PARKVIEW TRAUMA 2019

ANNUAL REPORT

✦ **PARKVIEW**
ADULT TRAUMA CENTER

✦ **PARKVIEW**
PEDIATRIC TRAUMA CENTER

INTRODUCTION

Caring for a trauma is a time-sensitive issue. What happens in the first few minutes after an accident, disaster or mass casualty event can make all the difference to a patient. That's why, in 2019, Parkview Trauma Centers sharpened their focus on trauma readiness.

One of the many ways Parkview has addressed this challenge is by working closely with other community partners to improve readiness and patient outcomes. Together with the Allen County Health Department, Parkview Trauma Services has spearheaded the development of the Trauma Regional Advisory Council (TRAC) for District 3, a unique partnership of area hospitals, EMS, law enforcement and other public health participants. The goal of the council is to make sure the most severely injured patients are transported to the most appropriate facility as quickly as possible.

In the event of a mass casualty, Parkview is also leading the way. In 2019, we established a Mass Casualty Committee to oversee the development of preparedness plans for each hospital department, as well as training exercises for the entire health system. Guided by the experiences of other hospitals and national mass casualty events, this committee brings the best practices in the country to the readiness plans now in use at Parkview.

Parkview also holds in-situ trauma simulations for first responders, which in 2019, included a mass casualty drill featuring 100 moulaged patients. In addition, as part of our continuing improvement efforts, we perform daily reviews of each and every injured patient who arrives at a Parkview hospital.

Outreach is an important part of our work, too. As a verified trauma center, Parkview recognizes its responsibility to educate and train the community regarding mass casualty events. Our trauma team has taken the national Stop the Bleed® campaign to various high schools, churches, health fairs and other community settings. Since the program was implemented in 2018, Parkview has provided free first-responder training to more than 1,500 members of the public.

We also offer a variety of other educational opportunities, including monthly Trauma Grand Rounds on-site and live-streamed at Parkview Regional Medical Center (PRMC),

monthly trauma simulation training, formal trauma-related courses for area healthcare providers and online trauma education via a robust website.

Of course, as a verified trauma center, Parkview must be ready for any type of traumatic injury, 24/7. At PRMC, our Adult and Pediatric Trauma Centers work closely with the following critical care providers, services and programs to optimize care for our patients:

- Trauma surgeons, orthopedic trauma surgeons, neurosurgeons, cardiovascular surgeons, pediatric surgeons, plastic surgeons, radiologists and anesthesiologists

- Emergency Department with board-certified emergency physicians and specially trained trauma nurses

- Parkview Samaritan medical transport (air and ground services) and Parkview EMS

- Parkview Women's & Children's Hospital and pediatric critical care physicians

- Parkview Mirro Center for Research and Innovation and Trauma Services, both conducting trauma research and participating in the Student Education & Research Fellowship (SERF) program

- Acute Care Surgery Program, the first in the region, featuring trauma surgeons who are board-certified in both general surgery and critical care medicine

- Patient and family support, including child life specialists, trauma case coordinators, post-traumatic stress treatment, specialized geriatric care and chaplaincy

- Performance Improvement and Patient Safety (PIPS) program to improve patient safety and outcomes

- Prevention programs (e.g., Don't Text & Drive and Share the Road) and trauma education programs for area healthcare providers

Through it all, Parkview remains focused on all aspects of trauma care. From registry data and performance improvement to trauma readiness and prevention, Parkview is committed to keeping people safe and treating them well.

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MISSION STATEMENT

Our multidisciplinary team is dedicated to the treatment of victims of trauma, education of the community and prevention of injury. We strive for optimal outcomes by providing efficient, quality care and are committed to supporting the caregivers in the crisis arena.
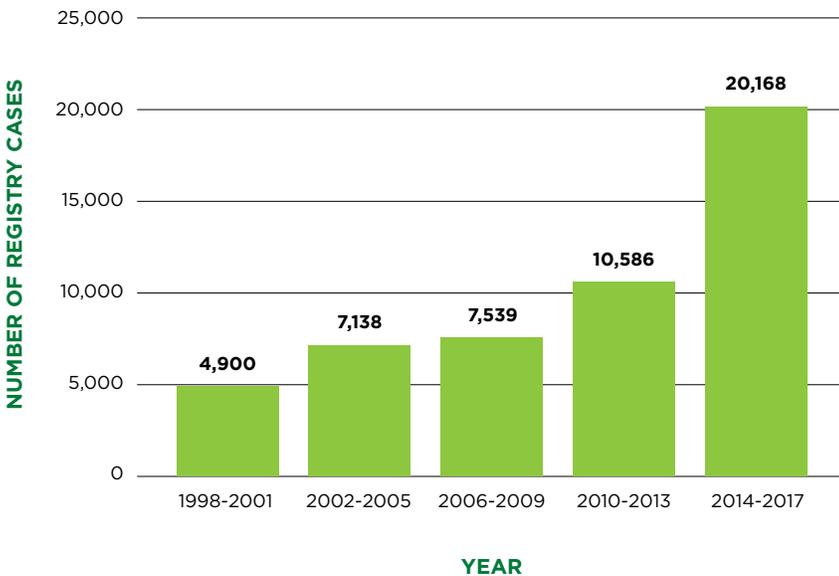
REGISTRY

A trauma registry is an electronic database with uniform data elements that describe the injury event, demographics, prehospital information, diagnosis, care, outcomes and cost of treatment. The registry database is used to collect, organize and analyze information on the trauma patient population and is essential to providing a trauma service.

The data has many uses, but is primarily used to monitor the continuum of care, from injury prevention through outcomes measurement. Currently, the Parkview trauma registry manages data for more than 59,000 patients. The Parkview trauma registry contributes clinical information to staff on a daily basis, quarterly to the Trauma Quality Improvement Program (TQIP) and Indiana State Department of Health and yearly to the National Trauma Data Bank. Contribution to a larger database allows Parkview to identify trends in quality measurement, shape public policy and benchmark at national, state and regional levels.

Left to right:
Becky Sickafoose, BSN, RN, CEN, CPEN, *Trauma Program Nurse, Trauma Services;* **Shanna Lemen, BSN, RN, CAISS,** *Trauma Program Nurse, Trauma Services*

Trauma Registry Case Total 1998-2017

Chart — NUMBER OF REGISTRY CASES (y-axis, 0 to 25,000) by YEAR (x-axis):

Year	Number of Registry Cases
1998-2001	4,900
2002-2005	7,138
2006-2009	7,539
2010-2013	10,586
2014-2017	20,168

Age of All Injured Patients, 2018

- ■ 0-16
- ■ 17-44
- ■ 45-64
- ■ >64

Pie chart:
- 10.1%
- 22.6%
- 19.8%
- 47.5%
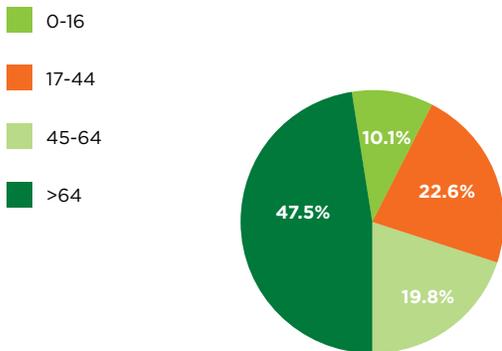
Age and Sex, All Injured Patients, 2018

- ■ M
- ■ F

0-16 yrs.
- 62.9%
- 37.1%

17-64 yrs.
- 66.9%
- 33.1%

≥65 yrs.
- 62.9%
- 37.1%

All Injured Patients, 2018*

- ■ Blunt
- ■ Penetrating
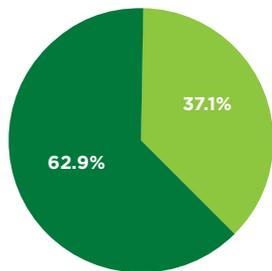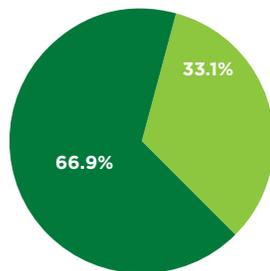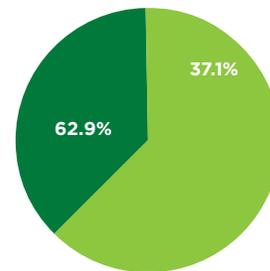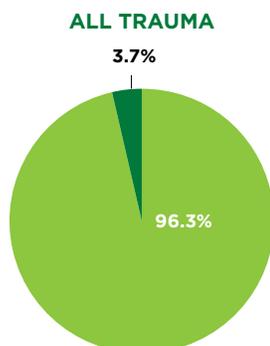
ALL TRAUMA
- 3.7%
- 96.3%

Excludes 16 cases with Thermal Trauma.

Mechanism of Injury All Ages, 2018

# CASES		PERCENTAGE DISTRIBUTION
1,310	Fall	57.8
376	Motor Vehicle Crash	16.6
75	Motorcycle	3.3
72	Industrial Injury	3.2
48	Other Mechanisms	2.1
42	Gunshot Wound	1.9
41	Sporting Injury	1.8
35	Bicycle Crash	1.5
34	Pedestrian Struck	1.5
30	Assault	1.3
29	Animal Attack	1.3
28	ATV Crash	1.2
27	Stabbing	1.2
26	Buggy Crash	1.1
15	Other Vehicle	0.7
13	Farm Machine	0.6
12	Machinery	0.5
11	Moped Crash	0.5
8	Burn	0.4
7	Boat Crash	0.3
6	Drowning	0.3
4	Dive	0.2
4	Hanging	0.2
4	Smoke Inhalation	0.2
3	Poison	0.1
3	Roller Blades	0.1

Note: 8 cases with unknown mechanism of injury.

Trend of Trauma Admission by Type, 2014-2018*

Year	All Trauma	Trauma Services Patients
2018	2,274	1,292
2017	2,307	1,349
2016	2,279	1,375
2015	2,263	1,403
2014	2,094	1,304

Legend:
- All Trauma
- Trauma Services Patients
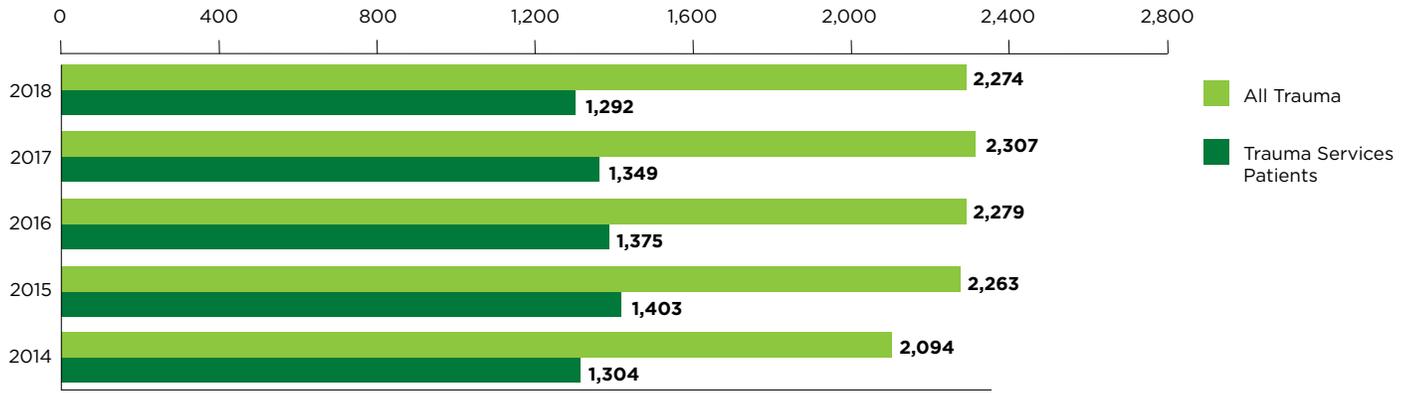
Excludes cases with isolated hip fractures from 2014.

ER Disposition All Ages, 2018

PERCENTAGE DISTRIBUTION

# CASES		Percentage
1,085	General Floor	47.7
498	Intensive Care Unit	21.9
232	Direct Admit	10.1
222	Operating Room	9.8
112	Pediatric Floor	4.9
79	Pediatric ICU	3.5
17	Other	0.9
16	Clinical Decision Unit	0.7
13	Transport Out	0.6
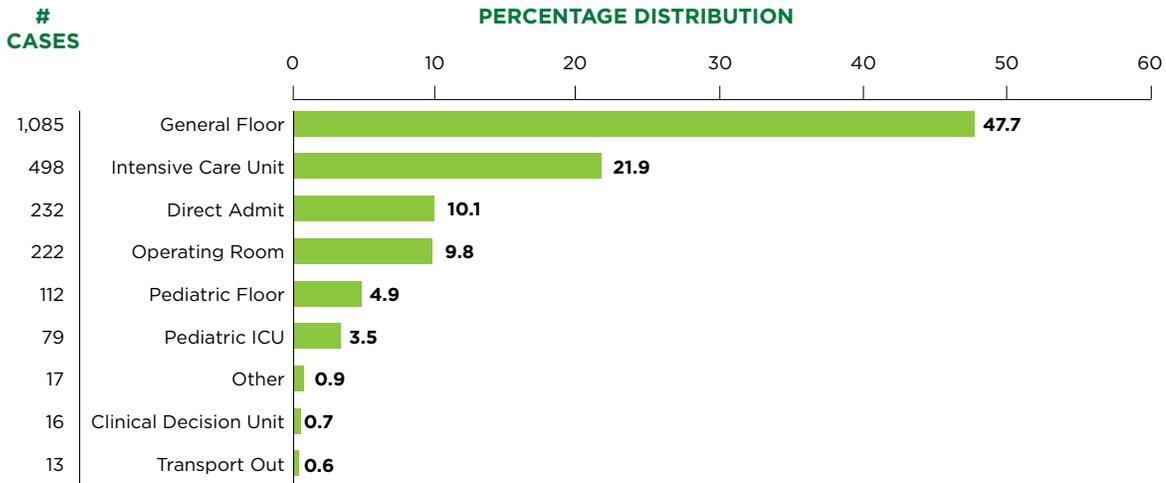
Volume of All Ages Admitted from ER to ICU and OR, 2014-2018*

Year	All Trauma	ER-ICU/PICU	ER-Surgery
2018	2,274	577	223
2017	2,307	582	239
2016	2,279	562	230
2015	2,263	580	142
2014	1,807	474	160

Legend:
- All Trauma
- ER-ICU/PICU
- ER-Surgery
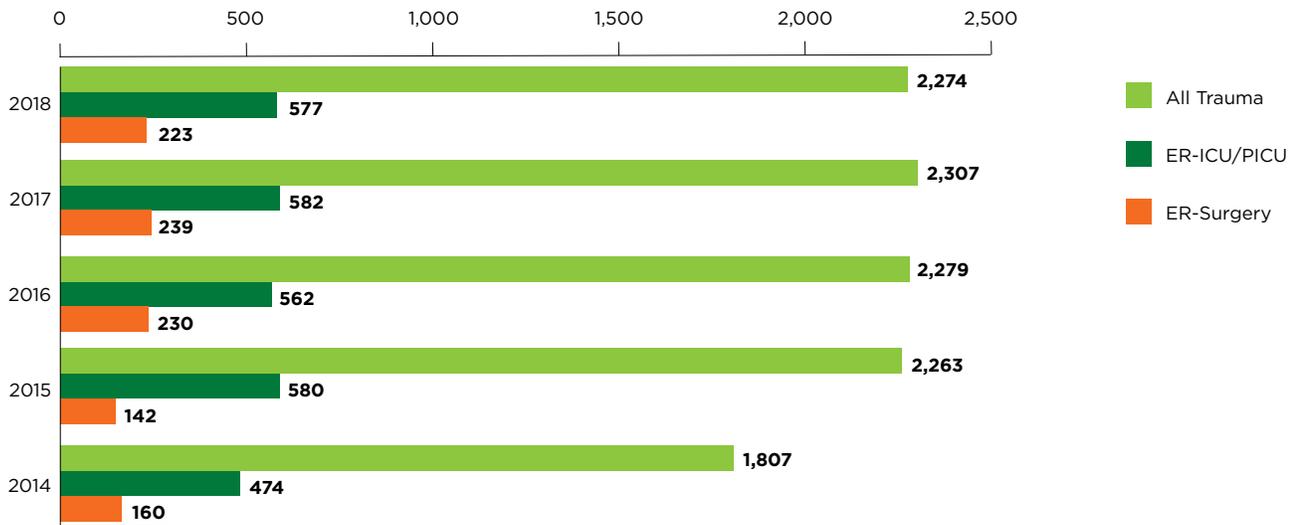
* Excludes cases with isolated hip fractures from 2014.

ICU Length of Stay (LOS) All Ages, 2014 -2018*

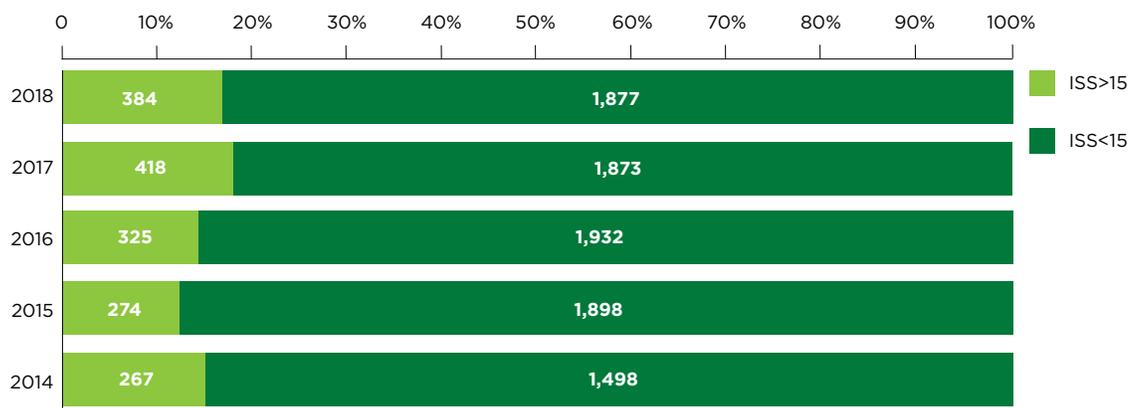| # CASES	Year	MEAN ICU LOS (DAYS)	TOTAL ICU DAYS
687	2018	3.93	2,700
693	2017	4.16	2,880
678	2016	4.05	2,740
690	2015	3.35	2,311
676	2014	3.75	2,533
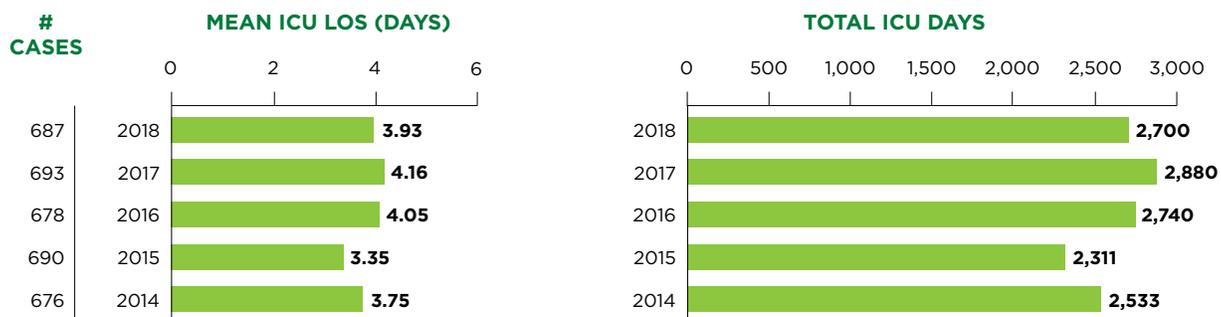
* Excludes cases with isolated hip fractures from 2014.

Volume (and %) of All Patients
Admission Glascow Coma Score (GCS), 2014-2018*
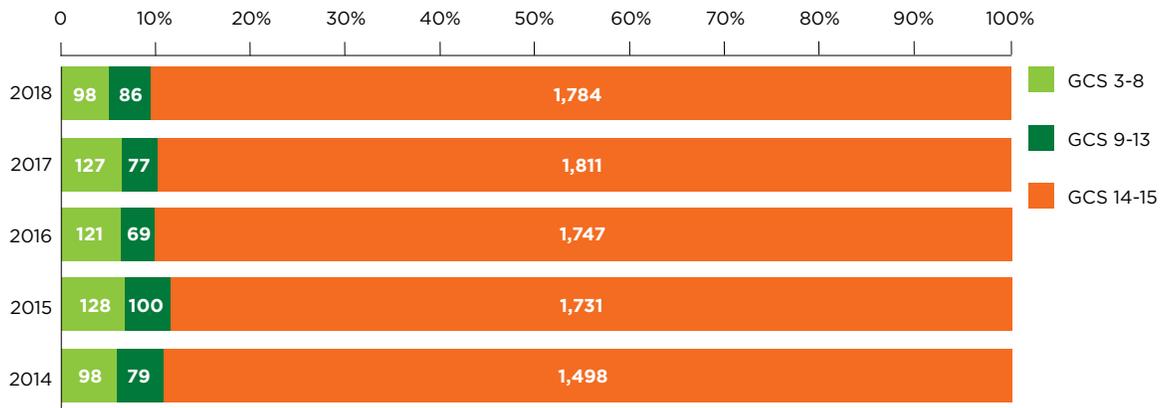
Year	GCS 3-8	GCS 9-13	GCS 14-15
2018	98	86	1,784
2017	127	77	1,811
2016	121	69	1,747
2015	128	100	1,731
2014	98	79	1,498

Legend: GCS 3-8 (light green), GCS 9-13 (dark green), GCS 14-15 (orange)

* Excludes cases for which GCS is unknown.
* Excludes cases with isolated hip fractures from 2014.
GCS, 3-8 = Possible severe head injury; GCS, 9-13 = Possible moderate head injury;
GCS, 14-15 = Possible mild head injury

Volume (and %) of All Ages Injury Severity Score (ISS), 2014-2018*

Year	ISS>15	ISS<15
2018	384	1,877
2017	418	1,873
2016	325	1,932
2015	274	1,898
2014	267	1,498

Legend: ISS>15 (light green), ISS<15 (dark green)

ISS > 15 can include life threatening, critical or fatal injuries.
* Excludes cases for which ISS is unknown.
** Excludes cases with isolated hip fractures from 2014.*

PEDIATRICS

As a pediatric trauma center, Parkview maintains dedicated resources for the care of injured children. Children experience trauma differently than adults, requiring a unique response from a team of specialties including: neurosurgery, orthopedic surgery, emergency medicine and pediatric critical care physicians. Parkview Regional Medical Center has been verified as a pediatric trauma center by the American College of Surgeons since 2003, the first pediatric trauma center in Indiana outside of Indianapolis, and is dedicated to achieving the best outcomes through its commitment to data collection and research, injury prevention, outreach, performance improvement and professional trauma education.

CHILD MALTREATMENT

Throughout 2019, pediatric trauma care has continued to focus on the identification, treatment and prevention of child maltreatment across our region. We have a child maltreatment team that includes physicians, nurses, social workers, chaplaincy, leadership, community nursing and radiology. The team meets monthly to discuss current statistics within Allen County and the region. Reporting of child maltreatment is monitored and shared within both, as well as with the local community and at the state level. Parkview community nursing trends the patterns of injury and alters their education or teaching strategies accordingly. By producing a system-based approach, the child maltreatment team and trauma services share resources and collaborate in difficult situations to ensure the safety of the children under Parkview's care. As a result, Parkview has increased the reporting of potential child maltreatment and responds to concerns about abuse and neglect internally at all Parkview hospitals, as well as by local authorities and Child Protective Services.

Reported Child Maltreatment Cases, Oct 2018-Oct 2019

Legend: PRMC reported abuse, PRMC reported neglect
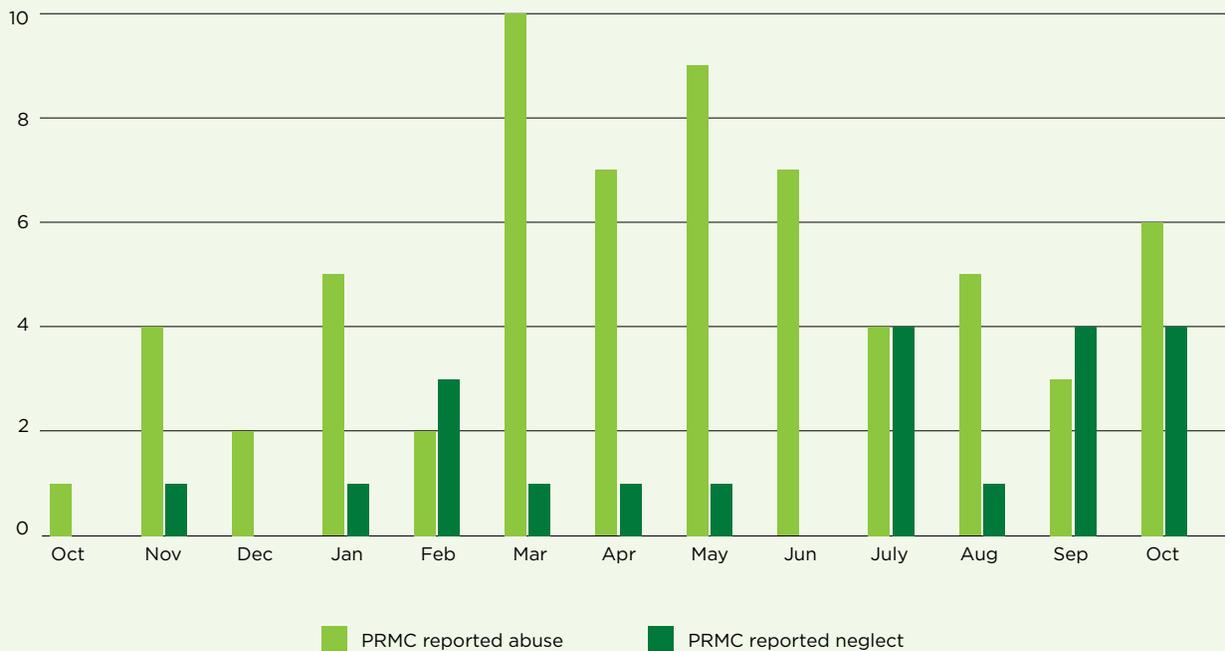
PEDIATRIC TRAUMA EDUCATION

The Parkview Pediatric Trauma Center continues to support both staff and community members throughout the state of Indiana by providing education related to pediatric trauma topics, free of charge. Parkview hosts the annual Child Maltreatment Symposium, sponsored by the Isaac Campbell Kidd Fund, in an ongoing effort to protect Hoosier children from abuse and neglect. Health professionals, teachers, social workers and other community members have had the opportunity to network with each other and learn about various topics, including but not limited to:

• Mandatory reporting
• Human trafficking
• Adverse childhood events
• Effects of the opioid epidemic on families
• The role of play and emotional expression in maltreatment
• Bullying/peer aggression
• Community resources that protect children
• Infant physical abuse prevention — National Center for Shaken Baby Syndrome

The Parkview Pediatric Trauma Center provides an annual Pediatric Trauma Symposium. Nurses, physicians, pharmacy, leadership, students and prehospital providers engage in a variety of pediatric-related topics that have been identified while caring for children throughout the system. Education has included:

• Closed loop communication in trauma
• Management of pediatric blunt abdominal trauma
• Violent crimes against children
• Pediatric spinal trauma
• Suicide awareness and prevention
• Indiana state pediatric injury prevention updates
• Analgesia and sedation
• Management of complex facial fractures

In addition to symposiums, the pediatric trauma center established a pediatric trauma simulation program that allows staff from the emergency department, lab, radiology, surgery, chaplaincy, social work, trauma services, pediatric critical care, pediatric intensive care unit and anesthesia to simulate care for our highest-level pediatric patients. An emphasis on closed loop communication, identification and treatment of life-threatening injuries and massive transfusion has allowed staff to demonstrate teamwork and improve patient outcomes. Bi-annually, the trauma team also visits Cincinnati Children's Hospital Simulation Center to experience and learn pediatric trauma care from regional partners.
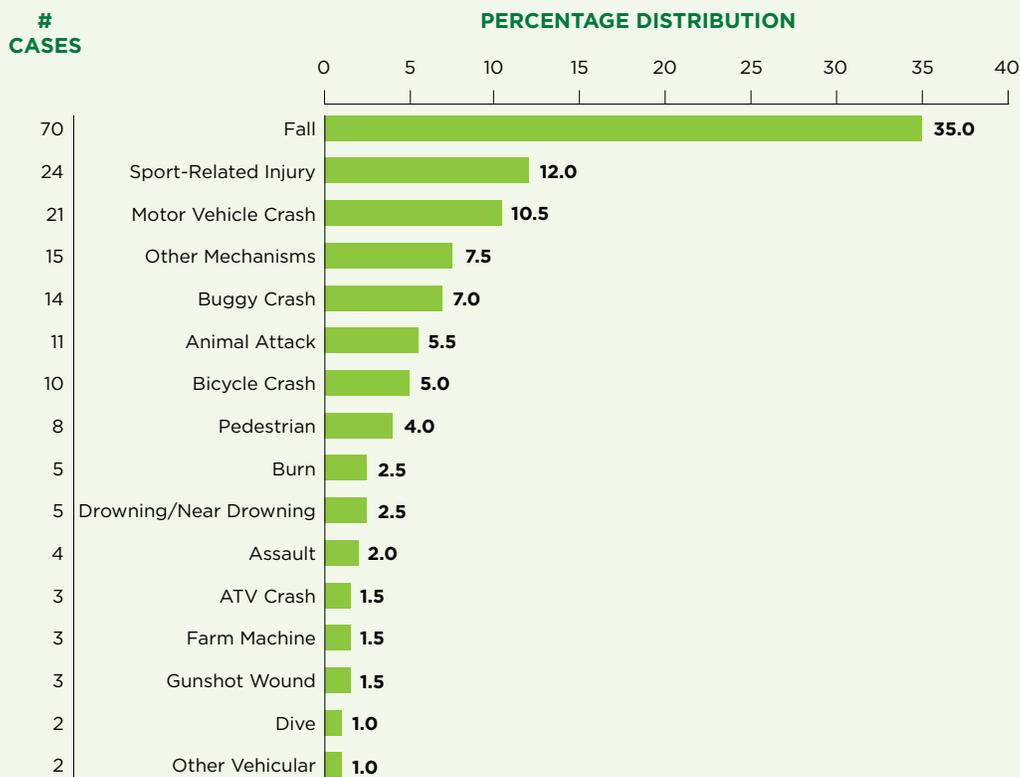
Volume (and %) of Pediatric Patients (Ages 0-14) Injury Severity Score (ISS), 2014-2018*

Legend: ISS>15, ISS<15

Year	ISS>15	ISS<15
2018	33	165
2017	26	182
2016	27	199
2015	17	208
2014	20	161

ISS > 15 can include life threatening, critical or fatal injuries.
* Excludes cases for which ISS is unknown.

Mechanism of Injury Pediatric Patients, Ages 0-14 Years, 2018

 # CASES

PERCENTAGE DISTRIBUTION

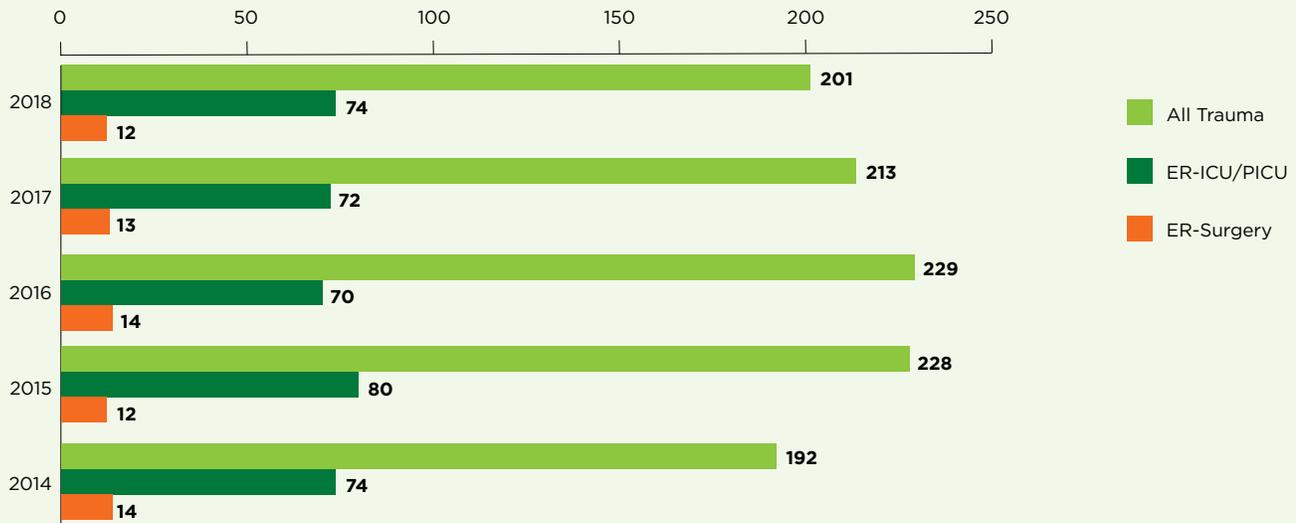| # Cases	Mechanism	Percentage
70	Fall	35.0
24	Sport-Related Injury	12.0
21	Motor Vehicle Crash	10.5
15	Other Mechanisms	7.5
14	Buggy Crash	7.0
11	Animal Attack	5.5
10	Bicycle Crash	5.0
8	Pedestrian	4.0
5	Burn	2.5
5	Drowning/Near Drowning	2.5
4	Assault	2.0
3	ATV Crash	1.5
3	Farm Machine	1.5
3	Gunshot Wound	1.5
2	Dive	1.0
2	Other Vehicular	1.0

Note: 1 case with unknown mechanism of injury.

Volume (and %) of Pediatric Patients (Ages 0-14) Admission Glascow Coma Score (GCS), 2014-2018*

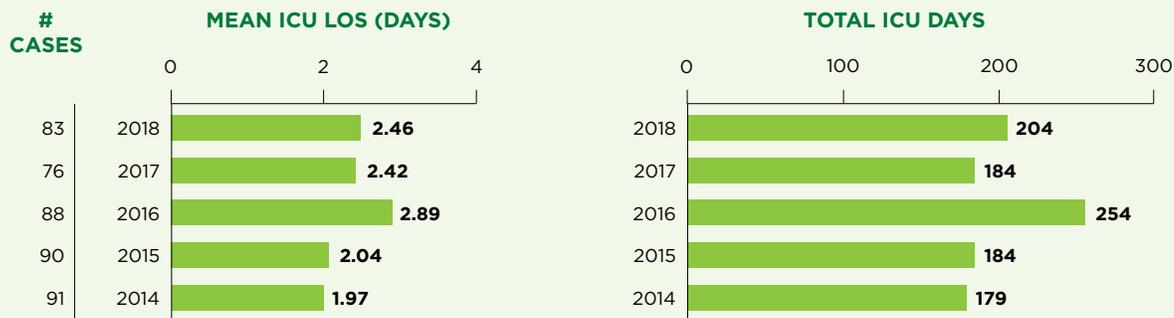| Year	GCS 3-8	GCS 9-13	GCS 14-15
2018	11	16	139
2017	13	19	150
2016	14	7	146
2015	5	15	154
2014	6	9	140
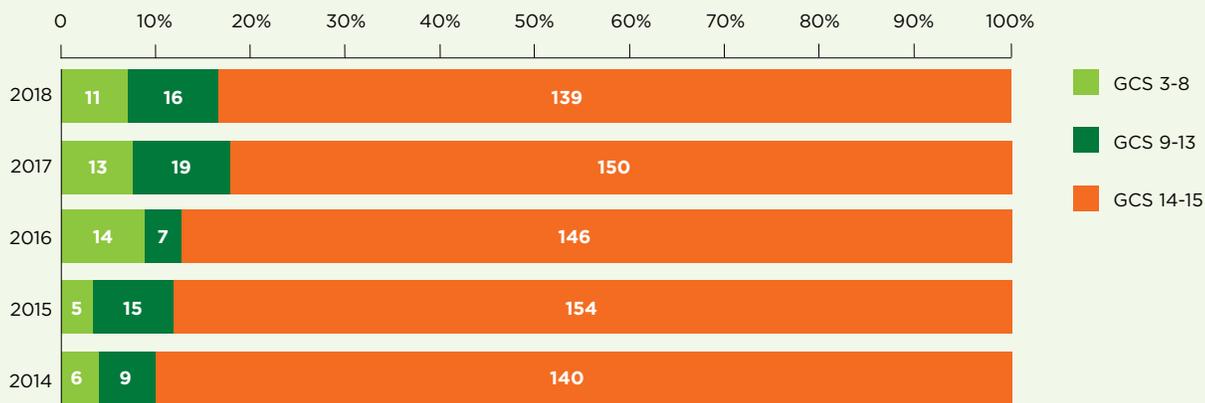
* Excludes cases for which GCS is unknown.
GCS, 3-8 = Possible severe head injury; GCS, 9-13 = Possible moderate head injury;
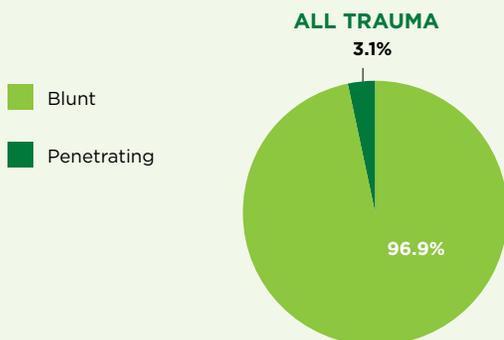*GCS, 14-15 = Possible mild head injury*

Volume of Pediatric Patients (Ages 0-14) Admitted from ER to ICU and OR, 2014-2018

Year	All Trauma	ER-ICU/PICU	ER-Surgery
2018	201	74	12
2017	213	72	13
2016	229	70	14
2015	228	80	12
2014	192	74	14

- All Trauma
- ER-ICU/PICU
- ER-Surgery

ICU Length of Stay (LOS) Pediatric Trauma (Ages 0-14), 2014-2018

# CASES	Year	MEAN ICU LOS (DAYS)	TOTAL ICU DAYS
83	2018	2.46	204
76	2017	2.42	184
88	2016	2.89	254
90	2015	2.04	184
91	2014	1.97	179

Trauma Type Pediatric Patients (Ages 0-14), 2018*

ALL TRAUMA

- Blunt
- Penetrating

3.1%

96.9%

* Excludes 5 cases with Thermal Trauma.
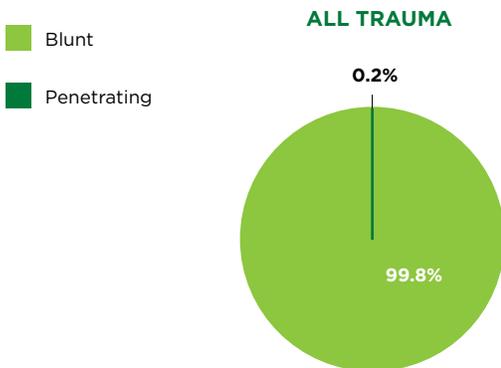
GERIATRICS

Parkview Trauma Centers are equipped to treat injured patients of any age, day or night. The geriatric population is growing in our region, as well as injuries at this age. Parkview Trauma Centers strive to provide excellent care to every patient, every day, and as more geriatric patients are injured, specialized care is essential to their outcome.

Our trauma patient care guidelines are specific to the geriatric population and include pain management, VTE prophylaxis, mobility, delirium and others. Since falls are the number one mechanism of injury for our geriatric patients, Parkview has a fall prevention program and a fall prevention clinic. In addition, in-home assessments and alternative pain treatments beyond standard opioid use are considered. Parkview has been involved in the Nurses Improving Care for Health system Elders (NICHE) program since 2014, reaching "Senior Friendly" status. Parkview also has a geriatric resource nurse committee and geriatric trauma coordinator who are in the process of developing a framework to support geriatric initiatives underway throughout the Parkview Health system.
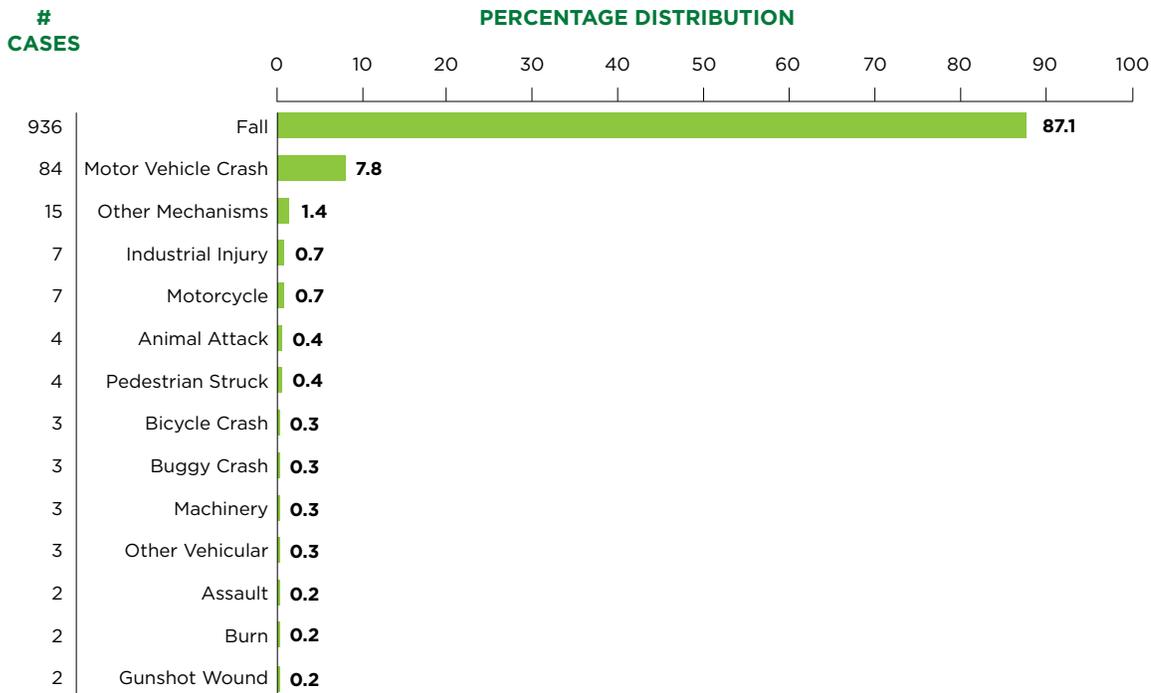
Trauma Type Geriatric Patients (Ages ≥ 65), 2018*
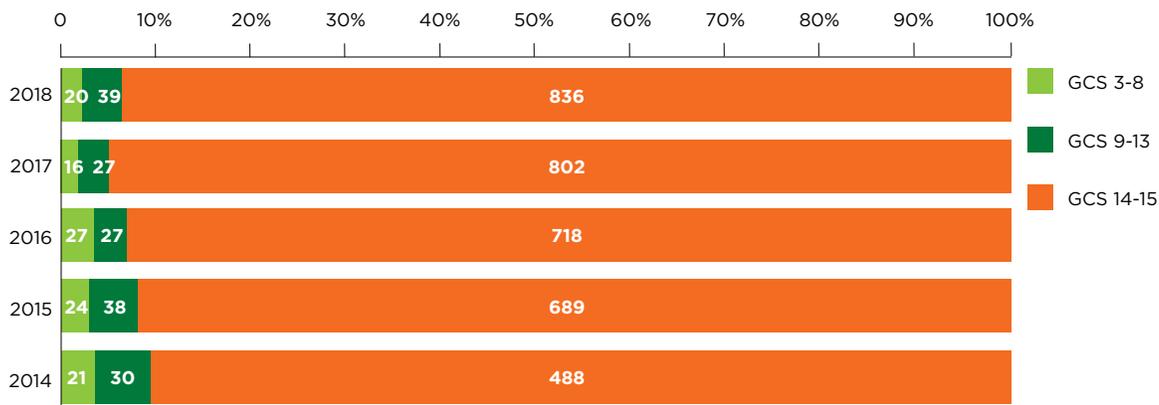

- Blunt
- Penetrating

ALL TRAUMA

0.2%

99.8%

* Excluded 3 cases with Thermal Trauma.
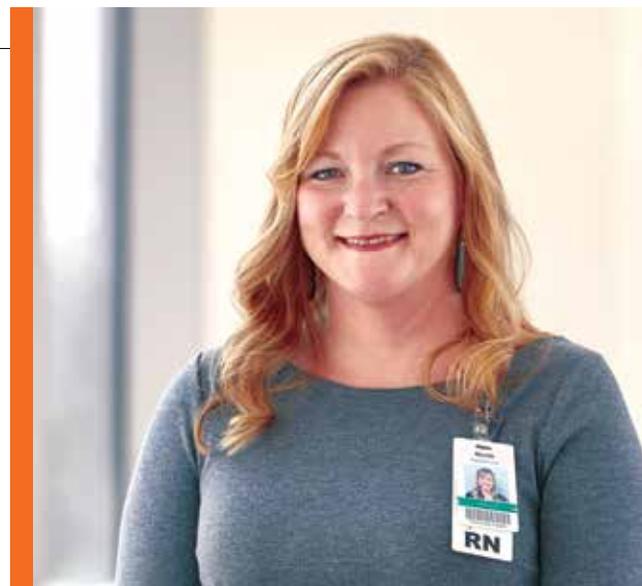
Nicole Bishir, BSN, RN, *Geriatric Trauma Coordinator*

Mechanism of Injury Geriatric Patients, Ages ≥ 65 Years, 2018

 # CASES

PERCENTAGE DISTRIBUTION

# Cases	Mechanism	Percentage
936	Fall	87.1
84	Motor Vehicle Crash	7.8
15	Other Mechanisms	1.4
7	Industrial Injury	0.7
7	Motorcycle	0.7
4	Animal Attack	0.4
4	Pedestrian Struck	0.4
3	Bicycle Crash	0.3
3	Buggy Crash	0.3
3	Machinery	0.3
3	Other Vehicular	0.3
2	Assault	0.2
2	Burn	0.2
2	Gunshot Wound	0.2

Volume (and %) of Geriatric Patients (Ages ≥ 65) Admission Glascow Coma Score (GCS), 2014-2018*

Year	GCS 3-8	GCS 9-13	GCS 14-15
2018	20	39	836
2017	16	27	802
2016	27	27	718
2015	24	38	689
2014	21	30	488

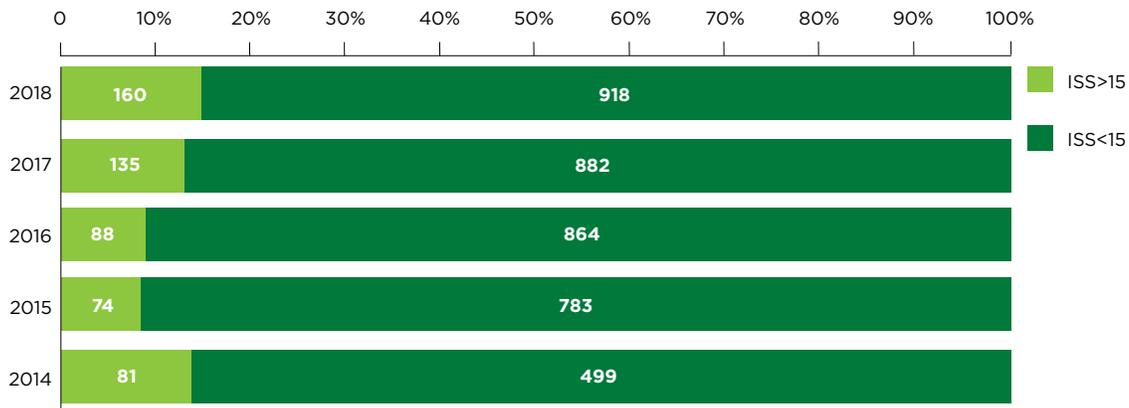Legend:
- GCS 3-8
- GCS 9-13
- GCS 14-15

Excludes cases for which GCS is unknown.
Excludes cases with isolated hip fractures from 2014.
GCS, 3-8 = Possible severe head injury; GCS, 9-13 = Possible moderate head injury;
GCS, 14-15 = Possible mild head injury

Volume (and %) of Geriatric Patients, (Ages ≥ 65 Years) Injury Severity Score (ISS), 2014-2018*

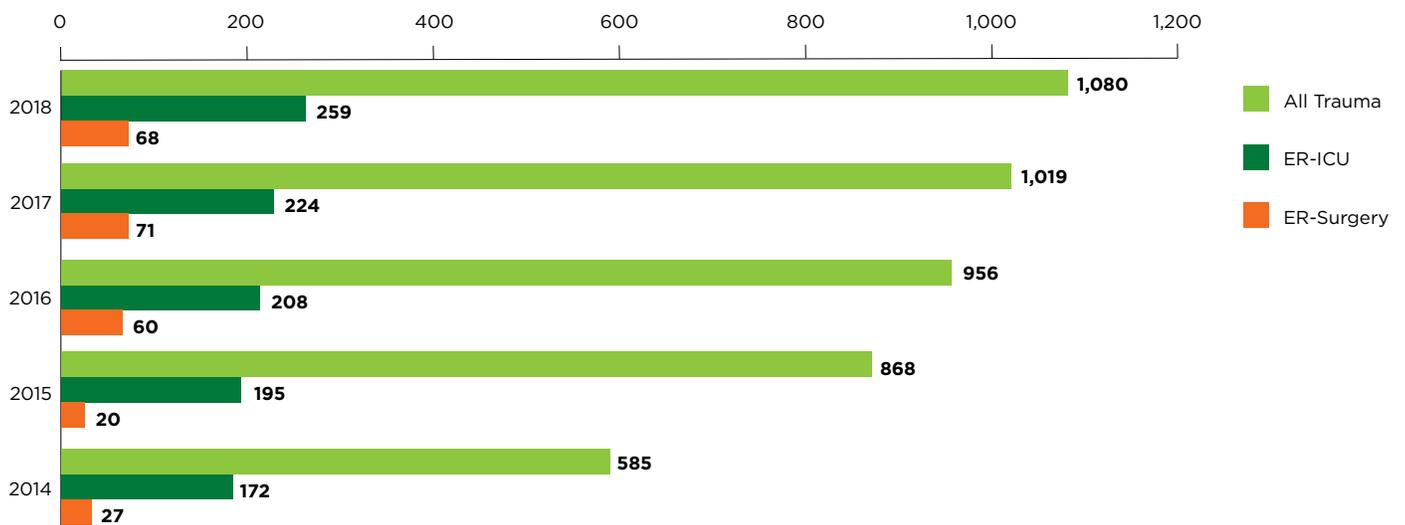| Year	ISS>15	ISS<15
2018	160	918
2017	135	882
2016	88	864
2015	74	783
2014	81	499

ISS > 15 can include life threatening, critical or fatal injuries.
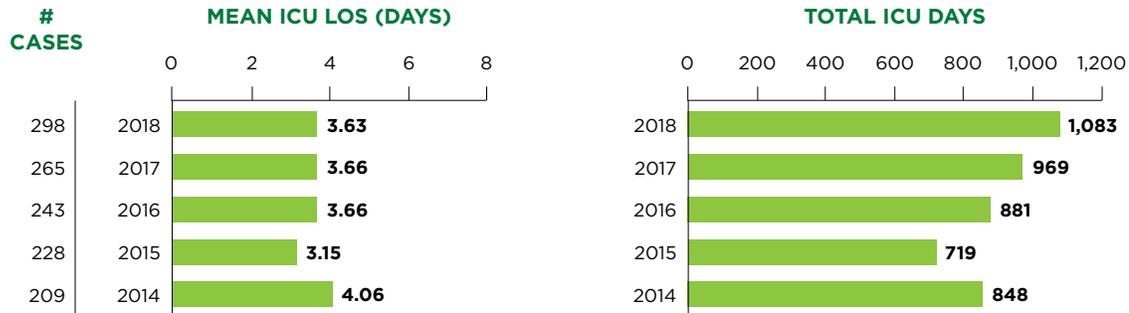** Excludes cases for which ISS is unknown.*
* Excludes cases with isolated hip fractures from 2014.

Volume of Geriatric Patients (Ages ≥ 65) Admitted from ER to ICU or Surgery, 2014-2018*

Year	All Trauma	ER-ICU	ER-Surgery
2018	1,080	259	68
2017	1,019	224	71
2016	956	208	60
2015	868	195	20
2014	585	172	27

* Excludes cases with isolated hip fractures from 2014.

ICU Length of Stay (LOS) Geriatric Trauma (Ages ≥ 65), 2014-2018*

# CASES		MEAN ICU LOS (DAYS)
298	2018	3.63
265	2017	3.66
243	2016	3.66
228	2015	3.15
209	2014	4.06

	TOTAL ICU DAYS
2018	1,083
2017	969
2016	881
2015	719
2014	848

* Excludes cases with isolated hip fractures from 2014.

Marcy Rogers, MBA, RN, *VP Surgical Practice, VP Inverness Operations, PPG*

Lisa Hollister, MSN, RN, *Director, Trauma & Acute Care Surgery*

Left to right:
Jennifer Konger, BSN, RN, *Community Hospital Trauma Program Manager;* **Lisa Hollister, MSN, RN,** *Director, Trauma & Acute Care Surgery;* **Sarah Hoeppner, MSN, RN, CCRN, TCRN,** *Adult Trauma Coordinator and Performance Improvement Specialist;* **Lauren Quandt, MSN, RN, CEN, TCRN,** *Pediatric Trauma Coordinator and Injury Prevention Specialist, Trauma Services*

MASS CASUALTY AND DISASTER PREPAREDNESS

Due to the increase in mass shootings throughout the United States and an average of one mass shooting every 12.5 days, Parkview Trauma Centers will be prepared in case the unthinkable happens. A sudden surge of patients would be a challenge for any hospital, but at Parkview, we've developed plans for each department, helping our co-workers feel more prepared and confident. We simulate our plans during training exercises where co-workers, physicians, community organizations and all departments have the opportunity to practice a systematic process, team skills and individual roles. By doing this, we share knowledge, uncover gaps and continually improve our plans.

Parkview established a Mass Casualty Committee that oversees the development of plans and training exercises for the organization. The committee learns from the experiences of national events and hospitals to apply best practices to the plans.

TRAUMA REGIONAL ADVISORY COUNCIL (TRAC), DISTRICT 3

Parkview Trauma Services has led the effort alongside the Allen County Health Department to develop the District 3 Trauma Regional Advisory Council. It is a partnership of 13 hospitals and:

• EMS agencies
• Law enforcement
• Nursing homes
• Fire departments
• Health departments
• Universities
• Healthcare Coalition

The council meets every other month with the strategic goal of Indiana and regional trauma system development. Of utmost importance to the council is the assurance that our district's most severely injured patients are transported to the right facility in the right amount of time to produce the best patient outcome. This makes performance improvement the key focus of the group. The council reviews Indiana injury statistics, as well as regional trauma statistics to understand trending issues. Gaps are then prioritized into improvement initiatives. Past and current initiatives include reduction of double hospital transfers of trauma patients, understanding the rate of geriatric falls with prescribed opioids, mass casualty preparedness and the Stop the Bleed national campaign.

The goal of a well-established Performance Improvement and Patient Safety (PIPS) model is to promote a culture of safety while providing a concurrent, systemic, coordinated and continuous approach to monitoring, assessing and managing trauma care to maximize patient safety and optimize outcomes. The Adult and Pediatric Trauma Centers at Parkview Regional Medical Center (PRMC) utilize the trauma PIPS model, using a multidisciplinary tiered approach to consistently measure, evaluate and improve the process of trauma care and clinical outcomes.

The PIPS model utilizes a multi-level approach, starting with concurrent daily patient rounds to identify opportunities. Opportunities for improvement are elevated through a well-established, multidisciplinary review process. The review process primes new care processes and new/updated clinical practice guidelines. Through the use of the PIPS model, the Adult and Pediatric Trauma Centers at PRMC continuously strive to ensure patient outcomes are improved while safe, effective and evidence-based care is provided to all injured patients.

The PRMC PIPS model is supported by a trauma data registry that has been in place for more than 20 years. The data obtained from the registry is used to continuously monitor the process measures and patient outcomes needed to identify additional opportunities, as well as ensure the loop closure of performance modification. The registry data is benchmarked, both internally and externally, and on multiple levels, including within our hospital system, regionally, statewide and nationally. The trauma centers at PRMC were honored to be asked to be on the first wave of hospitals nationwide to participate in the Trauma Quality Improvement Program (TQIP), a national benchmarking trauma program. The trauma centers have now proudly participated in TQIP for over 10 years and use the information to continually improve care to our injured patients.

Instruction — *Data Collection* — *Analysis* — *Modification* — *Correction* — *Recognition* — *Assessment*
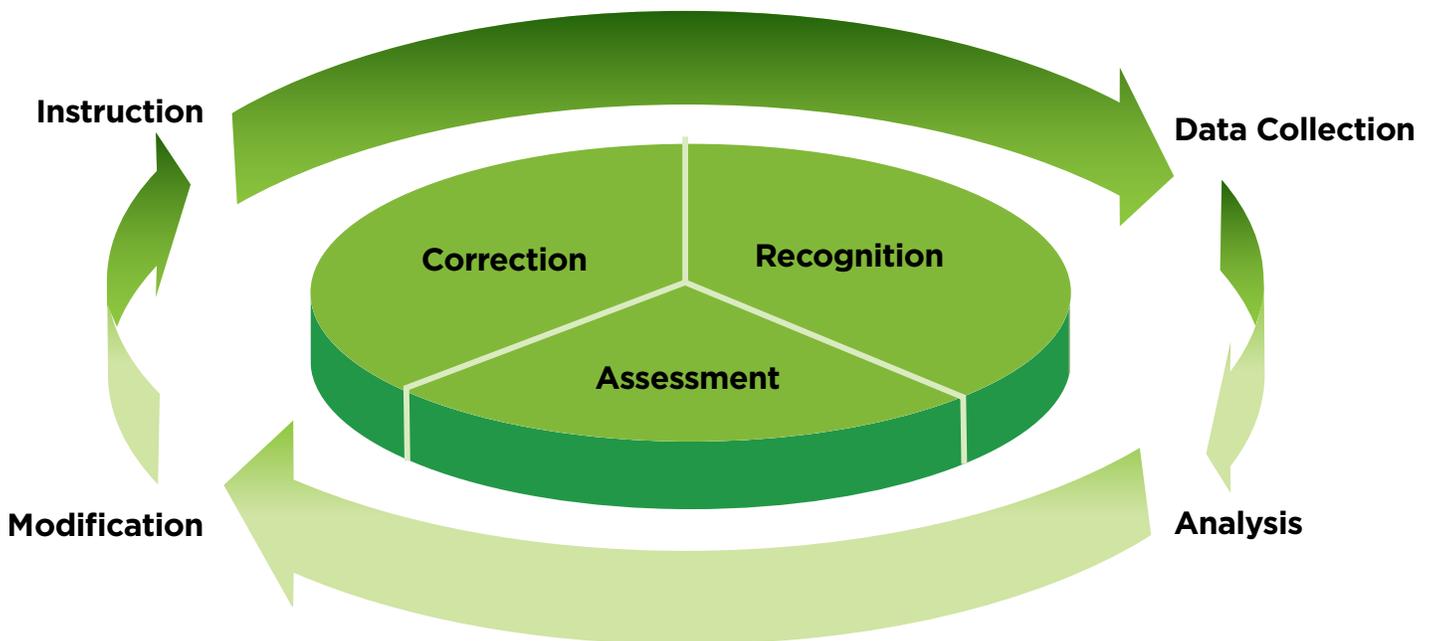
American College of Surgeons: Committee on Trauma (2014). Resources for optimal care of the injured patient.

TRAUMA RESEARCH

The research personnel of the Parkview Adult and Pediatric Level II Trauma Center updated the road trauma epidemiologic project and, compared with a similar project as an external control, reviewed the impact on our published papers, as well as trained the trauma team on statistical analysis per the statistical program of the Doctorate in Nurse Practitioner (DNP) course through Purdue, West Lafayette, and future research activities.

STATISTICAL DATA ANALYSIS

Comparison of Motor Vehicle Traffic Accidents by Road User Category in 2013 (Study I) with a Similar Project in 1977 (Study II) as External Control

For comparison between the two studies, we employed the same epidemiologic approach/design and parameter measures based on visiting ED cases, hospital admissions and deaths due to motor vehicle traffic trauma that occurred in our current study (Study I) as were done in Barancik's study (Study II). The age standardization method using the 2000 U.S. population was employed to compare age-adjusted rates between the two studies. Please refer to the tables and footnotes for more information.

RESULTS/DISCUSSION

ED Visit Cases: Table 1 shows the percentage distribution and incidence rates of Study I compared to Study II in patients with ED visits. Study I had higher percentages than Study II for motor vehicle occupants (78.3% vs. 52.6%) and motorcycle riders (9.1% vs. 7.2%). However, crude IRs in Study II were significantly higher in magnitude than in Study I by every road user. For comparison, both the crude and age-adjusted IRs by road-use category were three or more times higher in Study II than in Study I, in both sexes and in each sex (Table 2).

The improvement in the Study I area might be due to the existence of a mature, verified trauma center since 2000, extending its trauma system to peripheral Parkview rural/ community hospitals and implementing trauma prevention programs, such as bike safety beginning in 1990, Don't Drink & Drive in 1998, Don't Text & Drive in 2009 and Share the Road in 2010. In addition, universal seat belt law was enacted in 1985 and implemented in 1987. Similarly, motorcycle helmet law was enacted in 1967 to qualify for

certain federal safety programs and highway construction funds, repealed in 1977 and reinstated to cover those under 18 years in 1984 for motorcycles and all low-power cycles, such as motor-driven cycles, mopeds, scooters and various other 2-wheeled cycles. On the other hand, trauma centers did not exist, and seat belt law and reinstated motorcycle helmet law, though enacted in 1968 for the benefit of federal funding in Indiana, were not covered in the Study II area in or before 1977.

Hospital Admissions: The case-admission ratios per 1,000 ED visits were highest for pedestrians and motorcycle riders in both studies with road-use patients admitted about twice as often in Study I as in Study II (Table 3). This is probably due to more severely injured cases occurring in the rural Study I area than in the semi-metropolitan Study II area (Coben JH et al., *Am J Prev Med* 2009;36(1):49-55; Boland M et al., *Inj Prev* 2005;11:38-42).

Fatalities: The case-fatality ratios per 1,000 ED visits were highest for pedestrians followed by motorcycle riders in both studies and eight times higher in fatalities for all road users in Study I than Study II (Table 4). The much higher case-fatality ratio in Study I than Study II might be due to a more rural setting in Study I (with all counties being rural, population of each county less than 50,000) than Study II (with two metropolitan counties including Cleveland, population 627,000 and cities of Lorain-Elyria, population 133,000). One limitation of Study I was having a higher other/unspecified use category than Study II (66.7% vs. 17.2%) in the total fatalities. Many in the unspecified road use category were probably motor vehicle occupants.

Rural populations have higher risks associated with environmental, behavioral and prehospital care causes (Peek-Asa C et al., *Am J Pub Hlth* 2004;94:1689-93; Beck LF et al., *MMWR Surveill Summ*. 2017Sep 22;66(17):1-13). Environmentally, rural roads are not as wide as urban roads and typically not divided in the center with a median. Speeds are often higher, and there are fewer traffic control devices. Risk is posed by agricultural work vehicles such

Table 1. Comparison of Population Road Trauma Studies in 2013 (Study I) and 1977 (Study II) by Distribution and Incidence Rate in Both Sexes

Road User Category with ICD-9 E-codes (810-819) 4th digit code	STUDY I (2013 DATA)			STUDY II (1977 DATA)		
	Sample		Incidence Rate/100,000[1]	Sample		Incidence Rate/100,000[2]
	No.	%		No.	%	
Motor Vehicle Occupant (.0, .1)	467	78.3	301	10,896	52.6	983
Motorcycle Rider (.2)	54	9.1	35	1,503	7.2	136
Pedal Cyclist (.6)	11	1.8	7	853	4.1	77
Pedestrian (.7)	13	2.2	8	404	1.9	36
Other/Unspecified (.3-.5, .8, .9)	51	8.6	33	7,096	34.2	640
Total	**596**	**100.0**	**384**	**20,752**	**100.0**	**1,871**

[1]Based on residential population of 4 rural counties (LaGrange, Noble, Huntington and Whitley) for **2013** in NE Indiana (Our Study or Study I).

[2]Based on residential population of 5 counties (Cuyahoga [metropolitan area], Geauga Lake, Medina and Lorain-Elyria [metropolitan area]) for **1977** in NE Indiana (Study II, Barancik JI et al., *Am J Epidemiol*, 1986:123:846-861).

as all-terrain vehicles and farm machinery. Behaviorally, rural adult drivers (age ≥18 years) are more likely to drive without a seat belt, leading to a high percentage of unrestrained passenger-vehicle-occupant deaths, and they are more likely to drive after consuming alcohol. From a prehospital perspective, lack of EMS can slow the time it takes to detect rural trauma victims, prolong transport times and delay early arrival to trauma centers.

Conclusion: The influence of gender and age on motor vehicle traffic injuries/crashes by ED visits, hospitalization and deaths has public health implications in setting priorities for injury prevention programs in our community, as stated above. For instance, the Share the Road program is targeting high-risk populations to protect motorcyclists, pedal cyclists, pedestrians and Amish buggies from collisions with motor vehicles in our study area.

Improvement in the risk of injury incidence among road users in the time frames between the two studies (2013 vs. 1977) could probably be due to the effectiveness of the verified trauma center opening in 2000 and the implementation of seat belt and motorcycle helmet laws enacted for more than 25 years in our study area. The higher case admissions and fatalities in Study I than Study II may be due to the greater risk of more severe

injury in our predominantly rural study area. More trauma injury prevention efforts are needed on county roads, especially for speed control, seat belt and motorcycle helmet law enforcement and blood alcohol concentration level monitoring.

Left to right:
Dazar Opoku, BSC, MPH, *Trauma Data Specialist, Trauma Services;*
Thein-Hlaing Zhu, MBBS, DPTM, FRCP, FACE, *Trauma Epidemiologist, Trauma Services*

Table 2. Comparison of Age-adjusted Rate between Barancik's Study in NE Ohio (Study II) and Our Study in NE Indiana (Study I) Using 2000 U.S. Populations as Standard

Gender	Risk Ratio (Study II/Study I)	Motor Vehicle Occupant	Motorcycle Rider	Pedal Cyclist	Pedestrian	Other Users	All Road Users
Both Sexes	Crude Risk Ratio[1]	3.3	3.9	5.1	9.2	19.4	4.9
	Age-adjusted Risk Ratio[2]	**3.1**	**3.4**	**4.5**	**9.1**	**21.1**	**4.6**
Male	Crude Risk Ratio[1]	3.7	4.2	5.2	18.4	7.1	5.6
	Age-adjusted Risk Ratio[2]	**3.5**	**3.8**	**4.3**	**18.5**	**27.6**	**5.3**
Female	Crude Risk Ratio[1]	2.7	2.5	5.2	5.1	14.0	3.9
	Age-adjusted Risk Ratio[2]	**2.8**	**2.5**	**5.7**	**5.1**	**16.4**	**4.0**

[1]Crude Risk Ratio = $\dfrac{\text{Incidence Rate in Study II}}{\text{Incidence Rate in Study I}}$, Incidence Rate = $\dfrac{\text{Road Users Count}}{\text{Population}}$ x 100,000

[2]Adjusted Risk Ratio = $\dfrac{\text{Age-adjusted Incidence rate in Study II}}{\text{Age-adjusted Incidence rate in Study I}}$, Age-adjusted Rate is a weighted average of crude rates, where the crude rates are calculated for different age groups and the weights are the proportions of persons in the corresponding age groups of a standard population.

Table 3. Comparison of Hospital Admissions per 1,000 Hospital Emergency Incidence (ED) Cases (Case-Admission Ratio) by Road-use Category in Both Sexes (Study I vs. Study II)

Road User Category with ICD-9 E-codes (810-819) 4th digit code	Road-use Category Admissions/1,000 Cases*		Ratio between Study I and II
	Study I (2013 data)[1]	**Study II (1977 data)[2]**	
Motor Vehicle Occupant (.0, .1)	182 (85/467)	76 (828/10,896)	2.4
Motorcycle Rider (.2)	291 (16/54)	184 (277/1,503)	1.6
Pedal Cyclist (.6)	364 (4/11)	115 (46/404)	3.2
Pedestrian (.7)	385 (5/13)	266 (227/853)	1.4
Other/Unspecified (.3-.5, .8, .9)	80 (4/51)	40 (287/7,096)	2.0
Total	**191 (114/596)**	**80 (1,665/20,752)**	**2.3**

*Case Admission Ratio = $\dfrac{\text{Road User Admission Count}}{\text{ED Visit Cases}}$ x 1,000

Footnote[1] as in Table 1.

Footnote[2] as in Table 1.

Table 4. Comparison of Motor Vehicle Fatalities per 1,000 Hospital Emergency Incidence (ED) Cases (Case-Fatality Ratio) by Road-use Category in Both Sexes (Study I vs. Study II)

Road User Category[*] with ICD-10 V-codes with the 4th digit	Road-use Category Fatalities/1,000 Cases[**]		
	Study I (2013 data)[1]	Study II (1977 data)[2]	Ratio between Study I and II
Motor Vehicle Occupant	5.2 (3/487)	5.7 (63/10,896)	0.9
Motorcycle Rider	38.4 (2/54)	11.1 (17/1,503)	3.5
Pedal Cyclist	30.6 (1/11)	5.0 (2/404)	6.1
Pedestrian	155.8 (2/13)	42.5 (37/853)	3.7
Other/Unspecified	336.0 (17/51)	4.8 (34/7,096)	70.0
Total	**58.9 (35/596)**	**7.4 (153/20,752)**	**8.0**

[*] See reference for ICD-10 mortality codes for motor vehicle traffic road-use category: http://www.mdch.state.mi.us/osr/chi/FATAL/ICDINJ2.HTM

[**] Case Admission Ratio = $\dfrac{\text{Road User Fatality Count}}{\text{ED Visit Cases}} \times 1{,}000$

Footnote[1] as in Table 1.

Footnote[2] as in Table 1.

1. Impact of Published Articles

We wish to share the impact of our published articles at our Level II Adult and Pediatric (non-academic) Trauma Centers. Please see the table at right for the invitations from some of the journals or organizations.

2. Building Up Statistical Analysis Capability for Research Members at the Department

The project was initiated by the Director of the Department. The purpose was to help research team members understand and present statistical test results from univariate, bivariate, and multivariate analysis. The statistical analysis exercises and presentation were done according to statistical programs of the Doctorate in Nurse Practitioner course, using an advanced SPSS statistical software. The exercises had a total of 8 sessions. Each session lasted 1 and a half to 2 hours.

3. Future Research Activities

The following research activities were planned for the year 2019:

a. Submission of research manuscript "Epidemiology of Rural Trauma in Northeast Indiana" to *Journal of Rural Health, Journal of Trauma and Acute Care Surgery* or a suitable journal

b. Submission of research manuscript "Comparison of Motor Vehicle Traffic Accidents by Road User Category in Northeast Indiana and Northeastern Ohio" to *Journal of Trauma and Acute Care Surgery, Journal of Rural Health* or a suitable journal

c. Research project on "Epidemiology of Fractures in Northeast Indiana" together with a Student Research Fellowship Program (SRFP)

d. Data mining of Parkview Employee Injury Database by statistical analysis to find out injury patterns, correlation, outcome achievement and research topic identification in consultation/collaboration with Parkview-responsible personnel and department(s) concerned

e. Assistance with statistical analysis with SPSS software to Trauma Team Members or other research personnel on request or collaboration

Article Topic	Name of Journal/ Organization	Date(s) Received	Type of Invitation
Rural Trauma Team Development Course, published in *J Trauma Nursing* https://www.facs.org/ quality-programs/ trauma/education/ rttdc/evidence	Am J Nursing Science	8/6/2018 12/20/2018	To submit manuscript /accept editorial board member or reviewers
	Global Forum Nursing & Healthcare	2/12/2019	To participate as speaker in Congress
Helicopter vs. Ambulance Transport on Trauma Survival, published in journal of *Academic Emergency Medicine* https://www.ncbi. nlm.nih.gov/pmc/ article/PMC5813265/ pdf/ACEM-25-44.pdf	Clinical Medicine Research	6/24/2018 8/22/2018 10/10/2018 2/13/2019	To submit manuscript/accept editorial board member or reviewers
	EC Emerg. Med. & Critical Care	10/3/2018	To submit manuscript
	J Trauma & Treatment	10/8/2018	To submit manuscript
	Nursing Education Congress 2019	8/20/2018	To participate as speaker in Congress
Name of Article not Mentioned	Spring Journals	8/7/2018	To submit manuscript
	Internal Medicine Research	8/20/2018 12/4/2018	To submit manuscript
	GRF Journals	10/1/2018	To submit manuscript
	Emergency Med. & Trauma Care J	10/24/2018	To submit manuscript
	Emerg. M., Trauma & Surg. Care	12/13/2018	To submit manuscript
	Nursing World Congress & Healthcare	2/20/2019	To participate as speaker in Congress

INNOVATION

TRAUMA CLINICAL NURSE SPECIALIST

The nursing care we provide to our trauma patients is ever-evolving as we strive to improve nursing practice through innovation and evidence-based practice in our emergency department (ED), operating room (OR), surgical trauma intensive care unit (STICU) and ortho-neuro-trauma (ONT) floor.

In the ED, nurses are working to improve brain care for head-injured patients. ED and OR nurses are using new methods to prevent hypothermia in the most severely injured patients. In the intensive care unit (ICU), nurses have implemented measures to improve nutrition practices for intubated trauma patients to aid in the healing process. Nurses in all areas are working with physical therapists to strive for early mobility in trauma patients to return them to the highest possible level of functioning prior to discharge. Once a patient is transferred out of the ICU, nurses work with the trauma clinical nurse specialist (CNS) to determine priority assessments and nursing interventions that can be used to ensure that patients progress toward discharge and help prevent a return to the ICU. Additionally, nurses on the ONT floor are working to improve pain management in geriatric trauma patients.

Our trauma CNS supports these initiatives by bringing expertise and support to the trauma nurses and helping drive practice change with evidence and outcome data. The trauma CNS is an advanced practice registered nurse who works directly with patients/families, nurses and the trauma system to support the trauma team in achieving the best possible outcomes for injured patients.

Kellie Girardot, MSN, RN, *Trauma Clinical Nurse Specialist*

Sarah Hoeppner, MSN, RN, CCRN, TCRN, *Adult Trauma Coordinator and PI Specialist*

COMMUNITY HOSPITAL TRAUMA PROGRAMS

PARKVIEW COMMUNITY HOSPITAL TRAUMA PROGRAMS

Parkview's trauma system includes seven trauma programs outside of the verified trauma center at Parkview Regional Medical Center. Parkview Randallia, Parkview Wabash, Parkview Huntington, Parkview Whitley, Parkview Warsaw, Parkview LaGrange and Parkview Noble are part of Parkview's trauma system. An advantage of being part of Parkview's trauma system is that education, guidelines and resources are shared among all of Parkview Health in order to provide consistently high standards of care. Each Parkview hospital has a trauma data registry for tracking and improving patient care. The Parkview community trauma programs strive to provide excellent care to every patient, every day.

Parkview community hospitals developed a trauma activation process that provides quick diagnosis and transfer when needed. Parkview community hospitals have been educated in trauma through the Rural Trauma Team Development Course (RTTDC), which is a didactic program developed by the American College of Surgeons and is specific to rural trauma cases. The process is then practiced through trauma simulations for continual process improvement.

Parkview Adult and Pediatric Level II Trauma Centers recognize trauma as a disease requiring a systematic process. Follow-up is provided to prehospital providers, as well as referring hospitals for care coordination. This communication provides opportunities for recognition of a job well done or areas of opportunity. Keeping the lines of communication open with all trauma providers is a priority for the high-quality trauma care that the Parkview trauma system leads.

Jennifer Konger, BSN, RN, *Parkview Community Hospital Trauma Program Manager*

PREVENTION

Parkview trauma prevention programs have been a stable supporter of multiple communities in northeast Indiana, having reached more than 180,000 people through social media, outreach, distribution of merchandise and events both hosted and attended by trauma prevention staff.

DON'T TEXT & DRIVE

Parkview's Don't Text & Drive (DT&D) campaign raised awareness about the dangers of distracted driving years before national campaigns proliferated. Parkview Trauma Centers have been deeply involved in the program, which continues to mature year after year. The program is an outreach to the community to help save lives by raising public awareness. In 2019, the Don't Text & Drive campaign was featured at more than 25 events throughout Allen County and the surrounding communities including schools, parades, employee health fairs, community safety days and local events.

Parkview continues to collaborate with Evans Toyota, Fort Wayne, as well as the Indiana State Police to share the messages of the Don't Text & Drive and Share the Road campaigns.

DON'T TEXT & DRIVE TESTIMONIALS

Parkview Trauma Centers periodically sponsor free seminars to help equip young drivers and their parents with the tools they need to become more focused, safer drivers. Safe driving content including Don't Text & Drive and distracted driving are also featured on Facebook, a social media platform. With the permission of family, powerful testimonials from people who have lost loved ones to distracted driving crashes have been shared with the public, prompting frank conversation. Laws governing distracted driving and current statistics are also shared, demonstrating the dangerous nature of distracted driving. A driving simulator provided by Drive Alive is often featured at community events to allow participants firsthand experience with the virtual reality of how distracted driving accidents occur.

Trauma Prevention Education Programs

Program	Public Awareness[1]	Attendance at Presentation[2]	Program Display[3]	Total
Share the Road	23,703	214	3,787	27,704
Don't Text & Drive[*]	41,075	546	3,538	45,159
Other (Stop the Bleed, gun safety, falls, Don't Drink & Drive)	5,101	869	100,228	106,198
Total	69,879	1,629	107,553	179,061

1. Social media, outreach, distribution of merchandise
2. Attended an event facilitated by Parkview Trauma Services
3. Booths at local symposiums, presence at community events

[*]Billboards for Don't Text & Drive have been strategically placed throughout northeast Indiana.

SHARE THE ROAD

Parkview Trauma Centers have implemented the growing Share the Road program to help protect and prevent injuries within the community. With increased traffic on the roads, motorists and other travelers need to become more alert and aware of the variety of commuters. Parkview has been working closely with the City of Fort Wayne and surrounding communities to magnify the importance of sharing the road with pedestrians, bicyclists, motorcyclists and Amish buggy passengers. Public outreach includes public service announcements and billboards designed with runners, motorcyclists, cyclists and Amish buggies in mind. Early this year, Share the Road yard signs were distributed at the Fort Wayne Farm Show, where more than 30,000 attendees from rural communities were able to pick up these free signs to share in surrounding communities.

In 2019, Parkview Trauma Centers took the Share the Road campaign to more than 45 events throughout Allen County and surrounding communities. The Share the Road vehicle has utilized a chase car for several yearly cycle events organized by the city and various charities. If you see this vehicle on the road, watch for cyclists nearby!

BIKE HELMET SAFETY AND PARKVIEW SAFETY STORE

The Parkview Safety Store, located at the Carew Medical Building, offers injury-prevention merchandise and safety supplies to enhance public safety. The store also provides safety-certified bike helmets and fittings to ensure the proper fit for each individual. In 2019, approximately 400 helmets were sold at the safety store, while nearly 200 helmets were provided at no cost to Allen County children. Apparel and other items supporting Parkview's Don't Text & Drive and Share the Road campaigns are available for purchase at the store.

Parkview Safety Store
(260) 373-7201
1818 Carew Street, Suite 140
Parkview Hospital Randallia campus
Fort Wayne, IN 46805
Tuesdays, 10 a.m. – 1 p.m. and 4 – 7 p.m.

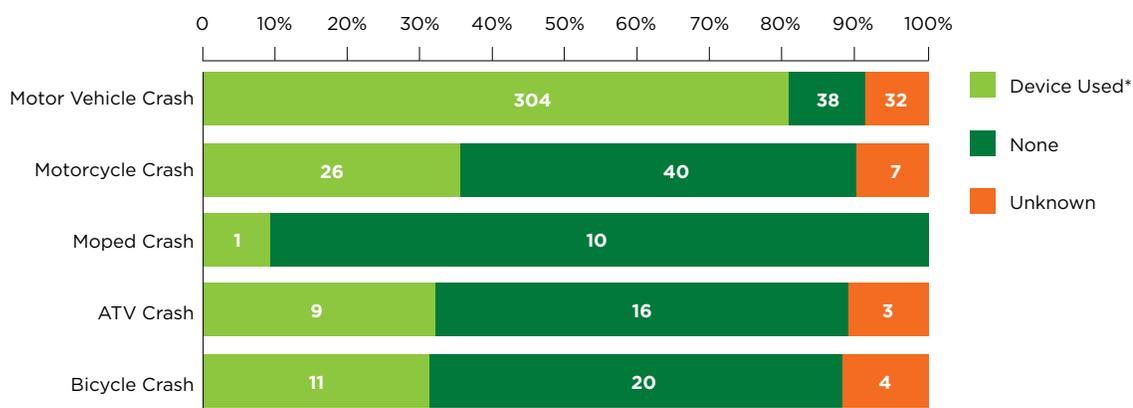## Blood Alcohol Concentration (BAC) Level in Selected Mechanisms for Injured Patients, 2018

Mechanism	Total Tested	BAC 0.08+
Fall	374	55
Motor Vehicle Crash	315	54
Motorcycle Crash	64	14
Industrial	47	0
Gunshot Wound	33	9
Stabbing	23	14
Pedestrian Struck	21	5
Bicycle Crash	21	3
Assault	19	6
ATV Crash	17	3
Buggy	12	0
Moped	11	4
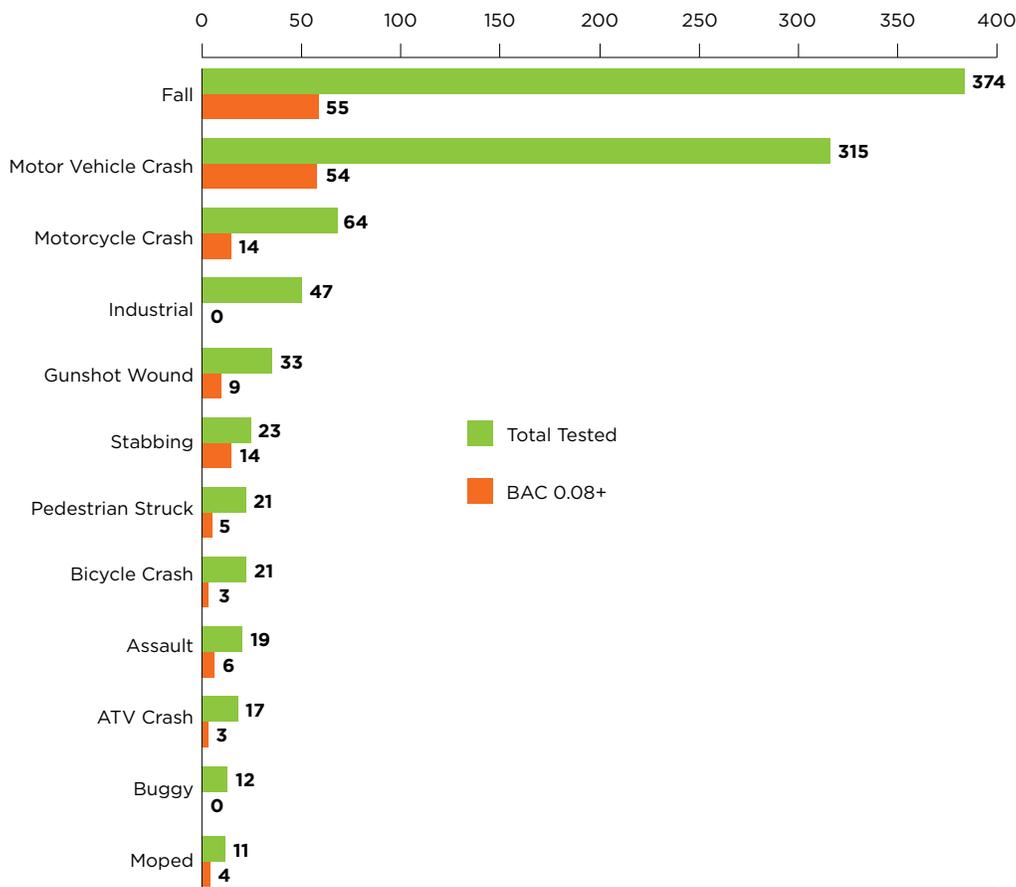
Note: BAC equal to or greater than 0.08 level is considered legally intoxicated.

Protective Devices Used in Selected Crash Types, All Injuries, 2018

Crash Type	Device Used*	None	Unknown
Motor Vehicle Crash	304	38	32
Motorcycle Crash	26	40	7
Moped Crash	1	10	
ATV Crash	9	16	3
Bicycle Crash	11	20	4

* Multiple devices used in a single vehicle are counted as one.

OUTREACH AND EDUCATION

Parkview has a vigorous outreach and education program that offers trauma-related training to regional healthcare providers, as well as the general public. Live, on-site education is provided to area EMS, fire and police services and community hospital emergency departments in northeast Indiana, northwest Ohio and south-central Michigan. Educational topics include, but are not limited to: pediatric, adult and geriatric trauma care, airway management, bleeding control and farm-related injuries.

Part of Parkview's responsibility as a verified trauma center is to help plan, educate and train the community regarding mass casualty events. Although we sincerely hope that no one will ever have to experience one of these unspeakable events, the current reality is that anyone may be called upon to be a first responder, especially in a school or community setting. The Stop the Bleed® campaign, developed by the American College of Surgeons, has been shared in many different community settings.

The entire trauma team has taken the Stop the Bleed campaign and education out into the community. The program is unique in that the public receives training, not medical professionals, as they will be the first responders for themselves, family members and peers. Free education has been provided to a total of more than 1,500 participants through 50+ organizations since we implemented the program in 2018. Participants have included local high schools, religious establishments and health fairs. Parkview Trauma Centers have also provided

tourniquets to help local organizations begin their process of preparedness.

Parkview also offers monthly Trauma Grand Rounds live, on-site at Parkview Regional Medical Center, as well as live-streamed and recorded for participation by those unable to attend the live event and those outside of Parkview. Various trauma care subject experts provide education on caring for injured pediatric, adult and geriatric patients. Another monthly educational offering is trauma simulation training for the multidisciplinary trauma care team, which involves simulated trauma cases created and practiced in a controlled setting in the emergency department trauma bays.

Several annual events are attended by many regional professional medical providers, educators and other members of the public with interest in trauma care. In 2019, experts in their fields provided education at the 30th Annual Trauma Symposium, 7th Annual Child Maltreatment Symposium, 9th Annual Pediatric Trauma Symposium, 3rd Annual Geriatric Trauma Symposium and the 20th Annual Brain Injury Symposium.

Parkview also offers formal trauma-related courses for area professional healthcare providers including: Prehospital Trauma Life Support (PHTLS), Advanced Trauma Life Support (ATLS), Advanced Trauma Course for Nurses (ATCN), Rural Trauma Team Development Course (RTTDC),

Trauma Nursing Core Course (TNCC) and the Emergency Nursing Pediatric Course (ENPC).

In addition to in-person education, Parkview offers online trauma education via a robust Trauma Outreach Education website. Many area providers take advantage of the site offerings, which are updated at least monthly. Online education on this site includes up-to-date trauma care related topics, links to trauma resources, monthly trauma case studies and an archive of video recordings of the various events offered annually. In addition to the Trauma Education website, Parkview Trauma Services also offers a YouTube® page with over 175 trauma-related educational videos. Professional educational credits are available including In-service Continuing Education for prehospital providers, Continuing Medical Education (CME) for physicians and Nursing Contact Hours (CNE) for nurses.

Parkview provides timely feedback to area referring community hospitals and prehospital providers related to injured individuals brought to Parkview Trauma Centers. This feedback is provided in the form of a letter, including a list of injuries identified, procedures provided, outcomes and opportunities for improvement. The letters are intended to improve trauma care through closing the communication loop between Parkview providers and the referring providers and agencies. There were 1,006 follow-up letters sent to referral agencies and hospitals in 2018.

Mode of Transportation to Parkview Trauma Centers, 2018

ALL TRAUMA

- Ambulance
- Private
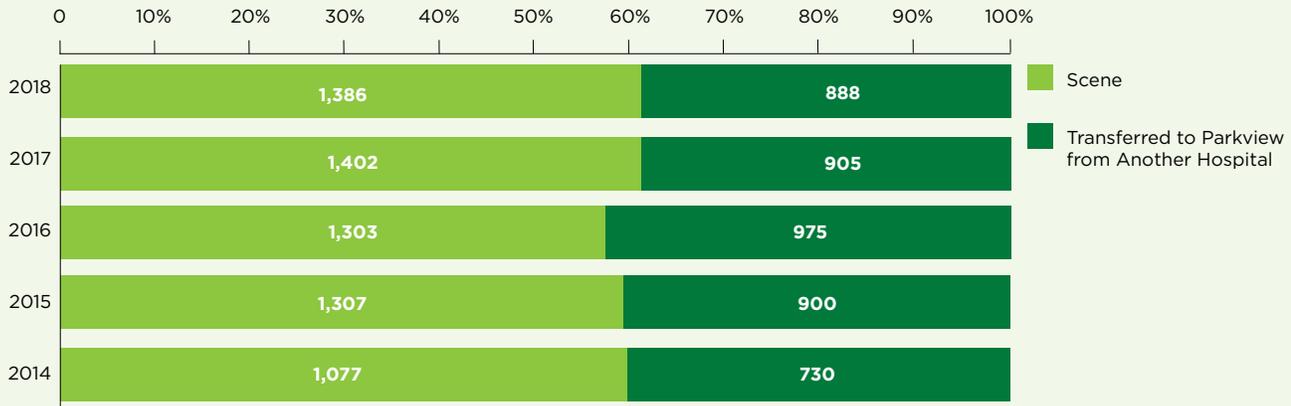- Air

8.6%
16.0%
75.4%
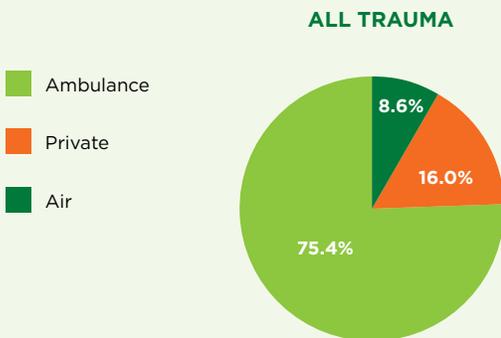
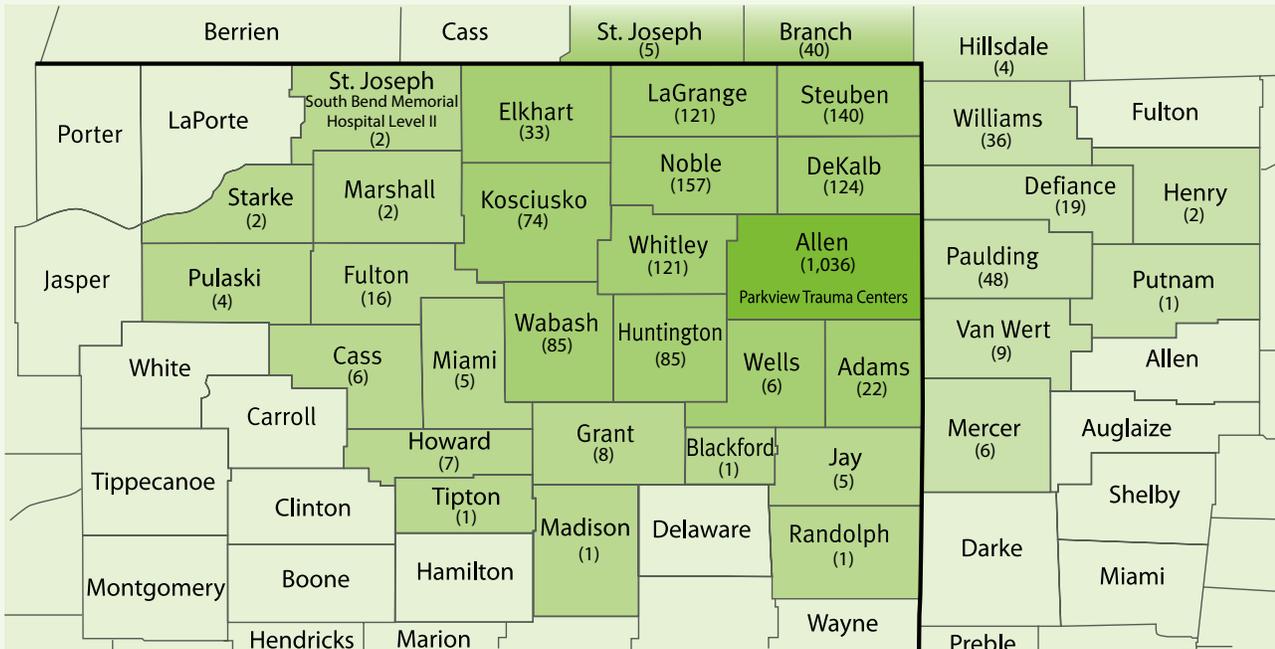*Note: There was 1 case with arrival by Police.*

Left to right:
Joseph Muller, MD, *Trauma & Acute Care Surgeon;* **Alicia Floor, RN,** *STICU;* **Eric Olsen, MD,** *Emergency Medicine;* **Lashonda Williams, MD,** *Trauma & Acute Care Surgeon*

Volume (and %) of All Patients from Scene or Transferred to Parkview Trauma Centers, 2014-2018*

Year	Scene	Transferred to Parkview from Another Hospital
2018	1,386	888
2017	1,402	905
2016	1,303	975
2015	1,307	900
2014	1,077	730

Legend:
- Scene
- Transferred to Parkview from Another Hospital

Excludes cases with isolated hip fractures from 2014.

County of Injury Occurrence in Catchment Area, 2018

Berrien

Cass

St. Joseph (5)

Branch (40)

Hillsdale (4)

Porter

LaPorte

St. Joseph
South Bend Memorial Hospital Level II (2)

Elkhart (33)

LaGrange (121)

Steuben (140)

Williams (36)

Fulton

Starke (2)

Marshall (2)

Kosciusko (74)

Noble (157)

DeKalb (124)

Defiance (19)

Henry (2)

Jasper

Pulaski (4)

Fulton (16)

Whitley (121)

Allen (1,036)
Parkview Trauma Centers

Paulding (48)

Putnam (1)

White

Cass (6)

Miami (5)

Wabash (85)

Huntington (85)

Wells (6)

Adams (22)

Van Wert (9)

Allen

Carroll

Grant (8)

Blackford (1)

Jay (5)

Mercer (6)

Auglaize

Tippecanoe

Howard (7)

Tipton (1)

Clinton

Madison (1)

Delaware

Randolph (1)

Darke

Shelby

Montgomery

Boone

Hamilton

Miami

Hendricks

Marion

Wayne

Preble

TRAUMA SERVICES TEAM

Raymond Cava, MD, FACS, Trauma Medical Director; Medical Director, Surgical Trauma ICU; Pediatric Trauma Medical Director and Pediatric ICU Co-medical Director, Parkview Regional Medical Center; Acute Care/Trauma Surgeon, PPG — Trauma & Acute Care Surgery

Marcy Rogers, MBA, RN, VP Surgical Practice, VP Inverness Operations, PPG

Lisa Hollister, MSN, RN, Director, Trauma & Acute Care Surgery

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Richard Falcone, MD, Pediatric Trauma Consultant, Parkview Pediatric Trauma Center & Pediatric Trauma Medical Director, Cincinnati Children's Hospital Medical Center

Nicole Bishir, BSN, RN, Geriatric Trauma Coordinator

Melissa Crance, Trauma Administrative Secretary

Kellie Girardot, MSN, RN, Trauma Clinical Nurse Specialist

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