



2023

Annual Report

RIGHT PATIENT. RIGHT PLACE. RIGHT TIME.



Right **patient.**

Right **place.**

Right **time.**

Over the past 13 years NOTS has grown. Our mission to this day still holds strong; right patient, right place, right time. We had another successful trauma symposium and wanted to stop and say thank you for all that you do for our patients.

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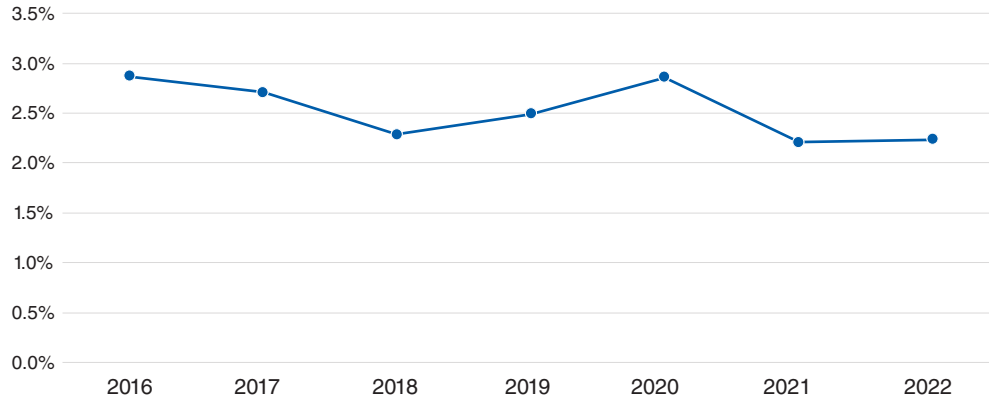


Our Mission Statement

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.

MORTALITY



Executive Summary

Greeting From Our Medical Director

Once again, I have the distinct honor of introducing you to our 2023 Northern Ohio Trauma System annual report, our thirteenth annual report to date. As this is also my final year as the medical director of NOTS, I would like to begin by commending and thanking our NOTS staff, our trauma program manager, Ms. Danielle Rossler, and our data specialist, Ms. Sara Arida; as without their efforts, this report, as well as most other NOTS-related activities, would not have been possible. I would also want to acknowledge the leadership and direction of our Advisory Board chairman Dr. Brandon Patterson and our board members for stewarding this unique collaboration in healthcare, EMS, and public health and remaining committed our mission of “providing the highest quality of care to trauma patients by rigorously evaluating and improving outcome, optimizing resources, and providing education”. Finally, I would like to introduce the incoming medical director, Dr. Justin Dvorak from MetroHealth, who expands our expertise with his experience in the care of the burn patient.

As with all our preceding reports, our 2023 report provides an annual accounting of a selected group of injured patients evaluated and treated in our regional trauma centers during 2022. Therefore, this report does not represent the entire burden of injury in northeast Ohio but does depict the demographics and outcomes of our region’s most seriously injured patients. This report continues to document NOTS’s remarkable growth in patient volume since the inclusion of University Hospitals into NOTS with MetroHealth, Cleveland Clinic Foundation, and Southwest General Hospital. Since 2016, NOTS trauma centers have doubled the trauma patient encounters that were available for review. This increase is most evident in the cohort of mostly elderly patients sustaining an injury due to a fall. Another evident vexing public health issue demonstrated in this report is the lethality of firearm injury which mainly afflicts our most vulnerable urban communities. Both these issues will require a more comprehensive approach beyond acute hospitalization utilizing prevention and mitigation strategies. These observations as well as myriad of others can be found in the charts and tables provided and sincerely hope it is of value to you as we look forward to continuing to serve our member healthcare systems, their trauma centers, and the citizens of northeast Ohio.

Sincerely,
Glen Tinkoff, MD, FACS, FCCM



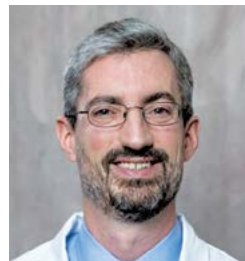
Glen Tinkoff, MD, FACS, FCCM
Trauma Medical Director, NOTS



NOTS Staff



**Glen Tinkoff,
MD, FACS, FCCM**
Trauma Medical Director,
NOTS



**Michael Dingeldein,
MD, FACS, FAAP, FCCM**
Trauma Pediatric
Medical Director,
NOTS



**Danielle Rossler,
MBA, BSN, RN**
Trauma Program Manager



**Sara Arida,
CSTR, CAISS, RHIT**
Data Specialist

Current NOTS Hospitals

Level I

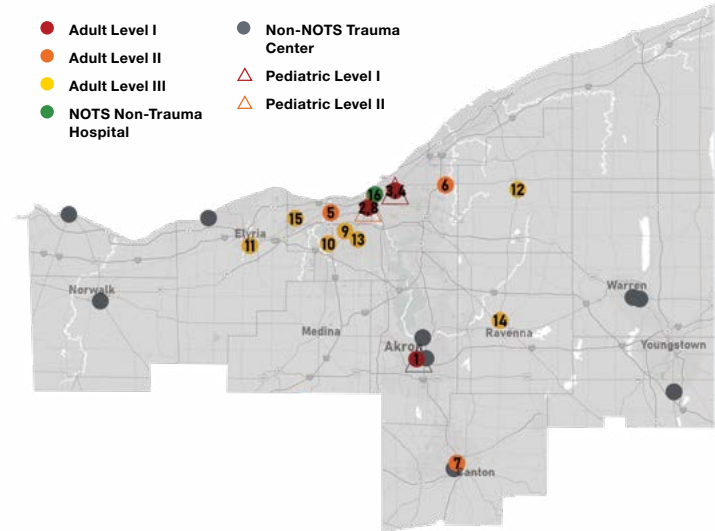
1. Cleveland Clinic Akron General
2. MetroHealth Medical Center (Adult)
3. University Hospitals Cleveland Medical Center
4. University Hospitals Rainbow Babies & Children's Hospital

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

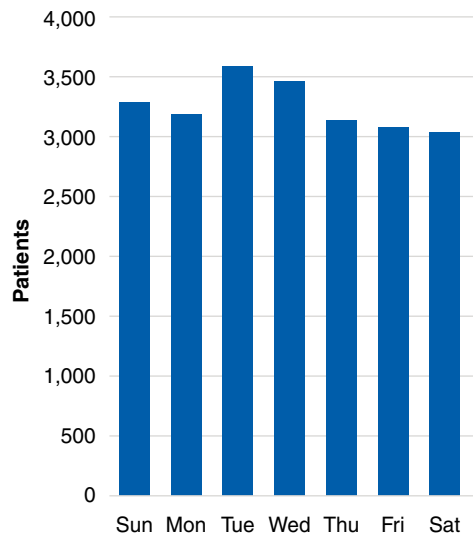
9. MetroHealth Parma Medical Center
10. Southwest General Health Center
11. UH Elyria Medical Center
12. UH Geauga Medical Center
13. UH Parma Medical Center
14. UH Portage Medical Center
15. UH St. John Medical Center
16. UH Lakewest Medical Center



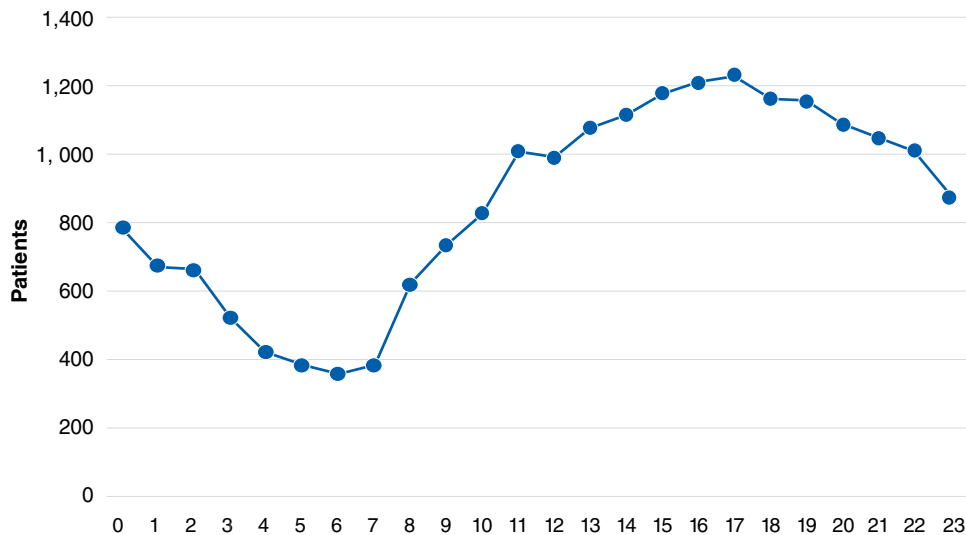
*These centers did not contribute data to this year's annual report. Cleveland Clinic Mercy Canton and UH Lakewest Medical Center, will contribute data in future years.

Frequency of Trauma

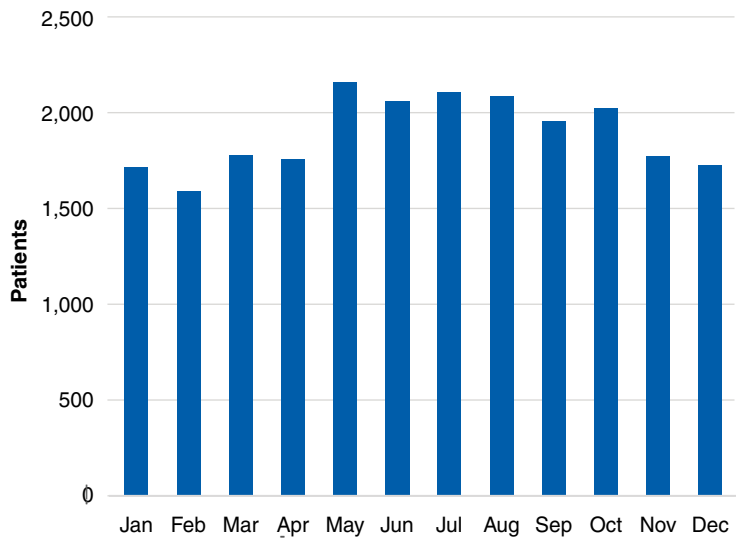
BY DAY OF WEEK



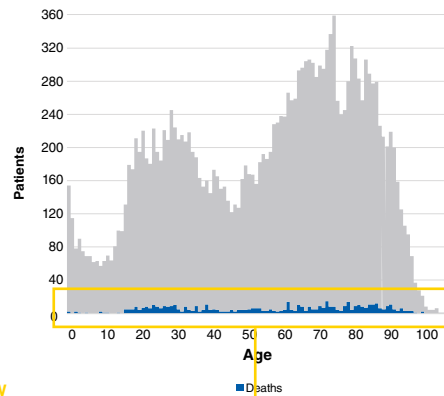
BY HOUR OF DAY



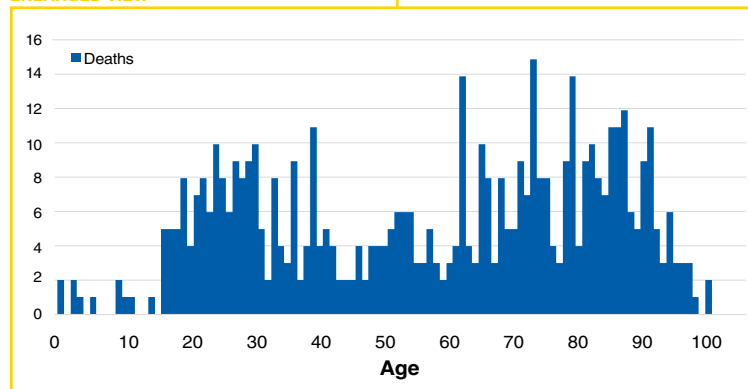
BY MONTH



BY AGE



ENLARGED VIEW

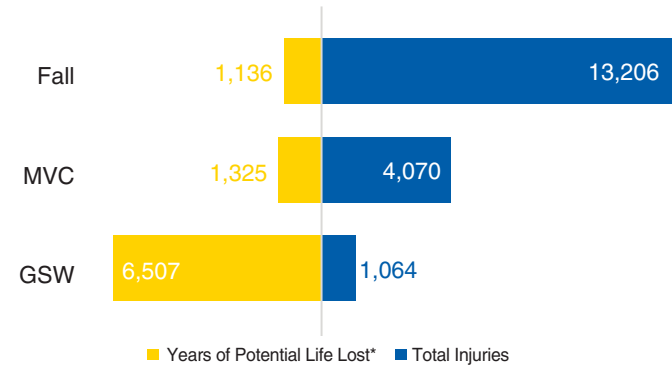


Years of Potential Life Lost

Years of potential life lost (YPLL) is a measure of the years a person would have lived had they not died prematurely. This is used to give an idea of 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 2022: 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 the 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.

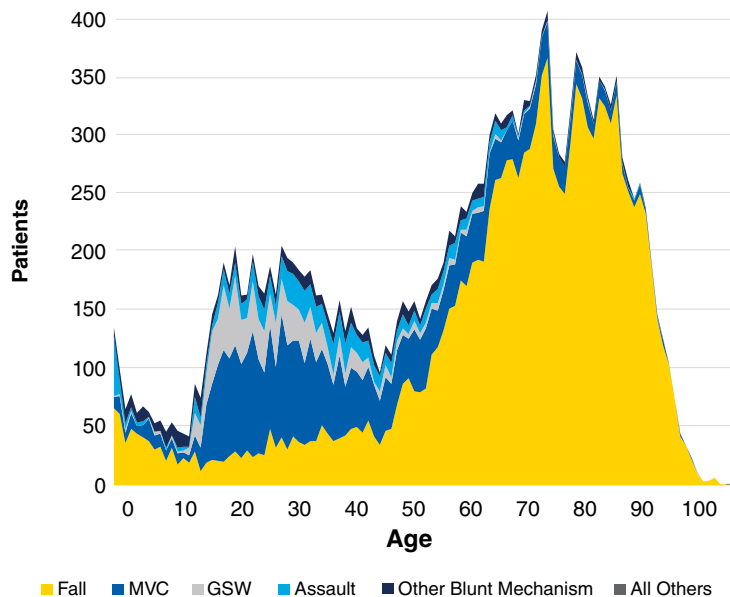
YEARS OF POTENTIAL LIFE LOST FOR TOP THREE MECHANISMS OF INJURY



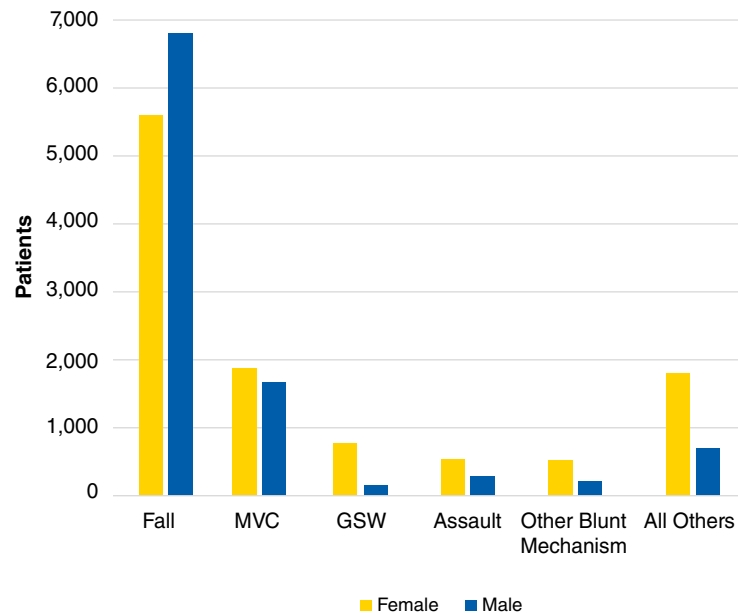
	Total Injuries	Deaths	Mortality	YPLL*	Mean YPLL per Death	Total YPLL per Death
Fall	13206	246	1.9%	1136	4.6	1136
MVC	4070	51	1.3%	1325	26.0	1325
GSW	1064	151	14.2%	6507	43.1	6507

Mechanisms of Injury

BY AGE

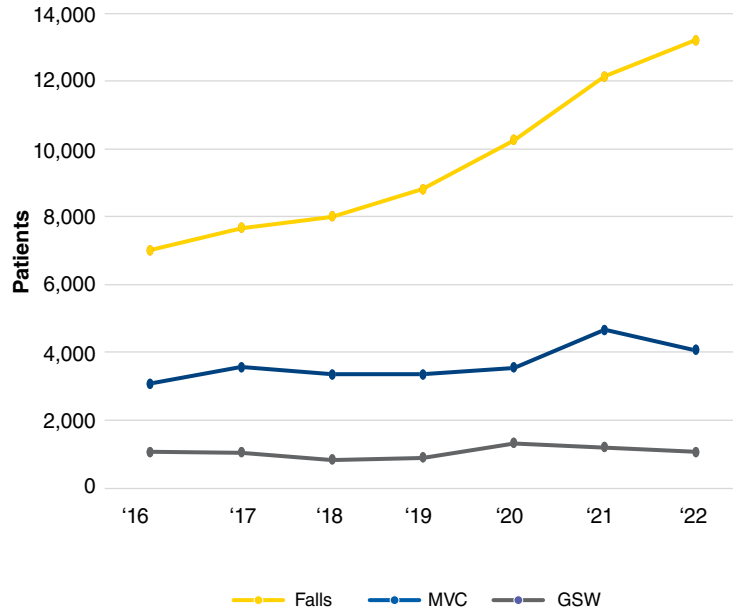


BY GENDER

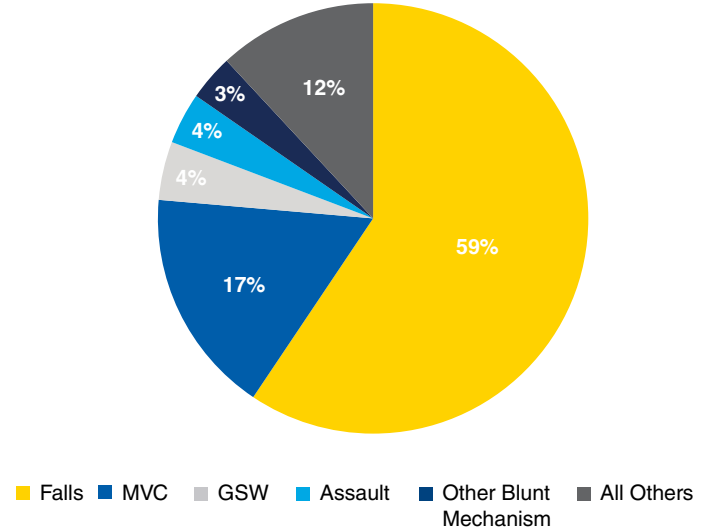


Falls

BY YEAR



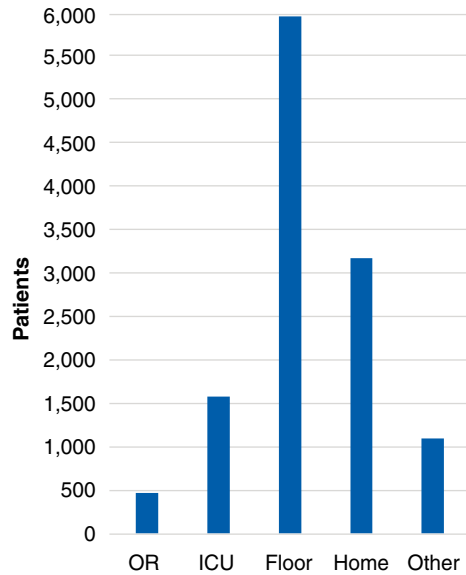
ALL PATIENTS



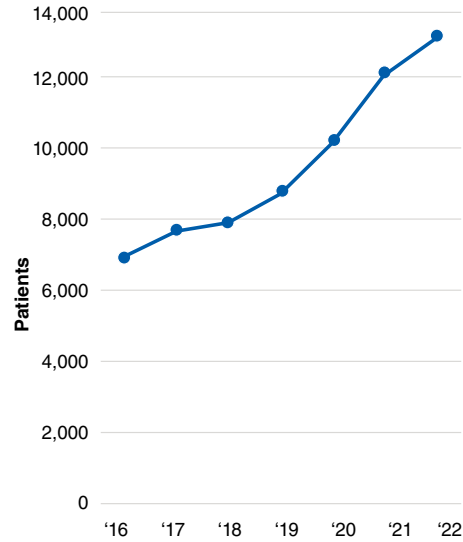
Note: All others includes: Asphyxiation, Bicycle, Biting, Burn, Drowning, Hanging, Horse and Rider, Motorcycle, Not Documented, Off Road/Other Vehicle, Other, Other Penetrating, Pedestrian Struck, Sport Injury, Stabbing, Unknown, and Watercraft

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

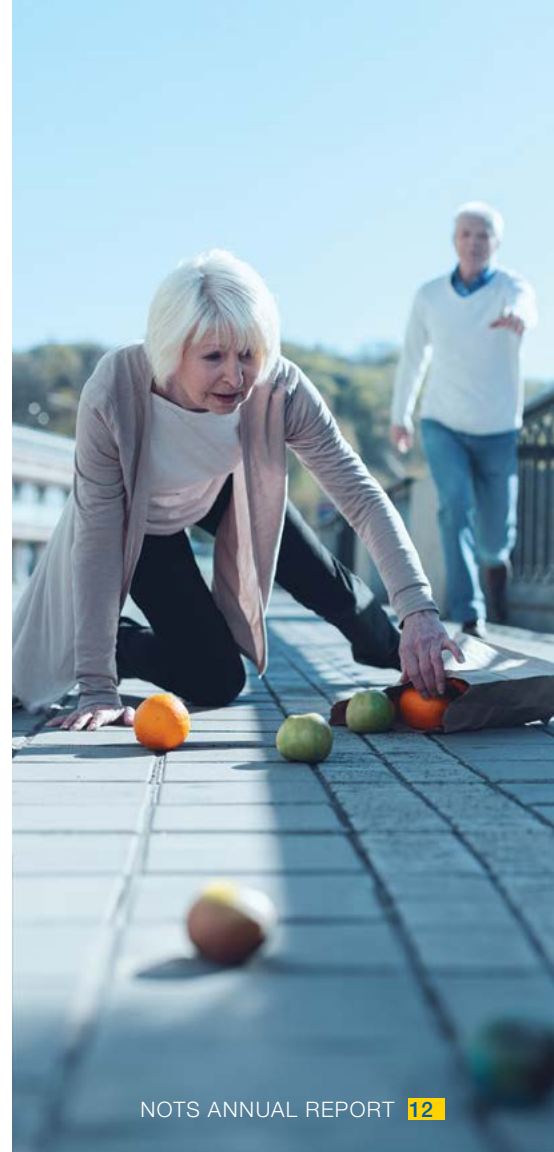
BY ED DISPOSITION



BY YEAR

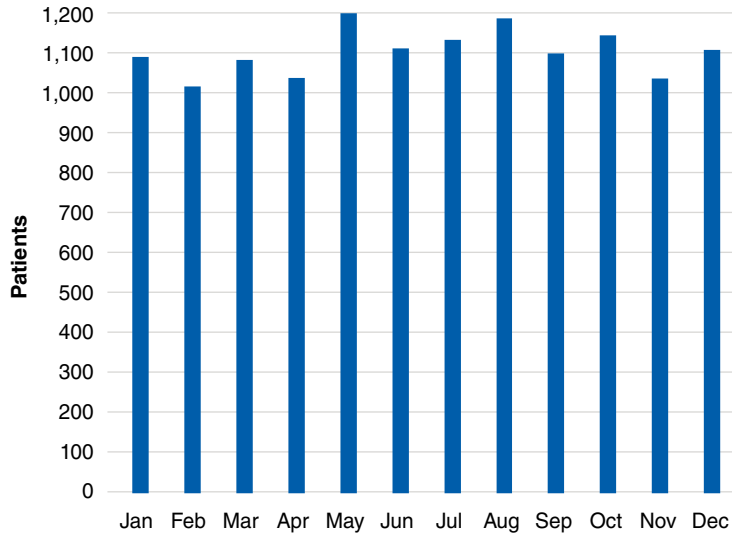


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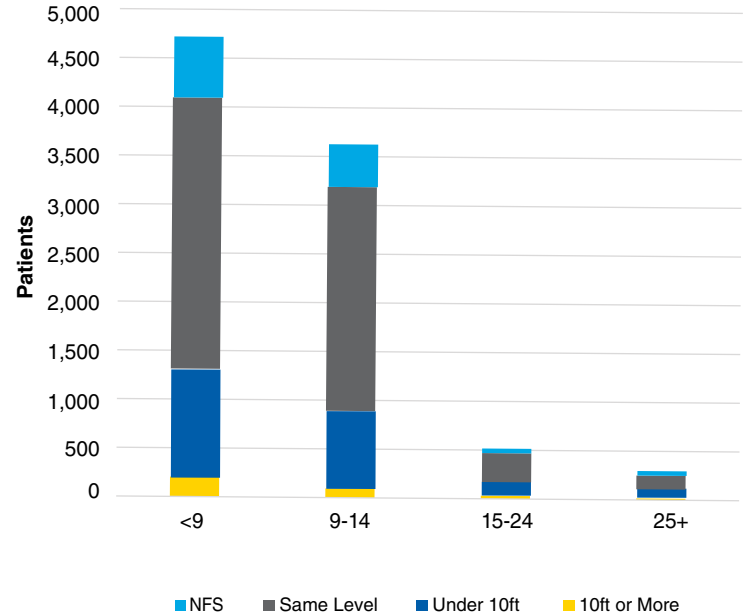


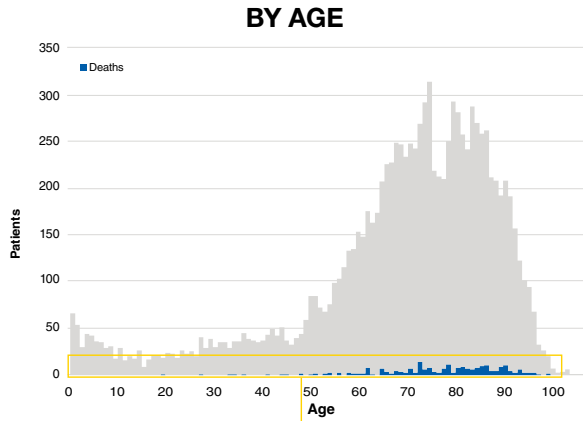
Falls

BY MONTH

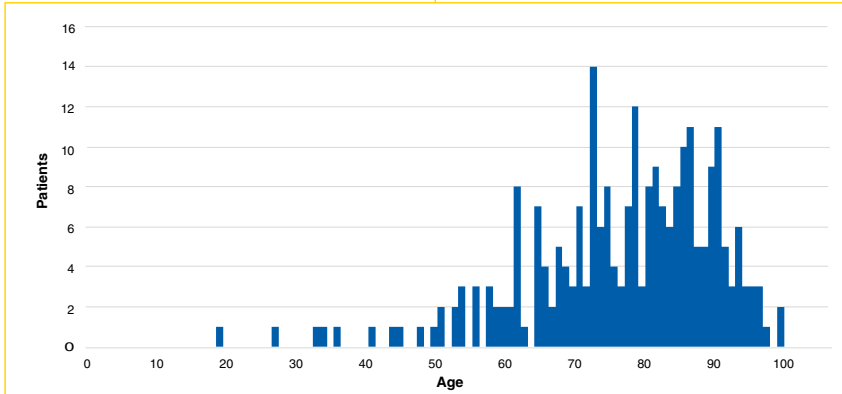


BY INJURY SEVERITY SCORE (ISS)



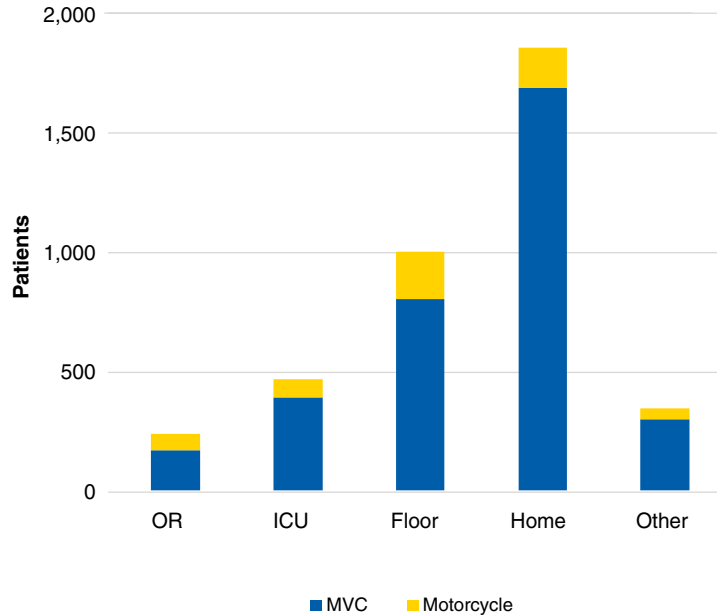


ENLARGED VIEW

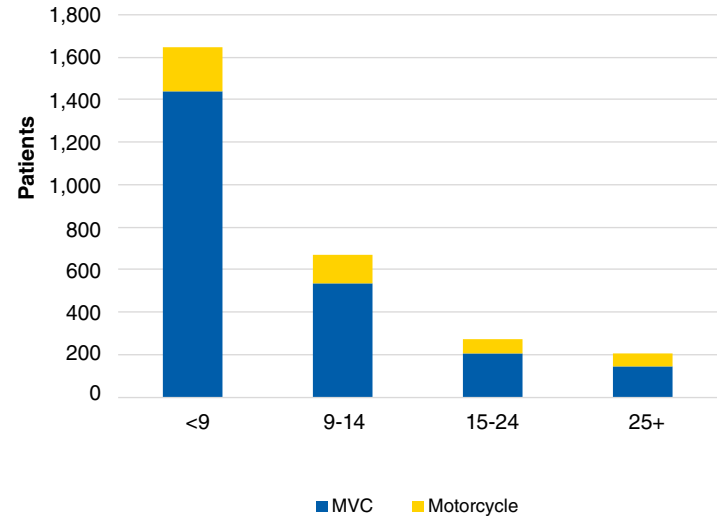


Motor Vehicle and Motorcycle Crashes

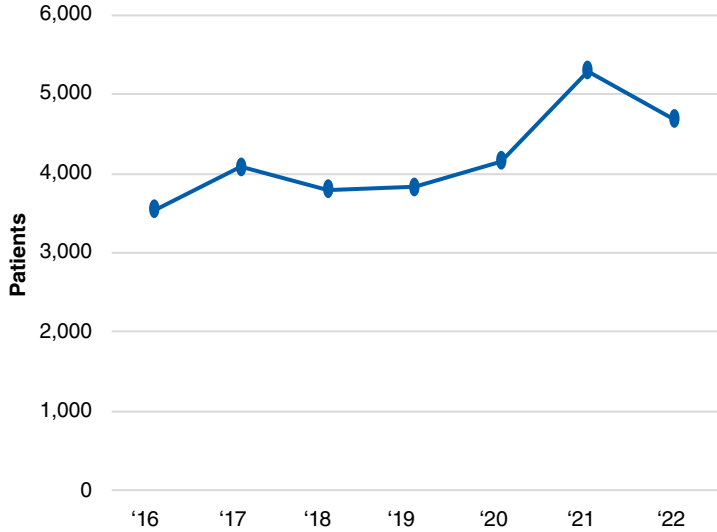
BY ED DISPOSITION



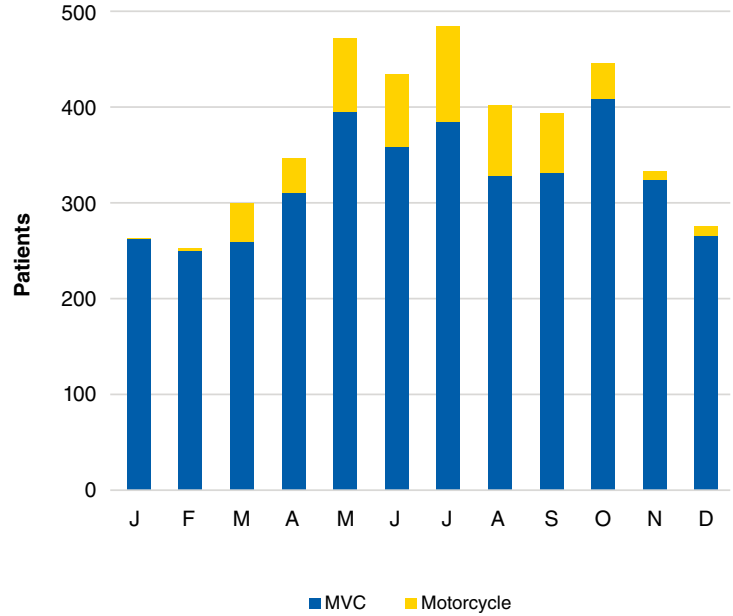
BY INJURY SEVERITY SCORE (ISS)



BY YEAR



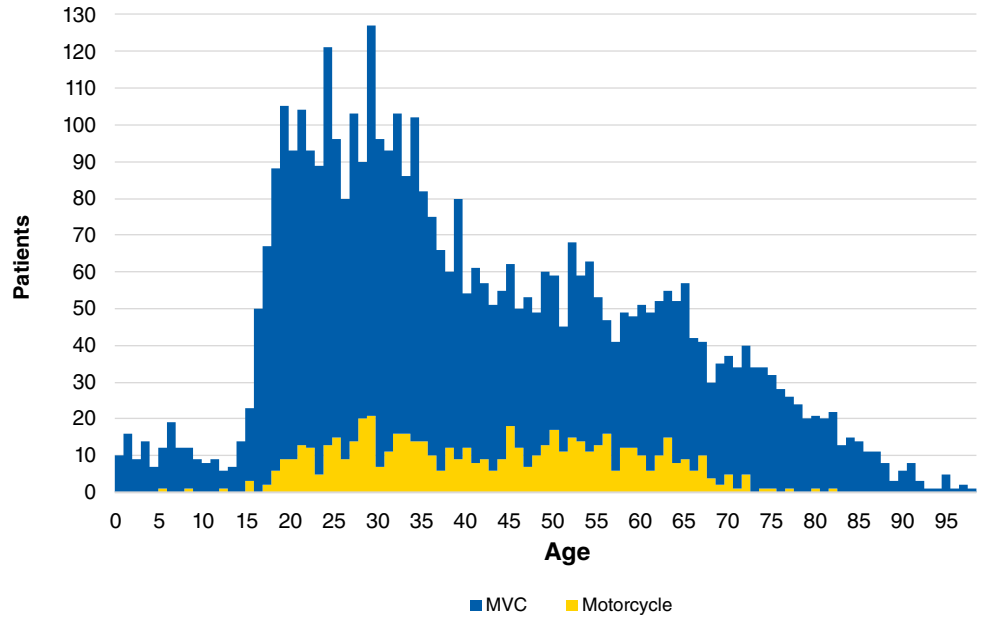
BY MONTH



Motor Vehicle and Motorcycle Crashes

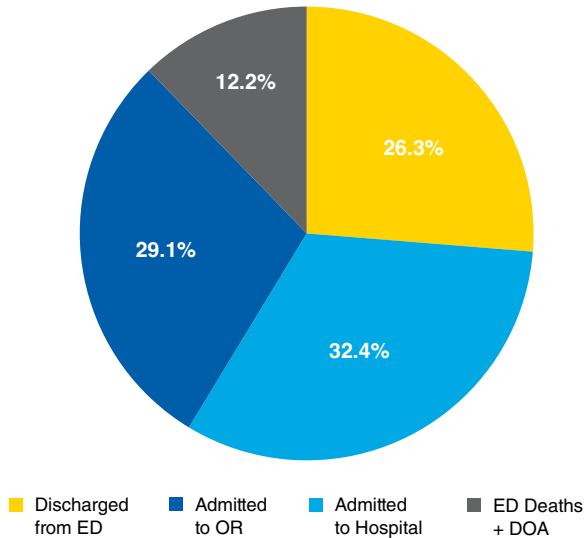


BY AGE

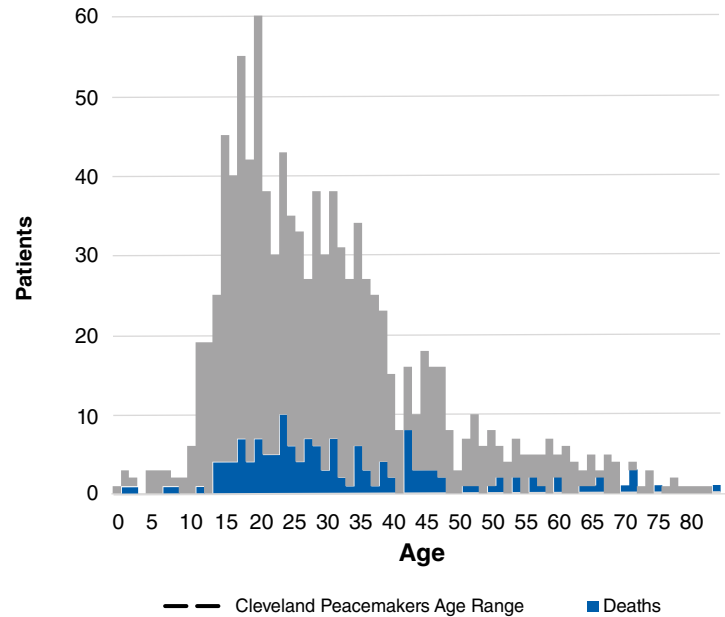


Gunshot Wounds

BY ED DISPOSITION



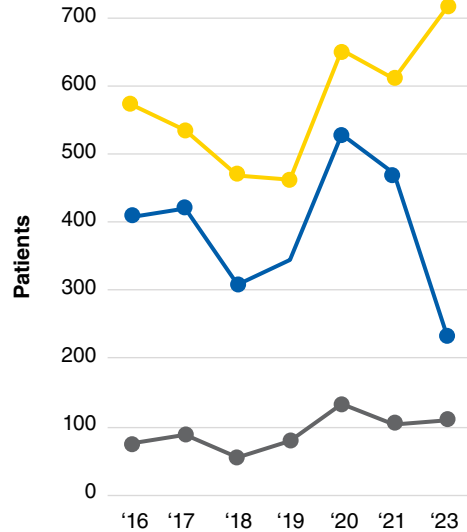
BY AGE





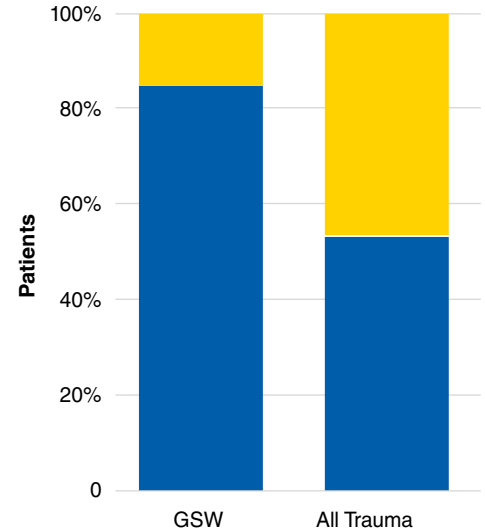
Gunshot Wounds

BY YEAR AND ED DISPOSITION



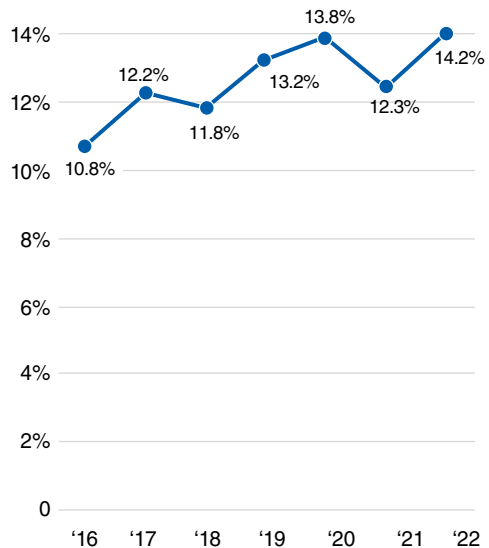
■ Discharged from ED ■ Admitted ■ ED Deaths

VS. ALL TRAUMA BY GENDER

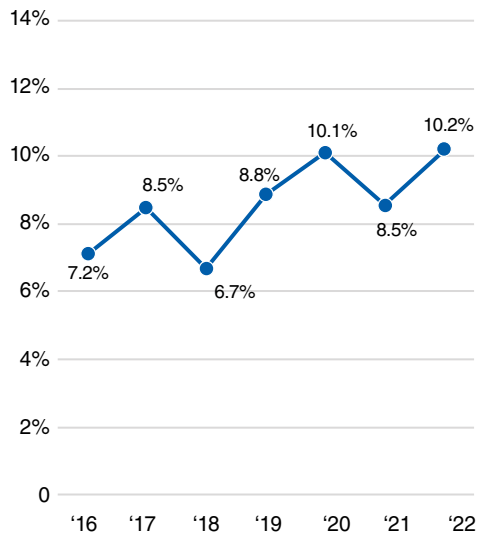


■ Male ■ Female

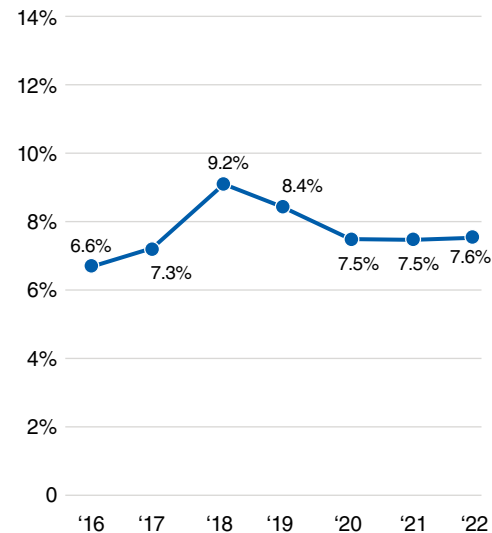
MORTALITY BY YEAR



ED MORTALITY BY YEAR



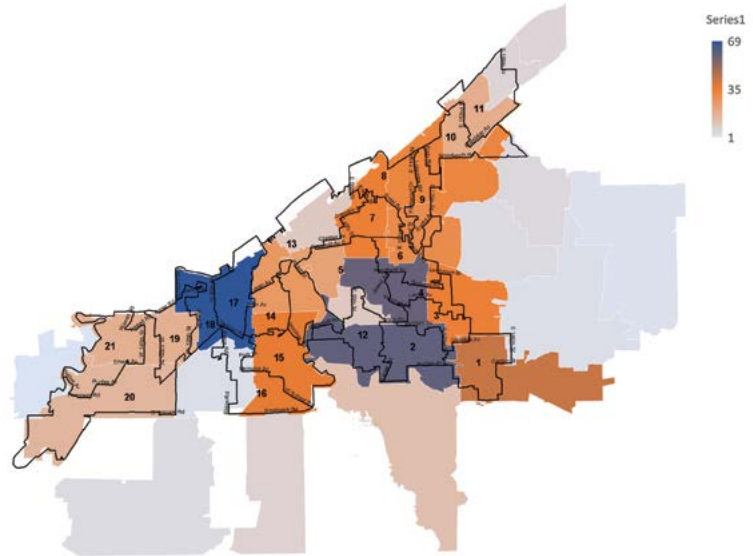
ADMITTED MORTALITY BY YEAR



	2016	2017	2018	2019	2020	2021	2022
ED Deaths	76	89	56	79	134	103	109
Admitted Deaths	38	39	43	39	49	46	42
Total	114	128	99	118	183	149	151
All GSW	1,060	1,049	838	893	1,327	1,209	1064

Gunshot Wounds

GSW FOR CLEVELAND WARDS

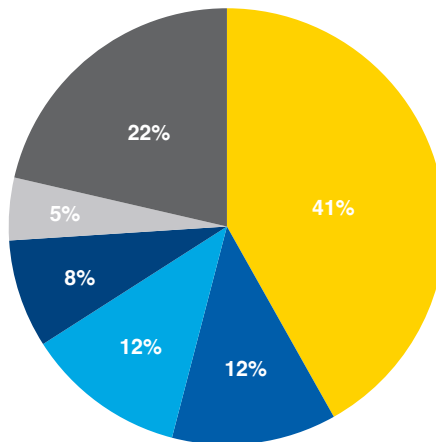


Pediatric and Adolescent 14 years and younger

Mechanism Of Injury	Patients
Fall	540
MVC	161
Other Blunt Mechanism	151
Assault	103
Pedestrian Struck	59
Biting - Human or Animal	55
Bicycle	49
GSW	46
Burn	44
Off Road/Other Vehicle	35
Other Penetrating	19
Sport	18
Horse & Rider	7
All Others*	21
Grand Total	1308

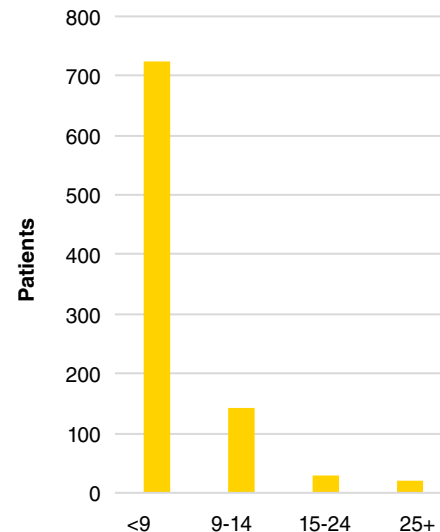
*All others includes Asphyxiation, Motorcycle, Stabbing, and Other

MECHANISM OF INJURY



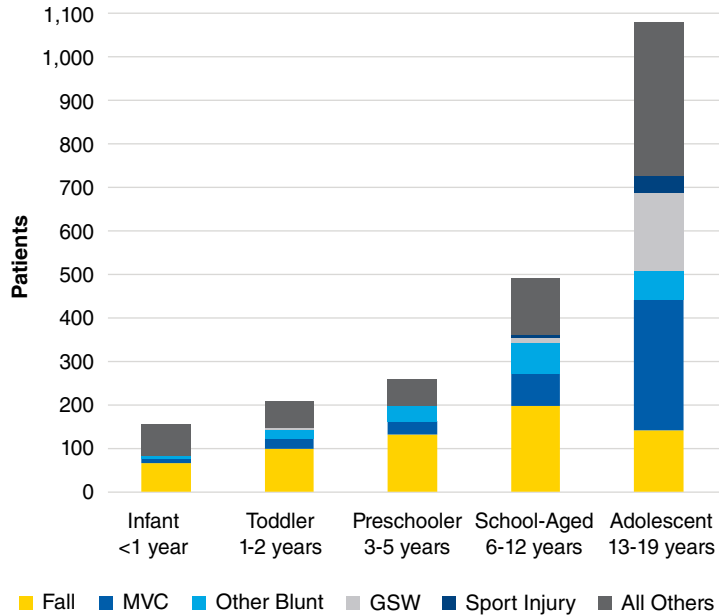
■ Fall ■ MVC ■ Other Blunt
■ Pedestrian Struck ■ Assault ■ All Others

BY INJURY SEVERITY SCORE (ISS)



Pediatric and Adolescent 19 years and younger

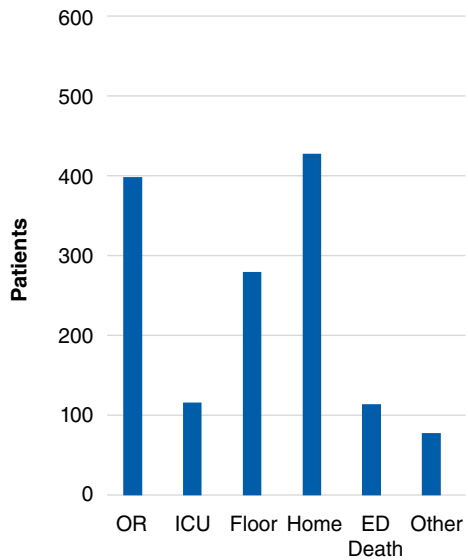
MECHANISM OF INJURY BY AGE GROUP



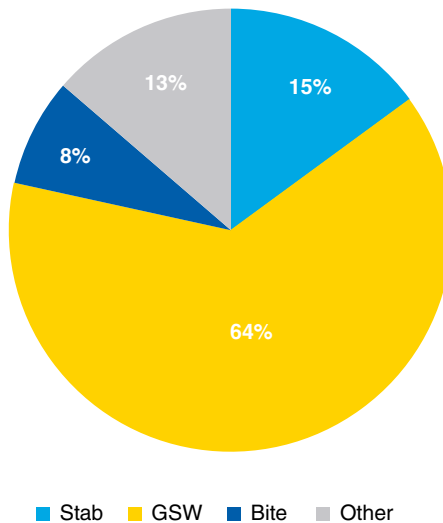
Pediatric Mechanism	Infant <1 Year	Toddler 1-2 Years	Preschooler 3-5 Years	School-Aged 6-12 Years	Adolescent 12-19 Years
Fall	66	97	133	196	142
MVC	10	25	32	73	334
Other Blunt	7	21	32	71	67
GSW		7		14	213
Sport Injury				7	41
All Others	71	61	55	128	293

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

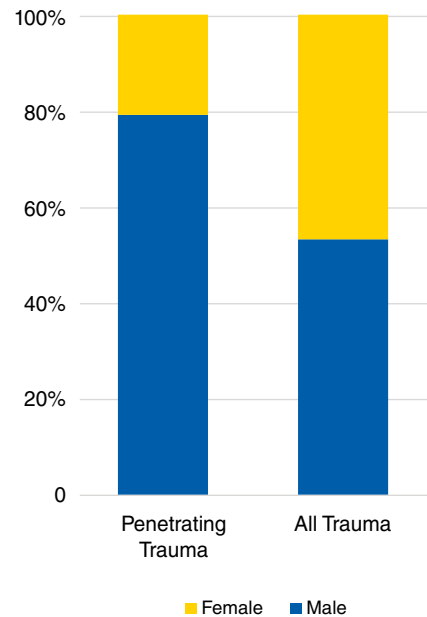
BY ED DISPOSITION



BY TYPE

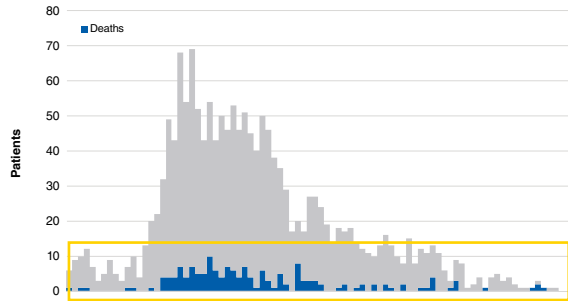


BY GENDER

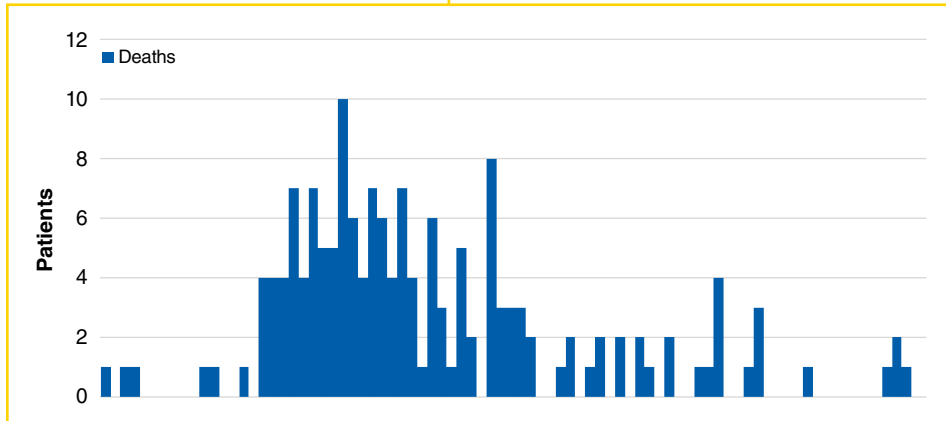


Penetrating Trauma

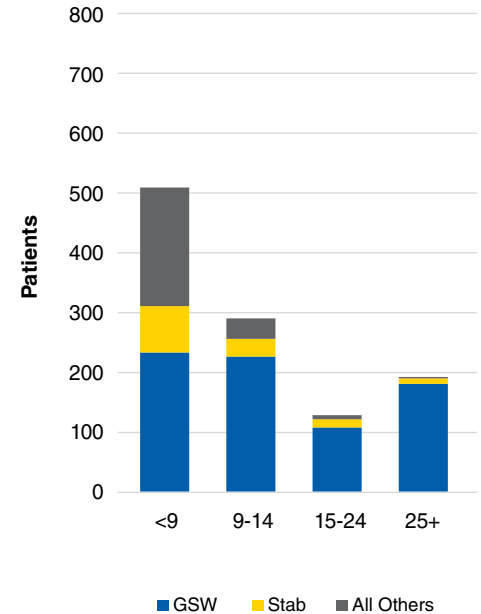
BY AGE



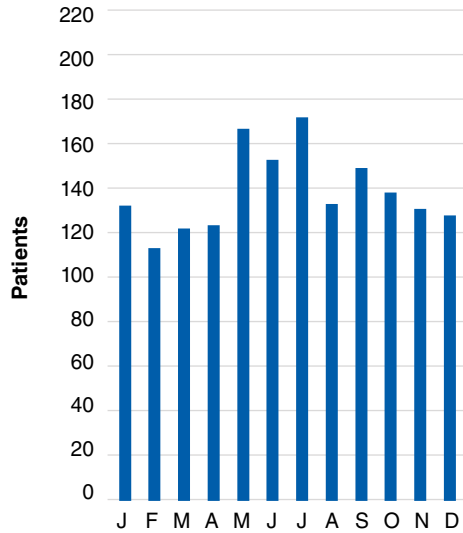
ENLARGED VIEW



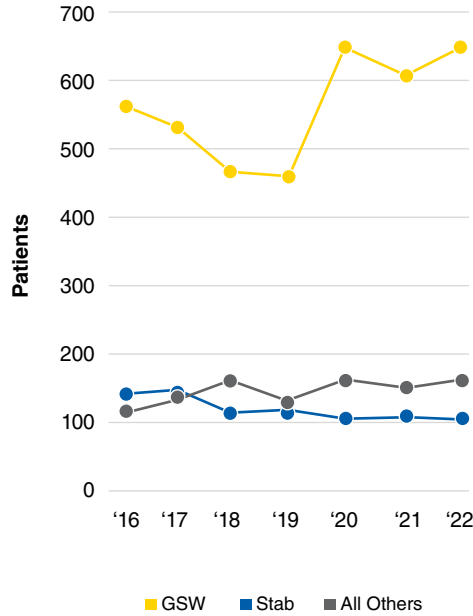
BY INJURY SEVERITY SCORE (ISS) AND MECHANISM



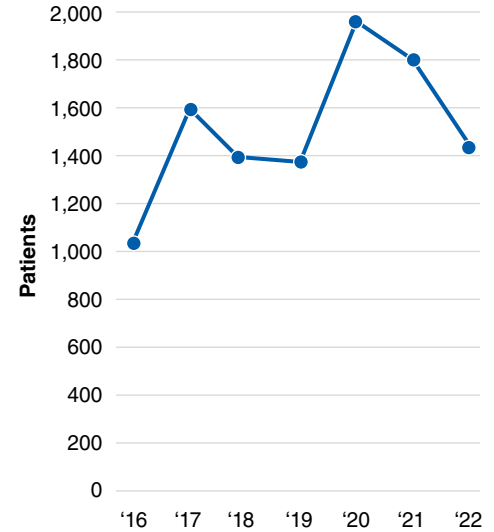
BY MONTH



ADMITTED BY TYPE AND YEAR

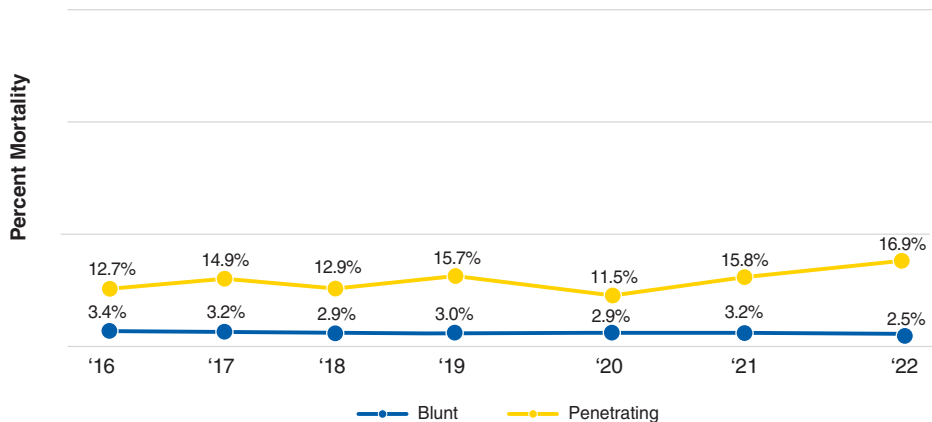


TOTAL BY YEAR



Outcomes

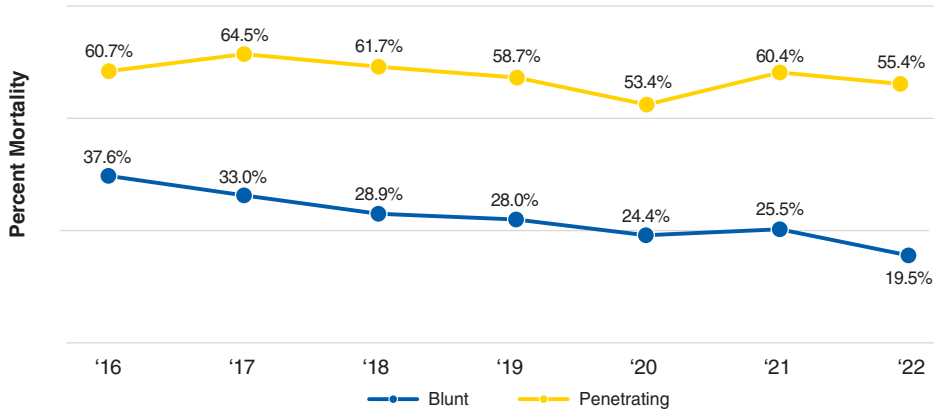
Figures on these pages show the trends of mortality in the NOTS region over time. Data includes all admission and ED deaths secondary to trauma, and is separated based on blunt and penetrating injuries. Blunt injuries are mechanisms of injury such as falls or motor vehicle crashes. Penetrating injuries mainly include gunshot wounds or 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 2022, the region saw 15,524 patients with blunt injuries and 1404 patients with penetrating injuries. The mortality percentages are not adjusted for injury severity or any other factors. Overall counts of injuries increased since 2020, with the mortality rate for penetrating injuries and the blunt mortality rate decreasing between 2021 and 2022.

	2016	2017	2018	2019	2020	2021	2022
Blunt	8739	9114	8743	9830	10653	11076	15524
Penetrating	896	912	799	788	979	977	1404

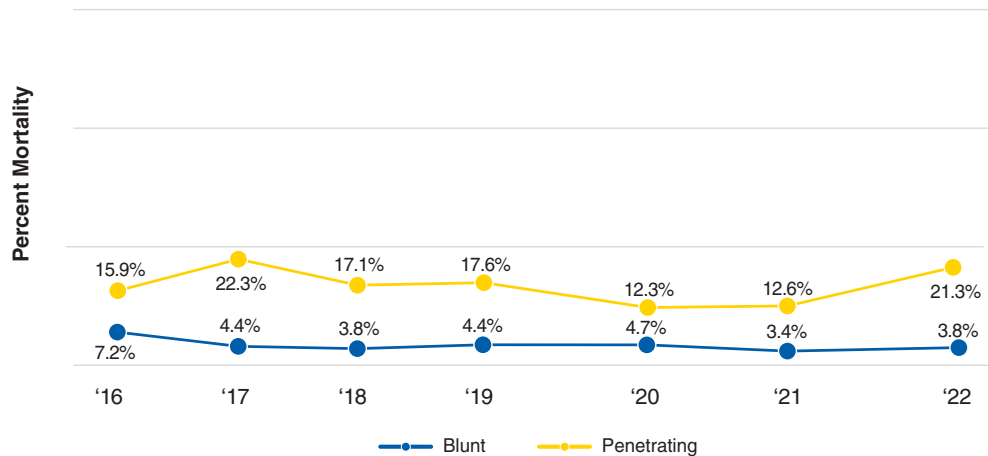


Mortality: Admitted Patients and Ed Deaths With Iss of 25+

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 2022, both penetrating mortality and blunt mortality decreased since 2021. Of note, 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
Blunt	370	479	460	522	577	609	453
Penetrating	141	155	120	155	161	192	193

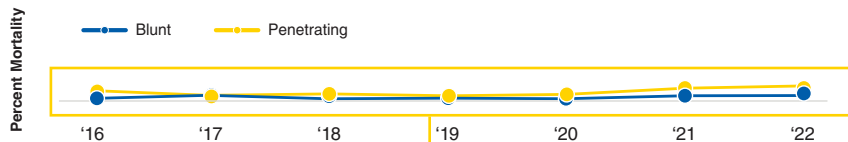
Outcomes



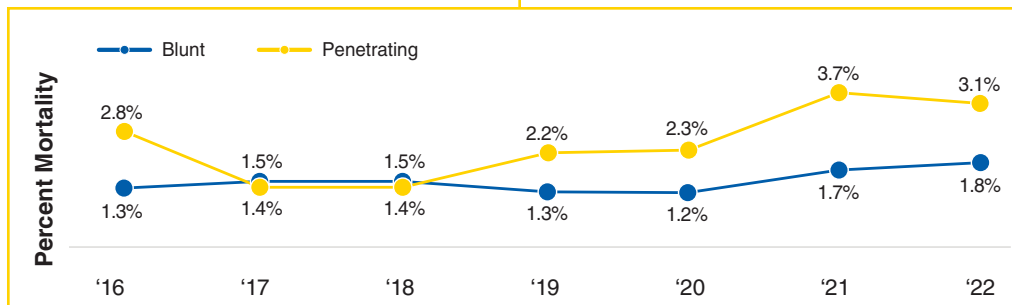
Mortality: Admitted Patients and ED Deaths with Injury Severity Score of 15-24

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
Blunt	745	857	815	860	935	969	783
Penetrating	90	103	111	91	130	111	128



ENLARGED VIEW



Mortality: Admitted Patients and ED Deaths with Injury Severity Score of 9-214

Patients with a minor ISS of 9-14 are numerous, while deaths are relatively rare. Deaths in this patient group often have contributing comorbid health conditions. Both blunt and penetrating mortality slightly decrease between 2021 and 2022

	2016	2017	2018	2019	2020	2021	2022
Blunt	3021	3268	3347	3748	4271	4376	4312
Penetrating	263	294	296	224	308	323	287

NOTS Advisory Board



Brendan M. Patterson, MD, MBA

Chair
Department of Orthopaedics, Cleveland Clinic
Professor
*Orthopaedics, Case Western Reserve University,
School of Medicine*



John H. Wilber, MD

Chairman
*Department of Orthopaedic Surgery,
MetroHealth Medical Center*
Professor of Orthopaedics
*Case Western Reserve University,
School of Medicine*



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Chief, Division of Trauma, Critical Care,
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Cristina Nickell, MPH, BSN, RN, CCRN

Director, Trauma and Acute Care
Surgery Programs
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and Emergency General Surgery*



Jeffrey A. Claridge, MD, MS, FACS

Division Director of Trauma, Critical Care,
Burns and Acute Care Surgery
The MetroHealth System
Professor of Surgery
*Case Western Reserve University,
School of Medicine*



Scott Sasser, MD, FACEP

Chief Physician Executive, President
UH Medical Group and UH Physician Services
Carol and Arthur F. Anton Chair
in Physician Leadership
University Hospitals Health System



R. Matthew Walsh, MD, FACS

Professor of Surgery Rich Family Distinguished
Chair of Digestive Diseases Chairman,
Department of General Surgery,
Digestive Disease Institute Chairman
Academic Department of Surgery,
Education Institute, Cleveland Clinic



Nicole A. Carlton

Cleveland Commissioner
Division of Emergency Medical Services



Bradford L. Borden, MD, FACEP

Chairman
Emergency Services Institute
Associate Chief of Staff
Staff Affairs, Cleveland Clinic



Brandy Carney

Chief
Cuyahoga County Public Safety & Justice Services



Paul R. Hinchey, MD

President
Community Delivery Network
Interim Chief Operating Officer
University Hospitals Cleveland
Medical Center



Sharyna C. Cloud, MPA

Senior Program Officer
Enterprise Community Partners, Inc.

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 2023 Annual Report

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