

NOTS

NORTHERN OHIO TRAUMA SYSTEM

2013 Annual Report

right patient. right place. right time.



Northern Ohio Trauma System **2013** Annual Report

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Welcome



It is with great pleasure that we present the 2013 yearly report reflecting the activities of NOTS throughout the past three years, including data through 2012. We are attempting to be as transparent as possible and share as much as possible with all interested parties. In this report we give you a glimpse into the centers and people who provide care to our patients. We are also getting some national recognition for our work and we have included some of the abstracts that have been presented nationally for the work that is being done in northern Ohio.

We should be proud of our successes and recognize areas where we still need to improve. I would like to thank everyone for helping improve the care of trauma patients across the region. After three years we have made some great strides, but there are still many opportunities for improvement. We look forward to your input and collaboration to provide the highest level of care and best long-term outcomes for our injured trauma patients. I personally am honored to serve the public and thank everyone who assists in providing care to trauma patients.

Sincerely,

A handwritten signature in blue ink, appearing to read 'JAC', on a white background.

Jeffrey A. Claridge, MD, MS, FACS

Medical Director, Northern Ohio Trauma System

The mission of **NOTS** is:

To provide the highest quality of care to patients across the region by rigorously evaluating and improving outcomes, optimizing resources, and providing education utilizing a collaborative approach with hospitals, emergency medical services, and the public health services.

Participating Trauma Centers



The MetroHealth System

Level I Adult Trauma Center
Level II Pediatric Trauma Center

2500 MetroHealth Drive
Cleveland, OH 44109

<https://www.metrohealth.org>

Medical Director of Trauma:
Dr. Jeffrey Claridge

Trauma Program Manager:
Patricia Wilczewski, BSN, RN

Pediatric Trauma Program and
Injury Prevention Coordinator:
Danielle Rossler, BSN, RN



Fairview Hospital

Level II Adult Trauma Center

18101 Lorain Avenue
Cleveland, OH 44111

<http://www.fairviewhospital.org>

Medical Director of Trauma:
Dr. Timothy Barnett

Trauma Program Manager:
Bernadette Szmigielski, BSN, RN



Hillcrest Hospital

Level II Adult Trauma Center

6780 Mayfield Road
Mayfield Heights, OH 44124

<http://www.hillcresthospital.org>

Medical Director of Trauma:
Dr. Michael Samotowka

Trauma Program Manager:
Mary Anne Edwards, RN

Participating Members of NOTS



Ashtabula County Medical Center
Ashtabula, OH

Euclid Hospital
Euclid, OH

Lutheran Hospital
Cleveland, OH

Lakewood Hospital
Lakewood, OH

CCF Main Campus
Cleveland, OH

Marymount Hospital
Garfield Heights, OH

Marymount Medical Center, Broadview Hts
Broadview Heights, OH

Medina Hospital
Medina, OH

Sagamore Hills Medical Center I & II
Sagamore Hills, OH

South Pointe Hospital
Warrensville Heights, OH

Richard E. Jacobs Health Center
Avon, OH

Twinsburg Family Health and Surgery Center
Twinsburg, OH

Metro Life Flight



The Metro Life Flight Critical Care Transport Team is comprised of flight physicians, acute care nurse practitioners, flight nurses, and critical care paramedics to meet all of your needs.

Metro Life Flight has three state-of-the-art EC-145 helicopters that are based strategically throughout northern Ohio ensuring a rapid response no matter where the need is: Lorain County Regional Airport, Wooster Wayne County Airport, and Portage County Regional Airport.



“Excellence in trauma care has always been a major focus of Metro Life Flight. With NOTS we get access to data that helps our quality assurance activities, transfer protocols that provide for a more efficient and patient focused system, and relationships with referring providers that allow us to optimize the care of trauma patients from the time of injury to when we deliver them to definitive care.”
— Dr. Craig Bates, Medical Director, Metro Life Flight

Metro Life Flight is proud to be the only dual pilot team with instrument flight rules (IFR) and night vision goggle capabilities operating the EC-145 in the United States and one of only a tiny handful of dual pilot programs in the country.

Metro Life Flight has facilitated thousands (over 90,000) of critical patient transports with an impeccable safety record! One Mobile ICU is based at MetroHealth Medical Center.

Every Metro Life Flight Crew carries advanced medications, “O negative” blood, and specialized equipment such as ultrasound to care for the critically injured and/or ill patient.

For further information, please go to our website:
www.metrolifeflight.net

Cleveland Clinic Critical Care Transport

Cleveland Clinic Critical Care Transport is among the most highly skilled transport teams in the world, in both aviation and critical care medicine. Cleveland Clinic Critical Care Transport prides itself on bringing the most advanced critical care medicine to critically ill patients around the world. Whether critically ill or critically injured, our team is prepared to respond locally, nationally, and internationally. Our fleet of fixed wing jets, Sikorsky S-76 C+ helicopters and ground ambulances allows us to bring Cleveland Clinic care to patients, anywhere and at any time.

Regionally, Cleveland Clinic Critical Care Transport Teams are located at the main campus of the Cleveland Clinic, the Richard E. Jacobs Health Center in Avon, and the Twinsburg Family Health & Surgery Center in Twinsburg. Each location is equipped with one of our Sikorsky S-76 C+ helicopters as well as ground ambulance. The Sikorsky S-76 C+ helicopter is among the largest and fastest in civilian use, with speeds of 180 mph. The larger interior allows for full access to the patient, and provides seating for three medical crew members and one family member when circumstances permit. Fixed wing operations are based out of Burke Lake Front Airport in Cleveland and provide national as well as international capabilities.

The Cleveland Clinic Critical Care Transport Team is committed to providing the highest level of critical care medicine anywhere in the world. No patient too sick, no patient too far. Learn more about our team at <http://my.clevelandclinic.org/departments/criticalcare/default.aspx>

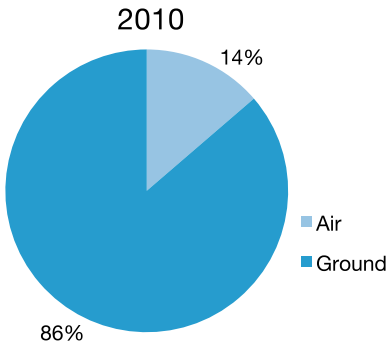
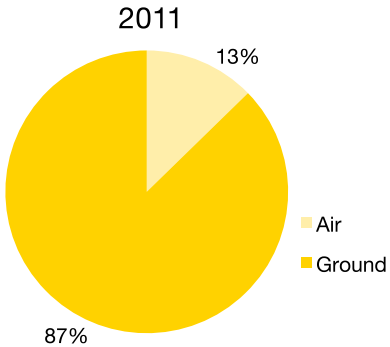
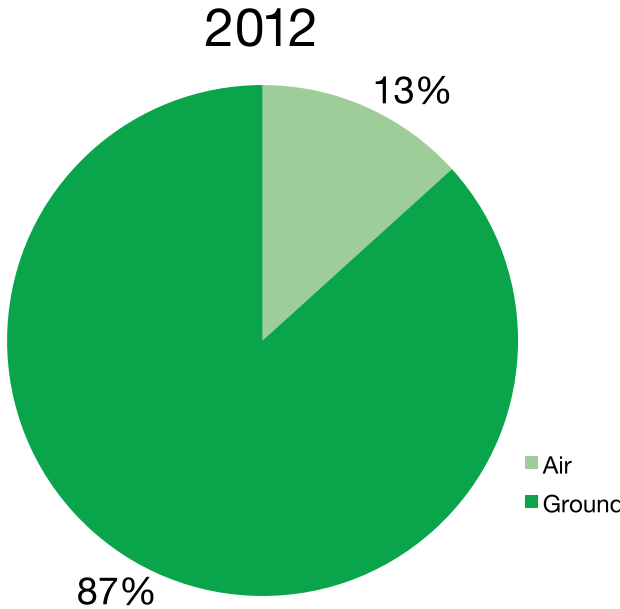


Dr. Damon Kralovic,
Medical Director,
Critical Care Transport

Mode of Arrival: Data



Trauma patients can arrive at a trauma center from the scene or by transfer from another facility. Scene transports are directed by local EMS and first responders. Transports between NOTS system hospitals are guided by the NOTS transfer line. Dispatchers use the NOTS protocols to direct the patient to the right facility.



Inclusion Criteria: Includes all patients transported to NOTS Trauma Centers in 2010, 2011 and 2012.
Ground transportation includes Ambulance, Fire Rescue, Police, Taxi and Walk In.

Abstract

Implementation of Cloud-Based Image Sharing Technology Significantly Reduced Repeat CT Imaging in a Regional Trauma System

Authors: Aman Banerjee MD, David Bronson MD, Debra Allen BSN, Patricia A Wilczewski BSN, Robert Ferguson MD, Jeffrey A Claridge MD, MS

Introduction: The practice of repeating computed tomography (re-CT) is common among trauma patients transferred between hospitals incurring additional cost and radiation exposure. This study sought to evaluate the effectiveness of implementing modern cloud-based technology (lifelIMAGE®) across a regional trauma system to reduce the incidence of re-CT imaging.

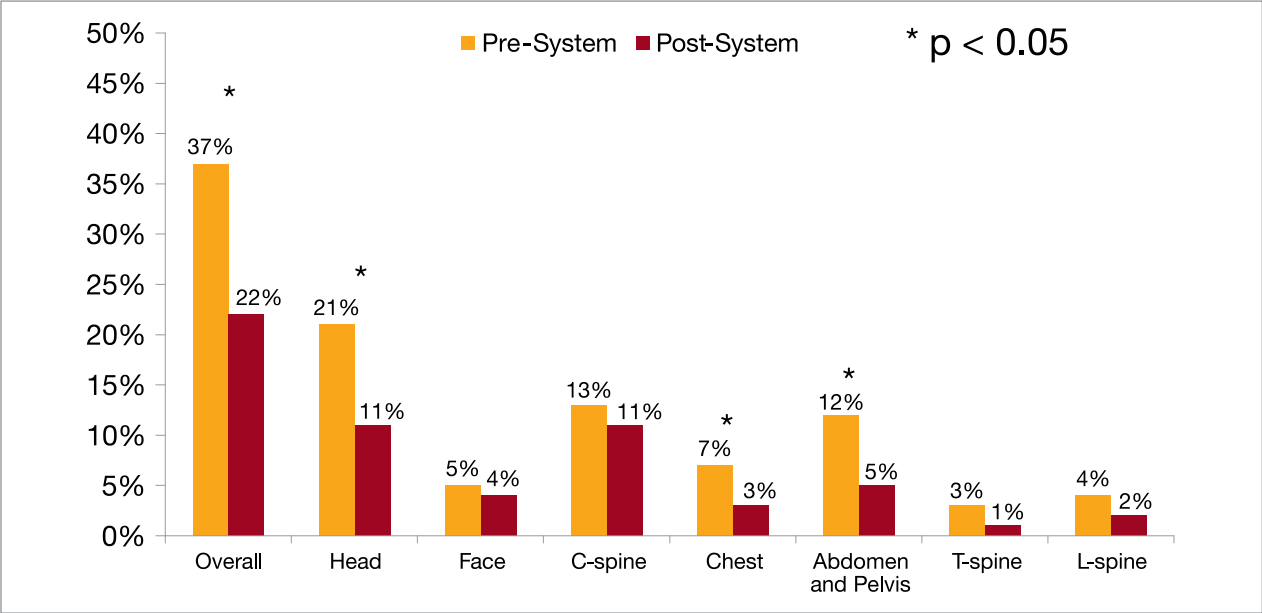
Methods: This is a prospective interventional study to evaluate outcomes after implementation of lifelIMAGE® in January 2012. Key outcomes were rates of CT imaging, including the rates and costs of re-CT from January 2009 through December 2012.

Results: There were 1081 trauma patients transferred from participating hospitals during the study period (657 patients before and 425 patients after implementation) with the overall re-CT rate of 20.5%. Rates of any CT imaging at referring hospitals decreased (62% vs. 55%, $p < 0.05$) and also decreased at the accepting regional level 1 center (58% vs. 52%, $p < 0.05$) following system implementation. There were 639 (59%) patients who had CT imaging performed prior to transfer (404 patients

before and 235 patients after implementation). Of these patients the overall re-CT rate decreased from 38.4% to 28.1% ($p = 0.01$). Rates of re-CT head (21% vs. 11%, $p = 0.002$), chest (7% vs. 3%, $p = 0.05$), and abdomen and pelvis (12% vs. 5%, $p = 0.007$) were significantly reduced following system implementation. The cost of repeat imaging per patient was significantly lower following system implementation (mean charges of \$1,046 vs.

\$589, $p < 0.001$). These results were more pronounced in a subgroup of patients with an ISS > 14 with a reduction in overall re-CT from 51% to 30% ($p = 0.03$).

Conclusion: The implementation of modern cloud-based technology across the regional trauma system resulted in significant reductions in re-CT imaging and cost.



This work was presented at the 75th meeting of the AAST (American Association for the Surgery for Trauma) and is being considered for publication in the Journal of Trauma.

EMS Support



Donald Spaner, MD
NOTS EMS Committee
Co-Chairman



Thomas Collins, MD, FACEP
NOTS EMS Committee
Co-Chairman



“EMS providers have totally embraced NOTS as their partner in providing exceptional trauma care that is expected by the residents in the communities we serve.

Most often, extraordinary trauma care begins in the field. Pre-hospital care providers are thrilled to be collaborating with two prominent healthcare systems.”

**— Mr. William Sillasen, BSN, RN, EMS-I,
Director, Regional Administration, CCF**



“We pride ourselves on not alienating or steering patients in any direction other than what is best for them at that time, under those circumstances and with the resources available. This prehospital support system is built across much of the northern part of the state. There are countless EMS/Fire departments and services working in synch to assure that the right patient receives the right level of care and is transported to the most appropriate facility. Working collaboratively with such large organizations does present a challenge; however, yielding optimal outcomes in our patient-centric environment is our focus.”

**— Mr. David A. Yarmesch, AAS, Paramedic, EMS-I,
EMS Coordinator, The MetroHealth System**

NOTS Transport Center



NOTS Moto:

RIGHT PATIENT, RIGHT PLACE, RIGHT TIME

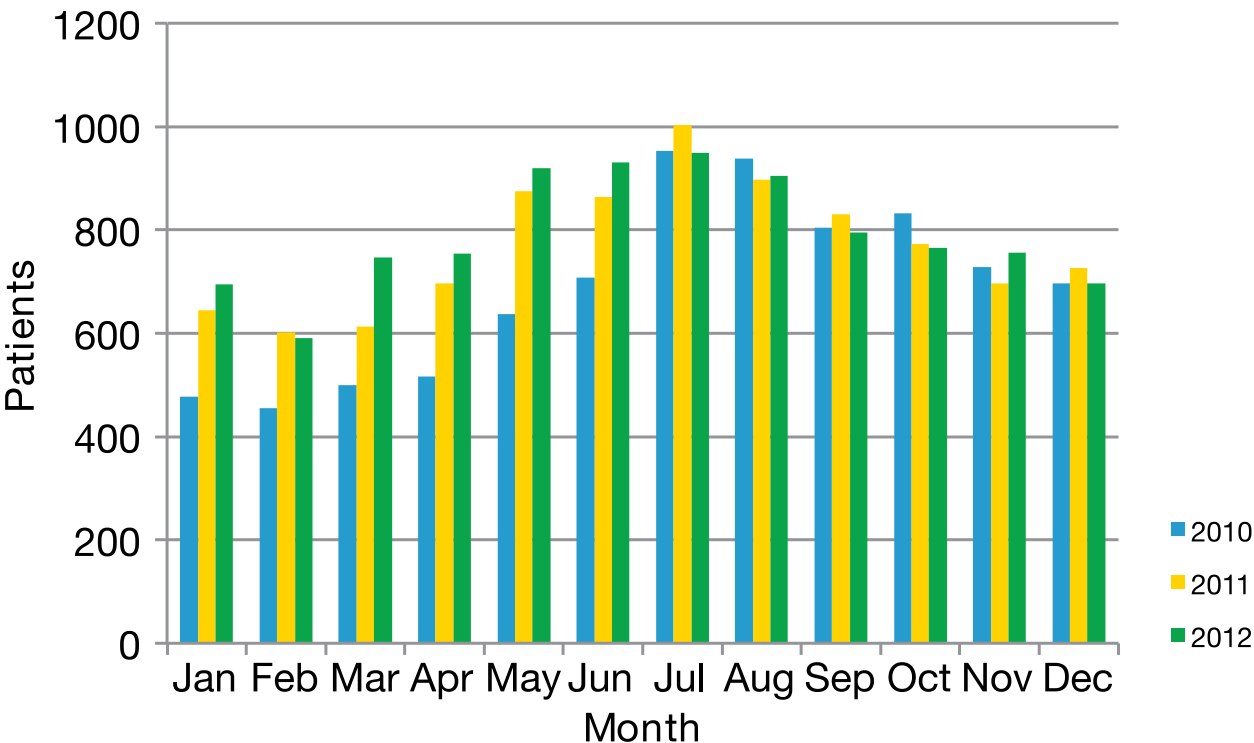
One central command center is essential for organizing trauma care in our community. The NOTS transfer center is a group of highly skilled technicians who ensure trauma patients are transported to the correct facility in the most efficient/expedient manner possible.

NOTS Transfer Center: **216-778-7850**



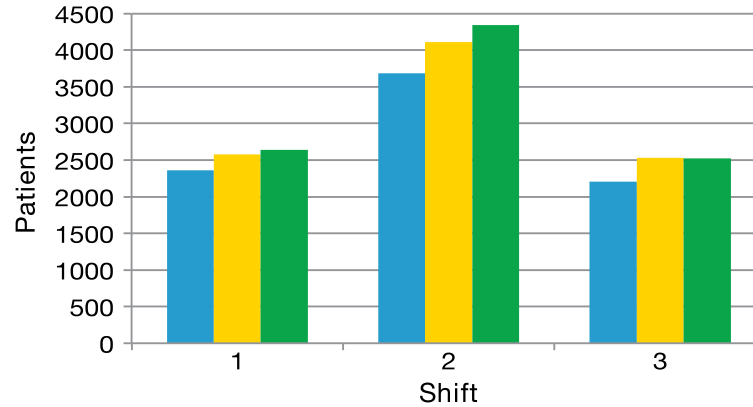
There is a common misconception that trauma only happens in the summertime or on weekends. It is true that trauma does peak in July and on the weekends, but the following graphs show that there is considerable trauma at other times as well. The graphs also show the variability in trauma, which makes it difficult to staff and maintain the necessary level of resources.

Frequency of Trauma: Data

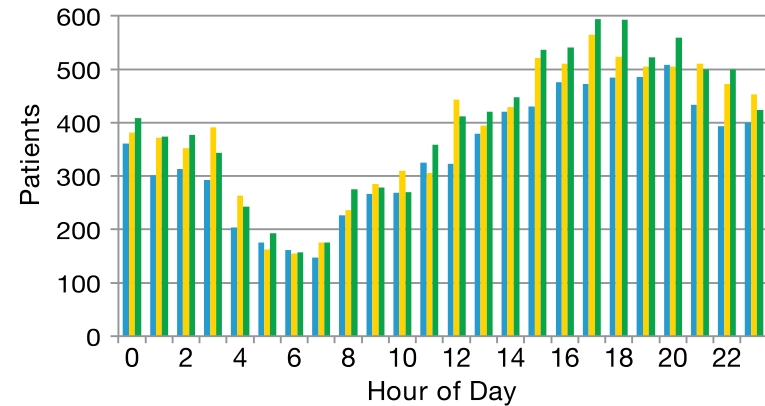
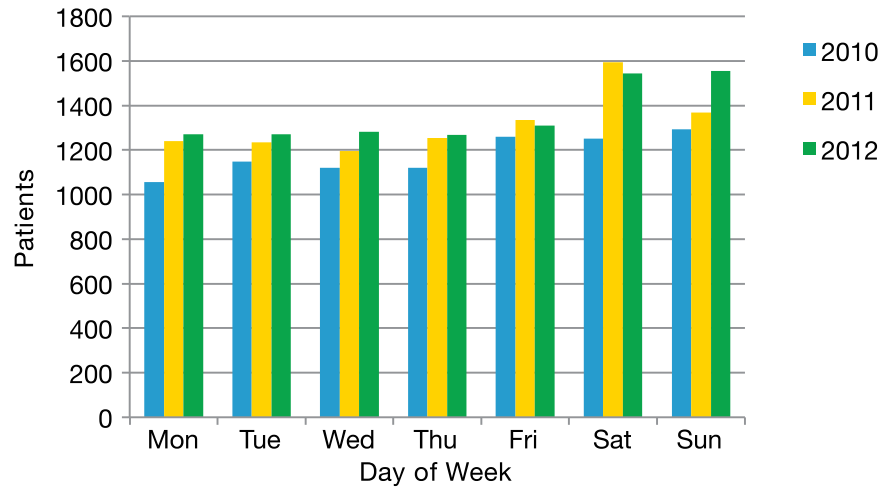


Inclusion Criteria: Includes all patients treated at NOTS Trauma Centers from 2010 to 2012.

Frequency of Trauma: Data



Shift 1 - 0700 to 1459
Shift 2 - 1500 to 2259
Shift 3 - 2300 to 0659



Inclusion Criteria: Includes all patients treated at NOTS Trauma Centers from 2010 to 2012.

The MetroHealth System

Level I Adult Trauma Center



Dr. Jeffrey Claridge,
Division Director of Trauma,
Critical Care, Burns and
Acute Care Surgery

MetroHealth's unique expertise is a vital asset to our community by providing a continuity of care during a time that can be both physically and psychologically life altering.

The MetroHealth System is the only American College of Surgeons (ACS) verified Level I Adult and Level II Pediatric Trauma Center in the State of Ohio!

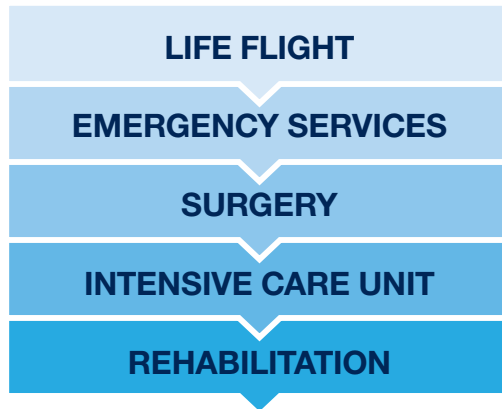
As a Level I Trauma Center, The MetroHealth System is prepared to manage the most complex of traumatic injuries. In order to fulfill our commitment of ensuring our patients receive the highest level of care possible, Metro has a full spectrum of surgical specialists including orthopedic surgery, neurosurgery, cardiac surgery, thoracic surgery, hand surgery, microvascular surgery, plastic surgery, obstetrics and gynecologic surgery, ophthalmology, otolaryngology, and urology. All of our service lines are dedicated to offering a patient-centric approach to care, while providing timely access to our team of specialists.

The Trauma Service works collaboratively with other specialties. Our multi-disciplinary approach leverages experts in their field to continuously strive for better patient outcomes.

Upon arrival to MetroHealth, the trauma patient is evaluated and treated by a multidisciplinary team consisting of six board certified trauma surgeons, emergency physicians, surgical subspecialists, advance practice nurses, highly skilled trauma nurses, as well as hundreds of ancillary personnel. Over 3,000 trauma patients are admitted annually, making this one of the busiest Trauma Centers in Ohio and in the U.S. We are also dedicated to the treatment of injured children with assistance from subspecialty teams of medical and surgical pediatric specialists.

The MetroHealth System

The Department of Surgery at The MetroHealth System, in conjunction with the Case Western Reserve University Integrated General Surgery Residency, offers a one-year Surgical Critical Care fellowship with an optional second-year fellowship in Trauma Surgery. MetroHealth is one of three teaching hospitals that make up the Case Western Reserve University Integrated Surgical Program. Both the Critical Care and Trauma fellowships are fully sponsored by Case Western Reserve University and all faculty hold full-time academic positions.

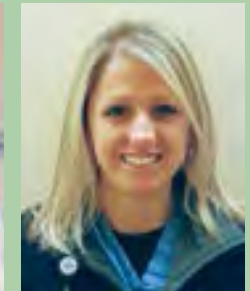


The Division of Trauma supervises two Intensive Care Units. A dedicated Trauma Intensive Care Unit has 12 beds and the Surgical Intensive Care Unit has 15 beds. Almost 2,000 patients are admitted annually to the Intensive Care Unit, making this one of the busiest Intensive Care Units in our community.

The MetroHealth Rehabilitation Institute of Ohio:

An important goal after an injury is to return to work or school. The MetroHealth System is the largest provider of inpatient and outpatient rehabilitation services in the region. Physical Medicine and Rehabilitation offers full-service programs for head injury, spinal cord injury, stroke, amputation, burns, oncology, major multiple trauma, neurologic conditions, arthritis, orthopaedics, and geriatrics. Inpatient acute rehabilitation services are provided in the 172-bed center, which includes 29 sub-acute rehabilitation beds. The Outpatient Rehabilitation Pavilion, located on the MetroHealth campus, provides state-of-the-art outpatient facilities for dynamic programs in spinal cord injury, brain injury, stroke, and industrial rehabilitation.

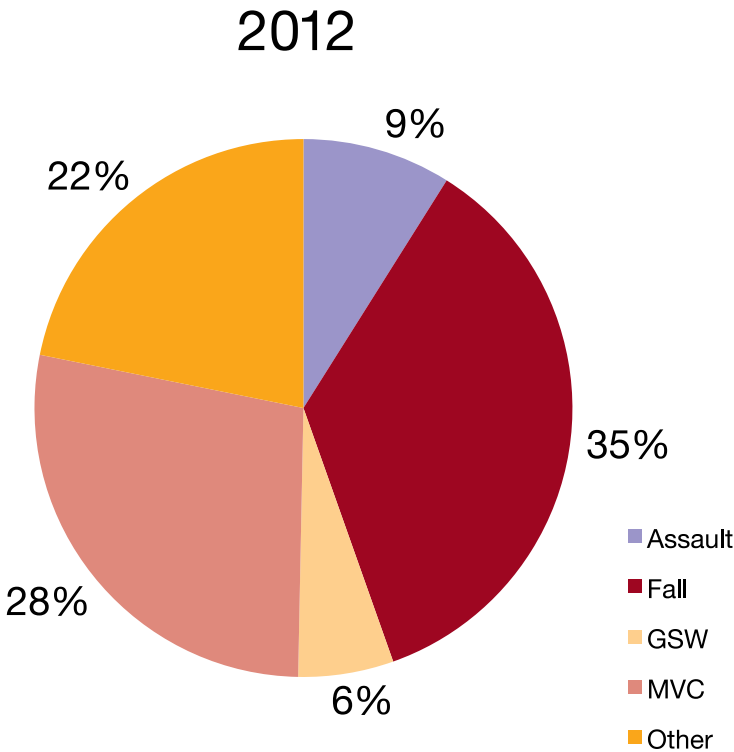
STAFF/FACULTY, John Como, MD, MPH; Joseph Golob, MD; Amy McDonald, MD; Nimitt Patel, MD; Charles Yowler, MD; Elizabeth Kempe, CNP; Patricia Wilczewski, BSN, RN; Danielle Rossler, BSN, RN





Trauma takes many forms. The following data provides a breakdown of the leading causes of trauma. In the NOTS region, falls and motor vehicle crashes make up 62.5% of the traumatic injuries.

Mechanism of Injury: Data



Mechanism of Injury 2012

Cause	Patients	Percent
Assault	836	8.8%
Bicycle	276	2.9%
Burn	200	2.1%
Drown	5	.1%
Fall	3333	35.1%
GSW	536	5.6%
Industrial	75	.8%
Motorcycle	369	3.9%
MVC	2605	27.4%
MVC/Pedestrian	353	3.7%
Other	342	3.6%
Sport/Leisure	253	2.7%
Stab	243	2.6%
Suicide Attempt	77	.8%

Inclusion Criteria: Includes all patients treated at NOTS Trauma Centers in 2012.
In the pie graph, the Other category includes: bicycle injury, drowning, burn, industrial, motorcycle, pedestrian, sport/leisure, stabbing, suicide and ones that do not fit a category.

Mechanism of Injury: Data

Outcome by Injury 2012

Cause	Alive	Dead
Assault	828	8
Bicycle	275	1
Burn	190	10
Drown	2	3
Fall	3244	89
GSW	486	50
Industrial	74	1
Motorcycle	360	9
MVC	2570	35
MVC/Pedestrian	341	12
Other	329	13
Sport/Leisure	252	1
Stab	240	3
Suicide Attempt	58	19

Injury by Gender 2012

Cause	Male	Female
Assault	640	196
Bicycle	226	50
Burn	125	75
Drown	4	1
Fall	1891	1442
GSW	492	44
Industrial	68	7
Motorcycle	320	49
MVC	1365	1240
MVC/Pedestrian	230	123
Other	246	96
Sport/Leisure	183	70
Stab	217	26
Suicide Attempt	54	23

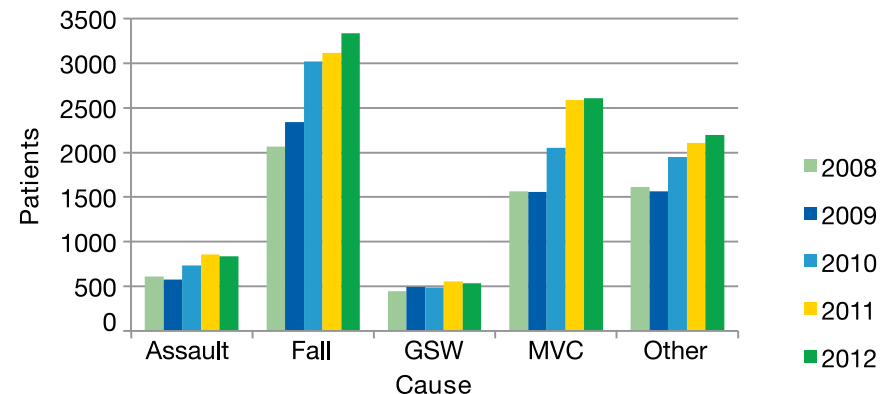
Injury by Age Group 2012*

Cause	< 15	15 - 20	21 - 40	41 - 65	66 - 80	> 80
Assault	23	103	427	274	6	2
Bicycle	54	39	66	110	4	3
Burn	47	6	48	68	20	10
Drown	1	0	2	2	0	0
Fall	268	103	483	1045	599	835
GSW	7	121	321	84	3	0
Industrial	0	4	30	37	4	0
Motorcycle	4	16	153	188	8	0
MVC	111	344	1147	751	172	80
MVC/Pedestrian	42	56	121	110	14	10
Other	51	26	112	117	26	9
Sport/Leisure	71	65	73	41	3	0
Stab	1	39	134	66	2	1
Suicide Attempt	3	8	37	25	4	0

Injury by ISS Group 2012**

Cause	< 9	9 - 14	15 - 24	25 +
Assault	271	104	31	12
Bicycle	109	50	20	3
Burn	140	21	12	12
Drown	0	2	0	3
Fall	1487	766	214	98
GSW	149	126	39	63
Industrial	34	12	3	2
Motorcycle	149	83	36	27
MVC	1116	314	125	66
MVC/Pedestrian	124	45	19	27
Other	137	47	14	6
Sport/Leisure	148	45	21	4
Stab	108	27	6	6
Suicide Attempt	28	9	7	22

Mechanism of Injury: 2008-2012



Inclusion Criteria: Includes all patients treated at NOTS Trauma Centers in 2012.

In the bar chart, the Other category includes: bicycle injury, drowning, burn, industrial, motorcycle, pedestrian, sport/leisure, stabbing, suicide and ones that do not fit a category.

* There are 3 patients who are missing age-related data because the patient identity is unknown.

** All patients do not receive an ISS score.

Hillcrest Hospital

Level II Adult Trauma Center

Since June 1993 we have provided trauma care to Mayfield Heights and the surrounding communities including Lake, Geauga, and Summit counties. From a yearly trauma volume of 116 to 1,950 over the past 20 years, our program has evolved to provide quality care to today's complex trauma patient. Specialty coverage now includes acute care, facial and hand surgeons, an orthopedic traumatologist, and interventional radiologists.

Hillcrest Hospital opened on November 23, 1968, in Mayfield to meet the healthcare needs of rapidly growing east side communities. There were 237 beds and 90 doctors on staff. Over the next 40 years, the hospital expanded and evolved to provide the best patient care for the community. Services grew at an astounding rate, launching many firsts in healthcare.



Dr. Michael Samotowka, Medical Director of Trauma and Mary Anne Edwards, RN, Trauma Program Manager

In 1994, a \$48 million expansion added a new emergency services facility, an atrium with a 70-suite medical office building, a helicopter landing pad on the roof, and a nondenominational chapel.

Hillcrest Hospital



In 2010, Hillcrest Hospital completed a \$163 million project, adding 103 new beds: 72 private rooms, new surgical suites, a Level III Neonatal Intensive Care Unit, the Neurological Institute, and increasing the capacity of the Emergency Department from 28 to 42 private rooms.

Hillcrest Hospital is a Level II Trauma Center, the second highest trauma rating a hospital can receive. We are ready to handle any emergency from a simple cut to life-threatening injuries. Surgeons are on-call 24 hours a day, 7 days a week to quickly and effectively take care of head, spinal, skeletal and internal trauma.



Hillcrest continues to be a leader in patient care, nationally ranking as one of the nation's top 100 hospitals, renowned in cardiac medicine. This dedication to offering the best in patient care resounds in our past, present, and toward our exciting future.

Specialized Care includes the Hirsch Cancer Center, Certified Stroke Center, Certified Chest Pain Center, the Neurological Institute, and SANE/Forensic Services.

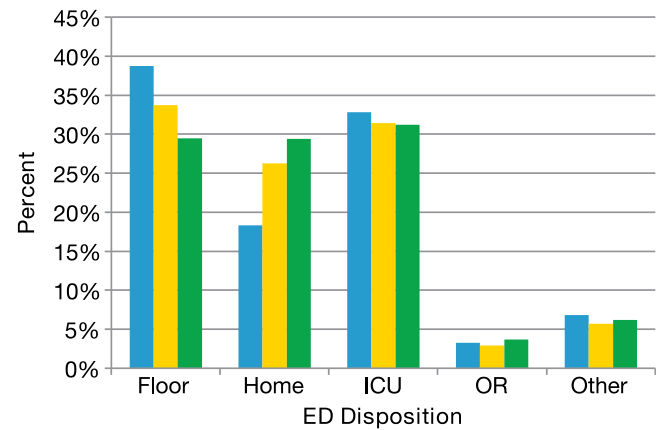
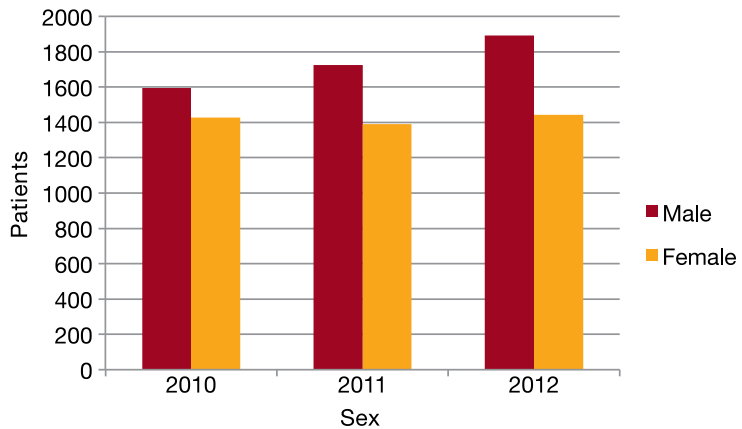
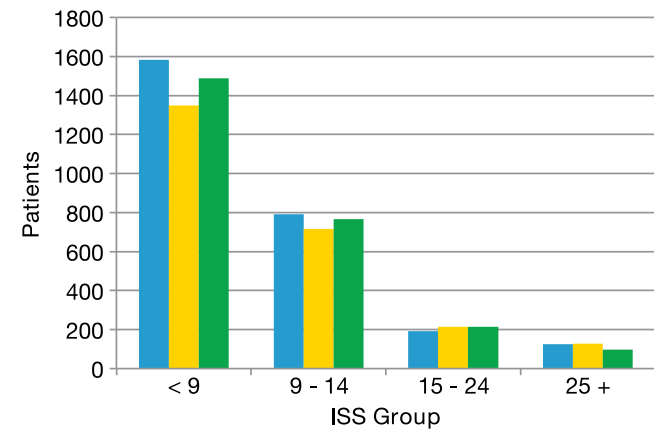
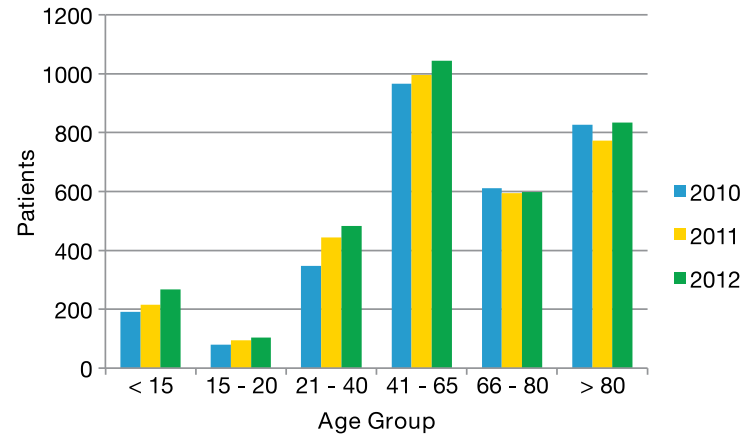
Hillcrest Hospital, a Cleveland Clinic Hospital, was established by visionary leaders who believed in simple, guiding principles. Six fundamental values form the foundation of Hillcrest Hospital's culture:

- **Quality.** We maintain the highest standards and achieve them by continually measuring and improving our outcomes.
- **Innovation.** We welcome change, encourage invention and continually seek better, more efficient ways to achieve our goals.
- **Teamwork.** We collaborate and share knowledge to benefit patients and fellow caregivers for the advancement of our mission.
- **Service.** We strive to exceed our patients' and/or fellow caregivers' expectations for comfort and convenience.
- **Integrity.** We adhere to high moral principles and professional standards by a commitment to honesty, confidentiality, trust, respect and transparency.
- **Compassion.** We demonstrate our commitment to world-class care by providing a caring and supportive environment for our patients, patients' families and fellow caregivers.



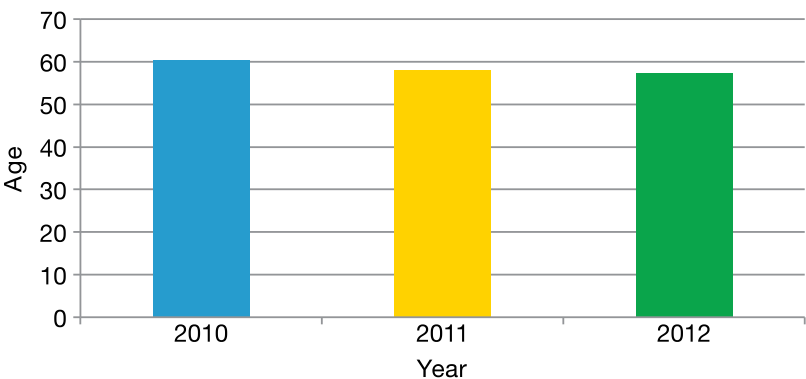
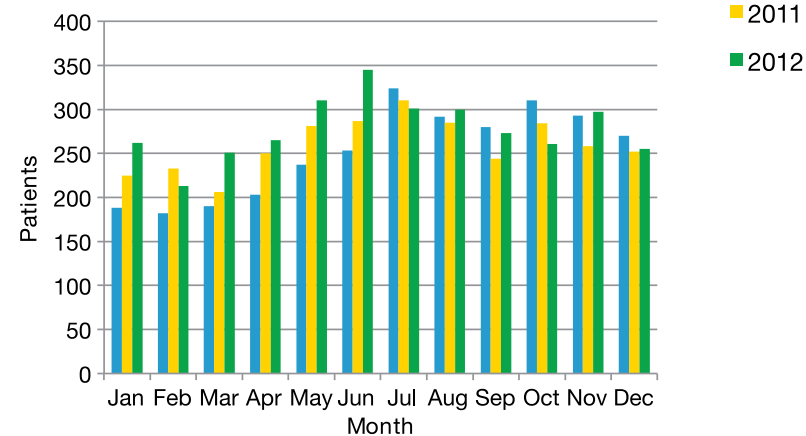
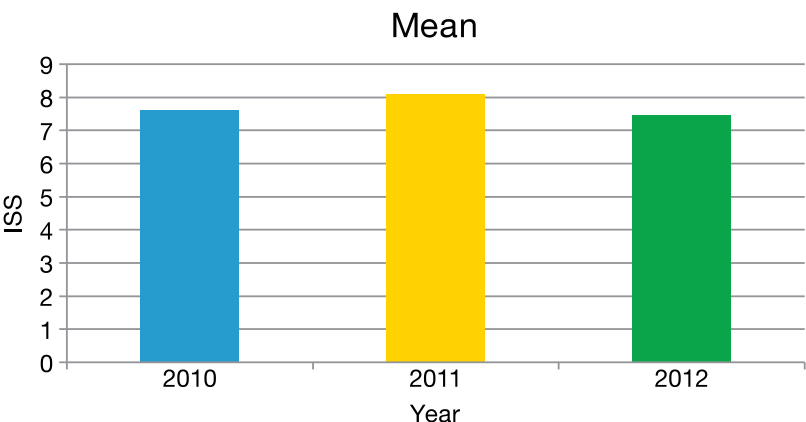
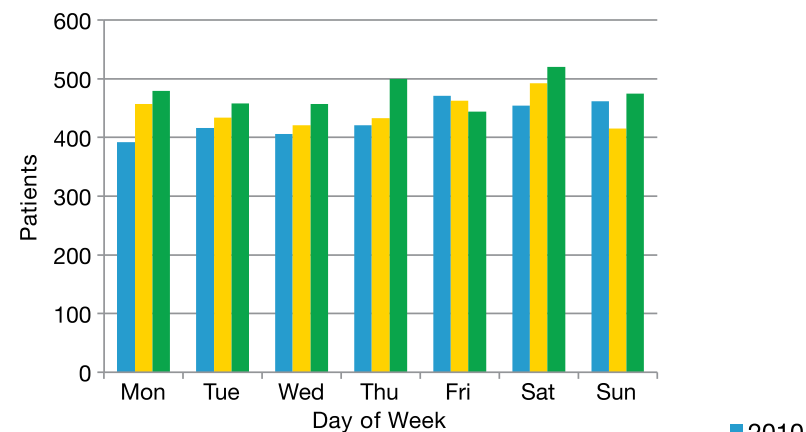
A review of NOTS data shows that patient falls is the leading cause of trauma in our region. Falls can be divided into 2 major categories: falls from height and falls from standing. The height of the fall can impact the degree of injury. For example, a fall greater than 10 feet may result in a more serious injury. This was shown to be true during the evaluation of our scene triage protocol. The NOTS protocol was adjusted so that falls greater than 10 feet require transport to a trauma center.

Falls: Data



Inclusion Criteria: Includes all patients treated for falls at NOTS Trauma Centers from 2010 to 2012.

Falls: Data



Inclusion Criteria: Includes all patients treated for falls at NOTS Trauma Centers from 2010 to 2012.

Fairview Hospital Level II Adult Trauma Center



Fairview Hospital received its first Adult Level II trauma verification by the American College of Surgeons in 1993.

Since its initial inception, Fairview Hospital has developed into an exemplary trauma hospital. Initially under the direction of Dr. Richard Treat, who retired in 2013, and currently under the guidance of Dr. Timothy Barnett, Fairview Hospital's Trauma Center continues to grow and expand.

In June 2013, Fairview opened its new Emergency Department, which can accommodate up to 100,000 patients annually. The expanded Emergency Department features 55 beds and a separate 16-room Pediatric Emergency Department. As Fairview Hospital is the only Level II Trauma Center on the west side of Cleveland, the new Emergency Department has expanded to include two trauma rooms.

The new facility provides improved access for everything from minor emergencies to life-threatening conditions in a setting that prioritizes patient comfort, convenience and healing. Emergency Department patients can also expect reduced wait times as the result of a streamlined process.

The new Emergency Department has increased the number of beds from 45 to 57. It is the only dedicated pediatric Emergency Department on Cleveland's west side.



“Over the past three years, Fairview has seen a growth increase of 30% in trauma volume. We continue to provide comprehensive care for full trauma needs which includes, but is not limited to Neurosurgical, Orthopaedic, and Maxillofacial. We are proud to serve not only our community, but surrounding communities who require specialized care”.

— Dr. Timothy Barnett, Medical Director
Bernadette Szmigielski, BSN, RN, Trauma Program Manager

Fairview Hospital

INTENSIVE CARE UNIT

Along with the new Emergency Department, Fairview Hospital built a new 38-room Intensive Care Unit. Four of the rooms are designated “bariatric rooms” for obese patients.

To cut down on patient disorientation that’s common when in the ICU, lights in the rooms and hallways are designed to dim in conjunction with sunset. The lights become brighter from noon to 4 p.m. when patients are naturally more alert. All patients’ rooms have large windows that provide natural light.



SANE UNIT

The SANE (Sexual Assault Nurse Examiner) Program has a designated room designed to provide private and compassionate care. The program is staffed by nurses who are specially trained to work with patients who have come to the Emergency Department as a result of violence. The program has been in existence since 2004 and initially worked with patients who have experienced sexual assault or rape. The program has expanded to include care to patients who have experienced Intimate Partner Violence (IPV), physical neglect or abuse for the geriatric and pediatric populations.

Patients can enter the SANE program by going to Fairview Hospital’s adult or pediatric emergency departments. Referral for SANE care is then made. Patients cared for by the SANE program are treated in a respected and compassionate manner by the staff. Physical assessments are completed, and if requested an appropriate evidence collection can be done.

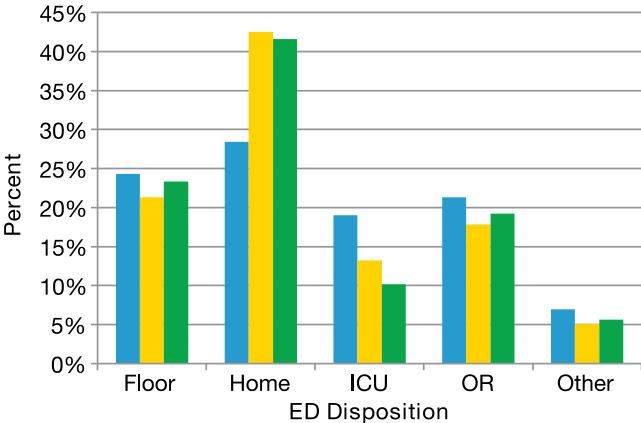
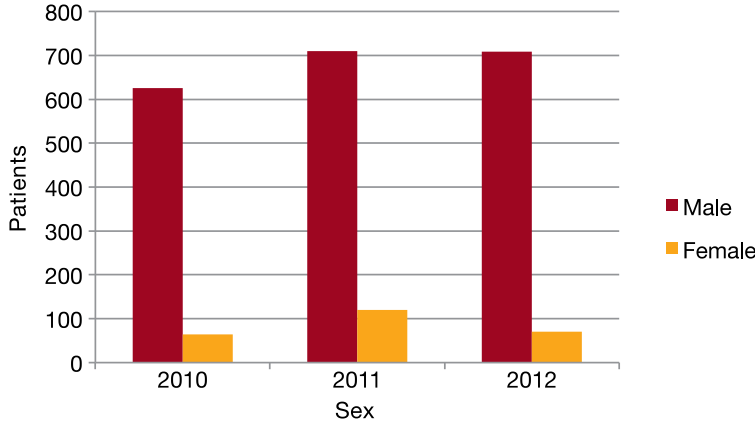
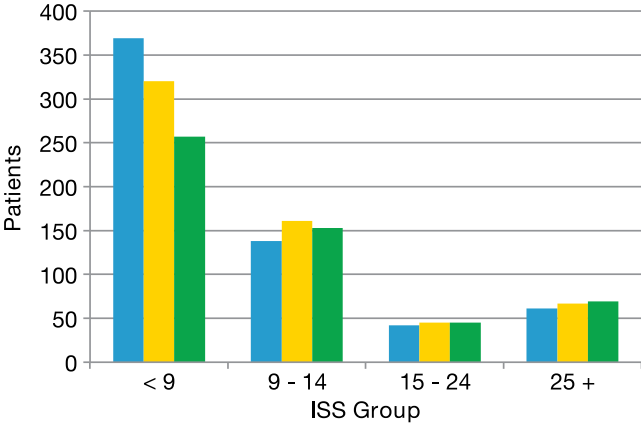
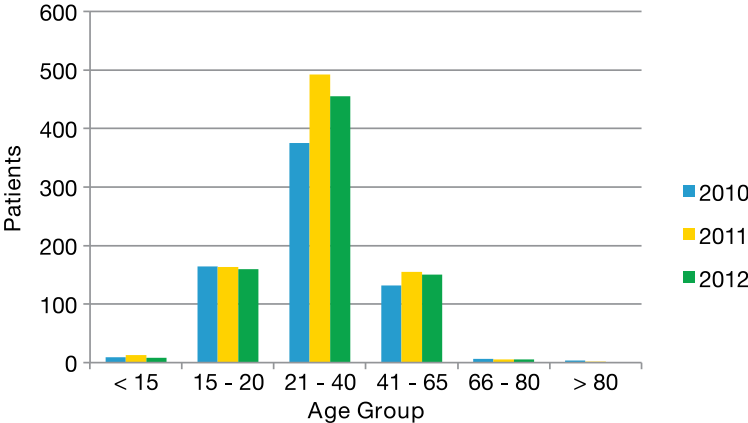
Advocates from the Cleveland Rape Crisis Center can be contacted to provide additional support to the patient or the patient’s family. SANE programs are available at all NOTS Trauma Hospitals: Fairview, Hillcrest and The Metro Health System.

Fairview has a dedicated entrance for ambulances and two separate entrances for walk-in patients. This will improve traffic flow in and out of the Emergency Department. A decontamination room and outdoor storage building adjacent to the Emergency Department will hold disaster supplies for emergency preparedness.



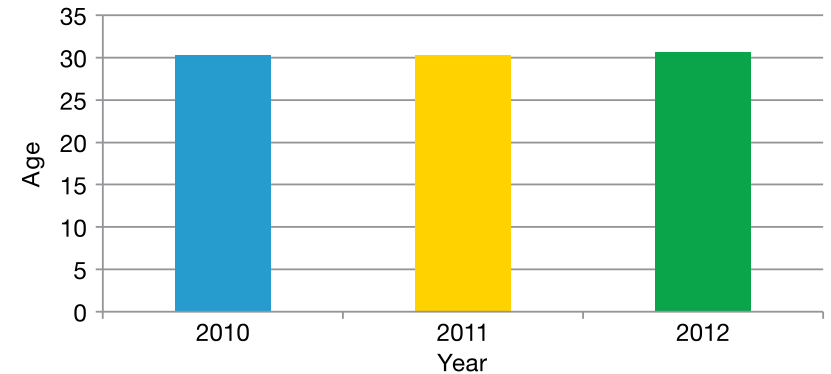
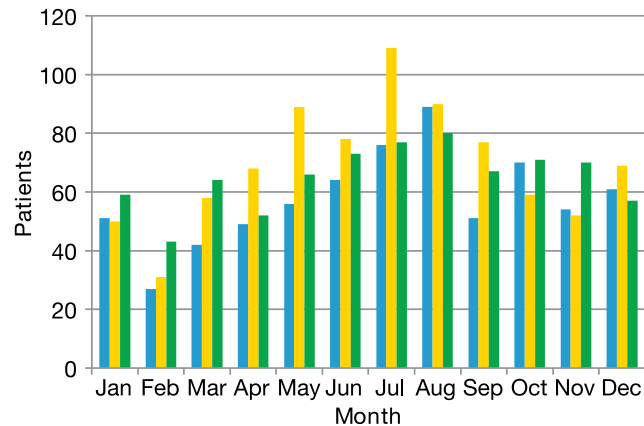
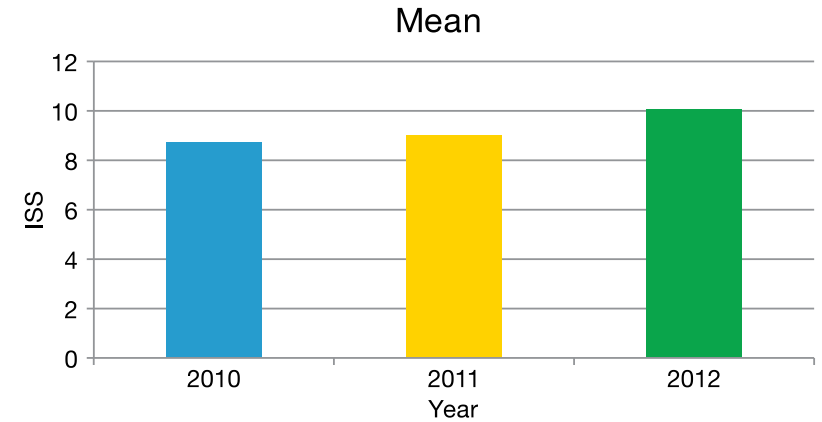
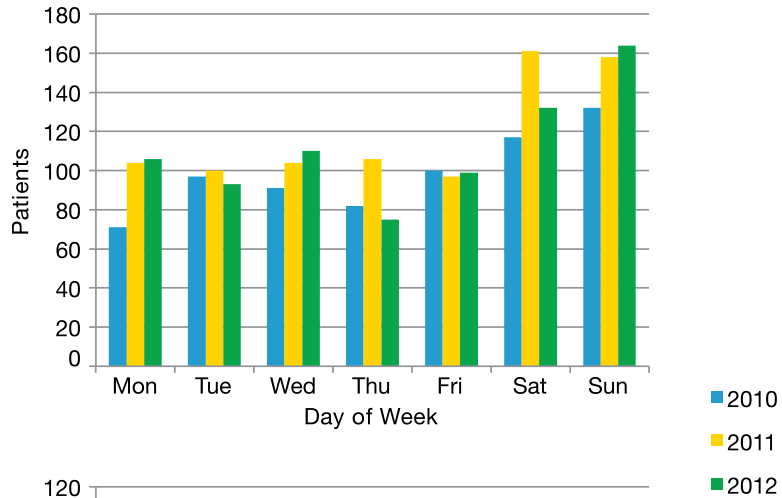
The Penetrating Trauma group is comprised of patients who were either shot or stabbed. In this group, the severity of the injury is dependent on the organs and tissues that are injured. While a large number of patients go home from the Emergency Department, there are multiple patients that go directly to the operating room.

Penetrating Injuries: Data



Inclusion Criteria: Includes all patients treated at NOTS Trauma Centers for gunshot wounds and stabbings from 2010 to 2012.

Penetrating Injuries: Data

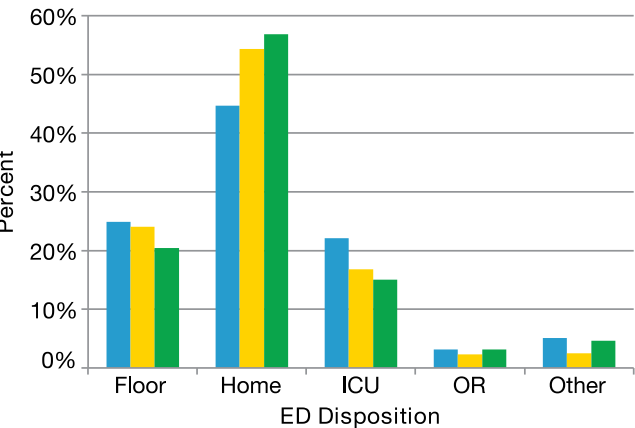
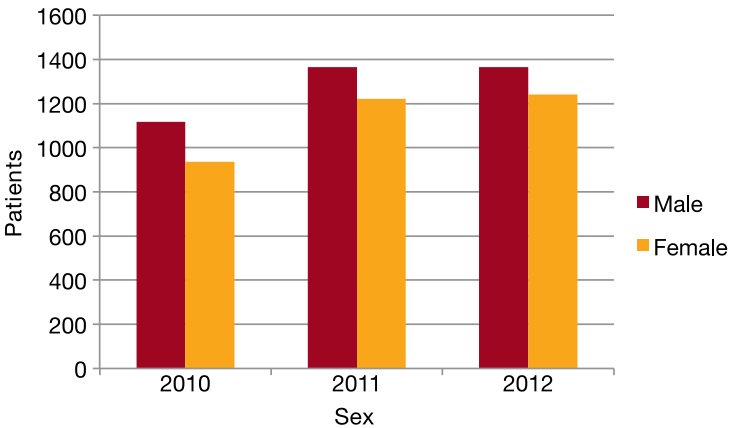
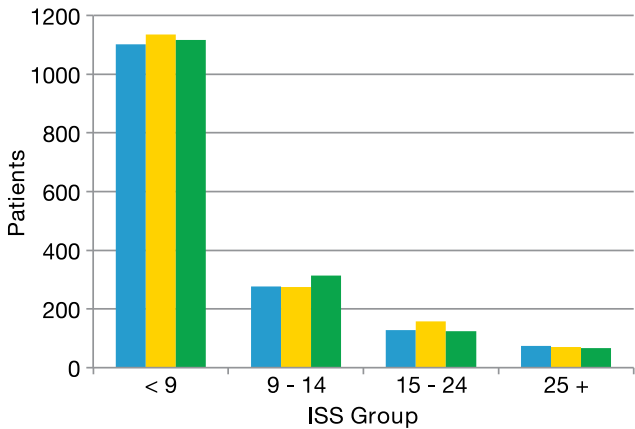
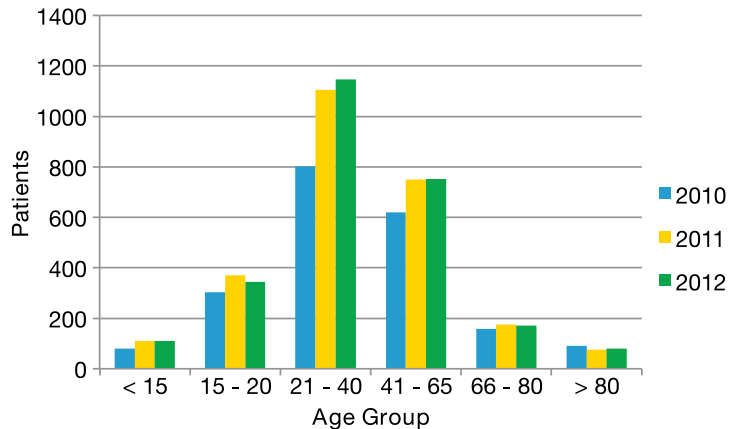


Inclusion Criteria: Includes all patients treated at NOTS Trauma Centers for gunshot wounds and stabbings from 2010 to 2012.

Motor Vehicle Crashes: Data

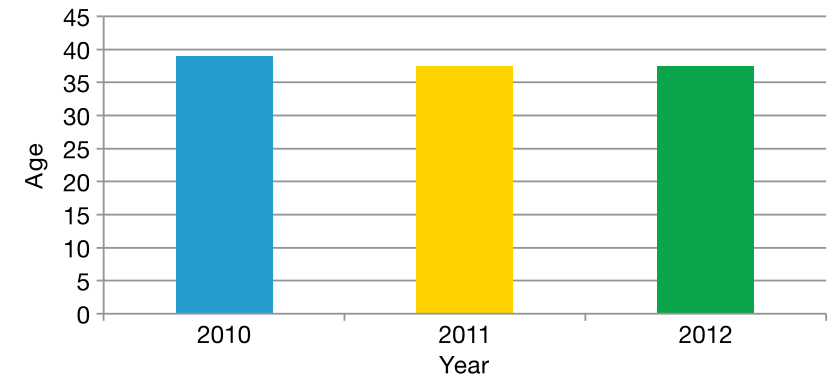
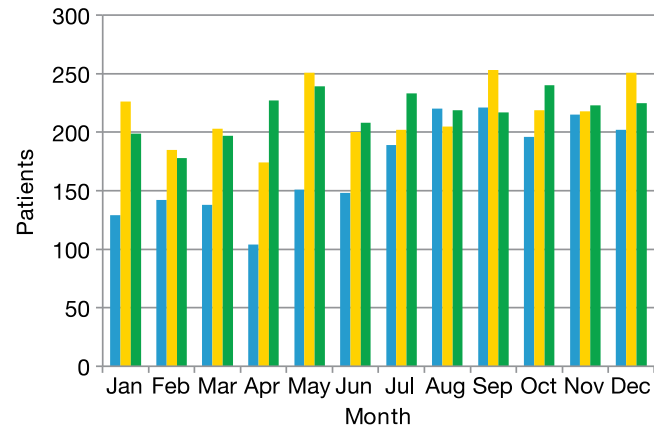
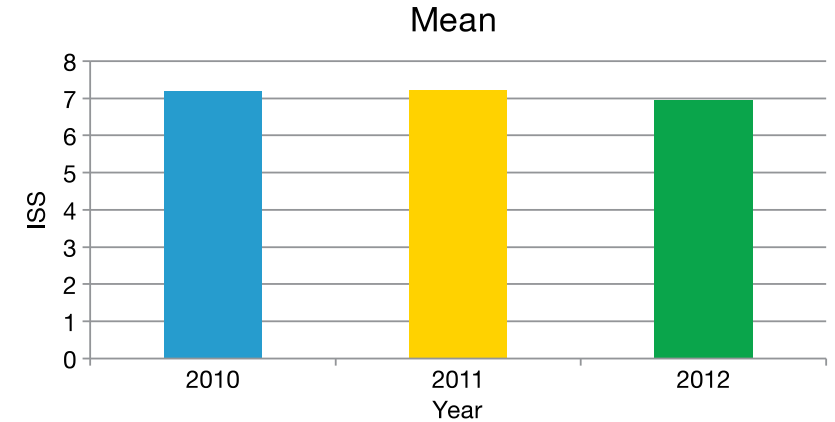
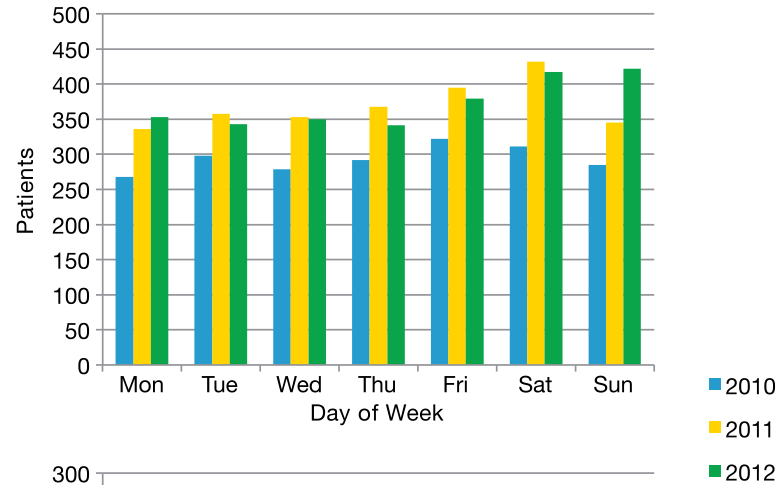


Motor Vehicle Crashes are the second leading cause of trauma in the region. Injuries can range from minor to serious, involving multiple body systems. While a large percent of the patients went home, there were a number of patients that went to the ICU, operating room or a general care unit. It is important to note that this group does not include crashes involving motorcycles or pedestrians.



Inclusion Criteria: Includes all patients treated at NOTS Trauma Centers for motor vehicle crashes from 2010 to 2012.

Motor Vehicle Crashes: Data



Inclusion Criteria: Includes all patients treated at NOTS Trauma Centers for motor vehicle crashes from 2010 to 2012.

The MetroHealth System Level II Pediatric Trauma Center

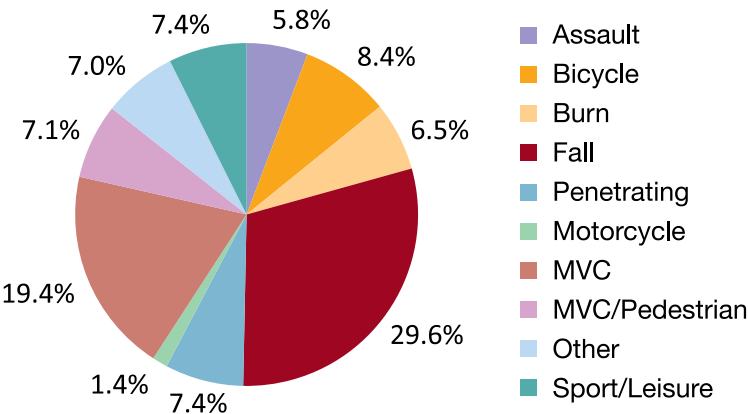


A condition set by the American College of Surgeons requires a minimum number of pediatric admissions in order to maintain the clinical skills of its pediatric trauma team members. MetroHealth surpasses the minimum requirement and excels in the care of pediatric trauma.

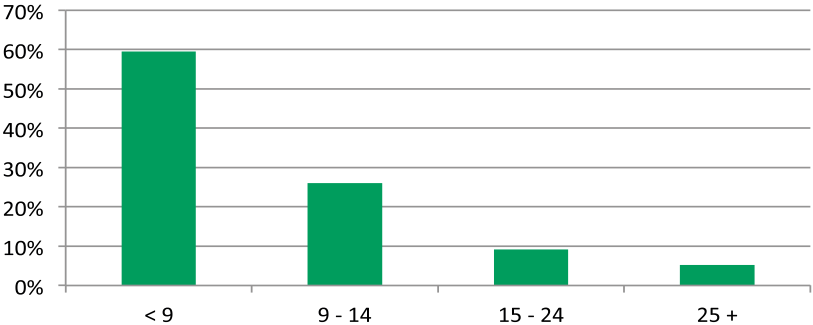
The MetroHealth System has the only Pediatric Trauma Center on Cleveland's west side. Being a Pediatric Trauma Center, MetroHealth assumes a leadership role in the care of the injured child. They provide comprehensive pediatric trauma care for the most severely injured children.

One of its unique capabilities as a comprehensive Adult Level I Trauma Center and a Pediatric Level II Trauma Center, MetroHealth has the capacity to ensure families are kept together and not admitted to two different facilities.

Mechanism of Injury 2012



ISS Group 2012



Inclusion Criteria: Includes all patients less than 18 years old treated at The MetroHealth System.

The MetroHealth System Level II Pediatric Trauma Center



Danielle Rossler, BSN, RN
Pediatric and Injury
Prevention Coordinator

216-778-4461

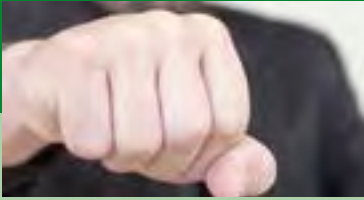
PEDIATRIC INTENSIVE CARE UNIT

The MetroHealth PICU is the only Pediatric Intensive Care Unit on Cleveland's west side.

It offers the advanced services of a pediatric hospital in a more personal setting.

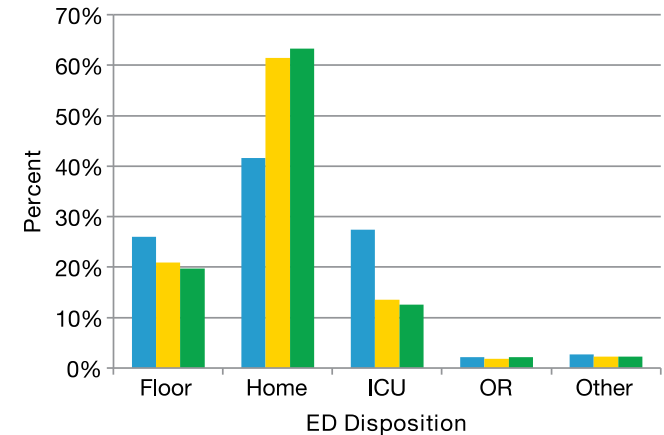
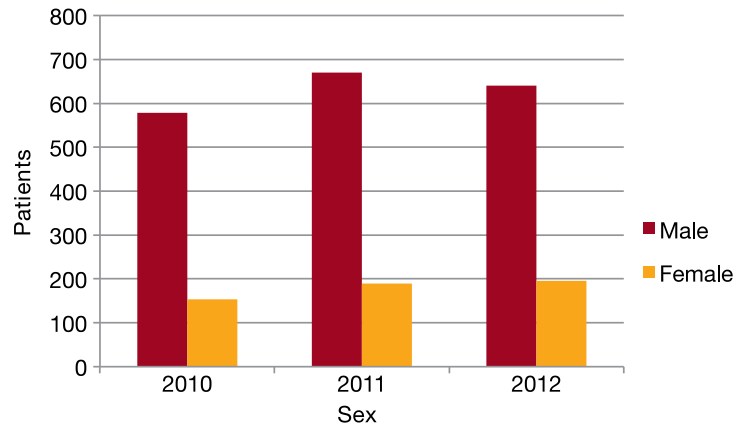
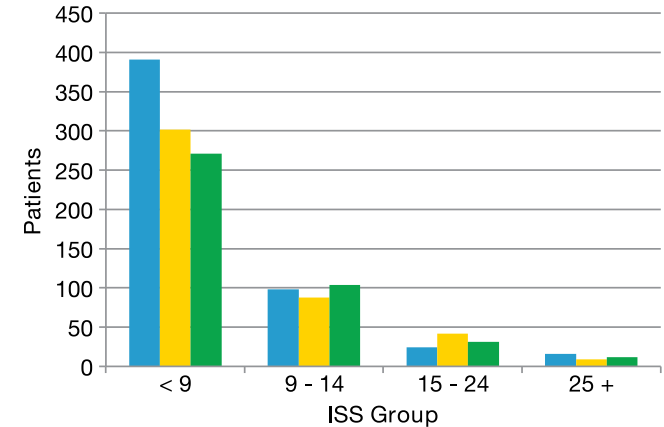
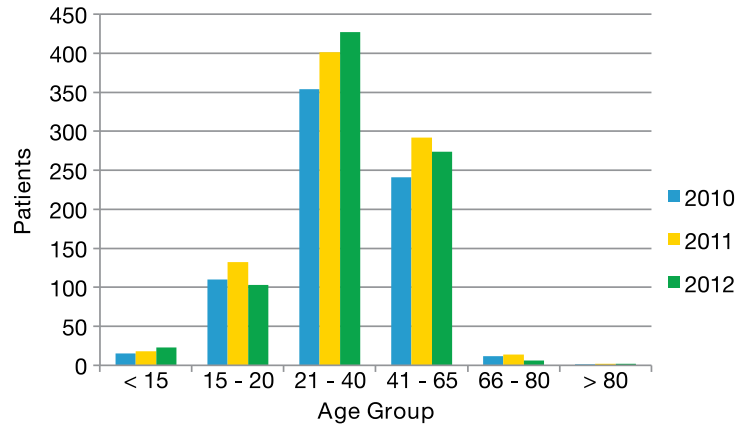
MetroHealth's PICU offers highly-trained specialists to care for critically ill or injured infants, children and adolescents in a state-of-the-art environment. Each year, more than 700 critically ill and injured children are admitted to the PICU at MetroHealth.

- 10-bed unit designed with both patient care and family-centered care in mind.
- Dedicated team of physicians, nurses, respiratory therapists, child life specialists, social workers, and support staff who care for children of all ages who require intensive monitoring and therapy.
- Pediatric Intensivists are available 24/7.
- Access to 24/7 on-site surgical services.
- Advanced technology including state-of-the-art ventilators, invasive and non-invasive monitoring.
- Pediatric procedural sedation services are also available.
- Each PICU room has a sleeper sofa, a desk for family members, and a DVD player for the child.
- Hospitality room offers family members another option for overnight stay at no charge.
- Ronald McDonald Family Room – offers refreshment area, comfortable seating and a place to gather.



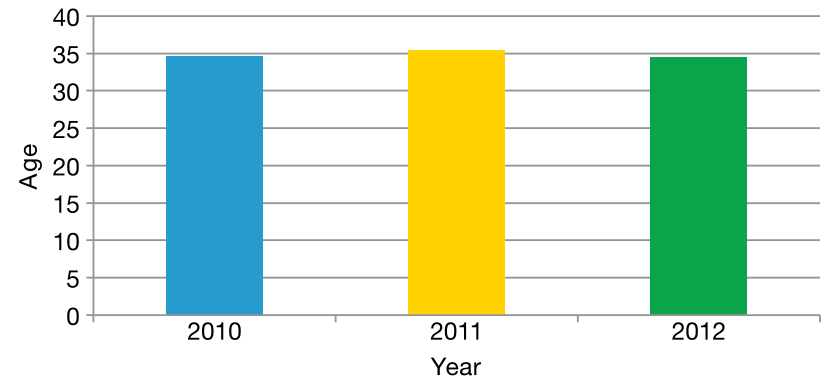
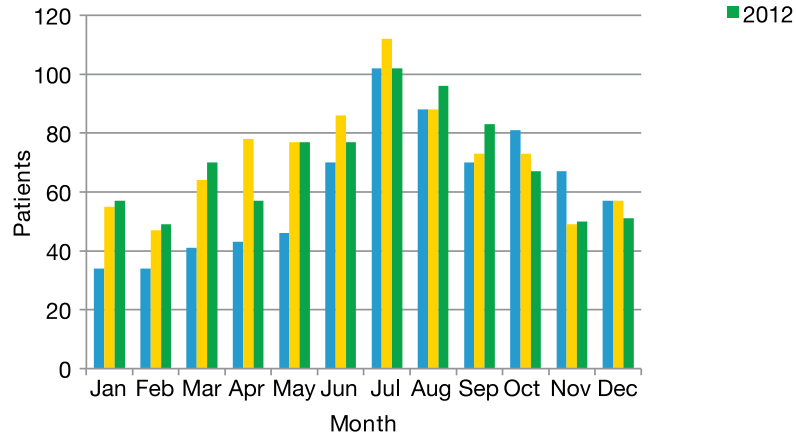
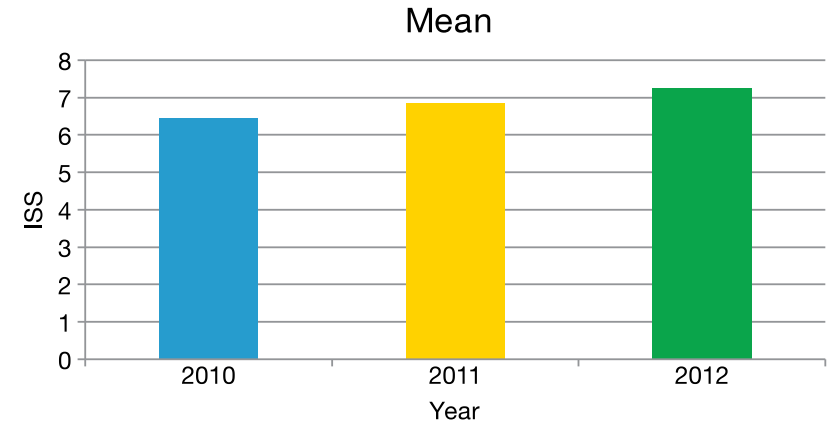
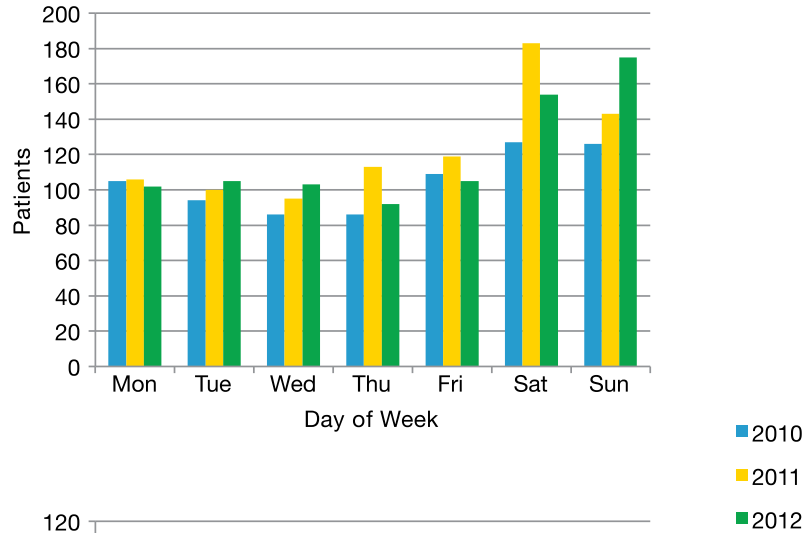
Assault can be defined as a form of inter-personal violence (IPV) which usually involves direct impact to the body. These blows can be provided by a person’s hand or an object such as a baseball bat. The injuries are usually blunt in nature and often involve the head, face and upper body. The common phrase “got beat up” would apply here. The injuries are usually not severe and a majority of the patients go home from the Emergency Department. Assaults tend to occur more frequently on the weekend.

Assault: Data



Inclusion Criteria: Includes all patients treated at NOTS Trauma Centers for assault from 2010 to 2012.

Assault: Data

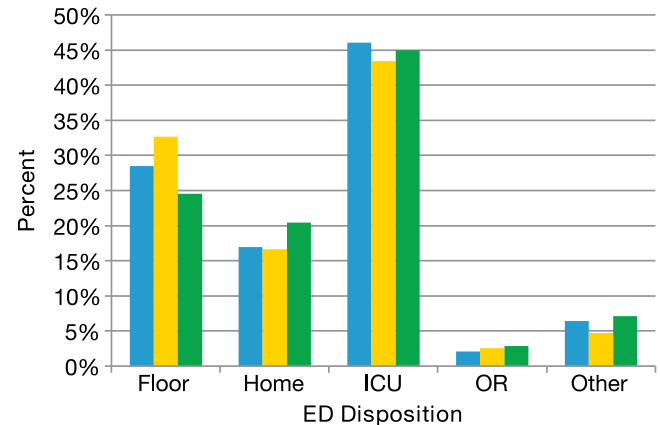
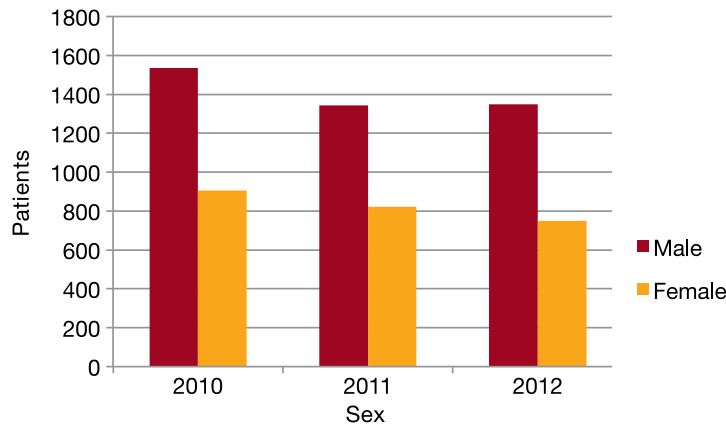
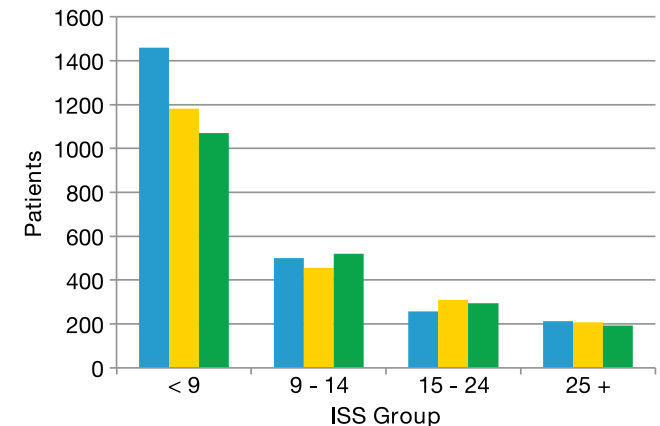
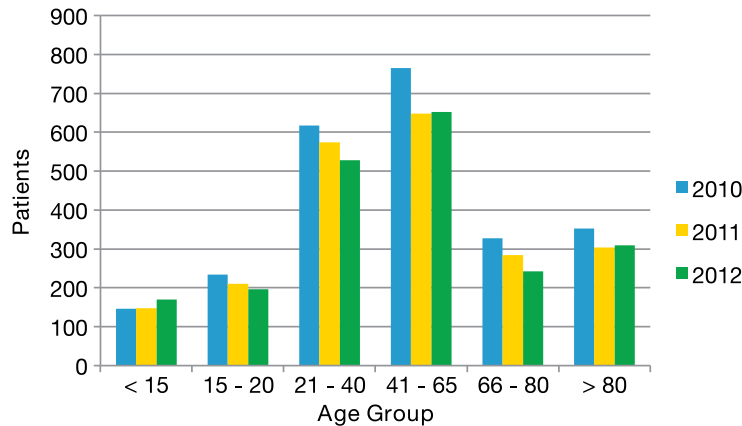


Inclusion Criteria: Includes all patients treated at NOTS Trauma Centers for assault from 2010 to 2012.



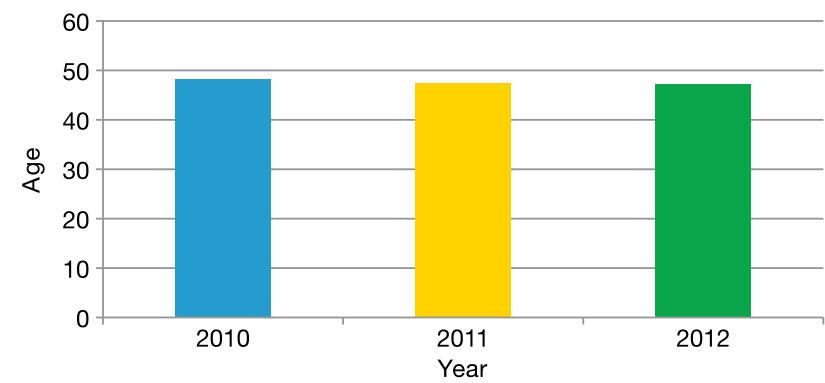
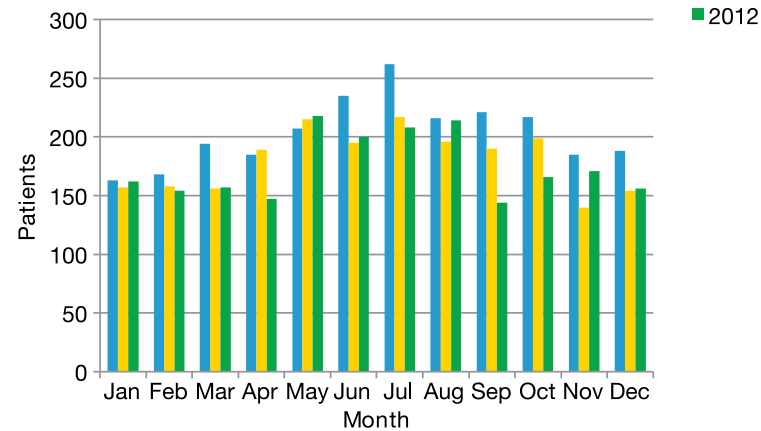
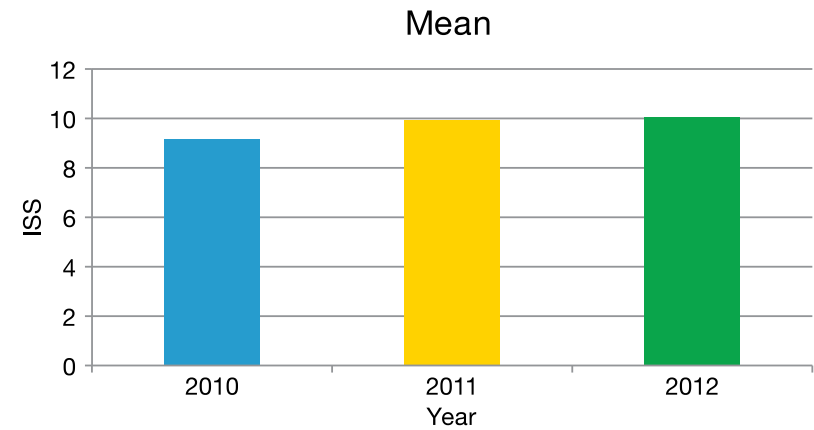
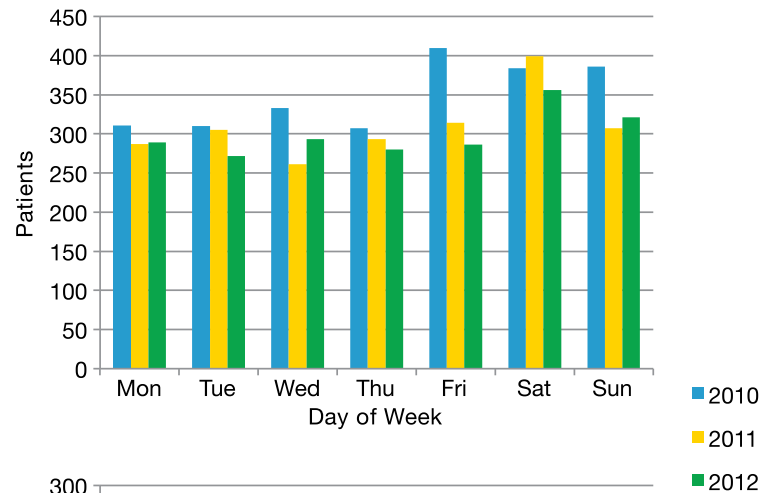
This section involves both blunt and penetrating injuries to the head. Patients were identified by the associated ICD-9 codes. Head injuries can take many forms. The injuries can be isolated or in combination with other insults. An example of an isolated injury would be a blunt impact to the head as the result of a fall, whereas a patient in an automobile crash may have both head and abdominal injuries. It is interesting to note the high percentage of patients that went to the Intensive Care Unit.

Head Injury: Data



Inclusion Criteria: Includes all patients treated at NOTS Trauma Centers for head injury from 2010 to 2012.

Head Injury: Data



Inclusion Criteria: Includes all patients treated at NOTS Trauma Centers for head injury from 2010 to 2012.

Head Injury Combinations: Data

Head injuries can result from many causes. The following tables represent three of the most common causes of head injury as they relate to age. They are Falls, Motor Vehicle Crashes and Assaults. The results show that patients who fall tend to be older than the other two groups.

Fall with Head Injury

Age Group	2010	2011	2012
< 15	64	63	87
15 - 20	33	27	22
21 - 40	102	101	100
41 - 65	329	285	290
66 - 80	249	227	185
> 80	319	282	280

Assault with Head Injury

Age Group	2010	2011	2012
< 15	4	5	5
15 - 20	40	32	25
21 - 40	143	103	104
41 - 65	90	88	56
66 - 80	4	4	3
> 80	1	1	2

Motor Vehicle Crash with Head Injury

Age Group	2010	2011	2012
< 15	23	20	15
15 - 20	99	97	82
21 - 40	251	258	208
41 - 65	178	176	150
66 - 80	47	43	37
> 80	27	16	21



Abstract

Decreased Mortality in Traumatic Brain Injury Following Regionalization of Trauma Across Hospital Systems

Authors: Michael Kelly, MD, Aman Banerjee, MD, Michael Nowak, PhD, Michael Steinmetz, MD, Jeffrey A. Claridge, MD, MS

Objectives: The Northern Ohio Trauma System (NOTS) was established to improve outcomes of trauma patients across the region. We hypothesized that mortality in patients with traumatic brain injury (TBI) would improve after regionalization.

Methods: All patients >14 years with a TBI were identified from NOTS, a regional trauma system consisting of 2 large healthcare systems and regional EMS providers. Data from 2008 through 2012 were analyzed before and after NOTS formation in 2010. Multivariate regression analysis (RA) was performed to evaluate independent predictors of survival.

Results: 11,220 patients were identified with TBI in the NOTS database during the study period; 4507 (40%) before NOTS and 6713 (60%) after NOTS. The percentage of patients presenting to the regional level 1 center post-NOTS increased from 35% to 66% ($p<.0001$). TBIs in the post-NOTS group were older (median age 55 vs. 52, $p= 0.02$) and less likely male ($p=0.001$). Injury severity scores and Abbreviated Injury Scores (AIS) were similar between periods. Post-NOTS TBIs had a lower median ICU stay ($p=0.001$) and were more likely to present via air transport ($p=0.02$). The mortality rate decreased from 6.2% to 4.9% ($p=0.005$) among all TBIs and from 19% to 14% ($p<.0001$) in TBIs with a Head AIS ≥ 3 (N= 2,570). Craniotomy procedures increased from 1.8% to 2.7% ($p= 0.003$) in all TBIs and from 5.9% to 8.1% ($p= 0.02$) in those with Head AIS ≥ 3 .

RA demonstrated an independent effect on survival for post-NOTS period. The OR for TBI patients in the post-NOTS period was 1.3 (95% CI: 1.1-1.6; C-stat= 0.96) and in TBI patients with Head AIS ≥ 3 was 1.4 (95% CI: 1.1-1.7; C-stat=0.86).

Conclusion: Regionalization of an urban trauma system is associated with a reduced mortality rate for patients with TBI, particularly for patients with a Head AIS ≥ 3 . These findings support regionalization of trauma in a spirit of collaboration across health care systems.

This abstract was accepted for presentation at the Eastern Association for the Surgery of Trauma (EAST). It will be presented in January 2014 at their yearly meeting.

The MetroHealth System

Burn Care Center – Adult and Pediatric

American Burn Association and American College of Surgeons Verified Burn Center



In 1987, The John A. Gannon Center for Burns and Trauma opened with 14 inpatient beds, five of which were dedicated to Burn Intensive Care.

In the late 1960's, treatment for burn injuries took a major step forward. New trends in caring for victims of serious injuries, including burns, showed that patients had a much greater chance of survival if they were treated by a multidisciplinary team of highly trained health care professionals at a specialized facility.

In 1970, only one out of two patients survived a 50 percent body surface burn. Today, most patients survive burns of greater than 75 percent of their body. Physicians credit modern technology, an aggressive surgical approach, new methods for early coverage of burn wounds, and new insights into providing nutritional support for this dramatic improvement in survival.

In 1972, the Burn Care Center was moved to its first permanent quarters in the west wing of the newly constructed twin towers. The Center now consisted of eight double rooms and a 16-patient capacity, and included hydrotherapy areas and a specialized area for dressing changes.

Over the last 40 years, the Burn Care Center has excelled in the treatment of the burn patient and is proud to report an overall survival rate of 97 percent. All services are offered within the Center, reducing the risk for infection. These services are available 24 hours a day, 7 days a week.

OUTPATIENT BURN MANAGEMENT

- **24/7 emergency clinic, including weekends and holidays.**
- **Burn Center should be consulted to determine when follow up should be arranged.**
- **Referred directly to the outpatient clinic (without going through MetroHealth's Emergency Department).**



Tammy Coffee, CNP

TRANSFERS TO MHMC BURN CENTER

- **Patient must be medically stable, airway maintained, and shock, if present, managed prior to transfer.**
- **Not all burns need immediate transfer.**

For appointments or consults,
call **216-778-5643**.

Abstract

Outcomes of Outpatient Management of Pediatric Burns

Authors: Matthew Brown, MD,
Tammy Coffee, CNP, Paul Adenuga, BS,
Charles J. Yowler, MD, FACS, FCCM

Importance: The literature surrounding pediatric burns has focused on inpatient management. The vast majority of pediatric burns are treated with outpatient management, but there is no characterization of this outpatient burn population or evidence to support this treatment modality.

Objective: To characterize the population of pediatric burns treated as outpatients and assess outcomes validating this method of burn care.

Design: 3-year retrospective review.

Setting: The burn clinic and burn unit of a tertiary care center.

Population: 953 patients, ages 0-18 treated at a tertiary care center burn unit over a 3-year period.

Intervention: Patients were classified as outpatient if they were discharged from the burn clinic upon initial evaluation. All patients directly admitted to the burn unit or admitted from clinic were considered inpatient.

Main Outcome(s) and Measure(s): Patient age, burn etiology, burn characteristics, burn mechanism and referral pattern were recorded. The type of wound care and incidence of outcomes including subsequent hospital admission, infection, scarring, and surgery served as the primary outcome data.

Results: For the outpatient cohort the mean time of burn injury to evaluation in our clinic was 1.8 days with 64% of patients being evaluated within 1 day of injury. Age and gender showed similar distributions between inpatient and outpatient cohorts. Scalds accounted for 53% of the burn mechanism, with burns to the hand/wrist being the most frequent area involved. The mean percentage of total body

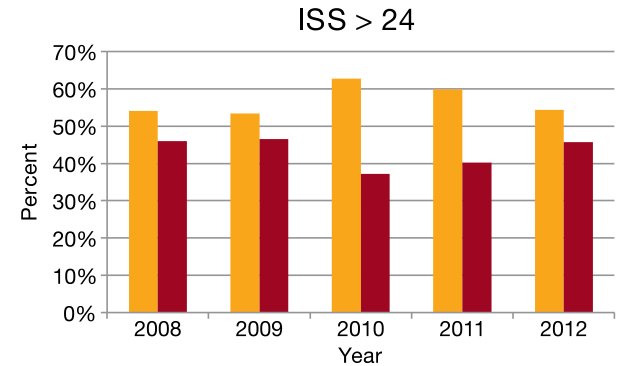
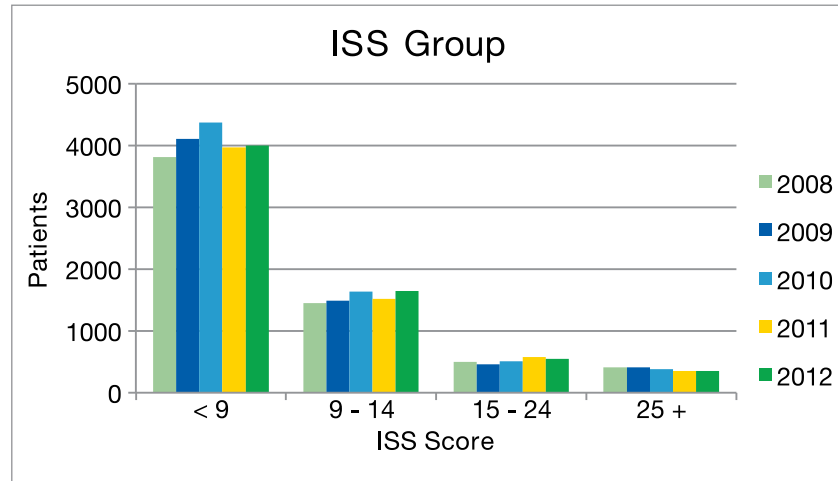
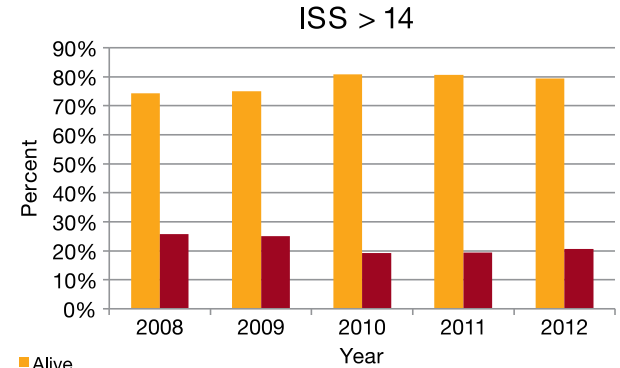
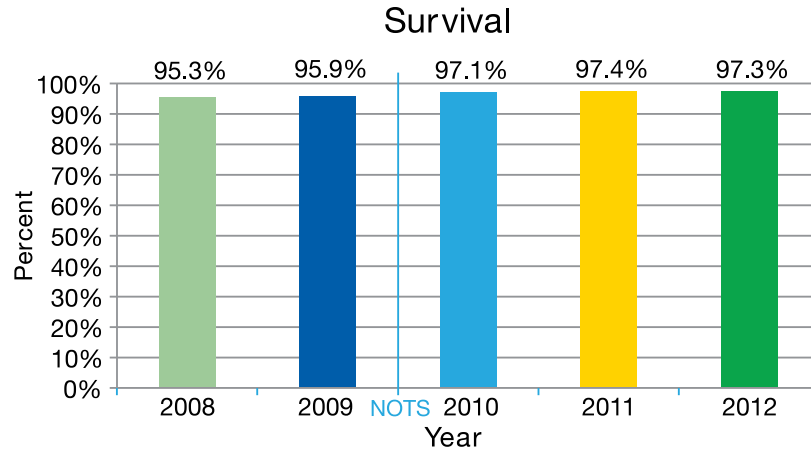
surface area was 1.4% for the outpatient cohort and 8% for the inpatient cohort. Burns in the outpatient cohort healed with a mean time of 13.4 days. In the outpatient cohort nine (1%) patients had subsequent admissions and three (0.4%) patients had concern for infection. Eight patients from the outpatient cohort were treated with excision and grafting.

Conclusions and Relevance: The vast majority of pediatric burns are small, although they may often involve more critical areas such as the face and hand. Outpatient wound care is effective treatment strategy and results in low rates of complications and should become the standard of care for children with appropriate burn size and home support.



“We have significantly reduced mortality across the region after two years. This reduction remains sustained in 2012. We work to continue to improve outcomes.”
 — Dr. Jeffrey Claridge, NOTS Medical Director

Survival: Data



Inclusion Criteria: Includes all patients treated at NOTS Trauma Centers from 2008 to 2012.

Abstract

Regional collaboration across hospital systems to develop and implement trauma protocols saves lives within 2 years

Authors: Jeffrey A. Claridge, MD, MS, FACS, Debra Allen, BSN, RN, CCRN, Brendan Patterson, MD, Fred DeGrandis, JD, Charles Emerman, MD, David Bronson, MD, and Alfred Connors, MD, *Cleveland, OH*

Background: The Northern Ohio Trauma System (NOTS) was created with the expressed goal of improving trauma care through collaboration, system-wide protocol implementation, and evidence-based process improvement. The primary goal of this study was to evaluate the mortality of trauma patterns seen across the region after 2 years of beginning NOTS.

Methods: Regional data was compared with the 2 years pre-NOTS (2008 and 2009) to the 2 years post-NOTS (2010 and 2011). The regional system consisted of two large hospital systems, initially including one level 1 center, four level 2 centers,

seven nontrauma hospitals, and local emergency medical services groups. Two level 2 trauma centers closed during the study period. Mortality was the primary outcome for this study. Multivariate logistic regression also was performed to evaluate for independent predictors of mortality. An odds ratio (OR) and 95% confidence interval (CI) of survival were determined after we adjusted for other factors associated with mortality.

Result: During the 4-year period 29,890 trauma patients were seen throughout NOTS. The mean age was 44 with a mean Injury Severity Score (ISS) of 8; 65% of the patients were male. Racial breakdown demonstrated that 64.0% were white, 31.9% were black, and 4.1% were other races. The hospital stay (mean \pm SD) was 3.0 ± 5.2 days, and overall mortality was 3.4%. A separate analysis in which we used multivariate logistic regression demonstrated that

patients treated in the post-NOTS period was an independent predictor for survival when we controlled for age, sex, ethnicity, mechanism, and ISS. The OR of survival of post-NOTS was 0.81 (95% CI 0.70-0.94) when we evaluated all patients. The OR for admitted patients was 0.79 (95% CI 0.67-0.94) and 0.76 (0.62-0.95) in patients with ISS > 24.

There was an increase in the percentage of patients seen at the level 1 center in the post-NOTS period, which was especially demonstrated in patients with greater ISS.

Conclusion: NOTS appears to have contributed to the saving of lives within 2 years of its formation. Regionalized protocols, collaboration, and consolidation resulted in an improvement in mortality. (Surgery 2013; 154:875-84.)

NOTS 2nd Annual Trauma Symposium - 2012

The 2nd Annual Trauma Symposium was a huge success with an impressive 62% increase over our attendance from the previous year. Attendees enjoyed extraordinary trauma lectures presented by nationally-recognized speakers.



EMS Award: Outstanding Care in the Field of Trauma

Chardon Fire Department recipients of the award are:

Chris Erskine

Willie Haines

Thomas Hummel, III

Roy Nieman

Brian Valletto

Craig Vatty

Asst. Chief Tom Hummel



On February 27, 2012 our community changed forever. A lone gunman entered Chardon High School killing three boys along with injuring three others.

It was our honor to present the Chardon Fire Department with the Northern Ohio Trauma System's EMS Award for Outstanding Care in the Field of Trauma.

We would like to thank the Chardon Fire Department for their expertise, skill, knowledge and compassion in dealing with this horrific event.

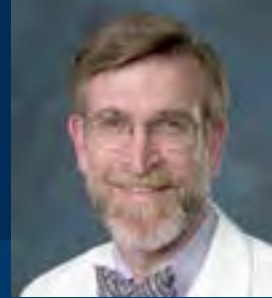
Northern Ohio Trauma System Board Members



Dr. Brendan M. Patterson
Chairman



Dr. David L. Bronson



Dr. Alfred F. Connors, Jr.



Mr. Fred M. DeGrandis



Dr. Charles L. Emerman



Dr. Robert Wyllie



Mr. Edward J. Eckart, Jr.

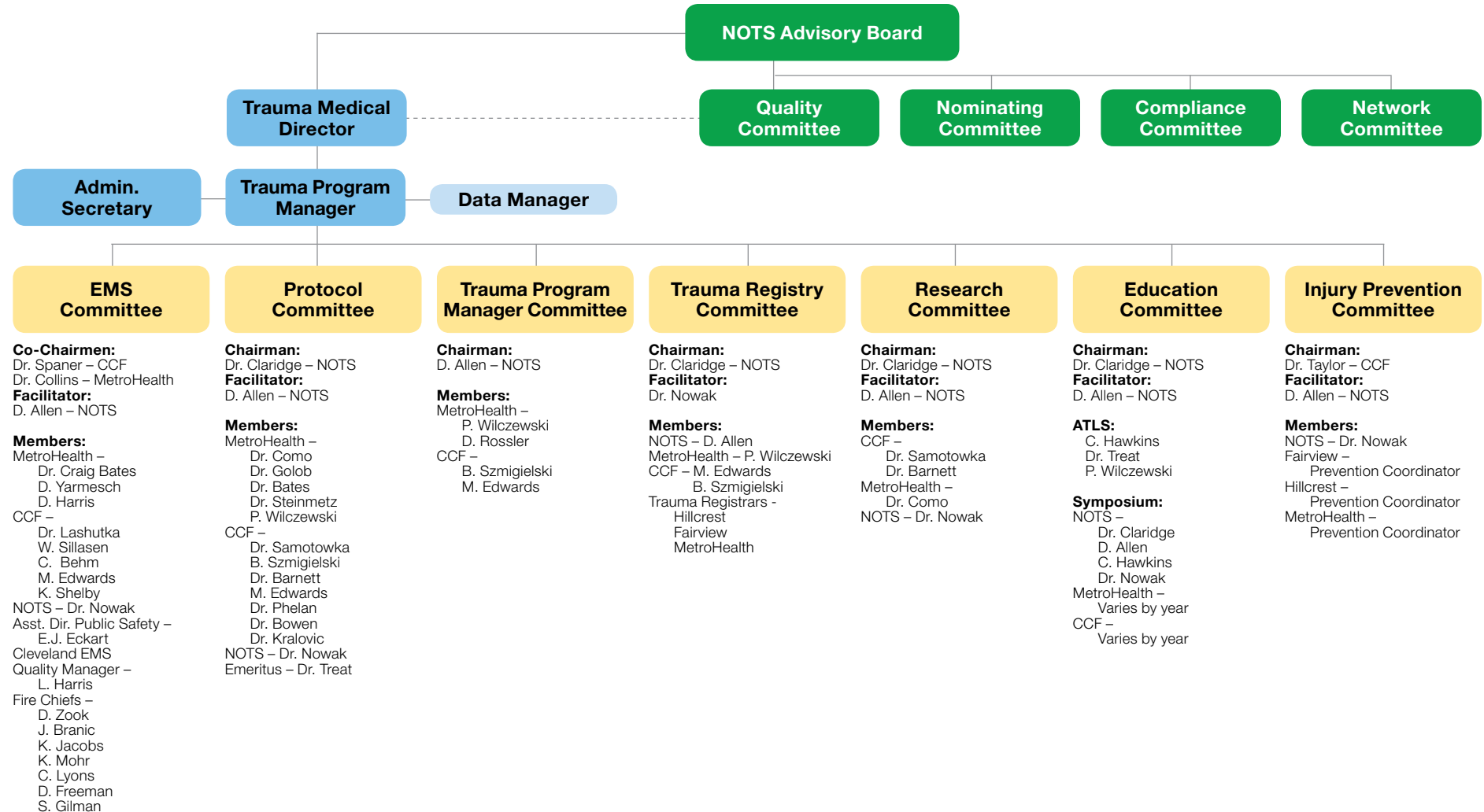


Mr. Terry Allan



Mr. Norberto Colón

Northern Ohio Trauma System Organizational Chart



Trauma Registries

The trauma registry is an integral part of the trauma service. Specially trained Trauma Registrars review and document the patient's trauma injuries. Each trauma center is required to have a trauma registry by both the American College of Surgeons and the State of Ohio.



The data contained in the registry is used by trauma departments to improve patient quality and conduct research. Each trauma registrar is trained in both ICD-9 coding and injury coding. Injury coding is based on the Abbreviated Injury Scale (AIS) developed by the Association for the Advancement of Automotive Medicine. The AIS provides a detailed description and location of injuries. Fairview Hospital, Hillcrest Hospital and the MetroHealth System maintain their own trauma registries. In addition to the trauma hospitals, the State of Ohio Department of Public Safety, Emergency Medical Services Board requires all acute care facilities to submit trauma data to the State on a quarterly basis.



The data from the three registries is combined in the NOTS trauma registry. Currently the NOTS trauma registry contains nearly 40,000 patients from 2008 through 2012. The NOTS system hospitals are currently upgrading their trauma registries, led by Hillcrest Hospital who is serving as the pilot facility.

Northern Ohio Trauma System Staff



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Cheryl Hawkins

Administrative Secretary

216-778-2266

Debra Allen, BSN, RN, CCRN

Trauma Program Manager

216-778-4595

Michael Nowak, PhD, MS

Regional Data Manager

216-778-3554

Conclusion

We would like to thank all the members of NOTS who work tirelessly to ensure patients who suffered a traumatic injury receive the best possible care. Specifically, we would like to thank the Cleveland Clinic and The MetroHealth System, along with all our EMS providers.

— Deb Allen

NOTS 2013 Annual Report

Written by Jeffrey Claridge, MD, MS, FACS, Medical Director and Debra Allen, BSN, RN, CCRN, Trauma Program Manager

Edited by Cheryl Hawkins, Administrative Secretary

Data by Michael Nowak, PhD, MS

Glossary of Terms

AIS: The Abbreviated Injury Scale (AIS) was developed by the Association for the Advancement of Automotive Medicine. The goal of the scale was to quantify the impact of automobile crashes on the human body. The AIS scale is based on a set of codes which correspond to specific locations on the body. The scale also provides a rating scale from 1 to 6 which describes the severity of injury. The AIS codes are the basis for the calculation of the ISS score.

ED Disposition: ED disposition designates where the patient went after treatment in the Emergency Department. The patient may have been discharged to home, home with home healthcare or left the hospital AMA. The patient may have been admitted to a hospital floor, the ICU, went directly to surgery or kept for 23-hour observation. The patient may have been transferred to another facility or died. The patient floor can be any regular inpatient unit. The ICU would include any critical care unit including Telemetry, Intensive Care Unit (ICU) and Coronary Care Unit (CCU).

ED Disposition Other: Includes patients who died, were transferred, or admitted for 23-hour observation.

Head Injury: Head injury was determined by the following ICD-9 codes. The codes are 804.1-804.4, 804.6-804.9, 804.00-804.06, 850.0-850.5, 804.5-804.53, 804.50-804.53, 804.55 - 804.56, 851-854, 950.0-950.3, 800, 801, 803, 804.9, 850.9, 850.59, 995.55, 959.01.

Hospital Shifts: 1st Shift = 0700-1459,
2nd Shift = 1500-2259, 3rd Shift = 2300-0659

ICD-9: Classification systems are important for the diagnosis and treatment of disease. A major classification system is the ICD-9 or International Classification of Diseases version 9. This system was developed in conjunction with the World Health Organization.

ISS: The Injury Severity Score (ISS) was developed initially to quantify blunt trauma. However, it is also used for penetrating injuries. Simply put, the higher the ISS, the more injured the patient. It is well accepted an ISS of < 9 is considered minimal trauma, an ISS of 9 – 14 is considered minor trauma, an ISS of 15 – 24 is considered moderate trauma, and an ISS of 25 and greater is considered to be major trauma. ISS is also highly associated with mortality.

Mean: Is the result of dividing the sum of the numbers by the number of numbers. It is something referred to as average. For example, you take a sample of 100 patients and sum their age and divide by 100. The result would be the mean age of patients in the sample.

Mechanism of Injury Other: This category includes bicycle injuries, drownings, burns, industrial, motorcycle, pedestrian, sport/leisure, stabbing, suicide and ones that do not fit a category.





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