

QUEEN ELIZABETH II HOSPITAL

REGIONAL TRAUMA PROGRAM



2017-2018

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Message from our Director

On behalf of the Queen Elizabeth II Hospital Regional Trauma Committee, we are pleased to present the QEII Regional Trauma Report for 2015 through 2016. This report is the result of countless hours of collecting trauma data from patient charts and related documentation on trauma patients treated at the QEII Hospital.

The intent of this report is to highlight the work currently being done both at the regional level and also as part of a provincial trauma system. We also examine ways in which we can optimize the overall trauma care as part of that system.

Lastly, we would like to thank all the members of the Grande Prairie Regional Trauma Committee and those involved in collecting and analyzing the data presented here. It is through this work that we continue to develop and provide excellent care to our patients.

Any questions or comments are very welcome and can be forwarded to us directly.

Sincerely

Johan Bolton
MD, FRCSC

QEII Regional Trauma Program

Emergency trauma care at the QEII strives to provide for the most critically ill and injured patients 24 hours a day, every day.

Trauma is the number one cause of death among Canadians during the first four decades of life. This means that **preventable injuries** result in more deaths every year in our youngest and most vital population than all other causes of death within the same age range. Parachute Canada recently released a report stating that in 2010, 15,890 Canadians died as a result of **preventable injuries**. Based on the trends of past results, it is predicted that number will increase to an estimated 26,390 annually by the year 2035.

Aside from the human cost of trauma, the Parachute Canada study shows that there is an increasing economic cost. The national total economic cost of trauma in 2010 was nearly \$27 billion. That same year, Canada's total population was approximately 34 million.

Alberta has the highest cost per capita for preventable injuries in the country. Nationally, the total economic cost of preventable injury per person is \$788. In Alberta, that cost is 1.4 times the national rate at \$1,083 per capita.

http://www.parachutecanada.org/downloads/research/Cost_of_Injury-2015.pdf June 26, 2019

How does our region contribute to these numbers? Our catchment area covers a disproportionately large geographic area of Albert, including most of the northwest of the province and many remote communities in northeastern British Columbia. This report examines the data on the major traumas from our region who are treated at the Queen Elizabeth II Regional Hospital.

Executive Summary

This report details the cause and outcomes of major trauma patients treated at the QEII Regional Hospital over a 2 year period, **2017 through 2018**.

- Major traumas (ISS>12) (**N=155**), Minor penetrating traumas meeting the definition and Trauma Team Activations that did not meet criteria giving a total of 251 patients (**N=251**) for this time period.
- Major trauma cases were highest during the month of July.
- Major trauma cases were highest on Saturdays.
- Most major trauma cases were males between the ages of 17-25.
- The majority of major trauma cases are due to blunt force trauma (93%, n=144)
- Most major trauma arrived directly from scene by ground ambulance (n=83).
- CT's (computed tomography) of the head are the most utilized ED procedure (n=113).
- Most major trauma cases were the result of MVC (motor vehicle collision) related injuries (n=49).

- Streets/highways remains the most prevalent place of injury (n=67).
- Interpersonal violence, major and minor injury scores remain at 20% (n=49).
- Penetrating injury, major and minor (n=72).
- Penetrating injury requiring surgical intervention, major (n=7) and minor (n=67) in total.
- Major & minor work related injury accounted for 12% all registry entries (n=29).
- 56% of MVC injured patients (n=50) used no form of safety device (seatbelt, helmet, etc.)
- Safety Device Use, ETOH Positive 18% vs ETOH Negative 30%.
- ETOH Screening major trauma, 45% (n=69) tested negative, 35% (n=54) were not tested, 18% (n=26) tested beyond legal limits, 3% (n=4) tested for trace levels and 1% (n=2) were not applicable due to age.
- Falls have the highest number of fatalities (n=5), followed by Interpersonal Violence (n=4).
- Trauma Team Activations, Minor (ISS < 12) 43% (n=50), Major (ISS ≥ 12) 57% (n=65).
- TTA Yes vs TTA No of both major and minor scores, assessing ED Length of Stay, showed that TTA's spend less time in the ED with an average of 5:56 hrs as opposed to an average of 10:22 hrs with no activation.
- ED Length of stay for TTA patients meeting criteria, regardless of having an activation of the team, showed no significant difference in time spent in the department.
- Reviewing TTA Yes vs TTA No and the time these patients waited for their first CT showed no significant difference.
- Seniors (60+) suffering major trauma spend more time in ED with an average of 15:26 hrs compared to 6:45 hours.
- Seniors with head injury spend more time in ED than the younger group, avg 24:18 vs 6:43hrs respectively.
- Seniors with head injury spend more time in ED than their counterparts, avg 24:18 vs 9:38hrs respectively.
- The younger group (59 yrs and under), head injured patients spend an average of 6:43hrs in ED compared to an average of 24:18 hrs for those over 60 years with head injury.

QEII Regional Trauma Program Vision:

Utilizing an interdisciplinary team, we shall provide excellent, coordinated, and integrated trauma care to the people we serve in the North Zone of Alberta Health Services and surrounding area

QEII Regional Trauma Program Mission:

Facilitate quality trauma care service consistent with the standard of care through and by;

- Integration of Services
- Multi-disciplinary Care
- Continuity of Care (pre-hospital, inter-hospital and post hospital; primary/secondary/tertiary care and transport)
- Timely and efficient patient focused care
- Following Best Practice(s)

QEII Regional Trauma Program Members:

Trauma Medical Director	Dr. Johan Bolton
Trauma Coordinator	Lydia Megraw
Trauma Manager	Tracy Peddy
Trauma Data Analyst	Karen Seymour

Trauma Program Medical Director

The Medical Director provides leadership and direction to the Grande Prairie Regional Trauma Program, which is based at the QEII Regional Hospital. The Director is a general surgeon who oversees all program activities that impact the overall care of the trauma patient including clinical initiatives, education, data collection and research. The director leads a multidisciplinary team which strives to provide the best possible care and outcome for trauma patients within our region. The Trauma Coordinator and Data Analyst report to the Medical Director in areas of patient care, education and research.

Trauma Program Manager

Trauma Program Manager oversees the administrative, operational personnel and financial aspects of the program. The Trauma Coordinator and Data Analyst report to the Trauma Program Manager for administrative issues. The Program Manager also serves as an integral link between the Trauma Program and the regional AHS administration to facilitate the development and maintenance of internal clinical protocols and guidelines. The manager also serves as a liaison to hospital administration and clinical disciplines and assists with intra-facility and regional staff development.

Trauma Program Coordinator

The Trauma Program Coordinator is responsible for the implementation of the programming of the Grande Prairie Regional Trauma Program. This includes the development, implementation and evaluation of all of the initiative of the Trauma Program in Grande Prairie and the surrounding region. This includes the coordination of continuing education for health care providers at all levels of the trauma system. Key responsibilities include the fulfillment of regional and provincial strategies within the Trauma Program, as well as the organization of performance

improvement initiatives and activities within the trauma system as a whole. The Coordinator is involved in facilitating protocol development within the Trauma Program and actively tracks trends in patient care through regular chart reviews.

Trauma Program Data Analyst

The Trauma Data Analyst fulfills several functions in the Trauma Program including the identification of trauma cases, analyzing and collecting the trauma data used in the building of the registry and the generation of various reports for research projects, publications and presentations. Further the Trauma Analyst is responsible for maintaining an accurate and current data registry which fosters data and indicator development for quality improvements in patient care and outcomes. Our current analyst is a member of TRISC (Trauma Registry Information Specialists of Canada), a national group which advocates for consistency in coding and data collection practices across the country while providing a forum for a team approach to problem solving, and for the sharing of expertise and skills. Trauma registry data is reported to and used by the Alberta Trauma Registry. Our data analyst is also responsible to analyze data and generate reports for the medical director, coordinator and manager when needed, including the development of the program's biennial report.

Current and Ongoing Initiatives

Education

The Grande Prairie Regional Trauma Program has regularly offered Advanced Trauma Life Support (ATLS) courses, over the past several years, for the physicians in our region. In conjunction with the **ATLS** course, a banquet is held and attended by course participants and other health care workers involved in the care of trauma patients. This is an educational and team building community activity that is always well attended.

The Trauma Program supports the QEII Emergency Department orientation program; and ongoing "in-service" educational sessions. These sessions are led by the Trauma Coordinator, Emergency/ICU Educators, and Emergency & ICU Clinical Coordinators and focus on a broad range of emergency and trauma specific areas such as;

- Trauma Nursing Core Course (**TNCC**)
- Emergency Nursing Pediatric Course (**ENPC**)
- Neonatal Resuscitation Program (**NRP**)
- Advanced Cardiac Life Support Course (**ACLS**)
- Pediatric Cardiac Life Support Course (**PALS**)

- Cardiac Pulmonary Resuscitation Course (**CPR**)
- Canadian Triage Acuity Scale (**CTAS**)
- Basic Life Support (**BLS**)
- Hazardous Response (**HAZMAT**)
- Emergency Department Orientation Course

With a goal of including Emergency Nursing Pediatric Course (**ENPC**), Emergency Practice, Interventions and Care (**EPICC**) Foundations and Trauma & Pediatrics in the near future.

Trauma Team Activation (TTA) Guidelines

In an effort to bring the care of trauma patients at the QEII Hospital to the highest “best practice” standards, the Grande Prairie Regional Trauma Program initiated and formalized a multi-disciplinary Trauma Team, including members from the departments of Emergency, Surgery, Radiology, Laboratory, and Social Services. Specific criteria have been developed for the activation of the Trauma Team and the effectiveness of the system has been demonstrated by the data over the past many years, showing it to be one of the most effective in the province. Recently, a formalized system has been implemented for the activation of an Operating Room Trauma Team which allows for more OR staff to assist with major traumas being immediately taken to the OR. The Trauma Team was initiated August 3, 2011 and is regularly evaluated for process improvement purposes.

Massive Hemorrhage Protocol

The Trauma Program led the development of our local Massive Hemorrhage Protocol (MHP). The MHP was developed to ensure early administration of blood products when dealing with hemodynamically unstable patients undergoing massive blood loss. The MHP was implemented in 2014.

Trauma Distinction

Alberta Trauma Services, supported by Alberta Health Services (AHS), is currently involved in the Trauma Distinction process with Accreditation Canada. The QEII Regional Hospital is working towards receiving official designation as a Level III Trauma Facility as part of the provincial accreditation. The Trauma Program strives to develop and implement relevant trauma initiatives from the pre-hospital to the rehabilitation phase of trauma care in order to meet accreditation standards and continually improve the trauma system.

Quality Improvement

The Grande Prairie Regional Trauma Program has developed a formalized **Performance Improvement Patient Safety** (PIPS) program which involves reviewing flagged cases through a multi-disciplinary review sub-committee. As all trauma patient charts are tabulated for input into the database, specific filters identify cases which may be outside of the parameters set by both the Regional and Provincial programs. These standards include missed Trauma Team Activations, prolonged length of time to CT scanning, missed spinal precautions, and the length of time to be transferred out to a higher level of care. The Trauma Coordinator, with the assistance of the Data Analyst, filters each major trauma case in order to assess the type of trauma care we are providing. Through this process, our program can identify areas in need of review or improvement. As a result of these PIPS reviews, the Regional Trauma Program has been able to make recommendations and develop policies, procedures and/or guidelines that work towards improving the care provided in our region. The improvement of trauma care is continuous and ongoing and often leads the way for other subspecialties to follow.

Over the past several years, the PIPS reviews have resulted in the development of new protocols and updates of others, including:

- **Spinal Immobilization and Spinal Precautions:** In 2018 the Spinal Motion Restriction protocol was released provincially with the objective to “assist health care professionals when implementing specific diagnostics, therapeutics, and interventions for patients, prior to the initial Physician and/or Nurse Practitioner (NP) assessment and in accordance with the patient’s continuum of care” with the goal of ensuring proper positioning of a patient with known or suspected acute spinal injury by limiting movement of the spine and preventing further harm.
- **Adult Trauma Admission Guidelines:** Introduced 2013, this was created to ensure adult trauma patients are admitted to the appropriate unit for their injuries and outlines the procedure for ensuring that beds are available on those units when needed.
- **Trauma Admission Orders:** In 2012 standing orders for the adult and pediatric trauma patient were created ensuring a standardized approach to trauma care. In 2018, these order sets were updated bringing various improvements and to ensure that the Trauma Coordinator was notified of the admission.
- **Physician/Nursing Trauma Record:** In 2011 the Alberta Trauma Coordinators, including the Grande Prairie Regional Trauma Coordinator, created a Provincial Nursing Trauma Record and an educational program to assist in its implementation. After a trial and review of this record it was recognized the provincial form did not meet all of the needs of the QEII’s emergency trauma team. Realizing that provincially guided record keeping does not always work best in a smaller regional setting, the Grande Prairie Regional

Trauma Program, in collaboration with the Emergency Chief of Staff and the emergency department staff developed a specialized combined Physician/Nursing Trauma Record for use at the QEII Hospital emergency department. This unique record ensured that all the data required for the provincial system was included but allowed for a more streamlined approach for a Level III Trauma facility. It was implemented in 2014 and continues to be used successfully.

- **EMS Patch Form:** An EMS patch form was created in 2013 to assist in identifying those inbound patients who may need specific services. The patch form allows staff to identify which criteria have been met and activate necessary staff for specific protocols accordingly. It was expanded to include other non-trauma patients and thus facilitated improved prehospital communication. In 2018 this form was once more updated to agree with policy updates.
- **Complications and Comorbidities Form:** A comorbidity is one or more chronic conditions in a patient. Complications are problems that arise following a trauma and subsequent treatment. Collecting this data is time consuming and rely on the review of the patient chart. With a goal of standardizing the language used and improving the accessibility of this information, a form was created to facilitate this by the Royal Alexandria Hospital's Data Analyst and shared with the provincial analyst group.
- **Pediatric Psych Consults:** Pediatric traumatic stress is a set of psychological and physiological responses children and their families have to pain, injury, medical procedures and invasive or frightening treatment experiences in a medical setting. The Pediatric Psych Consult was created to assist in identifying and providing support to patients and families affected by trauma.
- **Management of the Pregnant Trauma Patient:** Trauma complicates one in 12 pregnancies, and is the leading non-obstetric cause of death among pregnant women. The most common traumatic injuries are motor vehicle crashes, assaults, falls, and intimate partner violence. Recognizing the special needs of the pregnant trauma patient, a guideline was created to improve their care.

<https://www.aafp.org/afp/2014/1115/p717.html> June 20, 2019

Data Registries

Building and contributing to the local registry is an ongoing process. Provincially, the Data Analysts have worked to become a more cohesive and collaborative group, in view of providing the most reliable data possible. As part of this process, the group performed review and rewriting

of the Data Dictionary and throughout 2017 and 2018, the analysts have continued to work together to improve the quality and consistency of the data being collected. Formal monthly meetings are attended remotely from each site to discuss issues and provide input. In addition, the analysts have a “share page” where minutes, resource materials, coding questions and answers, etc.

Trauma Data Validation

Validating the data collected is accurate is essential. Standardizing the evaluation method of data collection becomes the foundation for analyzing the overall accuracy of registry data. True data is integral for orientation, development, training, benchmarking, and accurate reporting. An objective assessment of data can be achieved through the use of standardized definitions and descriptors, precise measurements, comparative re-abstractions, and structured evaluation. To this end, a minimum validation process was created as a collaborative effort between the Provincial Epidemiologist and the Data Analysts.

Field Triage Validation

Field trauma triage guidelines have been widely implemented by trauma systems, but rarely prospectively validated. A decision was made to validate the guidelines, as applied by out-of-hospital providers, for identifying high-risk trauma patients. A process was created to identify trauma patients by ICD10 codes. Once identified, the randomly selected charts are reviewed by the Trauma Coordinators to assess if the patient was taken to the appropriate facility for treatment. At the time of this report, very little data had been gathered and no conclusions have been made. Studies in the United States have found that field triage guidelines are relatively insensitive for identifying seriously injured patients and patients requiring early critical interventions, particularly among older adults.

[https://www.journalacs.org/article/S1072-7515\(15\)01699-3/abstract](https://www.journalacs.org/article/S1072-7515(15)01699-3/abstract) June 20, 2019

Community

We continue to be involved with the Grande Prairie Safe Communities Program, taking an active role to promote public safety and reduce the incidence of injury in Grande Prairie and area through the maintenance and operation of Safety City and other programs designed to educate the public about safety and injury prevention. The Trauma Program has led priority setting exercises to identify our most pressing areas requiring injury prevention education and intervention.

In the fall of 2018, the Trauma Program participated in the **Emergency First Responders Day**. Held at the Royal Canadian Legion, the day included a live trauma simulation by the Trauma Program, STARS, EMS, Fire and RCMP. An event which was open to the public.

Future Planning

- **Safe Communities:** Ongoing outreach to the community and its needs.
- **Operating Room Trauma Team Activation:** Further strengthen the OR Trauma Team system now that concept has been approved. The need for this was recognized in late 2015. We continue to update these guidelines as needs are identified.
- **Rounds:** Starting in 2015, all staff and physicians have been invited to participate in Grande Rounds via telehealth presented by the Edmonton trauma program and pediatric trauma rounds from the Alberta Children's Hospital and have continued to provide this access. Holding local rounds for staff is planned for the near future.
- **SIMMS:** Trauma simulations were introduced in 2015, with regular sessions being scheduled through the year. These SIMM/Skills days continue on a monthly basis.
- **Rural Trauma Outreach:** Rural sites have a challenging role in trauma care, charged with resuscitating, stabilizing, and transferring severely injured patients with limited resources. Rural facilities are less likely to have advanced technological equipment, trauma-focused education, or blood products. The trauma program is hoping to have site visits and education days in the near future to help support them in the challenging but critically important role they play in our trauma system.
- **New Hospital:** A new regional hospital with increased services and space is currently under construction. The new hospital will include:
 - An increase in the ICU spaces and allows for growth to the emergency department.
 - The new site will have 172 beds (compared to 161 at the QE2) and capacity to add an additional 60 in the future.
 - A state-of-the-art cancer centre with two radiation vaults, bringing radiation therapy services to the community and the surrounding region. The centre is part of a province-wide strategy to open a corridor of cancer care treatment centres across Alberta. Grande Prairie will become the fifth city in the province to offer radiation therapy, joining Edmonton, Calgary, Lethbridge and Red Deer.
 - Eight operating rooms. Shelled-in space for two additional operating rooms will be included to meet increased demands in the future. There will also be an operating room in the obstetrical suite specifically for caesarians.
 - Obstetrics – space for an anticipated 2,150 annual births in the region by 2025;

- Diagnostic imaging – including an MRI and future expansion capability;
- Respiratory therapy, laboratory and pharmacy services; and
- Approximately 4,000 square metres for the nursing and medical careers program from the Grande Prairie Regional College.

<https://www.albertahealthservices.ca/about/Page2408.aspx> June 25, 2019

Goal of this Report

- To examine the epidemiology of trauma patients (that meet criteria for registry inclusion) treated at the QEII Hospital.
- To disseminate information about trauma admissions at the QEII.
- To support the facilitation of injury and prevention/control programs.
- To increase awareness of injury as a major public health issue in the Peace Region.
- Highlight areas in which improvements have been achieved through the careful analysis of data, including areas of care which still need attention.

Considerations

This report provides data collected from the hospital charts of trauma patients with an Injury Severity Score (ISS) of greater than or equal to 12, and who were treated at the Queen Elizabeth II Regional Hospital, unless otherwise stated, from January 1, 2017 to December 31, 2018.

This data set does not represent all people treated for trauma at the QEII Hospital and does not include the following:

- People treated and or admitted with an ISS < 12 (with the exception of penetrating trauma as defined and Trauma Team Activations with ISS <12);
- People who die at scene; and
- Trauma patients treated at other health care facilities within our region and then released.

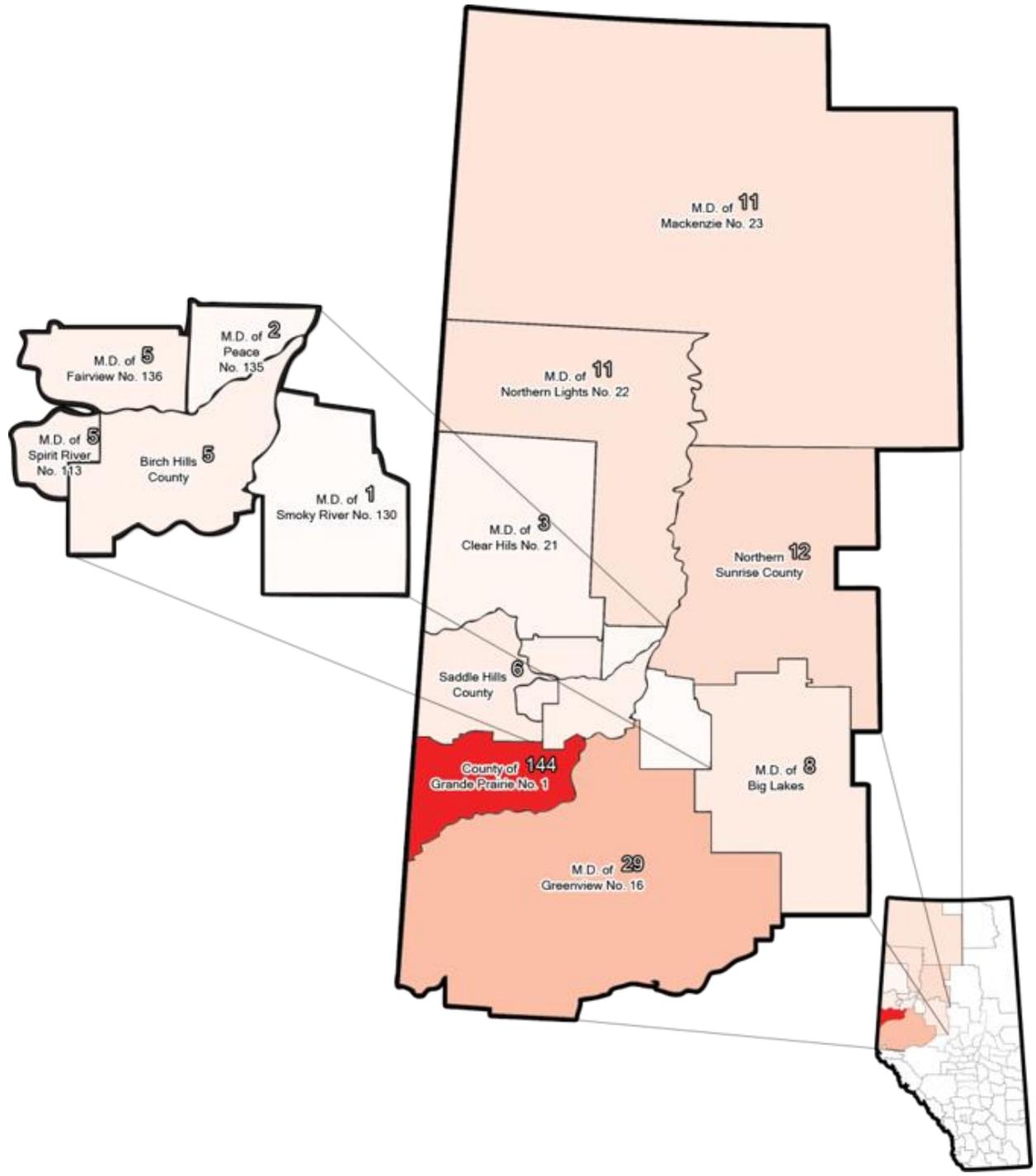
The Injury Severity Score (ISS) is an internationally recognized scoring system developed to assign a level of severity to an injury or injuries. It is used in conjunction with the Abbreviated Injury Scale (AIS) which is the sum of the squares of the highest AIS score in each of the three most

severely injured body regions. The ISS is scored from 1 to 75 with a higher score indicating increased severity.

Injury reports are based on the primary cause of injury.

Some percentages are rounded to the nearest whole number.

QEII Catchment Area/Heat Map 2017-18



N=251

*Excludes: 5 unknown
4 British Columbia

Figure 1

Major Traumas/2009-2018

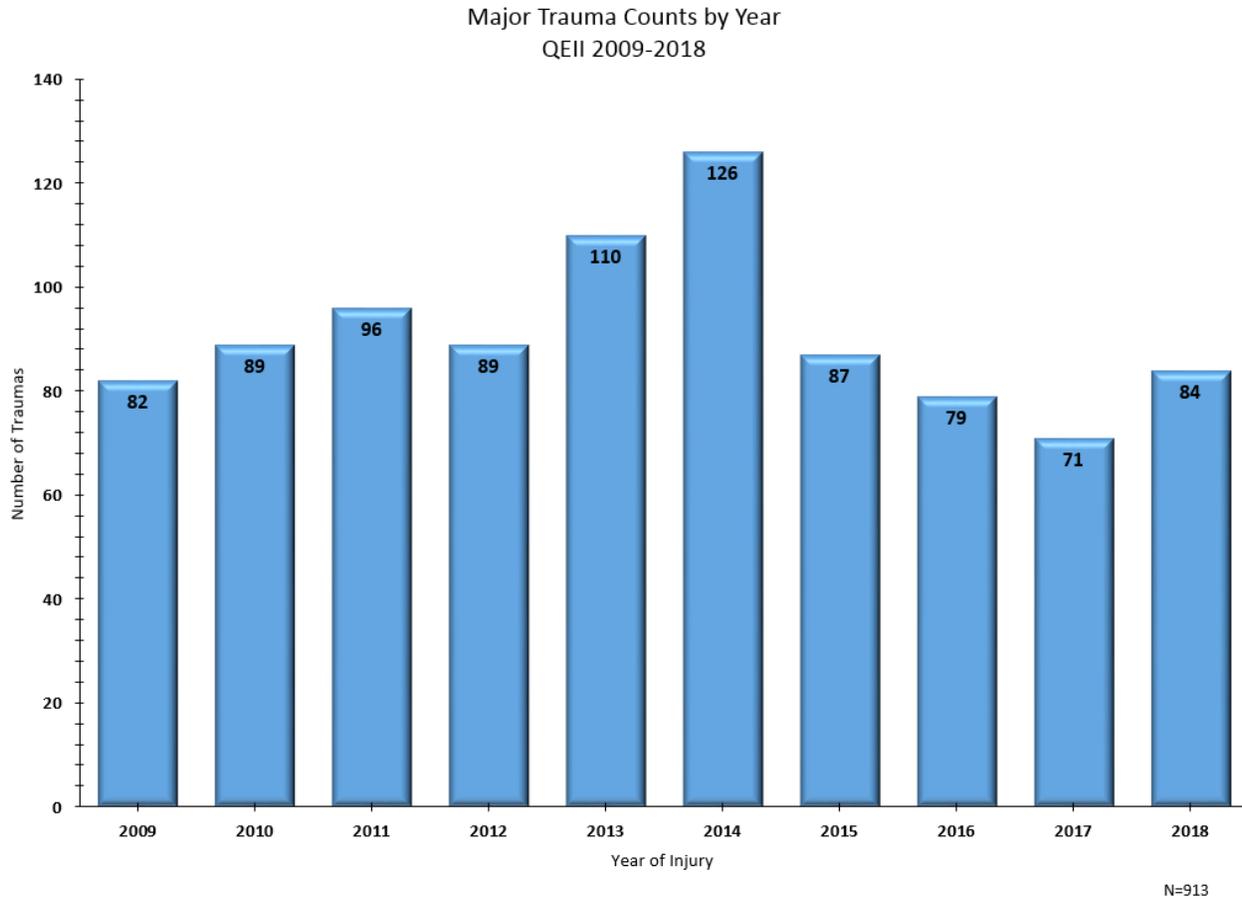


Figure 2

The Trauma Registry began at the QEII in 2009. The chart above gives the annual total of major trauma for the years of 2009 through 2018.

According to the World Health Organization, each year around the world, more than 5 million people die from injuries.

<https://www.canada.ca/en/public-health/services/injury-prevention/facts-on-injury.html>

June 26, 2019

Major Trauma/Month 2017-18

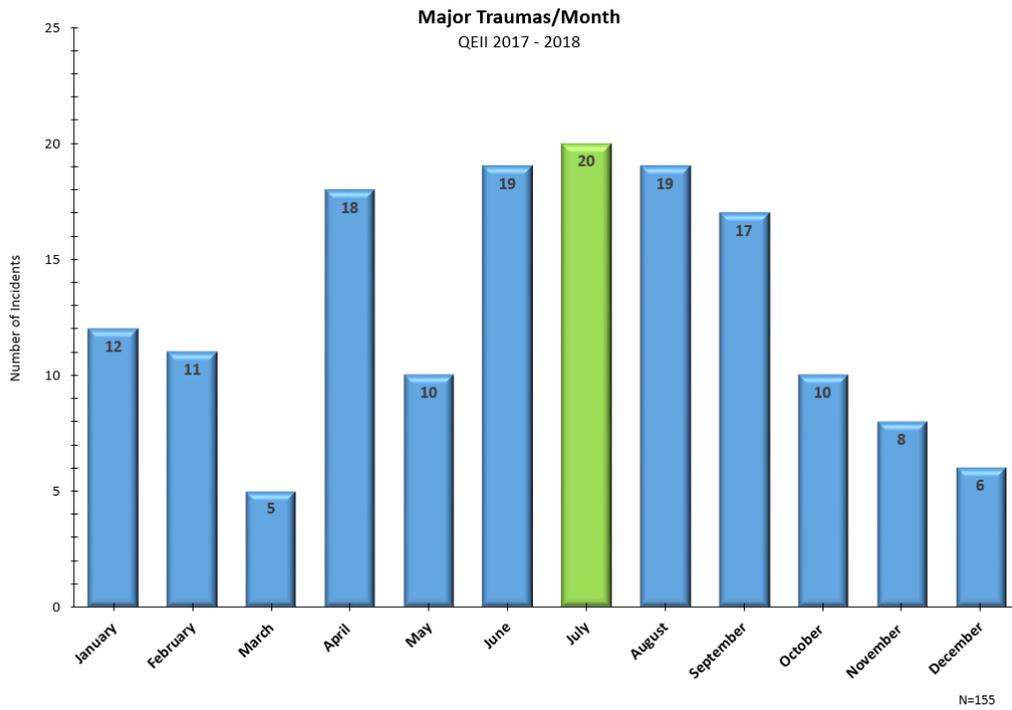


Figure 3

Major Trauma/Day of Week 2017-18

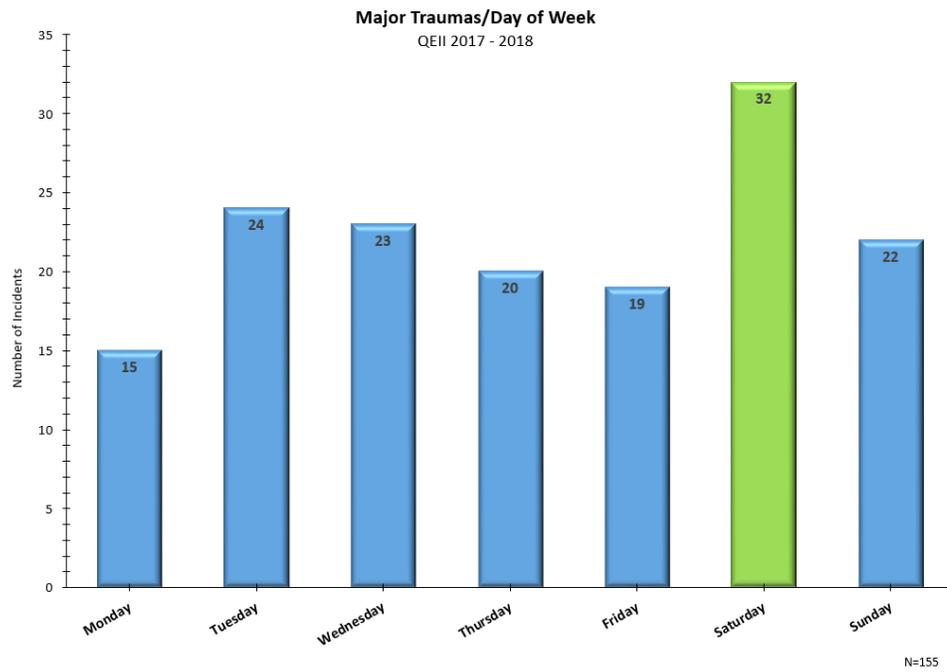


Figure 4

Major Trauma/Age Ranges and Gender 2017-18

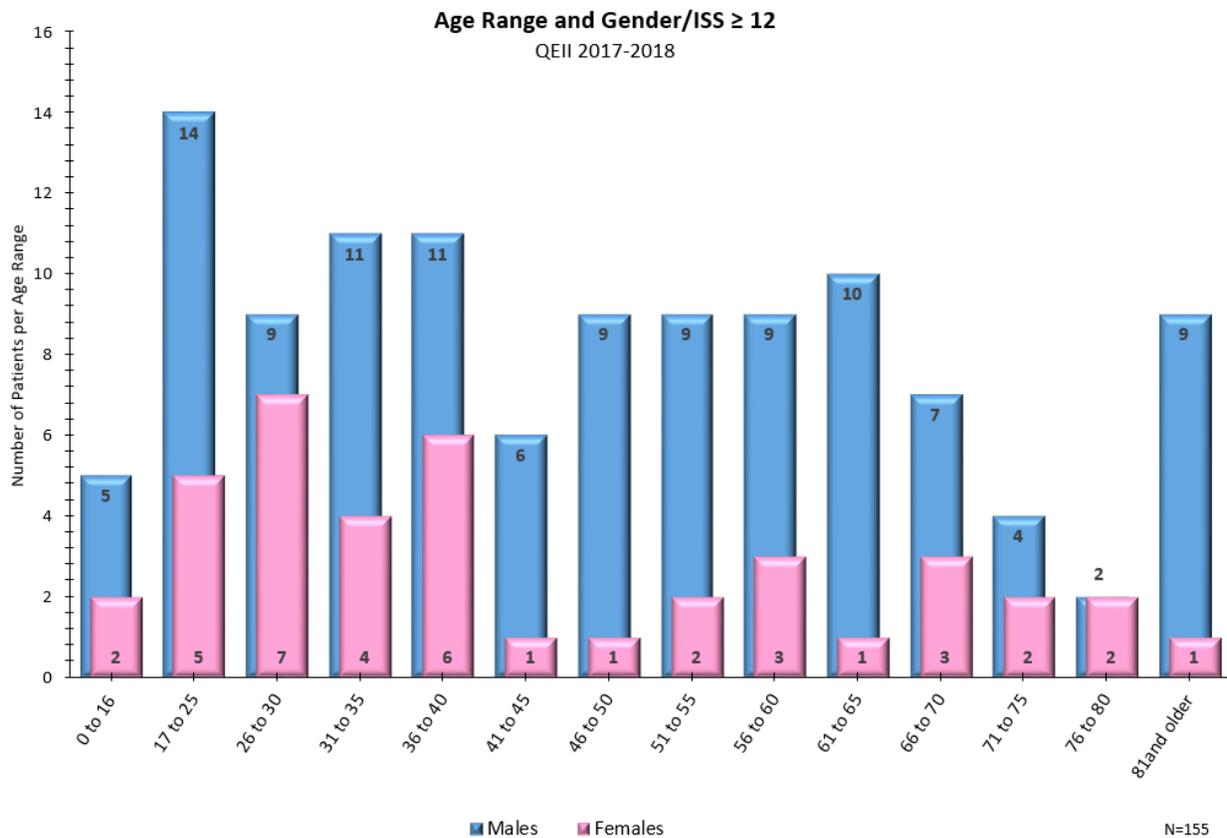


Figure 5

In keeping with injury data collected worldwide, males are more prone to injury throughout their lives.

Injuries (excluding complications of medical and surgical care) are the leading cause of death for Canadians between the ages of 1 and 44 and the fourth leading cause of death for Canadians of all ages.

<https://www.canada.ca/en/public-health/services/injury-prevention/facts-on-injury.html>

June 27, 2019

Major Trauma/Injury Types 2017-18

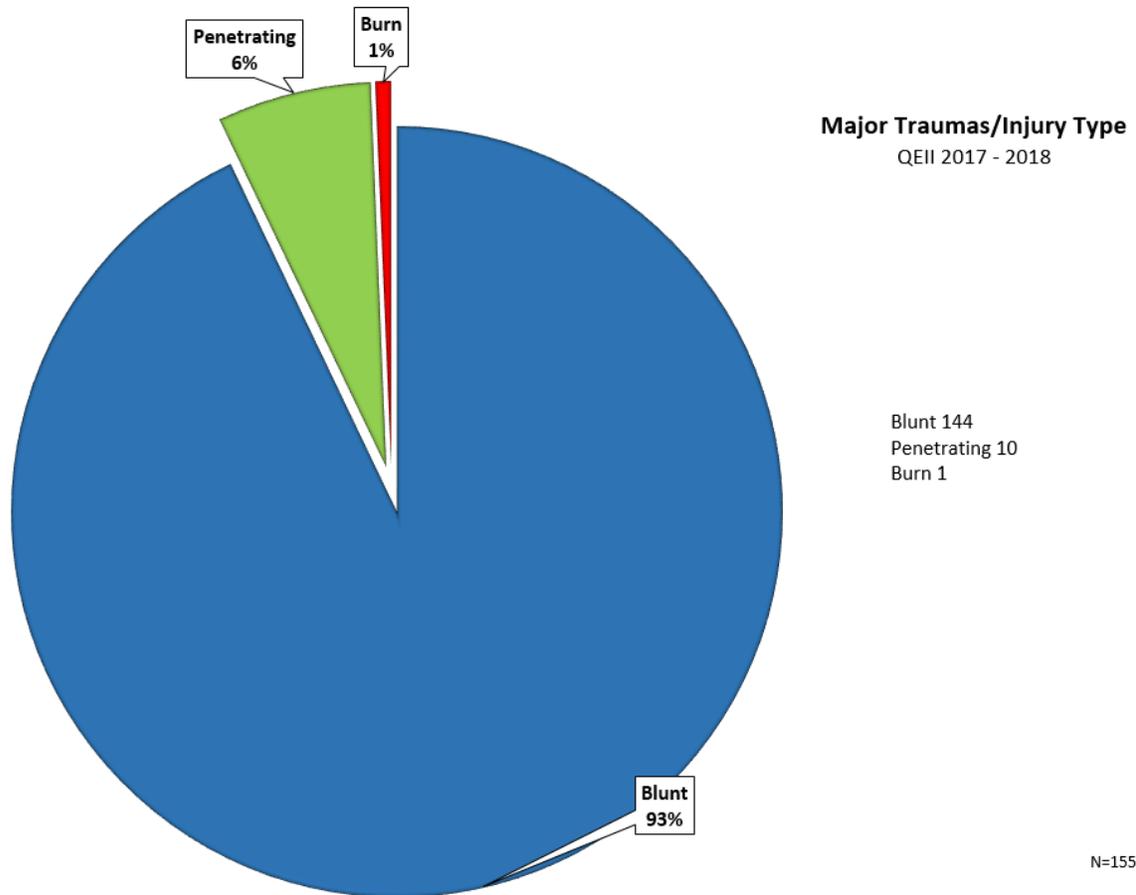


Figure 6

Blunt injury refers to the type of injury reflecting the cause of injury (i.e. a motor vehicle collision, a blow to the head). Blunt injury may include deep lacerations but does not include any injury in which a missile such as a knife or bullet enters the body; this would be a penetrating injury.

In Canada in 2016/17 (April 1, 2016 to March 31, 2017), unintentional injuries (excluding complications of medical and surgical care) were the 7th leading cause of hospitalization among all causes (excluding pregnancy, childbirth and the puerperium).

<https://www.canada.ca/en/public-health/services/injury-prevention/facts-on-injury.html>

June 27, 2019

Major Trauma/Mode of Arrival 2017-18

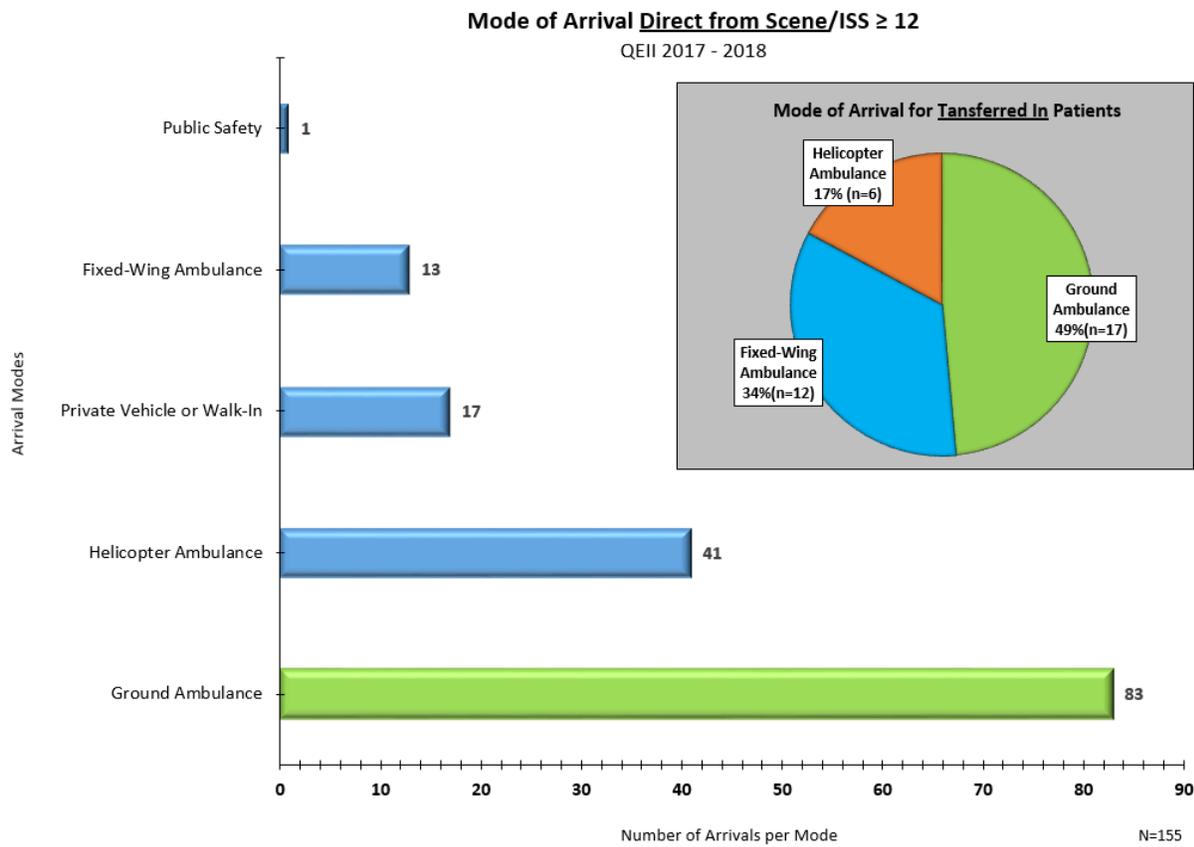


Figure 7

For patients arriving directly from the scene, most arrive by ground ambulance followed by STARS (helicopter ambulance). Those patients being transferred from another hospital are usually transferred by ground ambulance and fixed wing and often a combination of the two modes.



Major & Minor /ED Procedures 2017-18

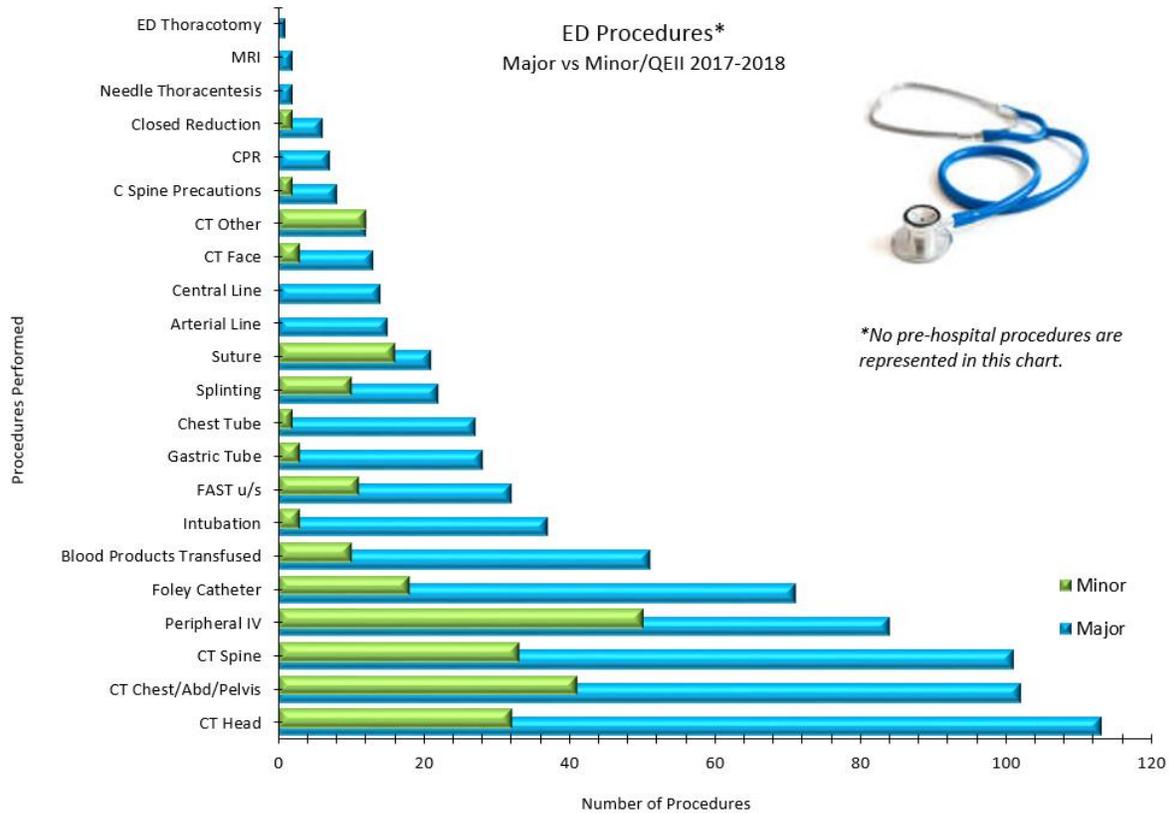


Figure 8

	CT Head	CT Chest/Abd/Pelvis	CT Spine	Peripheral IV	Foley Catheter	Blood Transfusions
Major	113	101	101	84	71	51
Minor	32	33	33	50	18	10

	Arterial Line	Central Line	CT Face	CT Other	C Spine Precautions	CT Chest
Major	15	14	13	12	8	8
Minor	0	0	3	12	2	2

	Intubation	FAST u/s	Gastric Tube	Chest Tube	Splinting	Suture
Major	37	32	28	27	22	21
Minor	3	11	3	2	10	16

	CPR	CT Abd/Pelvis	Closed Reduction	Needle Thoracentesis	MRI	ED Thoracotomy
Major	7	7	6	2	2	1
Minor	0	5	2	0	0	0

Table 1

Major Trauma/Mechanism of Injury 2017-18

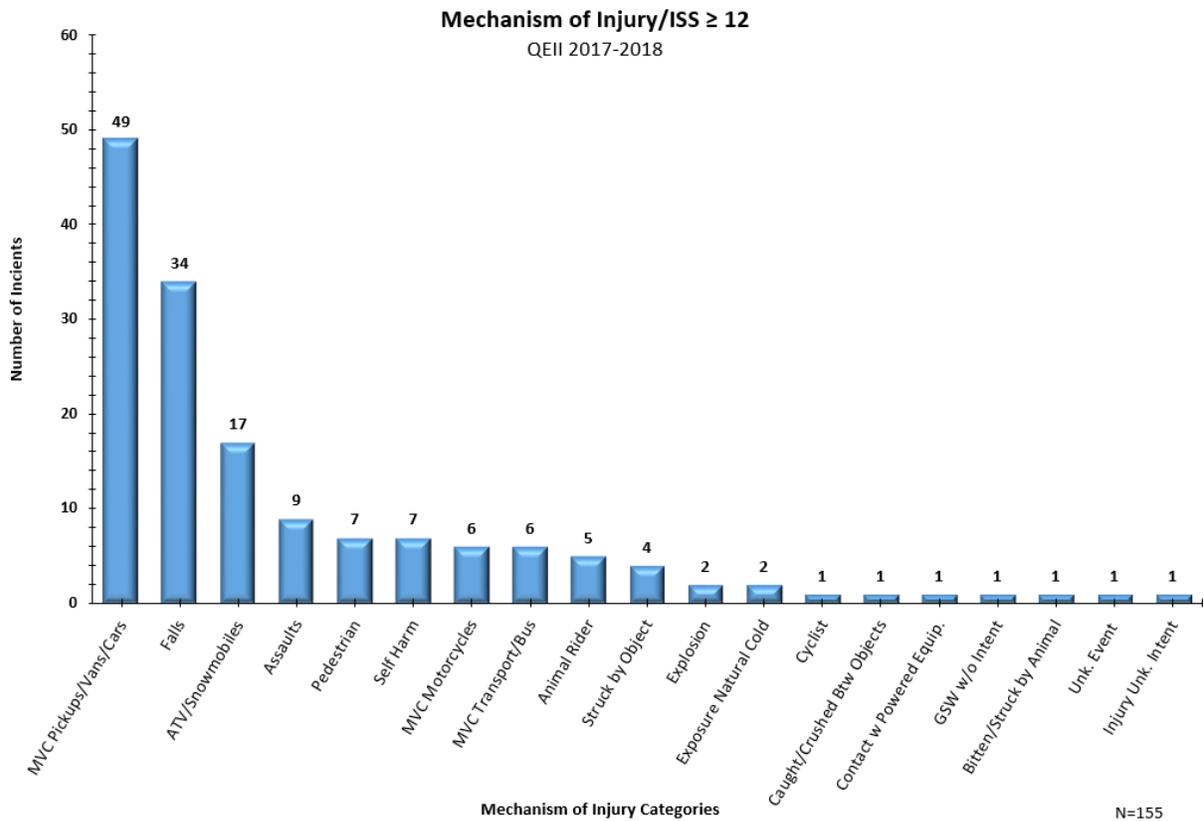


Figure 9

Traffic (on street or highway) motor vehicle collisions and falls are the two main mechanisms of injury in the QEII region. This is in keeping with Canadian data.

Injuries continue to be a public health concern in Canada. National injury death data are essential for understanding the magnitude and pattern of injuries. This paper used the Vital Statistics - Death database to examine deaths associated with injuries in 2015. Injuries were ranked against causes of death, and more in-depth analysis of injury categories was conducted by sex and age. Unintentional injuries were the 6th leading causes of death overall, with different ranking by sex. Among unintentional injury deaths, leading causes included falls, poisonings, motor vehicle traffic collisions, and suffocation, which varied by age group.

<https://www.canada.ca/en/public-health/services/reports-publications/health-promotion-chronic-disease-prevention-canada-research-policy-practice/vol-39-no-6-7-2019/2019-injury-deaths.html>

June 27, 2019

Major Trauma/Place of Injury 2017-18

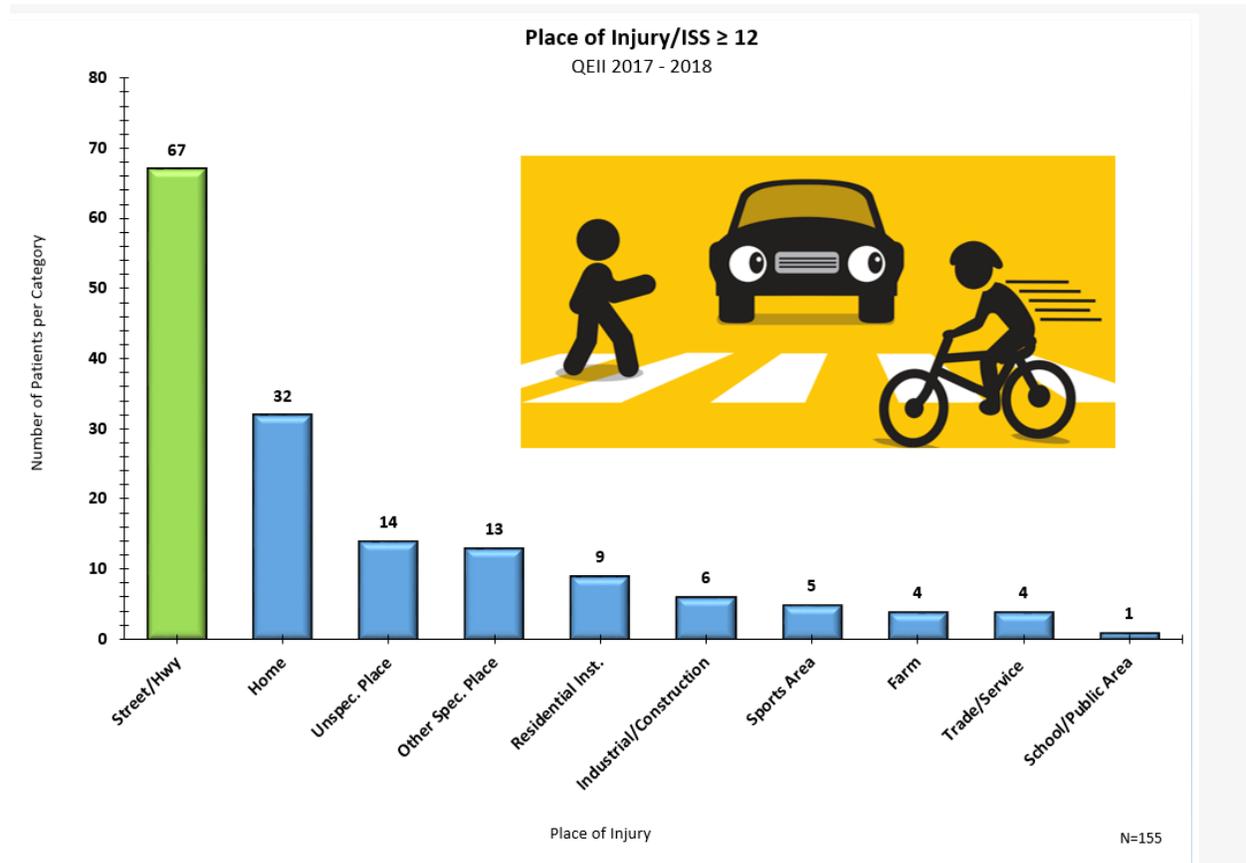


Figure 10

As demonstrated in the above chart, most major trauma injury incidents are occurring on our streets and highways followed by our homes.

In 2016, there were 10,322 serious injuries due to motor vehicle collisions in Canada, down 4% from 2015 (10,748).

In 2016, the number of fatalities per billion vehicle kilometers travelled was 5.1, unchanged from 2015.

<https://www.drivingtest.ca/canadian-motor-vehicle-traffic-collision-statistics/>

July 10, 2019

Major & Minor/Interpersonal Violence 2017-18

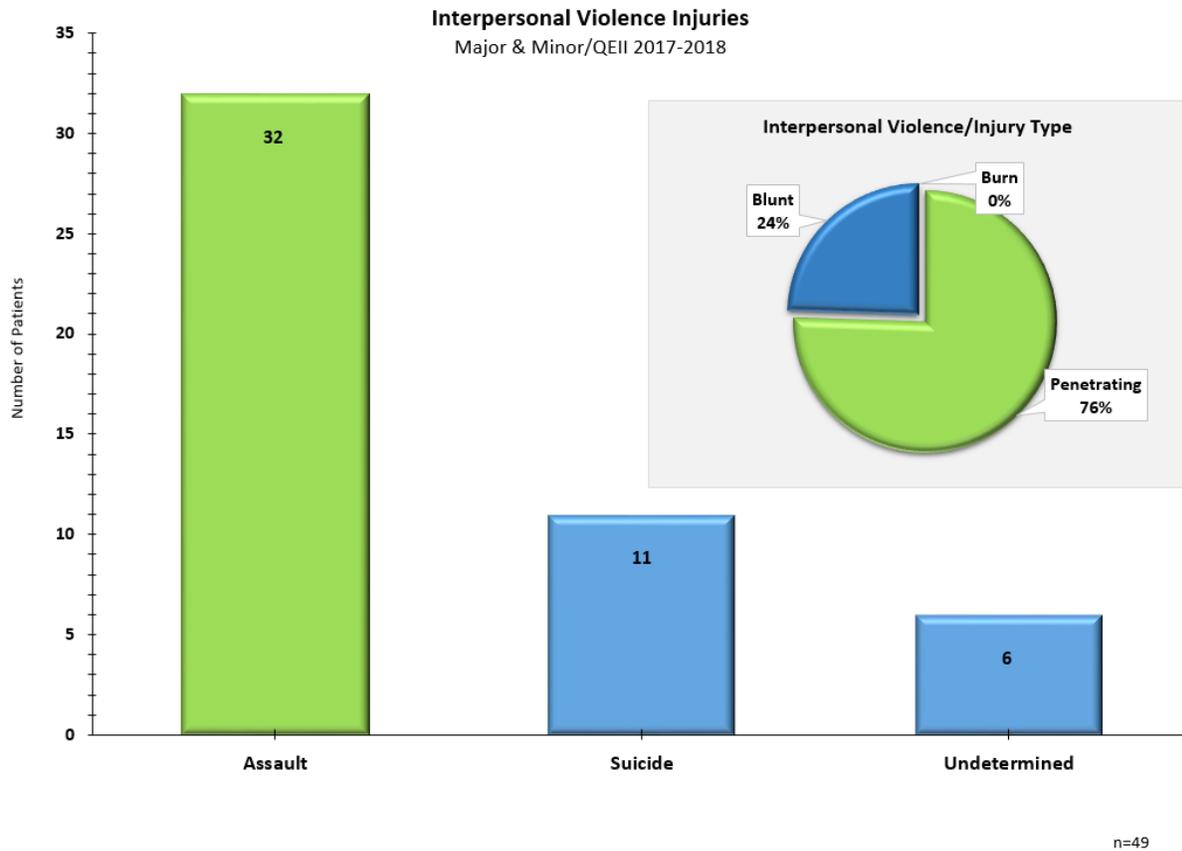


Figure 11

*Note: "undetermined" is suspected but not confirmed by patient.

Interpersonal violence accounts for 20% (n=49) of the trauma registry entries during the time period of this report. This number is twice that of the first year of data collection at the QEII in 2009.

Recent studies show that Alberta has the fifth highest rate of police reported intimate partner violence and the second highest rate of self reported spousal violence in Canada, and despite a 2.3 percent decline over the last decade, the province's rate of self-reported domestic violence has stubbornly remained among the highest in Canada; rates of violence against women alone are 2.3 percentage points higher than the national average. In fact, every hour of every day, a woman in Alberta will undergo some form of interpersonal violence from an ex-partner or ex-spouse.

<https://www.preventdomesticviolence.ca/sites/default/files/research-files/Economic%20Impact%20of%20Domestic%20Violence%20in%20Alberta.pdf>

July 12, 2019

Major & Minor/Penetrating Injury 2017-18

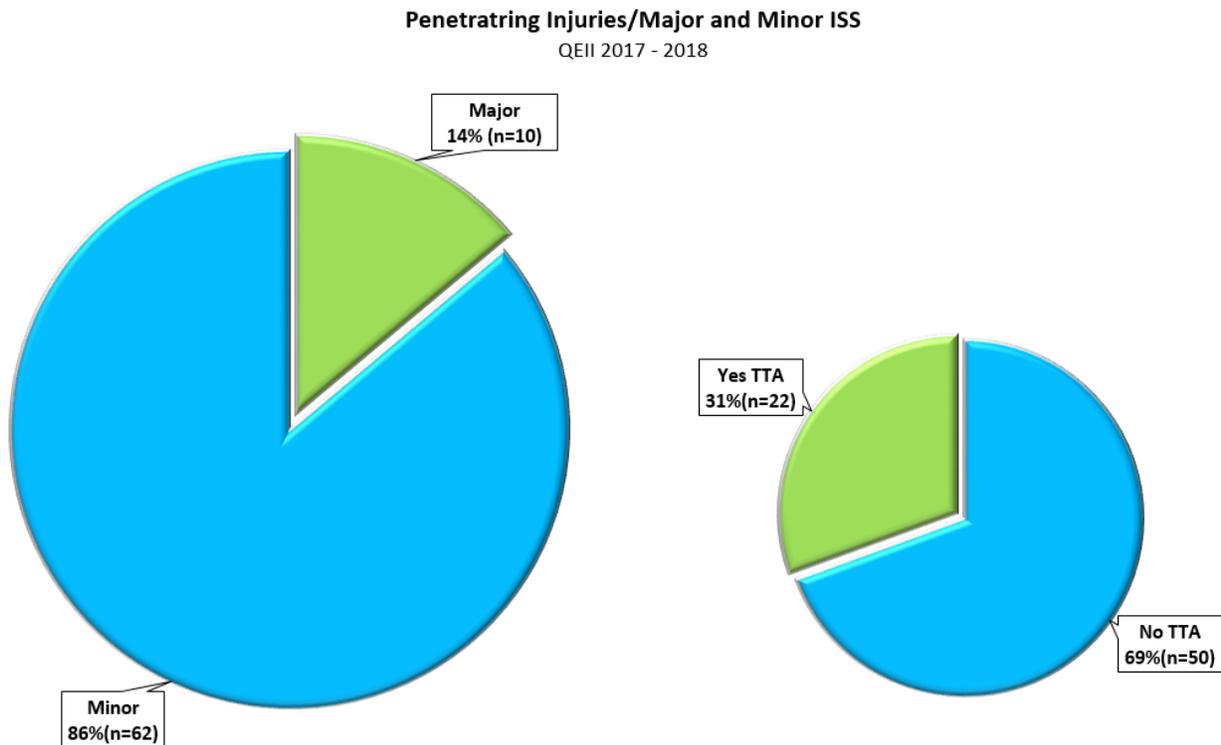


Figure 12

There are 72 penetrating injuries collected in the registry for the years 2017-2018. Penetrating injuries meeting the ATR's inclusion criteria are collected regardless of ISS, resulting in Major (ISS \geq 12) and Minor (ISS < 12) traumas. Of the 72 penetrating injuries, 31% (n=22) had a Trauma Team Activation (TTA).

Of these 72 patients with penetrating injuries:

- 40 were Not Tested for ETOH
- 16 tested Positive for ETOH
- 13 tested Negative for ETOH
- 3 were N/A (age \leq 9)
- 35 were unintentional injury
- 26 were the result of Assault
- 9 were the result of Suicide
- 2 were of unknown intent

Major & Minor/Penetrating Injury O.R. Visits 2017-18

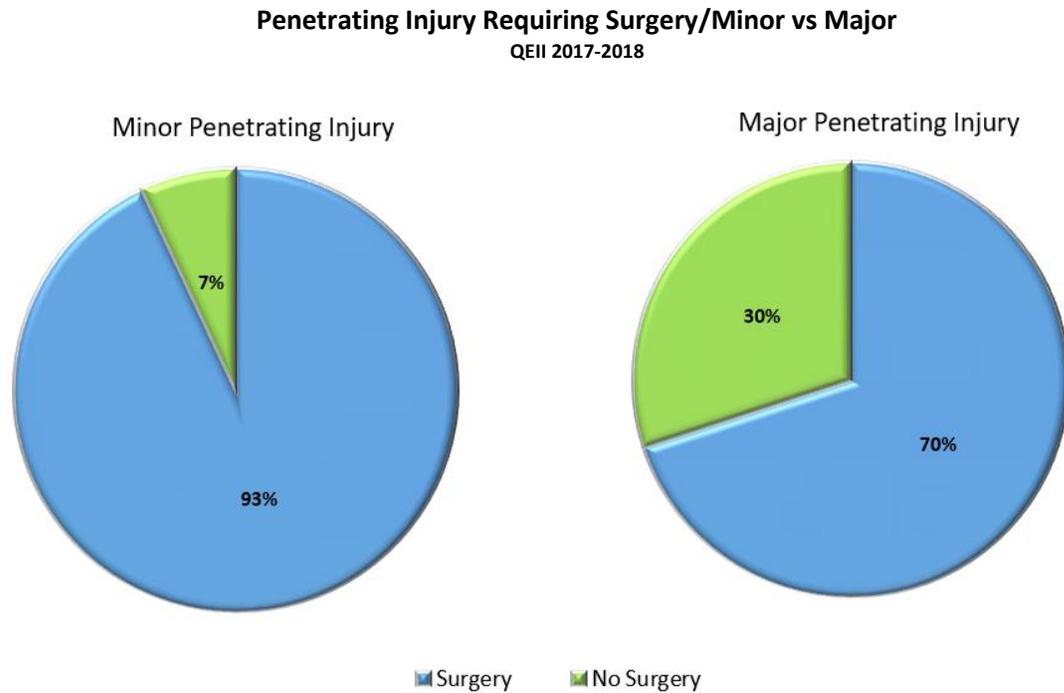


Figure 13

	Surgeries	No Surgery
Minor	67	5
Major	7	3

Table 2

Many minor penetrating trauma require one, or more, visits to the O.R. as part of their treatment. The charts above demonstrate the percentage of trauma requiring surgery (total number of surgeries), minor vs major. Given that the registry only collects data for minor trauma on penetrating and Trauma Team Activations, it is easily concluded that minor trauma results in a considerable financial burden to the facility and province.

Major & Minor/Work Related Injuries 2017-18

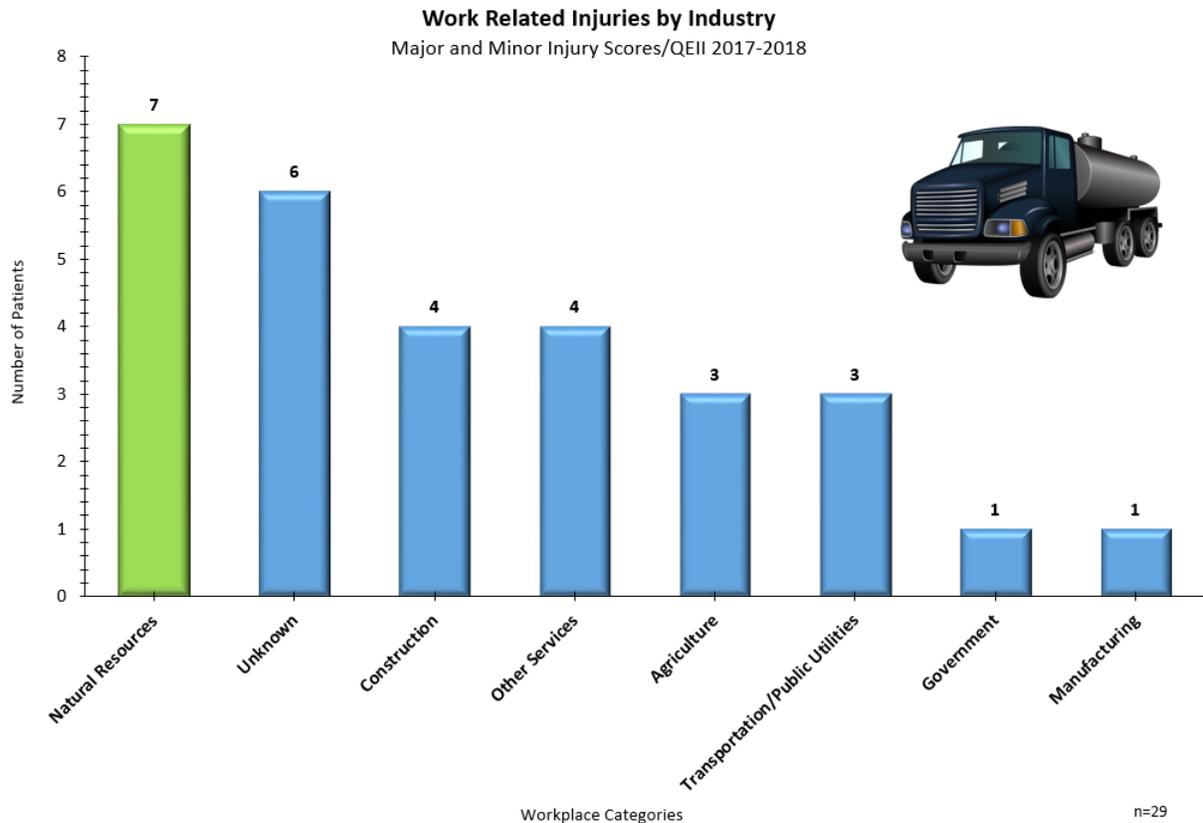


Figure 14

This chart represents reported work related injuries, regardless of ISS. Work related injury accounted for 12% of all trauma recorded in the registry with the Natural Resources (includes oil & gas workers and forestry) with the highest category. This is contrary to the 2017 Workplace Injury, Disease and Fatality Statistics Provincial Summary

In 2017, lost-time claim rates increased in all major industry sectors, except for Agriculture and Forestry.

Mining and Petroleum Development continued to have the lowest lost-time claim rate in 2017 at 0.36. Provincial and Municipal Government, Education and Health Services had the highest lost-time claim rate in 2017 at 2.24 per 100 person-years worked, closely followed by Agriculture and Forestry at 2.23 per 100 person-years worked.

The disabling injury rate declined in Agriculture and Forestry in 2017, while it increased in all other major industry sectors.

The Manufacturing, Processing and Packaging sector continued to have the highest disabling injury rate at 3.24 per 100 person-year worked and the Mining and Petroleum Development sector continued to have the lowest at 1.18 per 100 person-years worked.

<https://open.alberta.ca/dataset/c1c1b935-a5d5-456a-b86c-c9986fa5542d/resource/4572192b-df67-4aef-b85b-7eb21c417f65/download/2017-workplace-injury-disease-and-fatality-statistics.pdf>

June 28, 2019

Major Trauma/Safety Devices Used in Transport Related Injuries 2017-18

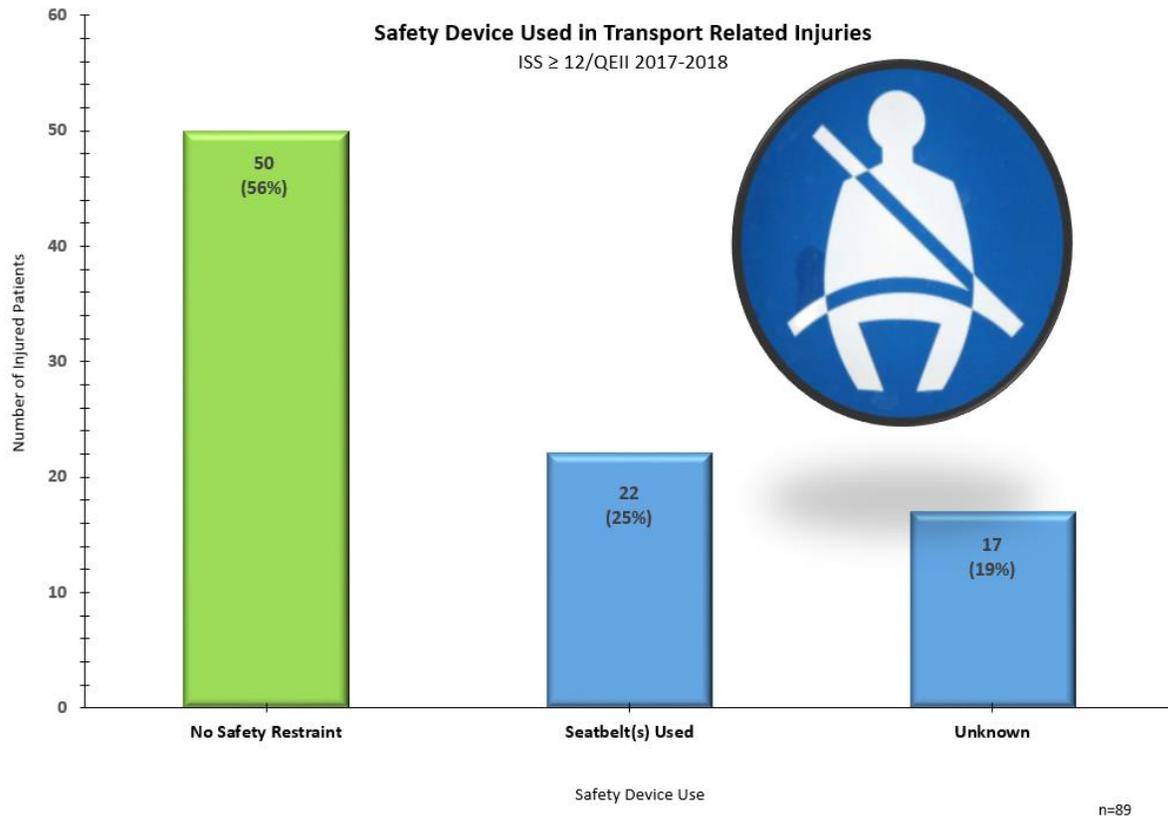


Figure 15

Throughout 2017 and 2018, there were 89 MVC patients treated at the QEII who were injured severely enough to have earned a major score (ISS ≥ 12). Over half of these trauma patients were not using safety devices (**seatbelts, helmets, personal protection equipment**).

Government of Alberta ■

Seat Belt Use in Light Duty Vehicles
2006 - 2011

	2006		2007		2009		2010		2011	
	Alberta	Canada	Alberta	Canada	Alberta	Canada	Alberta	Canada	Alberta	Canada
Rural & Urban Combined										
% All Occupants	90.9 ³	90.8 ¹	88.9 ⁴	92.5 ⁴	92.9 ⁵	—	92.0 ⁷	95.3 ⁷	95.1 ⁸	—
% Front Occupants	91.0 ³	91.0 ¹	—	—	93.0 ⁵	—	—	95.5 ⁷	95.2 ⁸	—
Rural										
% All Occupants	86.4	88.3	—	—	90.4	92.0	—	—	91.9	—
% Front Occupants	86.3	88.6	—	—	90.5	91.9	—	—	92.0	—
Urban										
% All Occupants	91.7 ²	—	89.3	93.1	93.3 ⁶	—	92.3	95.8	95.6	—
% Front Occupants	91.8 ²	—	—	—	93.4 ⁶	—	—	96.0	95.7	—

The combined Alberta urban and rural seat belt wearing rate in 2011 was 95.1%, up from 92.0% in 2010. The urban seat belt wearing rate increased from 92.3% in 2010 to 95.6% in 2011. In 2011, rural areas saw an increase to 91.9%, up from 90.4% in the previous rural survey of 2009.

<http://albertaseatbelts.ca/wp-content/uploads/2013/08/AlbertaSeatBeltUse2006-2011.pdf>

Major Trauma/Safety Device Use ETOH Pos. vs Neg. 2017-18

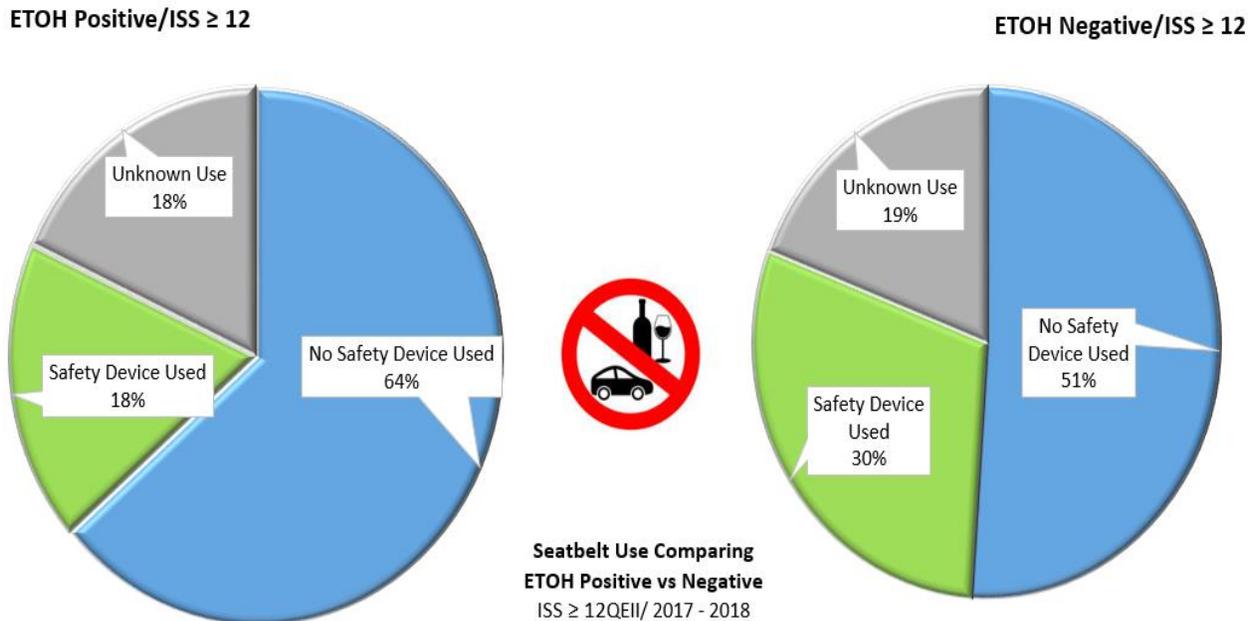


Figure 16

Of patients having experienced a MVC resulting in major trauma, 69 were tested for alcohol levels. Within the ETOH Positive group (n=22), 18% (n=14) used seatbelts. Within the ETOH negative group (n=47), 30% (n=14) used seatbelts.

A 2015 study looking at the influence of the association of drug & alcohol use and speeding and the use of seatbelts in Norway:

- The study involved car and van drivers killed in road traffic crashes.
- Alcohol or drugs were found in blood samples from about 40% of the drivers.
- Among impaired drivers, 64.6% had been unbelted and 71.7% speeding.
- Alcohol and amphetamines were significantly associated with no seatbelt and speeding.

<https://www.sciencedirect.com/science/article/abs/pii/S0001457515000457>

June 28, 2019

Major & Minor/ETOH Screening 2017-18

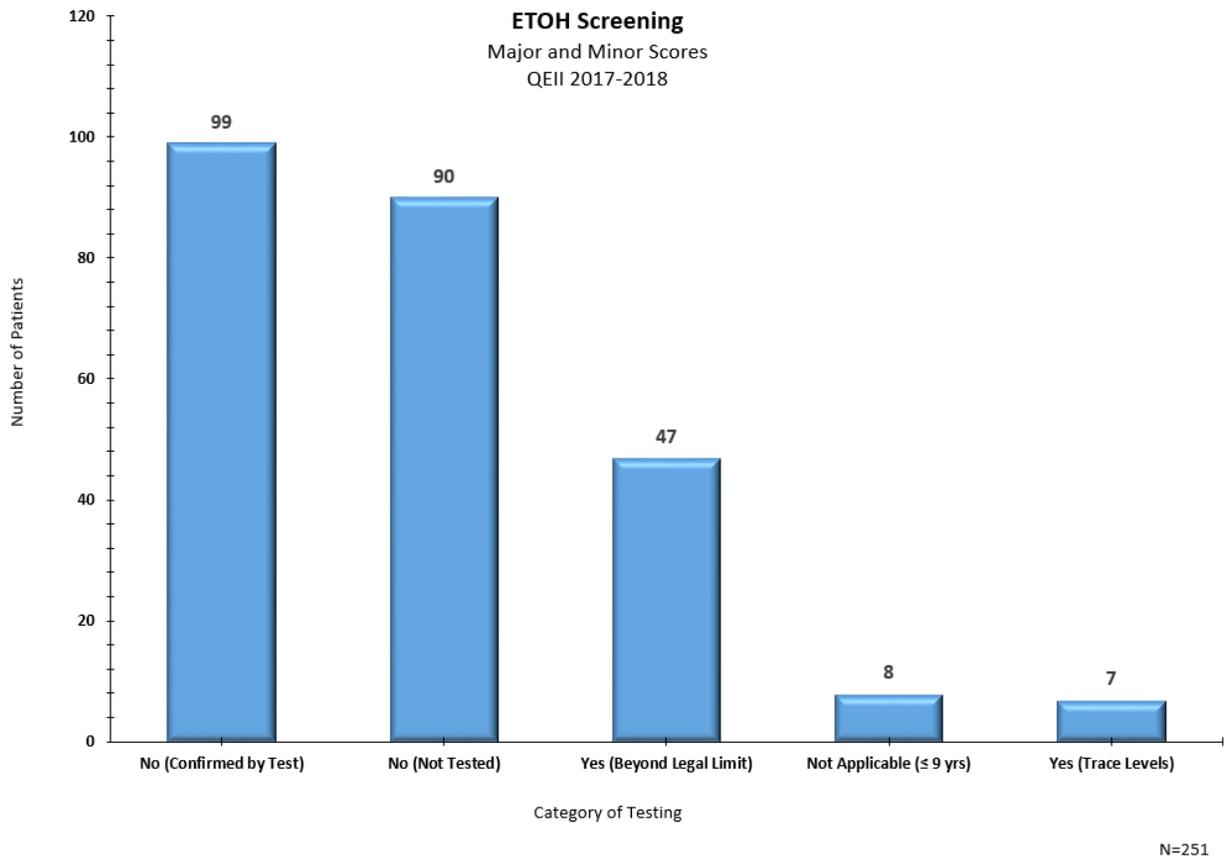


Figure 17

During the 2017 through 2018 calendar years, 39% (n=99) tested to be clear of alcohol, 36% (n=90) were not tested, 19% (n=47) tested beyond legal limit, 3% (n=8) were children 9 years and younger who are not tested and 3% (n=7) tested within legal limits.

- In 2016, 10,497 people died in alcohol-impaired driving crashes, accounting for 28% of all traffic-related deaths in the United States.¹
- Of the 1,233 traffic deaths among children ages 0 to 14 years in 2016, 214 (17%) involved an alcohol-impaired driver.¹
- In 2016, more than 1 million drivers were arrested for driving under the influence of alcohol or narcotics.³ That's one percent of the 111 million self-reported episodes of alcohol-impaired driving among U.S. adults each year.

https://www.cdc.gov/motorvehiclesafety/impaired_driving/impaired-driv_factsheet.html

July 9, 2019

Major Trauma/ETOH Screening 2017-18

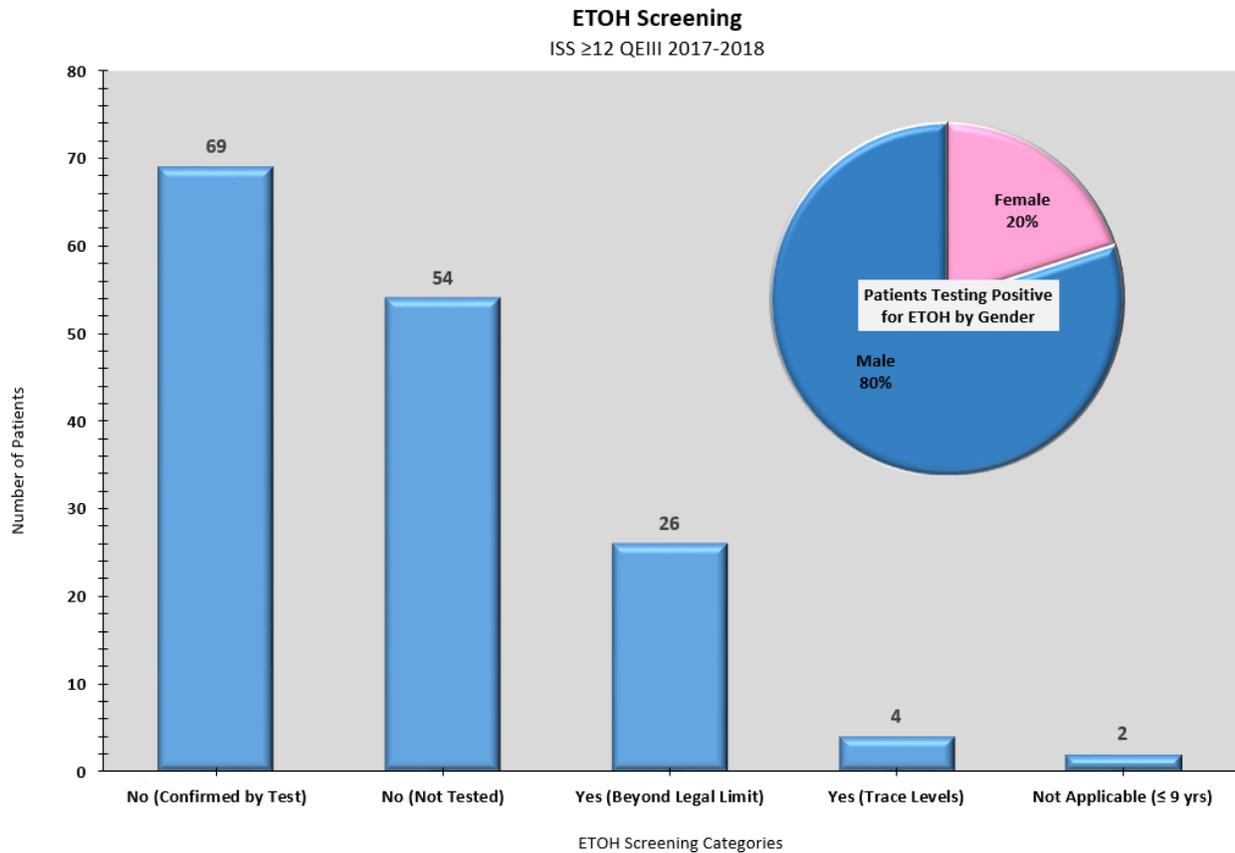


Figure 18

N=155

Looking alcohol usage in major traumas;

- 45% (n=69) tested negative for alcohol
- 35% (n=54) were not tested
- 18% (n=26) tested beyond legal limits
- 3% (n=4) tested for trace levels
- 1% (n=2) were not applicable due to age.

Although the majority of Canadians who drink alcohol do so in moderation, alcohol misuse affects too many Canadians. In fact, it is estimated that 4 to 5 million Canadians engage in high risk drinking, which is linked to motor vehicle accidents, Fetal Alcohol Spectrum Disorder and other health issues, family problems, crime and violence.

<https://www.canada.ca/en/health-canada/services/health-concerns/alcohol-health-concerns.html>

July 10, 2019

Mortality 2017-18

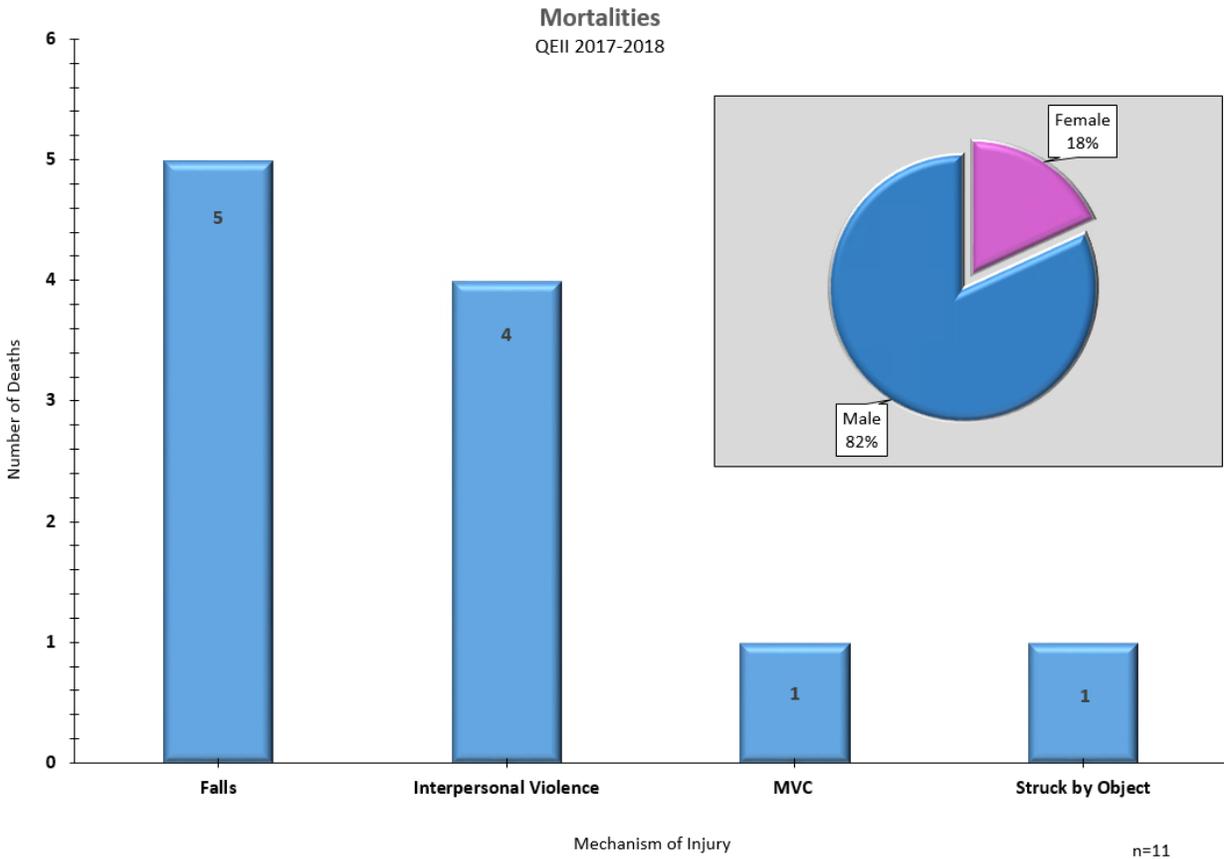


Figure 19

In the time period being assessed, Falls have the highest number of fatal outcomes followed by Interpersonal Violence (includes intentional self-harm). Falls are the number one cause of injury in Alberta and Canada according to 2013-2014 CIHI data, and reported as the number one cause of mortality in seniors by the C.D.C. Given this, the average age of 62 for injury resulting in the death of patients treated at the QEII is in keeping.

In 2009/2010, 256,011 older Canadians reported experiencing a fall-related injury. In comparison to those without a fall-related injury, they were more likely to be female (63.6% compared with 54.3%) and less likely to be aged 74 or younger (47.5% compared with 57.7%). There were also statistically significant differences found by marital status. Among those with a fall-related injury, 55.9% were married, compared with 63.6% without a fall-related injury.

<https://www.canada.ca/en/public-health/services/health-promotion/aging-seniors/publications/publications-general-public/seniors-falls-canada-second-report.html#s2-1>

July 12, 2019

Major & Minor/Trauma Team Activations 2017-18

Having a trauma team, comprised of specialized clinicians working together to care for trauma patients, has been shown to improve their care and outcome. The QEII Trauma Program developed a list of criteria to identify those patients who would benefit from a Trauma Team Activation. Since 2012 we have been tracking those cases in our registry in order to evaluate and provide in-site into whether the most seriously injured trauma patients are receiving the standard of care.

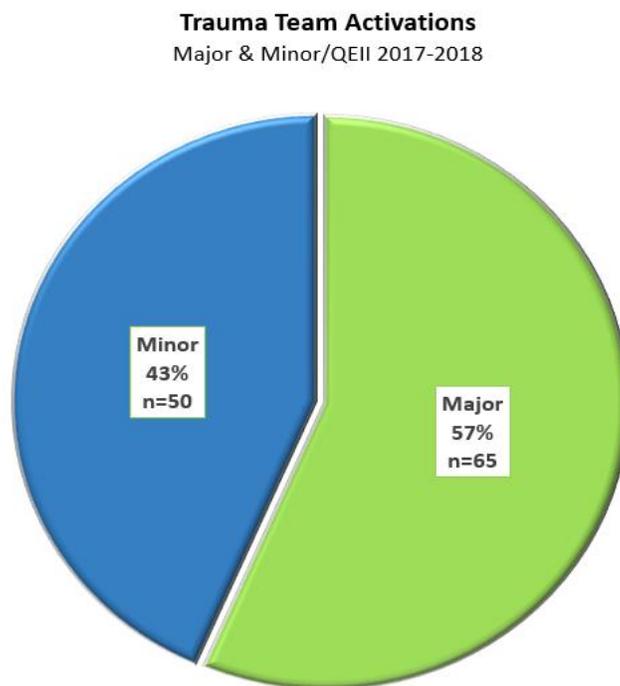


Figure 20

As stated, all Trauma Team Activations (TTA) are collected by the registry regardless of Injury Severity Score (ISS). Therefore, TTA's will be considered by grouping major scores ($ISS \geq 12$) and minor scores ($ISS < 12$) together. This results in a sample population of 115 to consider.

TTA Yes vs No/ED Length of Stay

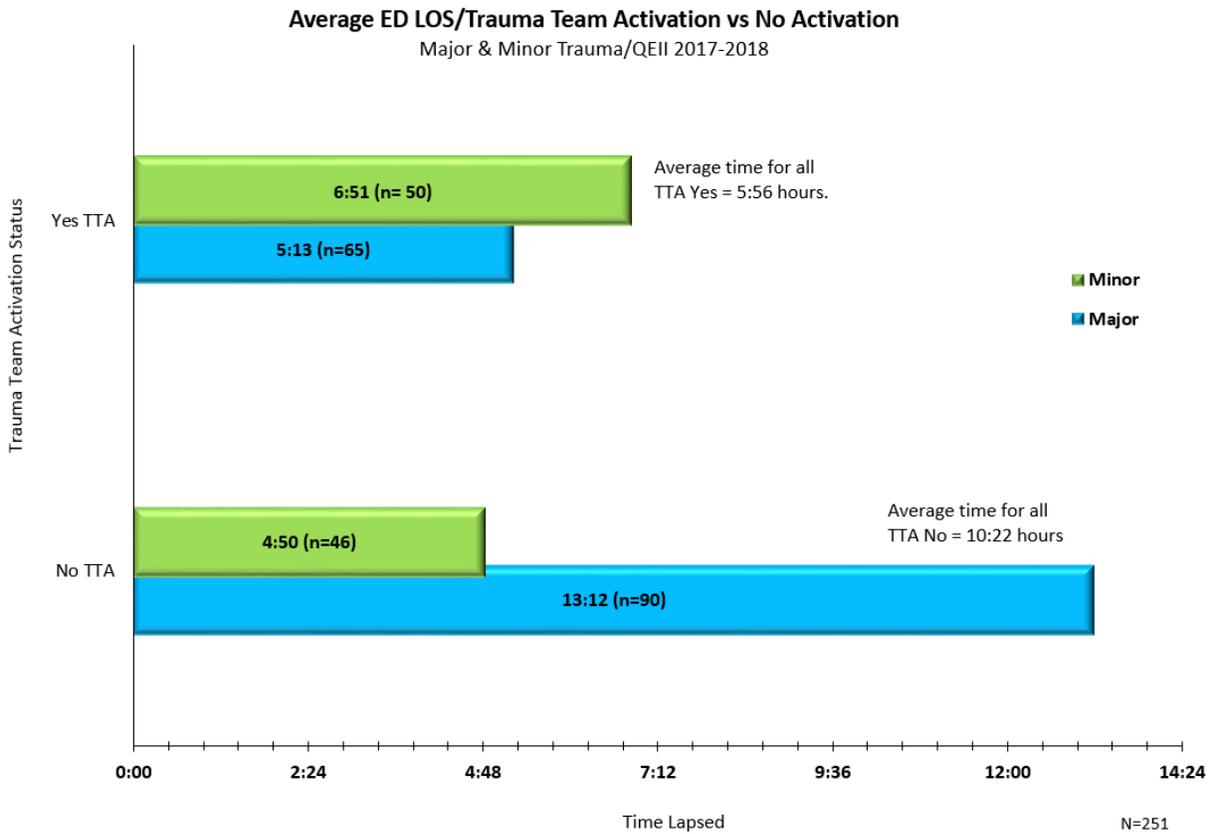


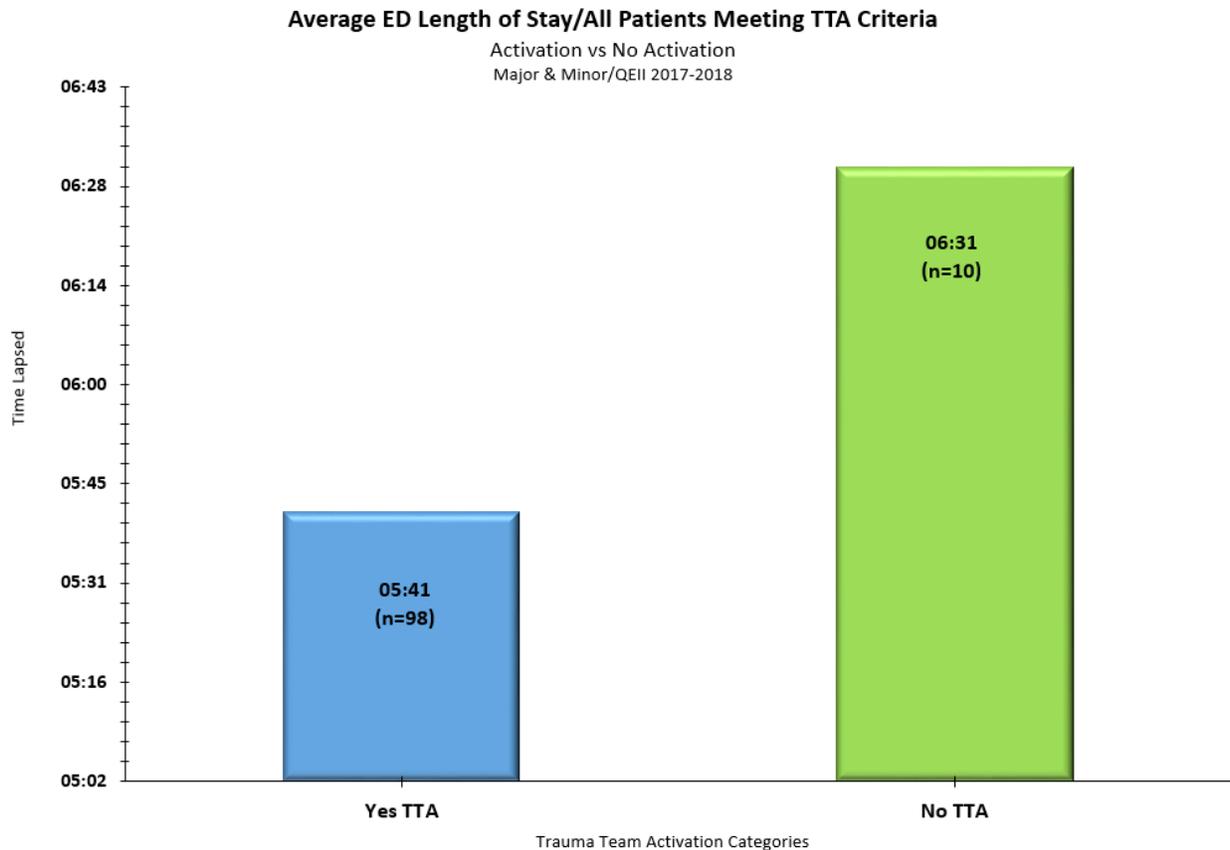
Figure 21

Studies have shown that having a TTA has a fundamental impact on the positive outcome of the trauma patient. Assessing the efficacy of a TTA requires having some tangible, trackable evidence. With this in mind, measuring the Emergency Department (ED) length of stay and comparing patients receiving a TTA (Yes TTA) to those who did not (No TTA). The chart above demonstrates that there is a notable difference ($p=0.001$) between the ED length of stay for Yes TTA vs No TTA.



ED Length of Stay/Patients Meeting TTA Criteria 2017-18

The previous chart displayed the ED length of stay comparing patients receiving a TTA to those who did not. In other words, it looked at all patients in the registry comparing “Yes TTA” with “No TTA”. The next chart compares all patients meeting TTA criteria (n=110) to determine if there is a significant difference in ED length of stay between “Yes TTA” and “No TTA”.



n=108

Figure 22

A patient who meets criteria for a Trauma Team Activation will have a multi-system injury, a GCS < 9, obvious pelvic practice, multiple patients with significant injury, paralysis, penetrating injury of neck or torso, significant burns covering >20% of the total body surface area, unstable vitals or any combination of the list. When looking at patients who **meet the criteria** for TTA, the difference in ED time is not as pronounced. In fact, there is no significant difference (p=0.3). This indicates that the sickest of the patients being treated applicably.

TTA Yes vs No/Average Time to First CT 2017-18

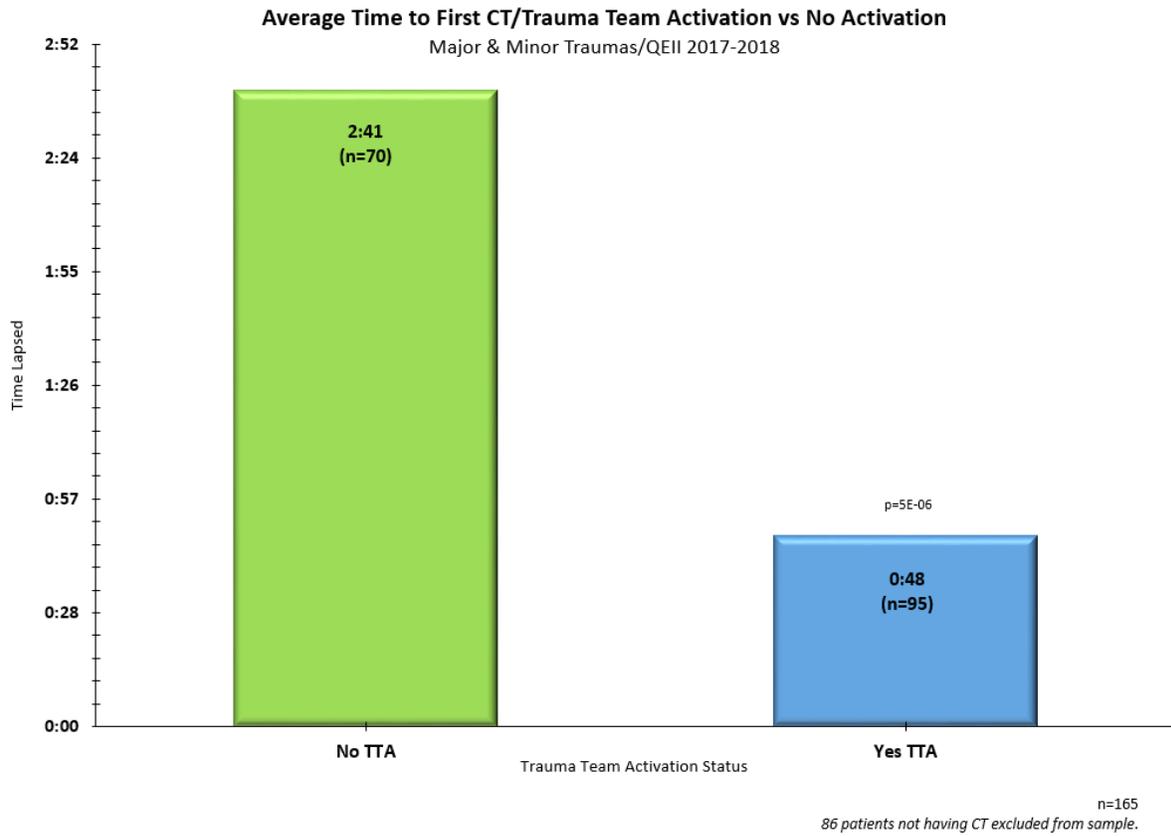
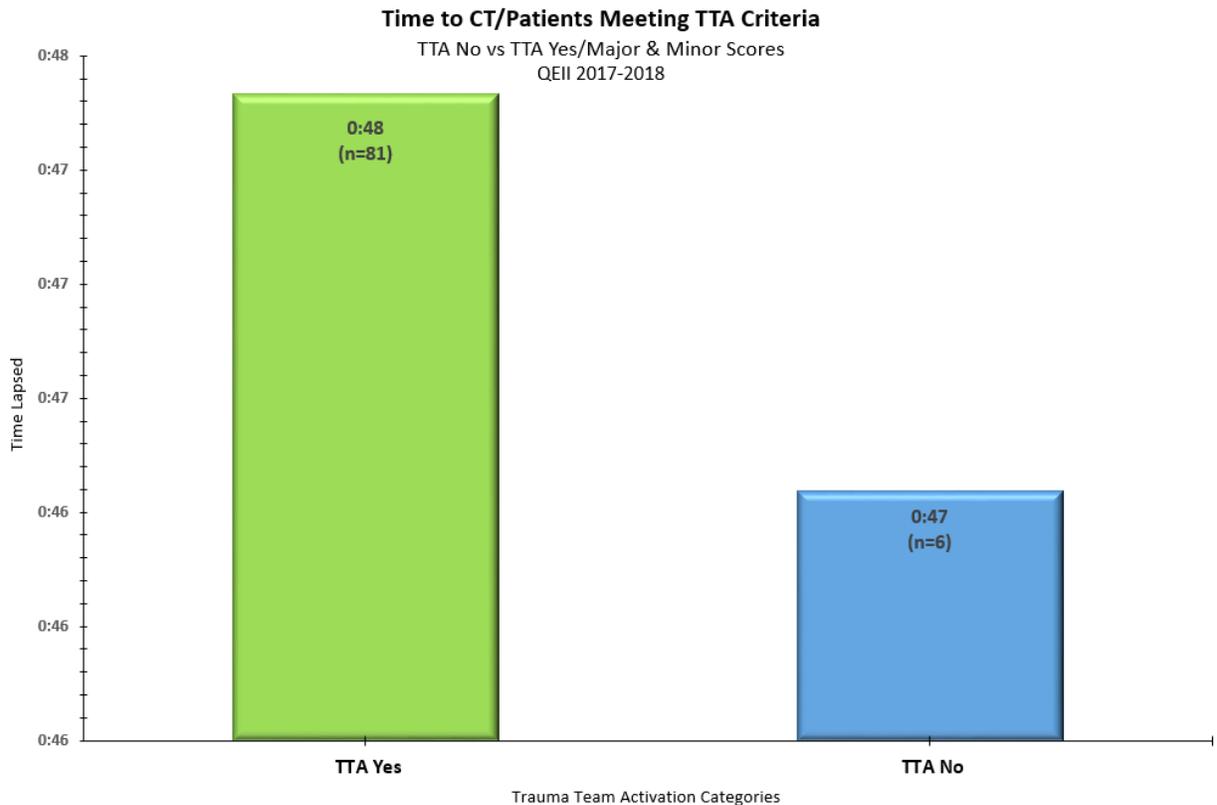


Figure 23

Analyzing the time from ED arrival to first CT is another measurable variable that can help to assess the effectiveness of a TTA on patient care. Figure 23 compares time to CT on all registry patients, “Yes TTA” versus “No TTA”. In this case there is a significant difference in time waiting.



Time to First CT/Patients Meeting TTA Criteria 2017-18

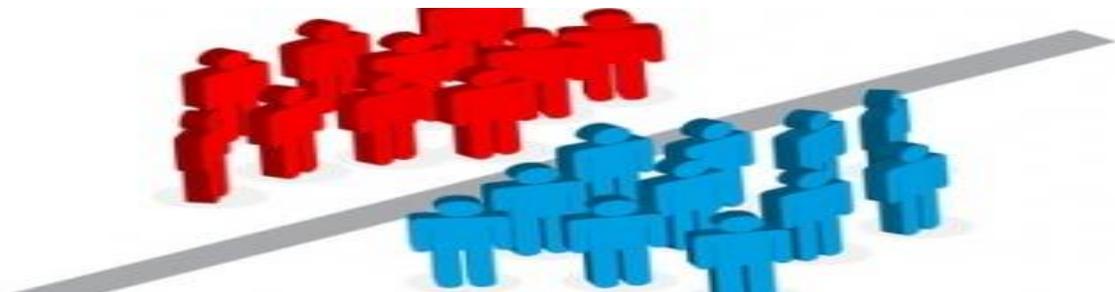


n=87

Figure 24

When looking at patients who **meet the criteria** for Trauma Team Activation, the difference in the time from ED arrival to first CT is not pronounced. As with the ED length of stay, there is no significant difference ($p=0.46$). Again, this appears to indicate that the sickest of patients being treated in a timely manner.

Time to first surgical procedure would be another measurable, however, the data pool for those people meeting criteria and not having an activation is too small for analysis for the time period of this report.



Majors/Average ED Length of Stay by Age 2017-18

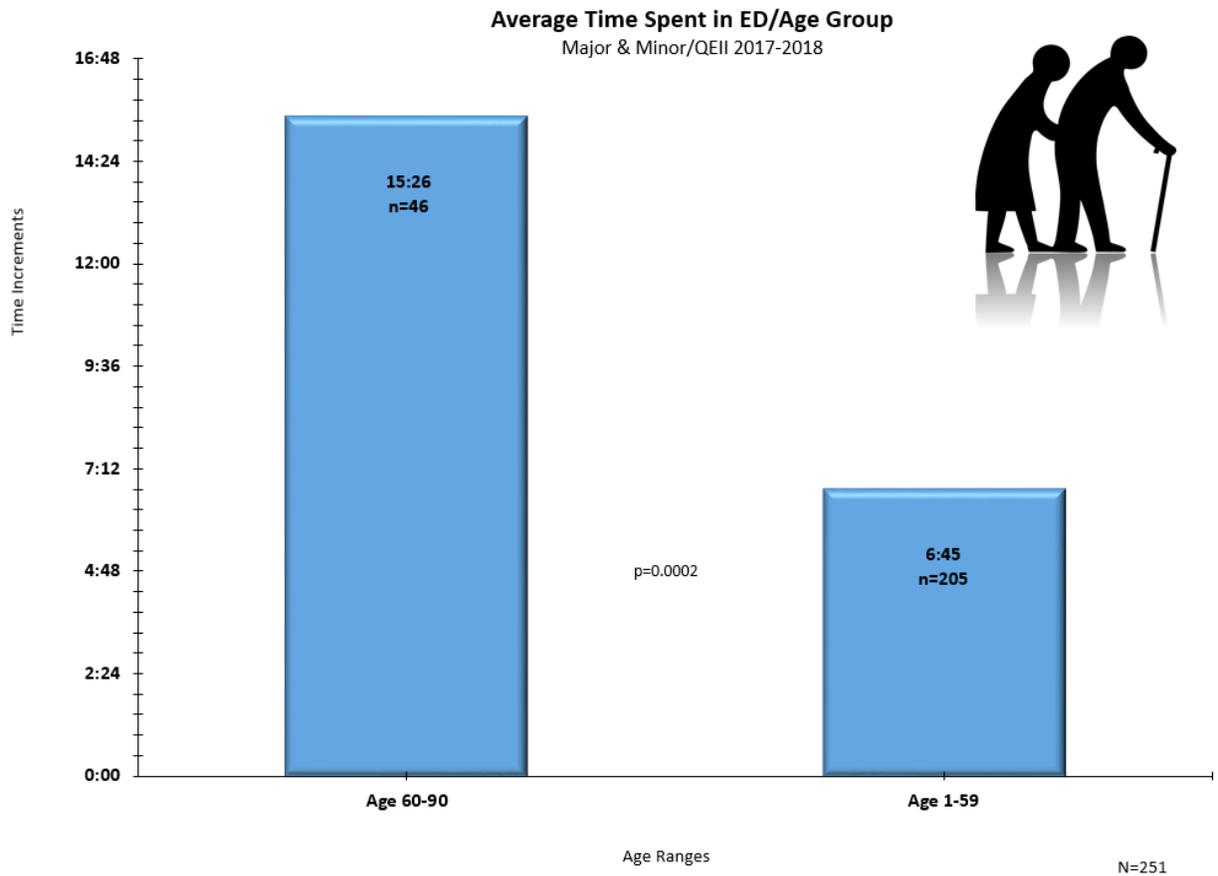


Figure 25

Recognizing that there can be a bias based on age, major traumas were separated by two age groups to identify an “elderly” group. Looking at the average time spent in the ED by each of these groups identified a significant difference ($p= 0.0002$). When looking at the data in previous years, it was noted that older patients with head injuries spent more time in the ED.

Older adults have distinct patterns of ED service use. ED resource use intensity (diagnostic testing, consultation, length of stay, and hospital admission) appears to increase with age. Prolonged ED lengths of stay are more likely to be experienced by patients over 85 years of age, potentially exposing this vulnerable group to an increased risk of adverse events in the ED. Patterns of use were described and may be used in resource planning, or to target future interventions involving improved or alternative care options.

<https://cjonline.ca/index.php/cj/article/view/108/214>

July 11, 2019

Majors with Head Injury/Average ED Length of Stay by Age

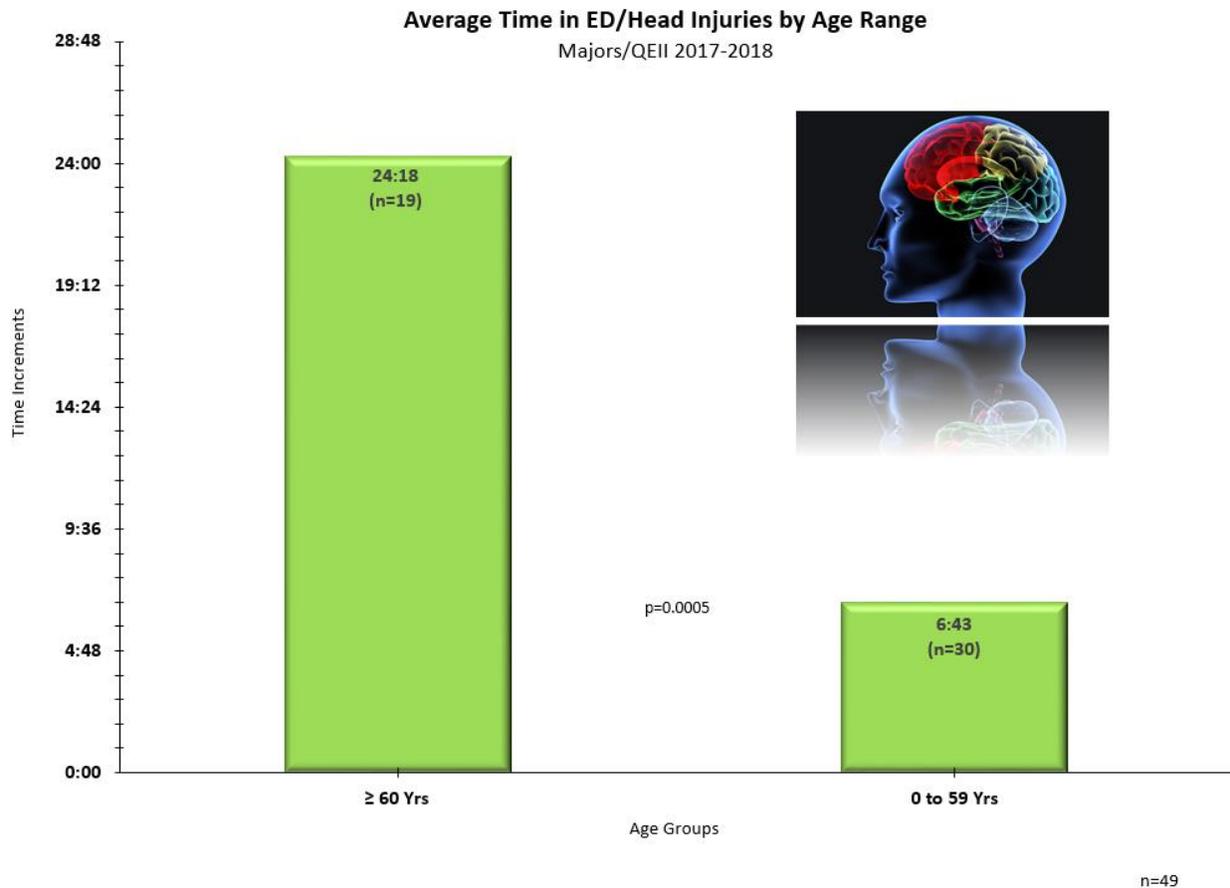


Figure 26

Comparing patients with like injuries (intracranial injuries), age being the variable factor, resulted in the older group again spending more time on average in the emergency department. So, the question remains, what is it about elderly patients that predispose them to longer ED times?

The emergency department (ED) length of stay for people admitted to hospital in 2016–2017 was up 11% from the year before and almost 17% from 5 years ago, according to CIHI data, which is based on more than 11.2 million ED visits across the country last year. 90% of ED visits for those admitted were completed within 32.6 hours, which means 1 in 10 people waited longer.

<https://www.cihi.ca/en/emergency-department-wait-times-in-canada-continuing-to-rise>

July 11, 2019

Majors/Comparing Like Injury with Like Age Group 2017-18

≥ 60 Years of Age

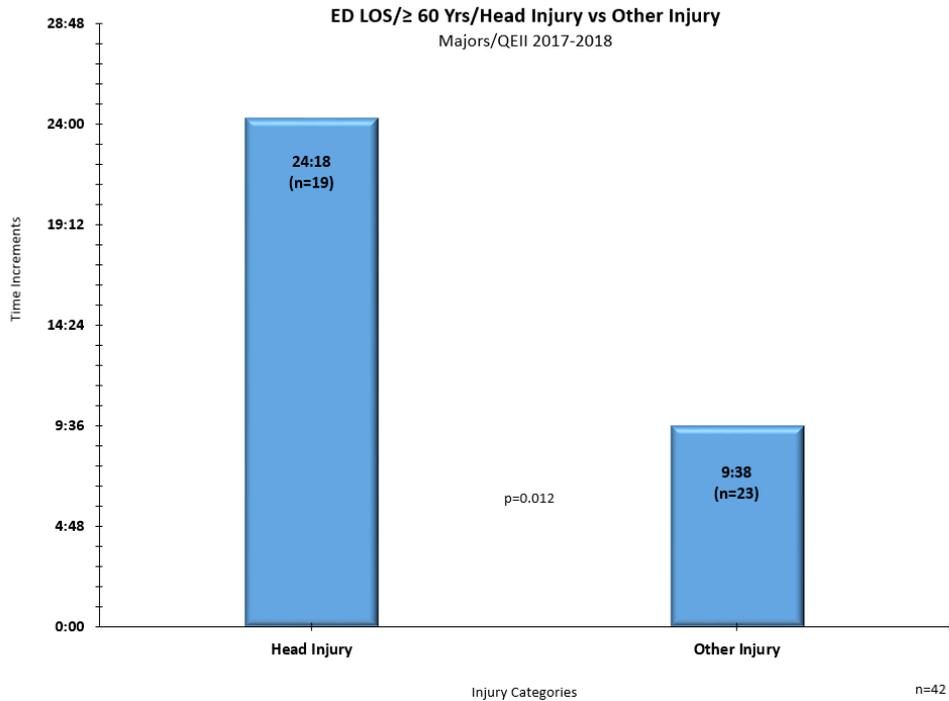


Figure 27

< 60 Years of Age

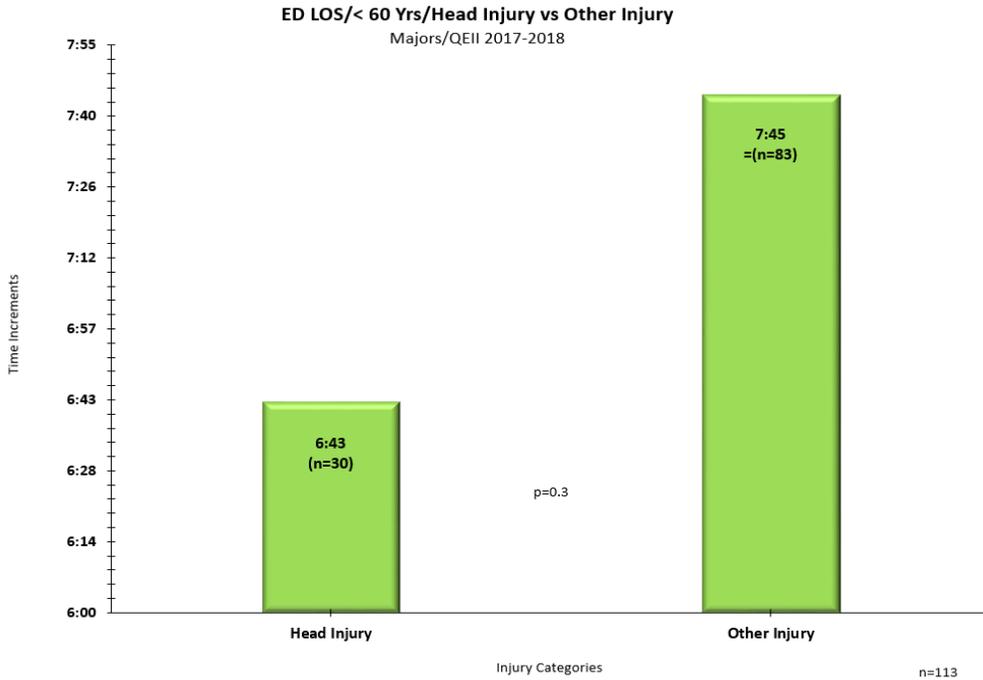


Figure 28

Comparing the older group of patients, those with head injury against those with other types of injury, the "Head Injury" group spends a considerable more amount of time in the ED awaiting transfer to an inpatient bed than do those in the "Other Injury" group. It has been surmised that the reason for this was, specifically in elderly patients, the tendency to wait for a medical bed for these isolated head injuries given the expectation for prolonged admission. As the younger group of patients shows, that there is no significant difference of time spent in ED for head injuries.

Definitions

Abbreviated Injury Scale or Abbreviated Injury Score (AIS): A numerical scale ranging from 1 (minor injury) to 6 (virtually un-survivable injury). Scores are subjective assessments of the severity of injury, assigned to specific anatomical diagnosis by trauma experts.

Blunt Injury Type: Refers to the type of injury reflecting the cause of injury (i.e. a motor vehicle collision, a blow to the head). Blunt injury may include deep lacerations but does not include any injury in which a missile such as a knife or bullet enters the body.

Collector: Specialized software from Digital Innovation, Inc. used by all participating trauma registries to collect pre-hospital demographics, nature and cause of injury, and follow up information on severely injured patients.

Crude Injury Rate: A rate giving the total number of events occurring in an entire population over a period of time, without reference to any of the individuals or subgroups within the population.

External Cause of Injury Codes (E-codes): Based on the International Classification of Diseases (ICD-9th revision). These codes allow for the classification and analysis of environmental events, circumstances, and conditions as to the cause of injury. All reports are based on the first recorded E-code, unless otherwise specified.

ICD (International Classification of Diseases): The International Classification of Diseases is a World Health Organization (WHO) publication that classifies morbidity and mortality information for statistical purposes, and for the indexing of hospital records by disease and operations, for data storage and retrieval. ICD manuals may be found in hospital Health Record Departments or in public libraries.

In-Hospital Death: An admitted patient who dies during their hospital stay following admission. This includes those patients who are dead on arrival (DOA) or who die in the Emergency Department (DIE).

Injury Severity Scale or Injury Severity Score (ISS): The Injury Severity Score is an internationally recognized scoring system developed to assign a level of severity to an injury. As an extension of the Abbreviated Injury Scale (AIS) it is the sum of squares of the highest AIS score in each of the three most severely injured body regions. The ISS is scored 1 (minor) to 75 (major) with a higher score indicating increased severity and mortality.

Length of Stay (LOS): Total number of hospital days as calculated from the date of admission through to the date of discharge or death inclusive.

Major Trauma Patient: A person admitted to a trauma centre for treatment of an injury with an ISS ≥ 12 .

Median: A measure of central tendency of a set of observations; it is the 50th percentile (the point above and below which 50% of the data fall).

Motor Vehicle: Any mechanical or electronically powered device, not operated on rails, which any person or property may be transported or drawn, operating on a public roadway or highway.

Motor Vehicle Non-Traffic Incident: Any motor vehicle incident that occurs entirely in any place other than public highway or roadway.

Motor Vehicle Traffic Incident: Any motor vehicle incident that occurs entirely on a public highway or roadway.

Other Road Vehicle Incident: Any incident involving a transportation device, other than a motor vehicle, which can transport a person or property on a public roadway or highway (example: animal-drawn vehicles; animals carrying a person; pedal cycles, etc.)

Pedal Cycle Incident: An incident that involves a pedal cycle, but not a motor vehicle.

Penetrating Injury Type: Refers to an injury caused by a missile entering the body. Missiles include bullets, knives, and items such as pieces of sharp glass or metal.

STARS: Shock Trauma Air Rescue Service

T Test: A statistical hypothesis test in which the test statistic follows a Student's *t*-distribution under the null hypothesis. It can be used to determine if two sets of data are significantly different from each other.

Trauma: Injury resulting from the transfer of energy further defined in accordance to the Canadian National Trauma Registry parameters as blunt or penetrating injuries and burns included in the International Classification of Diseases (ICD 9-CM), external cause of injury codes (E-codes) 800-998.

Note: Poisonings, certain types of immersion, thermal, and exposure injuries are not included in this report as they fall outside the National Trauma Registry parameters for trauma.

Transport Incident: Any incident (E800-E848) involving a device designed primarily for, or being used at the time primarily for, conveying persons or goods from one place to another. In classifying incidents which involve more than one kind of transport, the following order of precedence of transport incidents should be used: aircraft and spacecraft, watercraft, motor vehicle, railway, other road vehicles.

Trauma Centre: Institution that is equipped and committed to providing specialized care to trauma patients. The QEII Regional Hospital is the Trauma Centre referred to in this report.

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