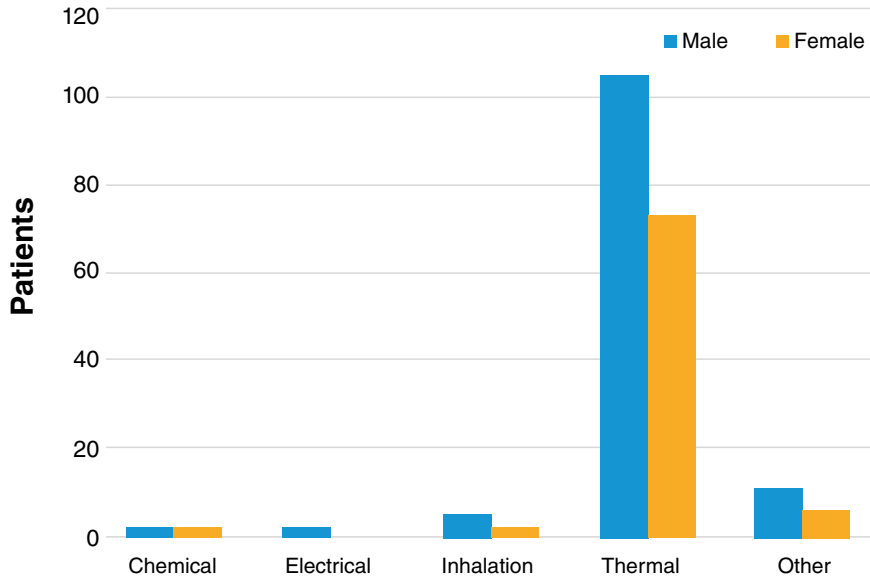


MetroHealth's Burn Center is an American Burn Association (ABA) verified Adult AND Pediatric burn care center. Our center has served the Northeast Ohio community for over 50 years. With all the resources of an adult Level 1 trauma center, our burn center continues to provide the highest level of burn care available. We are committed to improving burn care quality through prevention, education and research. MetroHealth's Burn Center maintains a center of distinction with resources such as adult and pediatric support groups, comprehensive outpatient clinic and the Institute for Burn Ethics (in partnership with Case Western Reserve University).

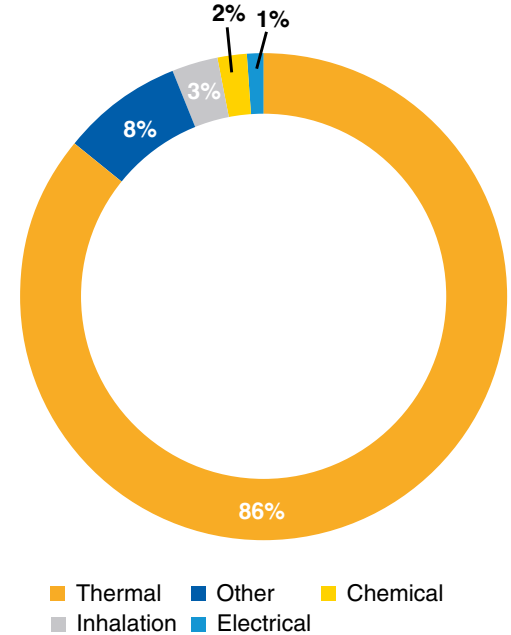
NOTS REGIONAL BURN CENTER, METROHEALTH MEDICAL CENTER



MECHANISM OF INJURY



TYPES OF BURNS



Chemical burn: A chemical burn is damage to tissue on the body due to a harsh or corrosive substance.

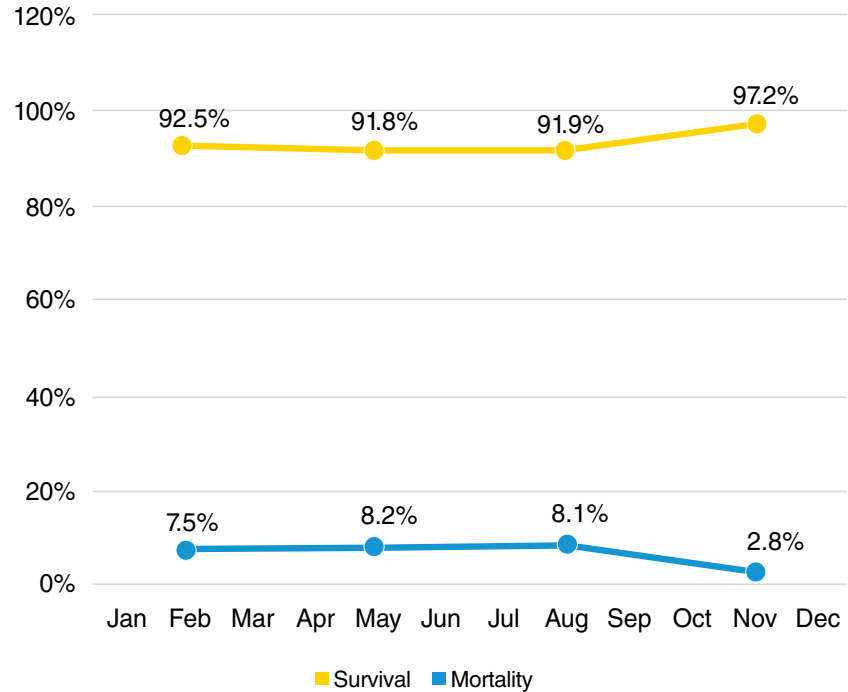
Thermal burn: A thermal burn is most common when skin comes into contact with a hot object, such as boiling water, a hot surface on a stovetop, or steam from an iron.

Electrical Burn: An electrical burn is a burn that results from electricity passing through the body causing rapid injury.



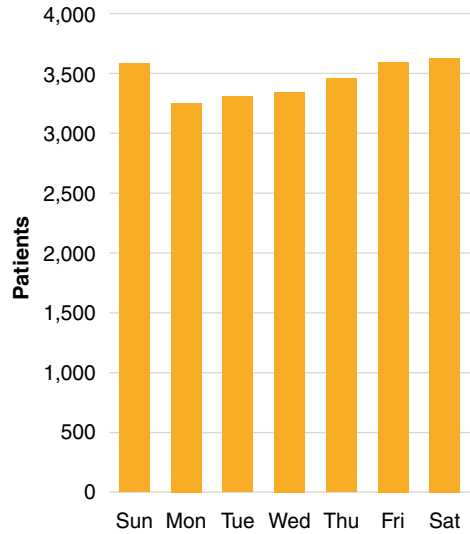
NOTS REGIONAL BURN CENTER, METROHEALTH MEDICAL CENTER

SURVIVAL AND MORTALITY

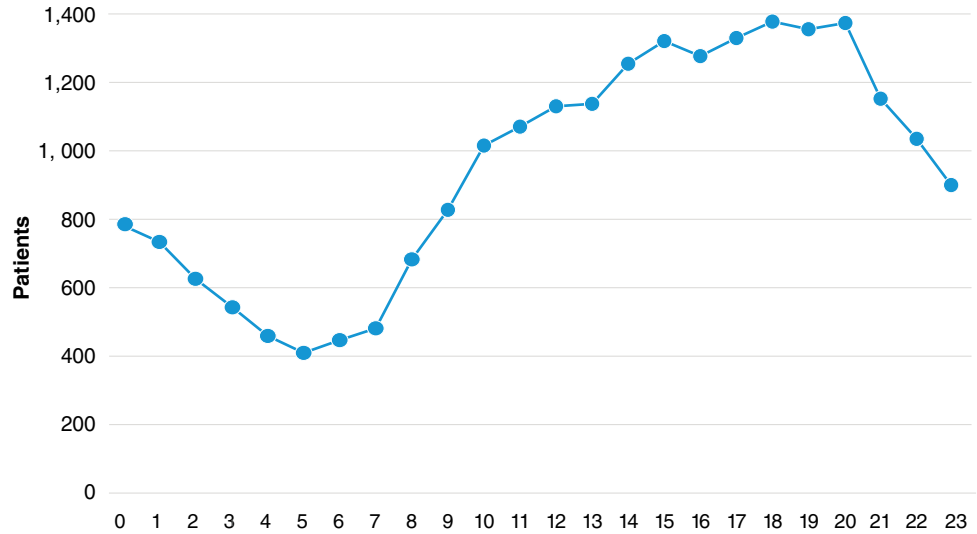


FREQUENCY OF TRAUMA

BY DAY OF WEEK

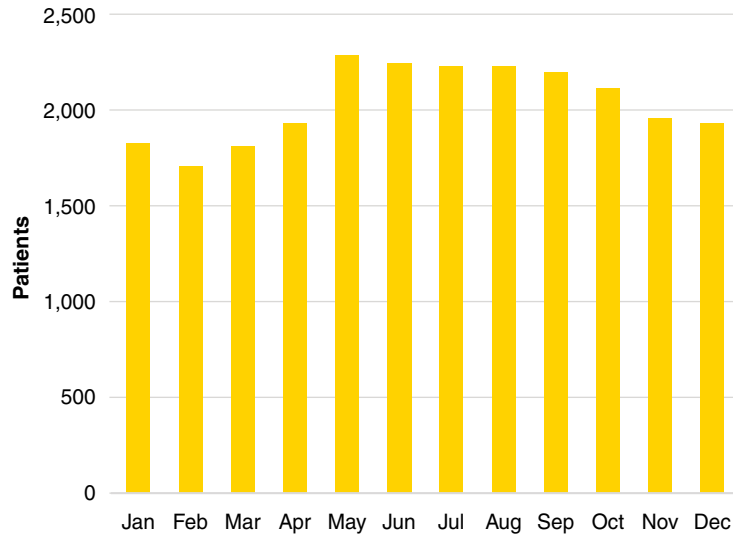


BY HOUR OF DAY

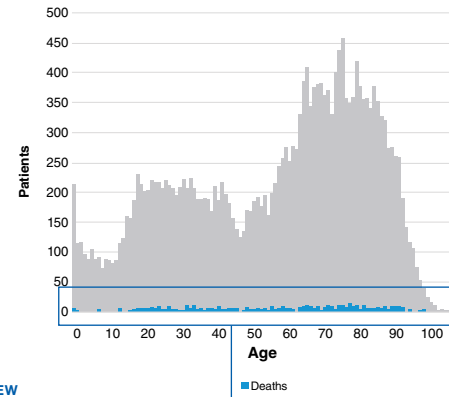


FREQUENCY OF TRAUMA

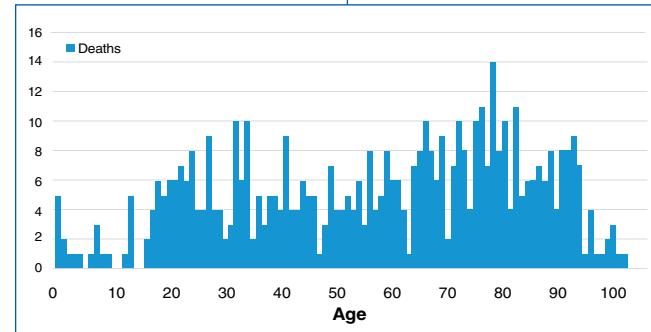
BY MONTH



BY AGE



ENLARGED VIEW

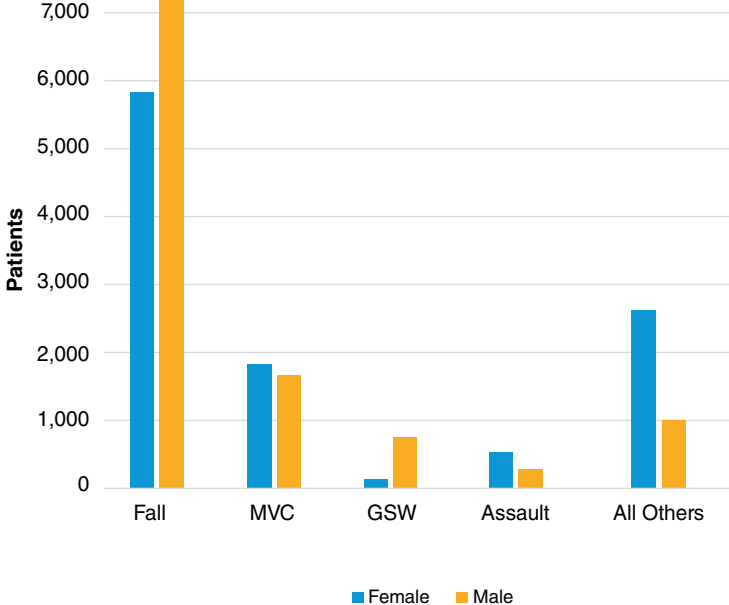


MECHANISMS OF INJURY

BY AGE

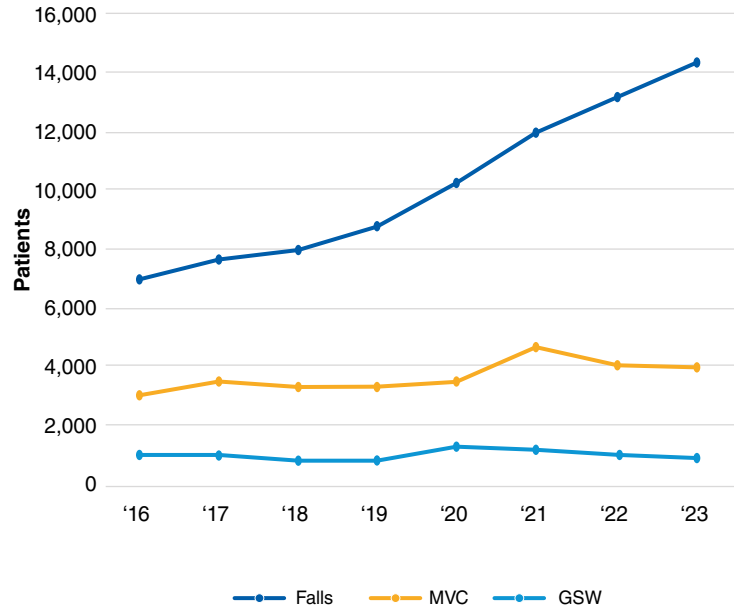


BY GENDER

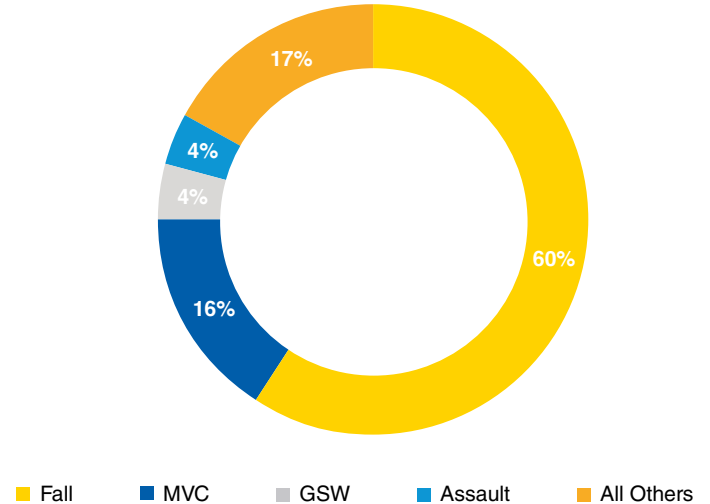


MECHANISMS OF INJURY

BY YEAR



ALL PATIENTS

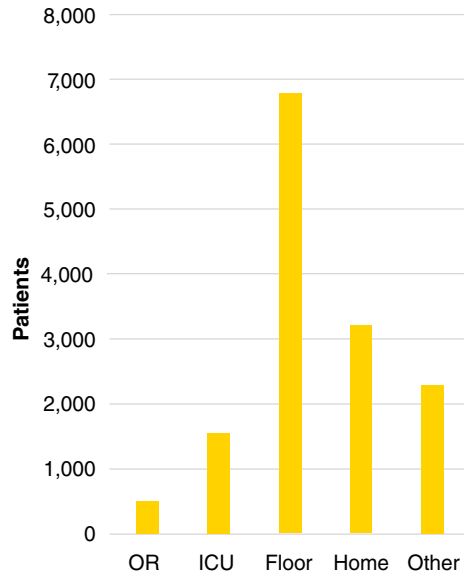


Note: All others includes: Asphyxiation, Bicycle, Biting, Burn, Drowning, Hanging, Horse & Rider, Motorcycle, Not Documented, Off Road/Other Vehicle, Other Blunt, Other Penetrating, Pedestrian Struck, Sport Injury, Stabbing, Unknown and Watercraft

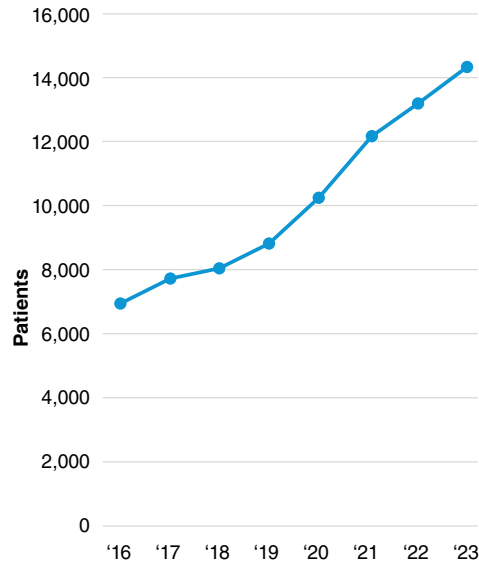
Note: The increase of falls is due to the increase of Level III trauma center data being sent to NOTS.

FALLS

BY ED DISPOSITION

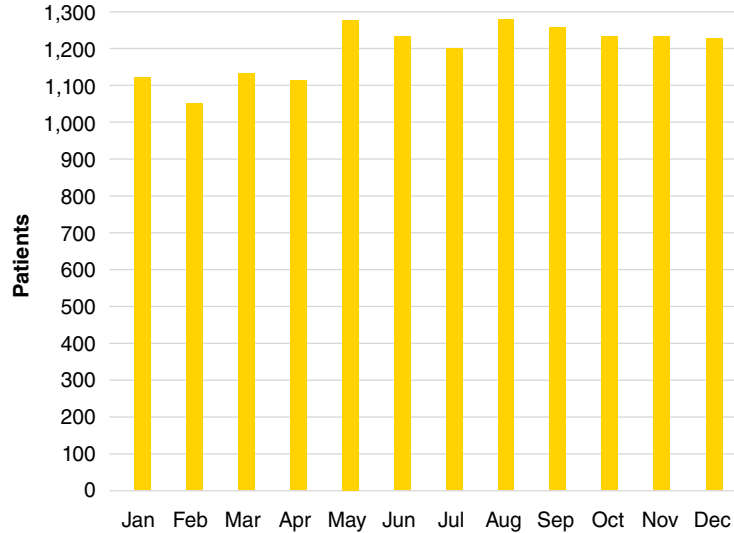


BY YEAR

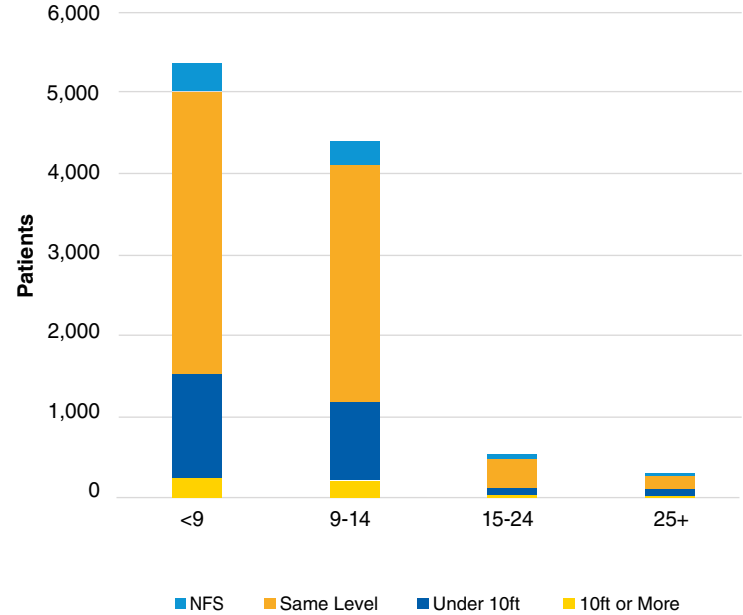


FALLS

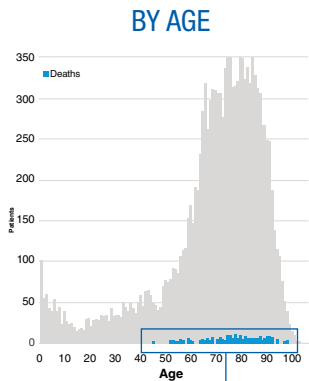
BY MONTH



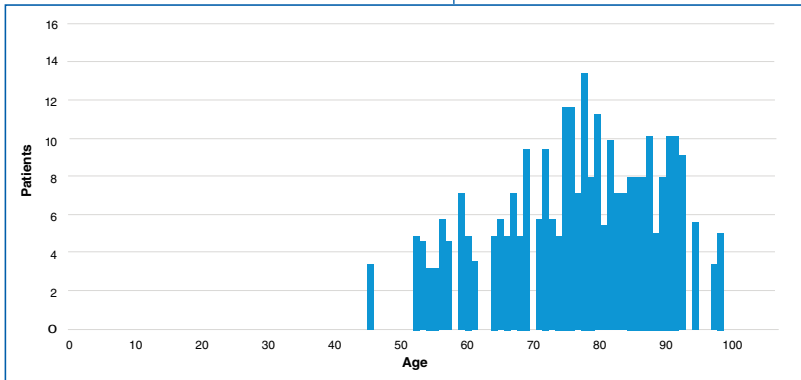
BY INJURY SEVERITY SCORE (ISS)



Note: The increase of falls is due to the increase of Level III trauma center data being sent to NOTS.



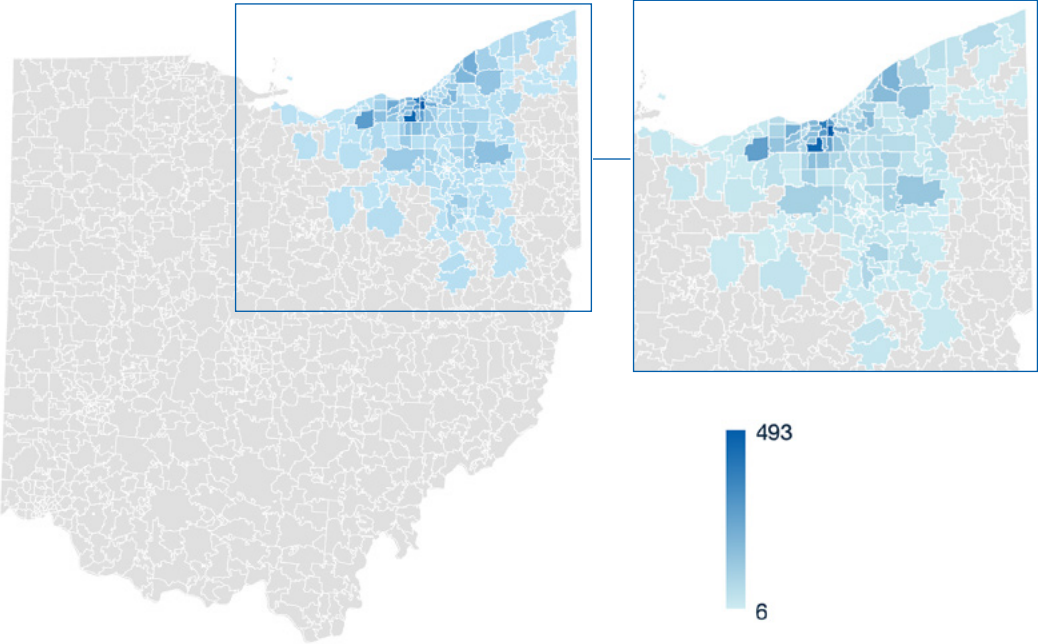
ENLARGED VIEW





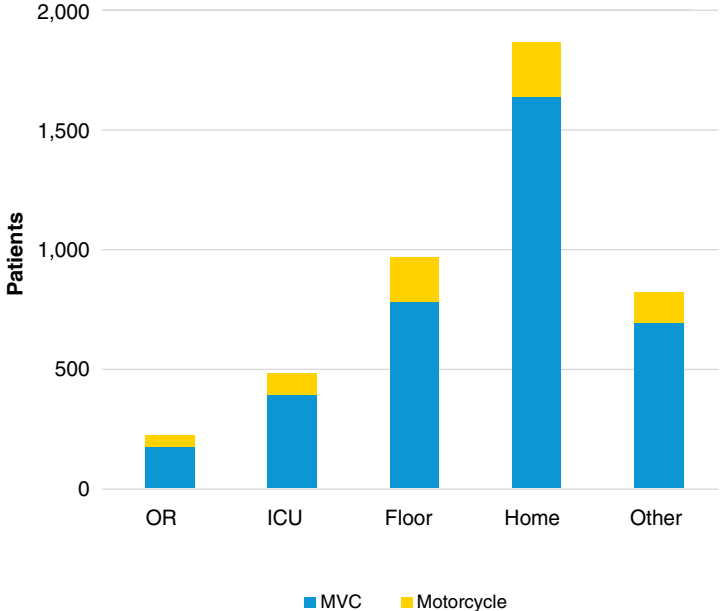
FALLS

FALLS IN THE NOTS REGION

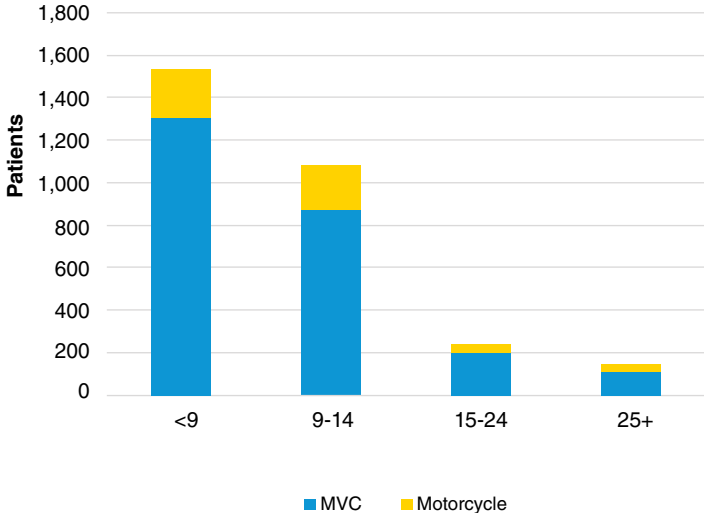


MOTOR VEHICLE AND MOTORCYCLE CRASHES

BY ED DISPOSITION

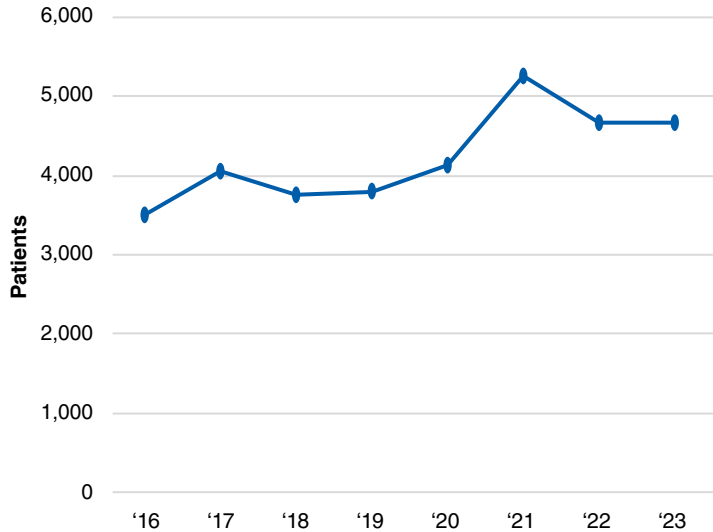


BY INJURY SEVERITY SCORE (ISS)

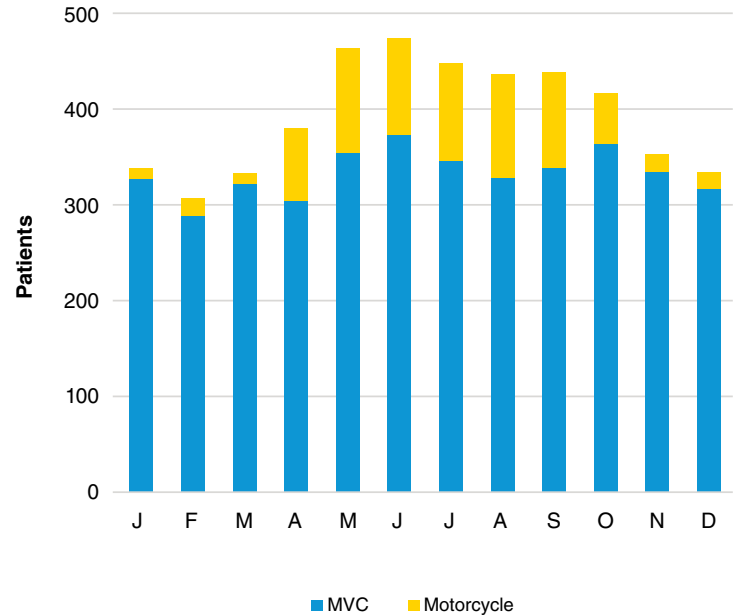


MOTOR VEHICLE AND MOTORCYCLE CRASHES

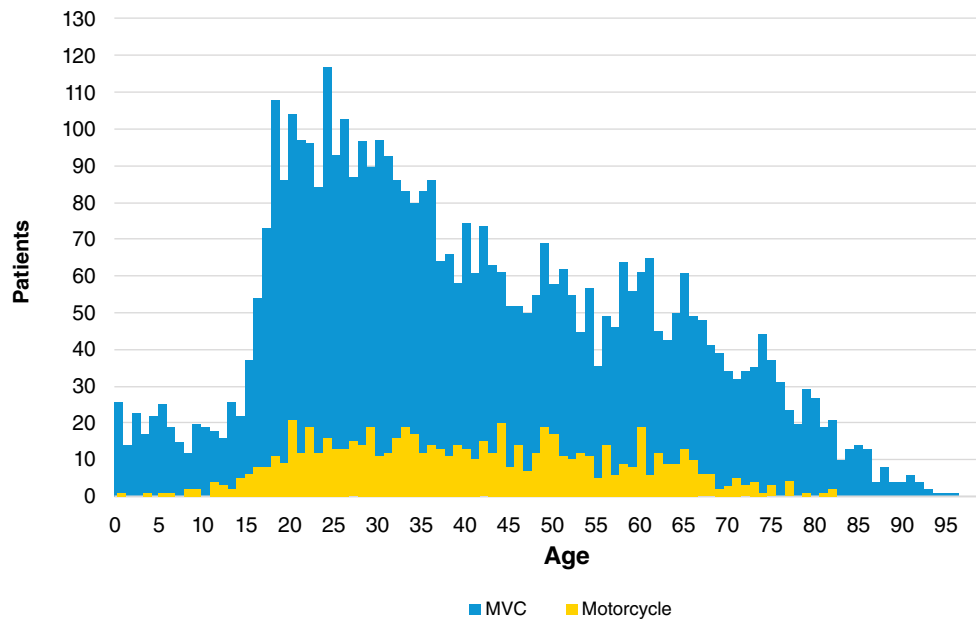
BY YEAR



BY MONTH

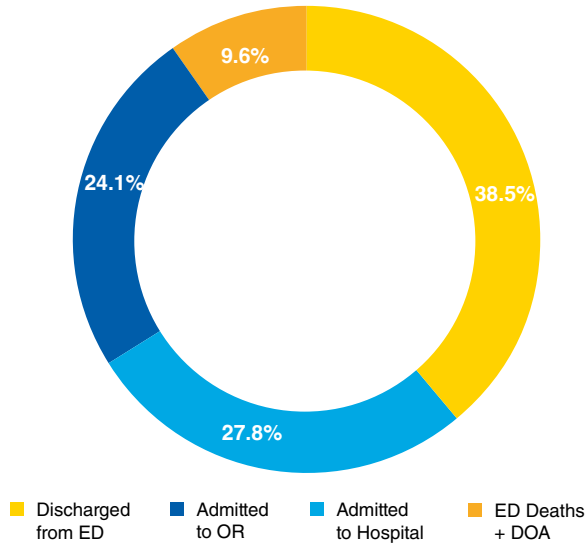


BY AGE

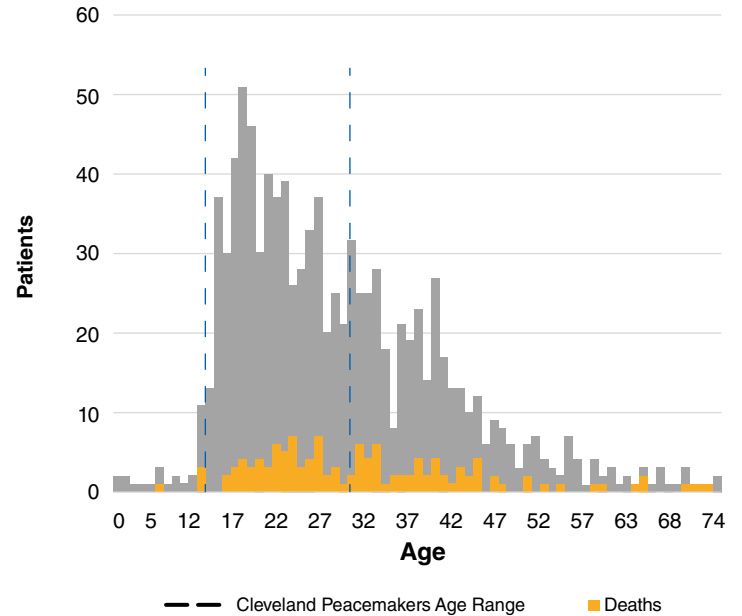


GUNSHOT WOUNDS

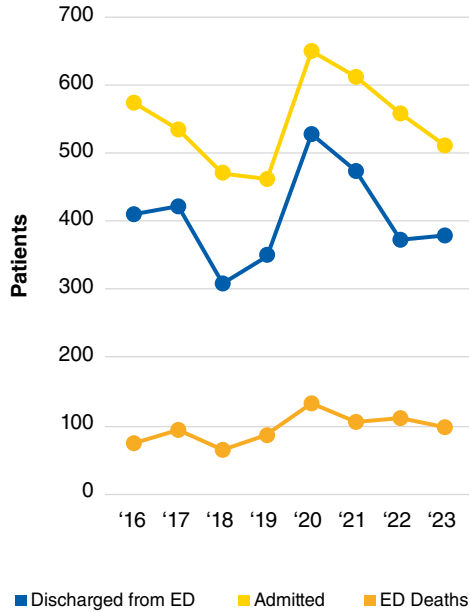
BY ED DISPOSITION



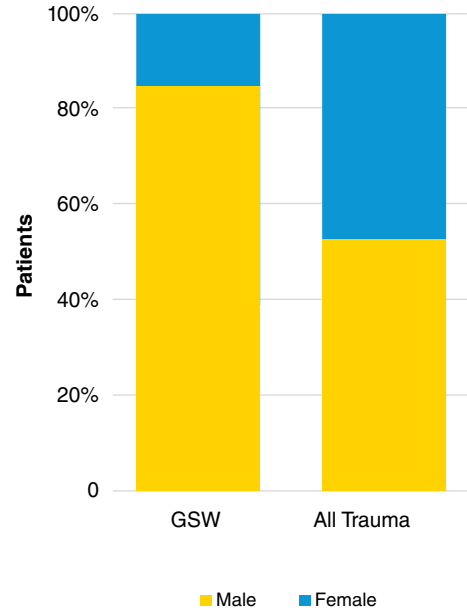
BY AGE



BY YEAR AND ED DISPOSITION



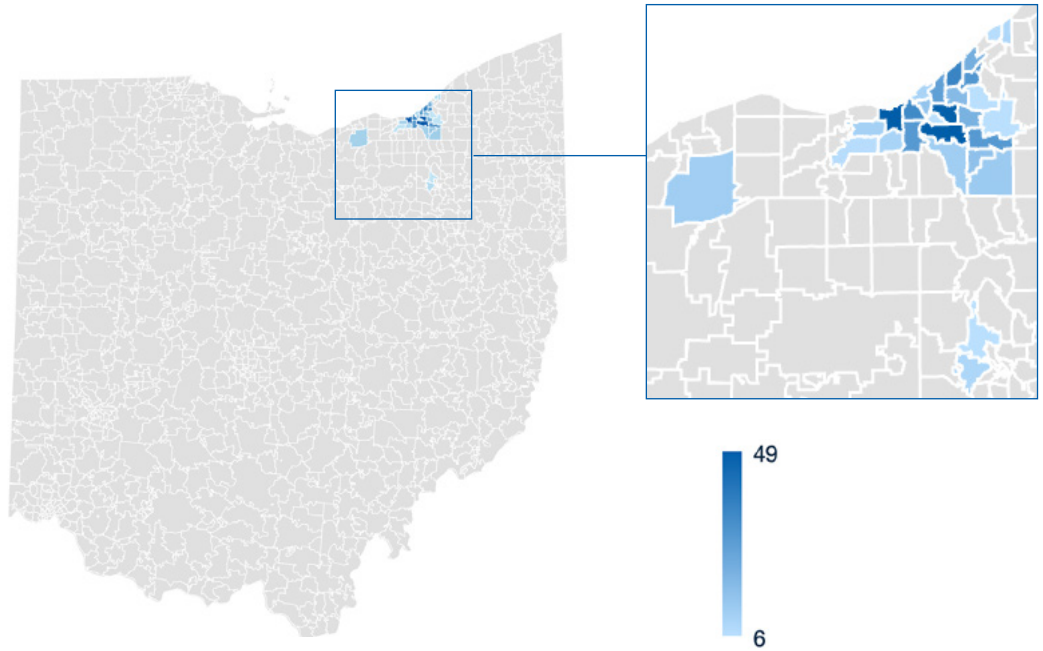
GSW VS. ALL TRAUMA BY GENDER



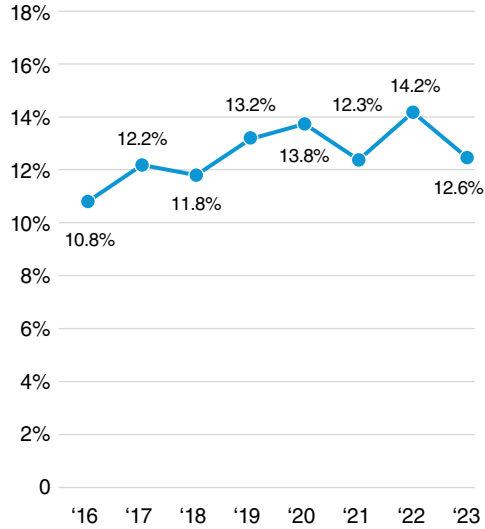


GUNSHOT WOUNDS

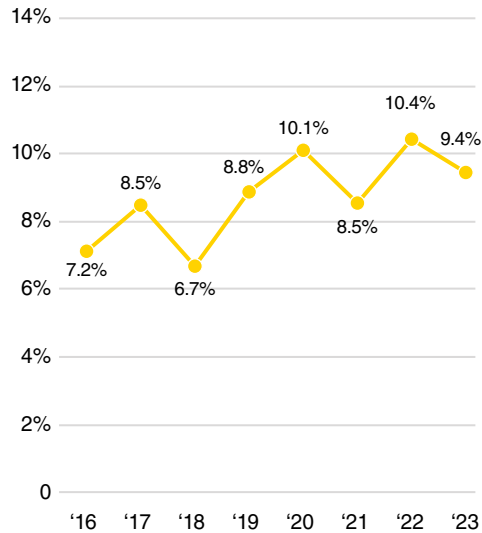
GSW FOR CLEVELAND WARDS



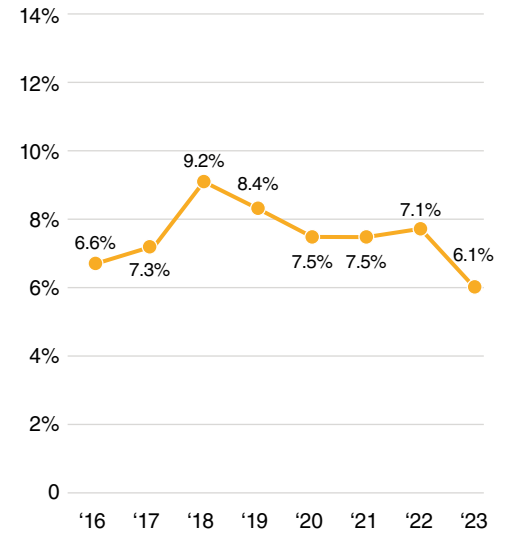
MORTALITY BY YEAR



ED MORTALITY BY YEAR



ADMITTED MORTALITY BY YEAR





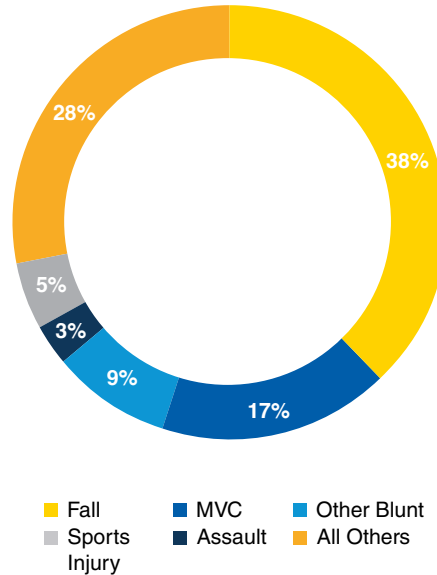
	2016	2017	2018	2019	2020	2021	2022	2023
ED DEATHS	76	89	56	79	134	103	111	94
ADMITTED DEATHS	38	39	43	39	49	46	43	31
TOTAL	114	128	99	118	183	149	154	125
ALL GSW	1,060	1,049	838	893	1,327	1,209	1,064	996

PEDIATRIC AND ADOLESCENT 14 YEARS AND YOUNGER

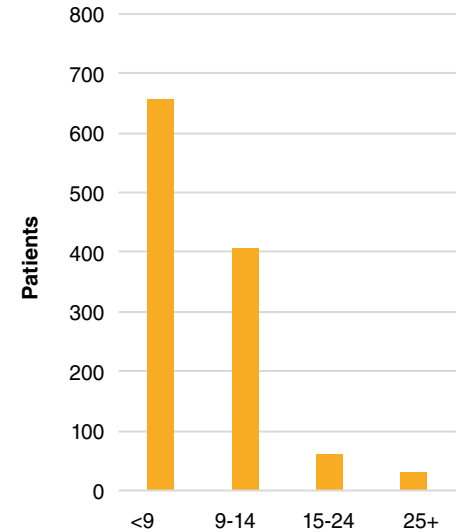
MECHANISM OF INJURY	PATIENTS
FALL	603
MVC	272
OTHER BLUNT MECHANISM	143
SPORT	89
BICYCLE	71
OTHER VEHICLE/OFF ROAD (ATV, ANIMAL, GOLF CART)	59
PEDESTRIAN	56
ANIMAL INJURY (INCLUDES BITE AND STRUCK BY)	55
BURN	55
STRUCK BY OR AGAINST	44
GSW	42
ASSAULT	41
MCC	22
ALL OTHERS*	52
GRAND TOTAL	1,604

*All others includes: Asphyxiation, Bicycle, Biting, Burn, Drowning, Hanging, Horse & Rider, Motorcycle, Not Documented, Off Road/ Other Vehicle, Other Blunt, Other Penetrating, Pedestrian Struck, Sport Injury, Stabbing, Unknown and Watercraft

MECHANISM OF INJURY

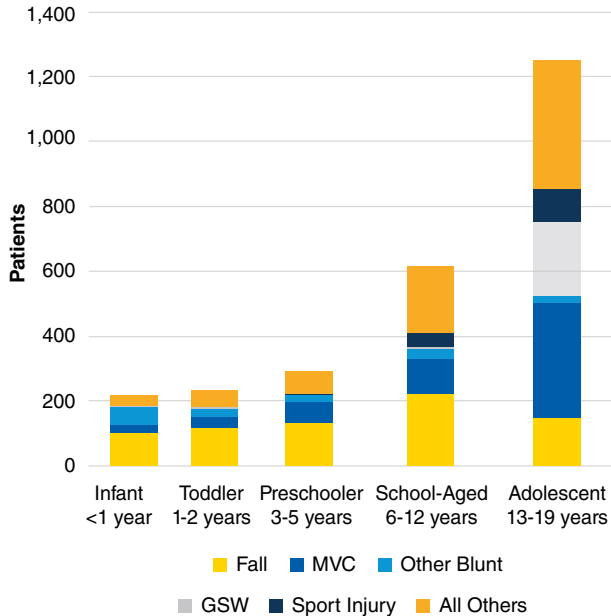


BY INJURY SEVERITY SCORE (ISS)



PEDIATRIC AND ADOLESCENT 19 YEARS AND YOUNGER

MECHANISM OF INJURY BY AGE GROUP

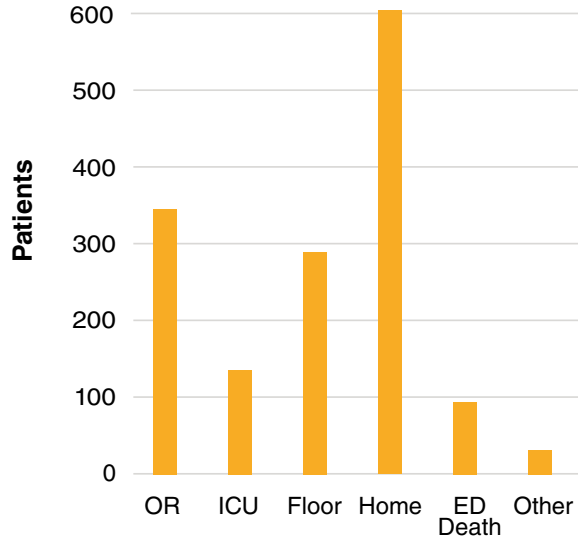


PEDIATRIC MECHANISM	INFANT <1 YEAR	TODDLER 1-2 YEARS	PRESCHOOLER 3-5 YEARS	SCHOOL-AGED 6-12 YEARS	ADOLESCENT 12-19 YEARS
FALL	101	115	133	221	146
MVC	25	37	62	107	357
OTHER BLUNT	57	26	25	31	18
GSW		6		12	230
SPORT INJURY		0		43	98
ALL OTHERS	33	51	68	206	402

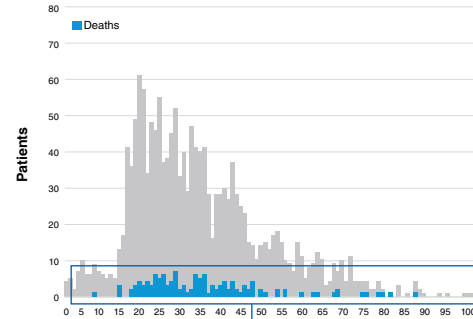
Note: Due to small case counts in some categories, some cells were combined to protect patient privacy

PENETRATING TRAUMA

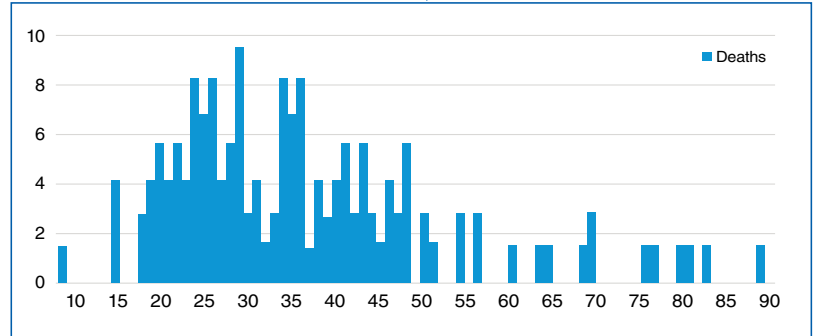
BY ED DISPOSITION



BY AGE

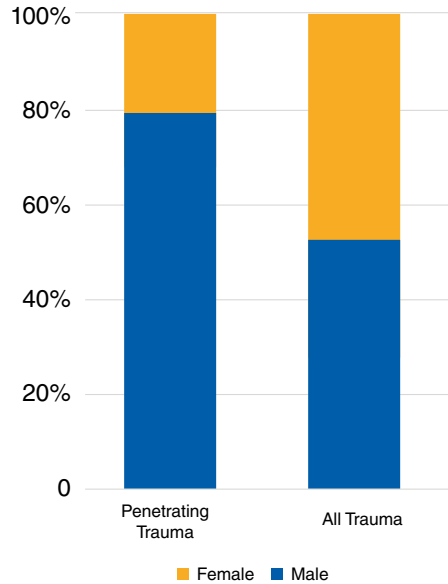


ENLARGED VIEW

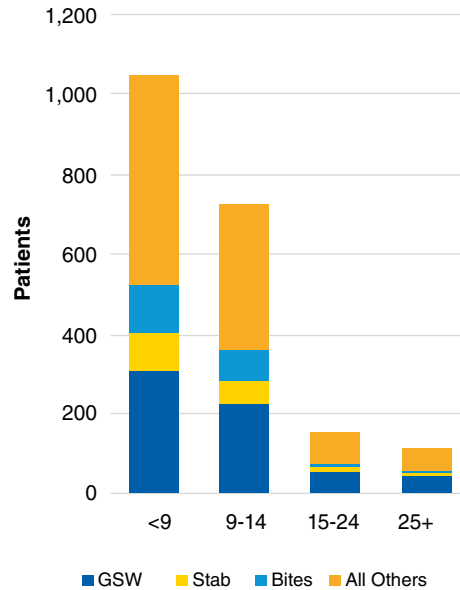


PENETRATING TRAUMA

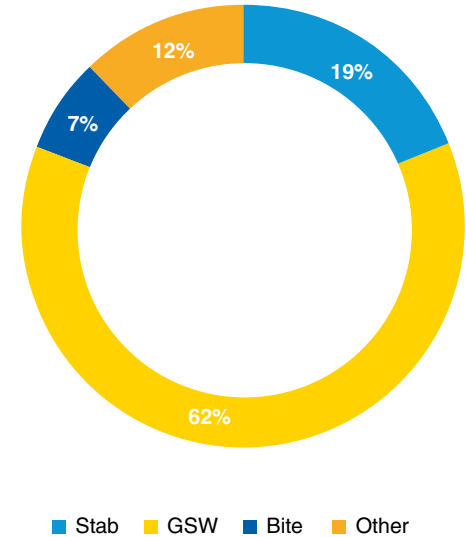
BY GENDER



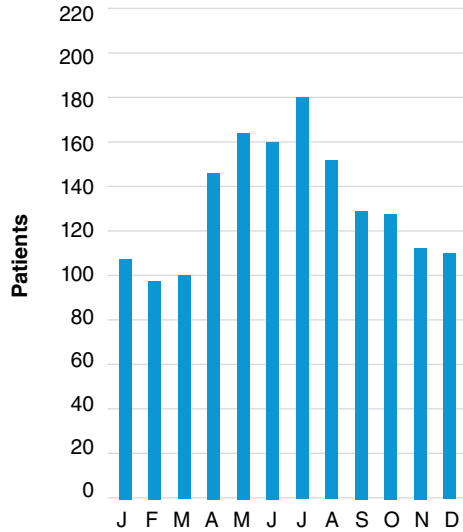
BY INJURY SEVERITY SCORE (ISS) AND MECHANISM



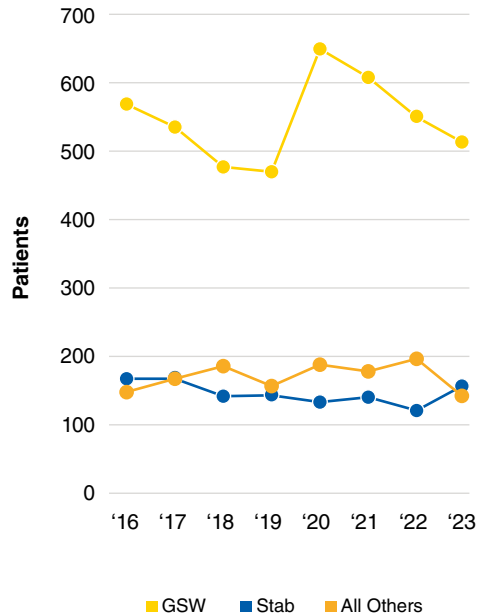
BY TYPE



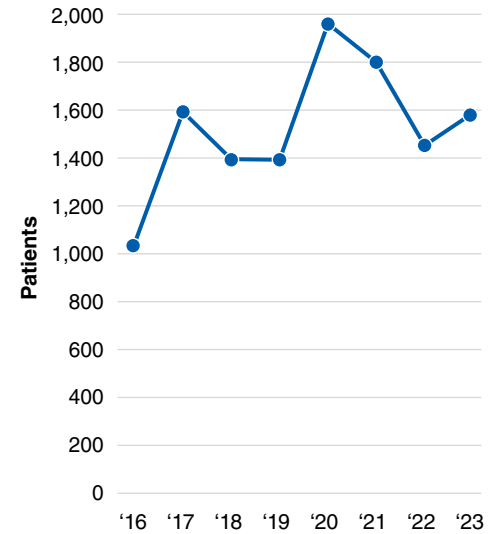
BY MONTH



ADMITTED BY TYPE AND YEAR

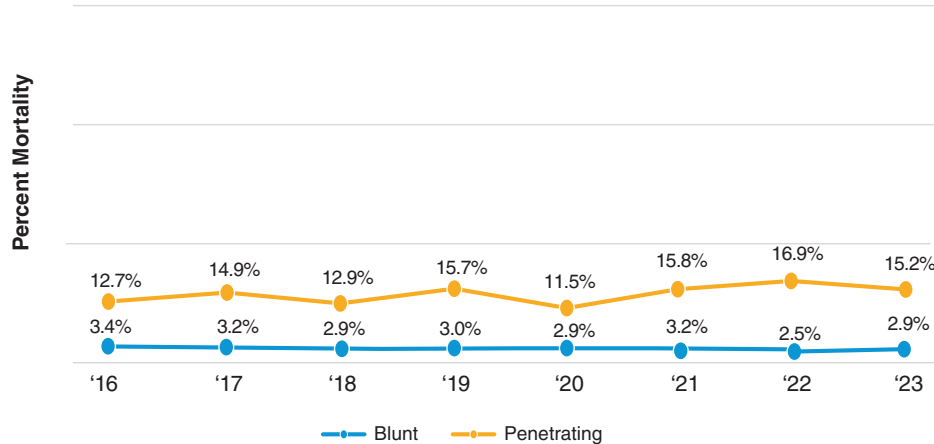


TOTAL BY YEAR



OUTCOMES

Figures on these pages show the trends of mortality in the NOTS region over time. Data includes all admission and ED deaths secondary to trauma, and is separated based on blunt and penetrating injuries. Blunt injuries are mechanisms of injury such as falls or motor vehicle crashes. Penetrating injuries mainly include gunshot wounds and stabbings. Included is the number of patients (n) by each category for each year.

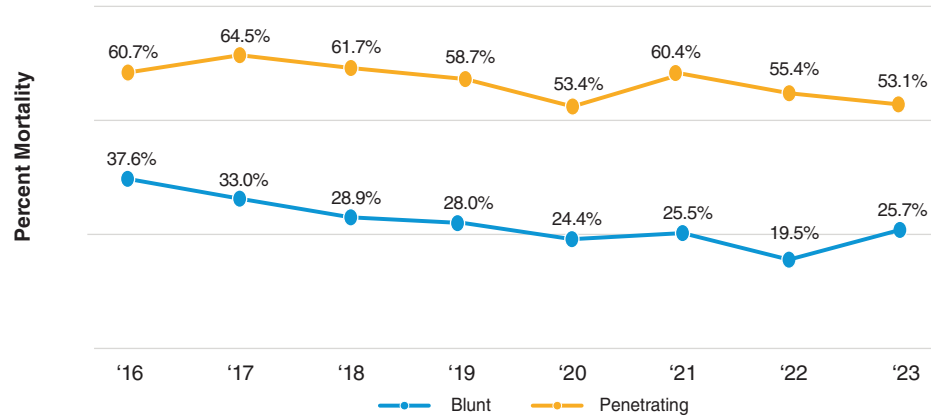


MORTALITY: ALL ADMITTED PATIENTS AND ED DEATHS

This figure shows mortality over time for patients of all injury severity scores (ISS). In 2023, the region saw 12,329 patients with blunt injuries and 837 patients with penetrating injuries. The mortality percentages are not adjusted for injury severity or any other factors. Overall counts of injuries have remained at a consistent rate since 2020, with minor fluctuations for blunt and penetrating mortality.

	2016	2017	2018	2019	2020	2021	2022	2023
BLUNT	8,739	9,114	8,743	9,830	10,653	11,076	15,524	12,329
PENETRATING	896	912	799	788	979	977	925	837

MORTALITY: ADMITTED PATIENTS AND ED DEATHS WITH ISS OF 25+

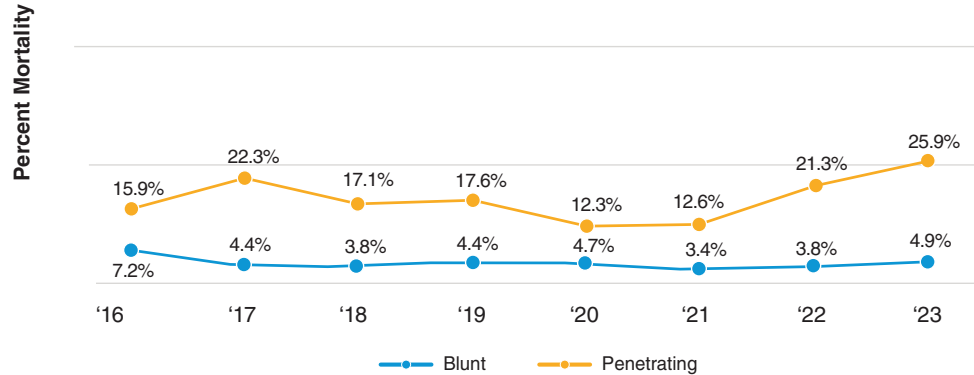


This figure represents the patients with the highest severity of injury: an ISS of 25 or higher. A large percentage of these patients have life-threatening injuries and a markedly reduced likelihood of survival. A general rule of thumb is that roughly 50% of patients with an ISS \geq 25 do not survive their injuries. In 2023, penetrating mortality has continued a downward trend from 2022. While blunt mortality has increased from 2022, of note this may be due to the addition of two additional trauma centers to the NOTS repository. Part of the trauma surgeon's job is to respect family and patient wishes and recognize that it is our responsibility to allow people to die comfortably. At this time, we do not monitor how often we honor patient and family wishes to provide comfort care only and withhold life-sustaining therapy.

	2016	2017	2018	2019	2020	2021	2022	2023
BLUNT	370	479	460	522	577	609	453	538
PENETRATING	141	155	120	155	161	192	193	128

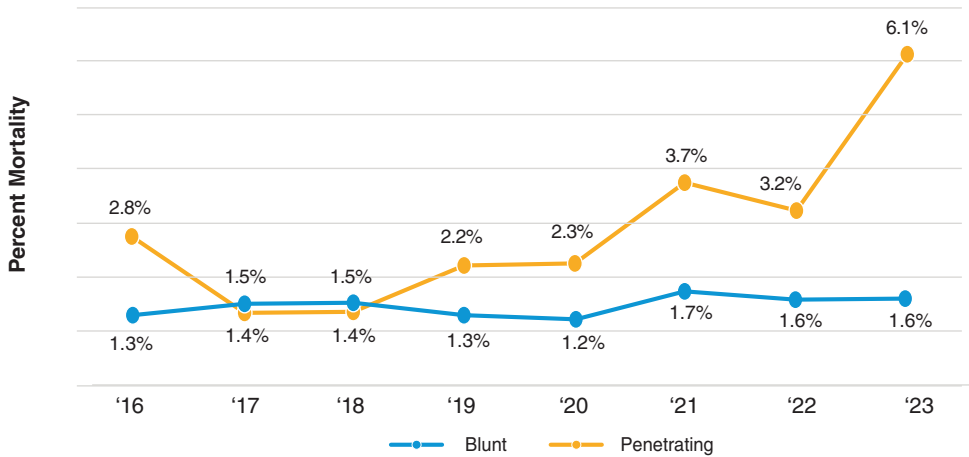
OUTCOMES

MORTALITY: ADMITTED PATIENTS AND ED DEATHS WITH INJURY SEVERITY SCORE OF 15-24



This group represents patients with a moderate severity of injury. At the inception of NOTS, our specific goal was to improve the outcomes of this patient group. Though we may never reduce the number to zero, striving to do that is still our goal. Mortality for both penetrating injuries and blunt injuries increased.

	2016	2017	2018	2019	2020	2021	2022	2023
BLUNT	745	857	815	860	935	969	783	933
PENETRATING	90	103	111	91	130	111	128	112



MORTALITY: ADMITTED PATIENTS AND ED DEATHS WITH INJURY SEVERITY SCORE OF 9-14

Patients with a minor ISS of 9-14 are numerous, while deaths are relatively rare. Deaths in this patients group often have contributing comorbid health conditions. While blunt mortality remained consistent between 2022 and 2023, penetrating mortality increased. This increase is partially due to the amount of penetrating injuries experiencing an overall decrease, while deaths have increased. Another possible contributing factor is facilities not receiving autopsies to inform coding of injuries.

	2016	2017	2018	2019	2020	2021	2022	2023
BLUNT	3,021	3,268	3,347	3,748	4,271	4,376	4,312	5,073
PENETRATING	263	294	296	224	308	323	287	277

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GLOSSARY OF TERMS

Adolescents: Patients ages 13-19 years.

Cause of Death: For the purpose of national mortality statistics, every death is attributed to one underlying condition, based on information reported on the death certificate, and uses the international rules for selecting the underlying cause of death from the condition stated on the death certificate. For injury deaths, the underlying cause is defined as the circumstance of the accident or violence that produced the fatal injury.

Coroner: A person whose standard role is to confirm and certify the death of an individual within a jurisdiction. A coroner may also conduct or order an inquest into the manner or cause of death, and investigate or confirm the identity of an unknown person who has been found dead within the coroner's jurisdiction.

Drowning: This category includes injuries from drowning/near drowning and submersion with and without involvement of watercraft.

Emergency Department (ED): A medical treatment facility specializing in emergency medicine and the acute care of patients who present without prior appointment, either by their own means or by ambulance. The emergency department is usually found in a hospital or other primary care center.

ICD-10 Code: The International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) is a system used by physicians and other health care providers to classify and code all diagnoses, symptoms and procedures recorded in conjunction with hospital care in the United States.

Frequency: The number of times an event occurs.

Geriatric: Patients ages 65 and older.

Gunshot Wounds (GSW): This category includes injuries from firearms, including unintentional, suicide, homicide, legal intervention and undetermined intent.

Homicide: The killing of or intent to kill one person by another.

Incidence: The number of instances of illness or injury during a given period of time in a specified population.

Injury: Any unintentional or intentional damage to the body resulting from acute exposure to thermal, mechanical, electrical or chemical energy or from the absence of such essentials as heat or oxygen. According to the Injury Surveillance Guidelines, an injury is the physical damage that results when a human body is suddenly or briefly subjected to intolerable levels of energy. Injury can be a bodily lesion resulting

from acute exposure to energy in an amount that exceeds the threshold of physiological tolerance, or it can be an impairment of function resulting from a lack of one or more vital elements (air, water or warmth), as in strangulation, drowning or freezing. The time between exposure to the energy and the appearance of an injury is short. The energy causing an injury may be one of the following:

- Mechanical
- Radiant
- Thermal
- Electrical
- Chemical

International Classification for Diseases (ICD): The ICD provides the ground rules for coding and classifying cause of death data.

Injury Severity Score (ISS): The Injury Severity Score (ISS) is an established medical score to assess trauma severity. It correlates with mortality, morbidity and hospitalization time after trauma. It is used to define the term major trauma. A major trauma (or polytrauma) is defined as the Injury Severity Score being greater than 15.

Major Trauma: A patient with injuries that result in death, intensive care admission, major operations of the head, chest or abdomen, a hospital stay of three or more days, or an ISS of greater than 15.

Minor Trauma: A patient who is entered into the trauma system, has an ISS of less than or equal to 15, and survives until hospital discharge.

Mechanism of Injury (MOI): The manner in which a physical injury occurred (e.g., fall from a height, ground-level fall, high- or low-speed motor vehicle accident, ejection from a vehicle, vehicle rollover). The MOI is used to estimate the forces involved in trauma and, thus, the potential severity for wounding, fractures and internal organ damage that a patient may suffer as a result of the injury.

Mortality: Deaths caused by injury and disease. Usually expressed as a rate, meaning the number of deaths in a certain population in a given time period divided by the size of the population.

Morbidity: Number of persons nonfatally injured or disabled. Usually expressed as a rate, meaning the number of nonfatal injuries in a certain population in a given time period divided by the size of the population.

Pedestrian: This category includes injuries among pedestrians hit by a train, a motor vehicle while not in a traffic, or another means of transportation.

Pediatric: Patients ages 0-15 years.

Penetrating: This category includes injuries caused by cutting and piercing instruments: knives, swords, daggers, power lawn mowers, power hand tools or household appliances.

Risk Factors: Characteristics of people, behavior or environment that increase the chance of disease or injury occurring. Examples: alcohol use, poverty and gender.

Struck By/Against: This category includes injuries resulting from being struck by or striking against objects or persons. This category includes being struck (unintentionally) by a falling object, being struck or striking objects or persons (sports), and injuries sustained in an unarmed fight or brawl.

Years of Potential Life Lost (YPLL): The concept of years of potential life lost involves estimating the average time a person would have lived had he or she not died prematurely.





NOTS 2024 Annual Report

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