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Alberta Health Services

Our Vision
Healthy Albertans. Healthy Communities. Together.

Our Mission
To provide a patient-focused, quality health system that is accessible and sustainable for all Albertans.

Our Values
Alberta Health Services' core values – compassion, accountability, respect, excellence and safety – guide our actions and behaviours to achieve excellent patient- and family-centred healthcare for all Albertans.

Trauma Services Vision
Excellence in trauma services

Trauma Services Mission
To continuously evaluate and improve the delivery of trauma services and to actively support collaborative injury reduction strategies.
Message from the Trauma Director

A year and a half has flashed by since I took over as Trauma Director. As I firmly plant my feet in this position, I must recognize the team effort that goes into Trauma Services with the goal of improving patient outcomes and care of the injured patient.

In that light, I want to acknowledge Christine Vis, Dawn McKeivitt, Carla Atkinson, our data analysts and all of the health care professionals working on Unit 44. A special thanks to Crystal Wilson who has moved on and a welcome to our new NP, Carolyn Gratton. I also want to acknowledge our trauma team leaders and especially welcome our newest addition, Dr. Paul McBeth. He is a recent graduate of the University of Calgary and finished fellowships in ICU (Vancouver) and Trauma (Memphis).

Trauma Services has continued to be busy with further increases in our volumes over our previous years. This is not reflected in our trauma registry data as explained in detail by Ms. Vis below. As evidence of our commitment to patient care, we have submitted our first set of trauma registry data to the American College of Surgeons Trauma Quality Improvement Program (TQIP). We await the feedback from the American College and will be able to use this data to see our areas of strengths but also where we can improve patient care.

We continue with our dedication to teaching of our physician colleagues with ATLS and ATOM, and teaching our nurses with the Trauma Nursing Core Course (TNCC). We also ran a Rural Trauma Team Development Course in Oyen, AB.

In reviewing my colleague’s contributions, there is too much to list. They continue their dedication to research with a multitude of peer reviewed articles, as well as sitting on local, national, and international committees. They continue to be invited speakers at international conferences and have received numerous awards. A special thanks to Dr. John Kortbeek. He recently finished his term as Department Head, Department of Surgery, University of Calgary and I would like to say thank you for his continued support of Trauma Services during his extremely busy tenure as department head.

Our challenges are many but our biggest one is a province wide accreditation. We are working with the Alberta Trauma Services Core Leadership Team and look forward to meeting the standards of the upcoming (Fall 2017) provincial wide trauma distinction accreditation as set out by Accreditation Canada.

I invite you to read this annual report to understand the depth of our work in improving trauma care in southern Alberta.

Sincerely,

Rohan Lall MD FRCSC FACS
Executive Summary 2015 Annual Report

The Trauma Services Program in Calgary has been in place since 1992 and was accredited as a trauma system by the Trauma Association of Canada (TAC) in October 2010. Southern Alberta Trauma System (SATS) was one of the first trauma systems to be accredited in Canada. The Regional Trauma Services Program is dedicated to supporting and evaluating the provision of optimal trauma care to individuals and families affected by traumatic injury across Southern Alberta, South-Eastern British Columbia and South-Western Saskatchewan. Services provided by the program include the provision, ongoing development and advancement of clinical care, education, and research pertaining to pre hospital care to discharge into the community. Our team continues to collaborate with our partners and stakeholders within the trauma system on a provincial and southern Alberta level to address identified needs and issues, and to ensure an efficient, effective and integrated system of care.

The end of the fiscal 2013-14 fiscal year, the Canadian Institute for Health Information (CIHI) enacted a decision to cease support for a National Trauma Registry (NTR) of which Alberta participated. As a result, the Alberta Trauma Services Core Leadership Team (ATS CLT) [previously known as the Provincial Trauma Committee (PTC)] requested that the Alberta Trauma Registry (ATR) begin participating in the NTDB and TQIP. The aim was to promote accurate benchmarking and quality improvement initiatives in an effort to improve the delivery of trauma services within Alberta. With sponsorship and support from the Surgical Strategic Clinical Network (SSCN) of Alberta Health Services (AHS), this project was initiated. The first priority was the upgrade of the ATR to a web based registry to prepare for the inclusion into TQIP. As the tertiary trauma center for the Calgary Zone and Southern Alberta, the Foothills Medical Centre was well positioned due to already being active participants in the NTDB since 2012. 2014 saw the engagement of a number of departments and stakeholders to begin the process of this registry upgrade which was completed and implemented in the spring of 2015. A mandated change in the Abbreviated Scoring System (AIS) was also scheduled to occur during this implementation (please see below). This year (2015) also signifies the first submissions to TQIP for the FMC.

Of Particular Interest:

Effective January 1, 2015, the Association for the Advancement of Automotive Medicine (AAAM), the parent body of the AIS, mandated a change from AIS90 to AIS05. The AAAM originated in 1971 with its original purpose being to fill a need for a standardized system for classifying the types and severity of injuries resulting from vehicular crashes. This injury coding update significantly impacted how specific injuries are scored for the calculation of the Injury Severity Score (ISS) and thus influenced who qualified for inclusion into the Calgary Zone Trauma Registry and the Alberta Trauma Registry. For example, with AIS90, any patient with a subdural hematoma (SDH) regardless of size automatically qualified for the Trauma Registry. With AIS05, only patients with a SDH greater than 0.6cm in size qualify for inclusion. This impact has significantly reduced in the number of major trauma patients (ISS>12) included in our Trauma Registry. These decreases in major trauma numbers have been demonstrated provincially, nationally and within North America as a whole.

All told, 2015 saw a decrease in the number of trauma patients seen and admitted who qualified for the registry in the Calgary Zone at the Foothills Medical Centre and the other health facilities within Calgary (the Peter Lougheed Centre, the Rockyview General Hospital and the South Health Campus). This noted decrease was attributable to the change in number who qualified for inclusion in the registry because of the AIS05 coding.
Due to the changes with coding language for all patients in the zone, the implementation of a new registry and workload issues with abstracting and submitting to the NTDB and TQIP for the qualifying patients at the FMC, a decision to cease fully abstracting admitted patients with penetrating injuries at the PLC, RGH, and SHC was made by the Trauma Services leadership team. These numbers are still tracked and included in those sites’ report for information purposes but the entire admission is not entered into the trauma registry.

Some highlights of our 2015 year include:

- The total number of admitted major trauma patients included in the trauma registry was 1132. As noted in the above section, this is the direct impact felt by the AIS coding update from AIS90 to AIS05. To qualify for the registry, a patient must have an Injury Severity Score (ISS) \( \geq 12 \) or have a penetrating mechanism (FMC only) and be admitted to the trauma centre or die in the emergency department of the trauma centre.
- Only the Peter Lougheed Hospital (PLC) saw an increase of their qualifying trauma admits in spite of the coding change (59 patients up from 51 patients- an approximate 15% increase in included patients). The South Health Campus (SHC) and the Rockyview Hospital (RGH) saw the anticipated decrease along with the FMC.
- Males continue to outnumber females in the admitted major trauma population by a ratio of approximately 3:1 for FMC.
- 34% of admitted trauma patients were between the ages of 15-34 at FMC. Also of note, 26% of all FMC’s major trauma admits were over the age of 65.
- Transportation was the primary mechanism of injury at the FMC primarily attributable to the AIS coding changes. At the other three Calgary adult facilities, falls were the primary mechanism of injury.
- 68% of admitted patients included in the registry had an ISS between 12 and 25 at the FMC.
- 11 % of patients who qualified for the registry died at the FMC. Of those, 36% died in the first 24 hours of their hospital admission.
- Blunt trauma continues to be the primary type of traumatic injury at all 4 Calgary facilities.
- At the FMC, the admitted trauma patient who has an ICU admission has a median length of stay of 7 days.
- The trauma patients admitted to FMC were in the operating room for a total of 1929 hours during a total of 651 visits.
- Unit 44, the inpatient trauma unit, had 1457 admissions (includes transfers in and admits) and 1459 discharges (includes discharges, transfers out and deaths). That is an average of 4 admissions and 4 discharges every day!
- As a referral centre for trauma in Southern Alberta, FMC received 145 patients from Calgary intercity hospitals and 99 from our district partners in Medicine Hat, Red Deer and Lethbridge. The other rural sites within Southern Alberta sent 114 patients to the FMC.
- 64 % of admitted trauma patients were discharged directly home from the FMC which remains consistent. These numbers are even higher at the other acute care sites.

Christine Vis BSN, RN
Manager Trauma Services and PCU 44
Foothills Medical Centre, Alberta Health Services
Acknowledgements:

Ms. Shawna Syverson, Senior Operating Officer, Foothills Medical Centre
Dr. Peter Jamieson, Medical Director, Foothills Medical Centre
Dr. Rohan Lall, Medical Director, Trauma Services
Dr. John Kortbeek, Chief of Surgery, Calgary Zone
Dr. Andrew Kirkpatrick, Past Medical Director, Trauma Services
Ms. Holly Mackin, Executive Director, Surgical Services, Trauma Services & Southern Alberta Organ and Tissue Donation Program
Ms. Denise Brind, Past Executive Director, Surgery, Women's Health, Trauma Services & Southern Alberta Organ and Tissue Donation Program
Ms. Holly Mackin, Executive Director, Surgical Services, Trauma Services & Southern Alberta Organ and Tissue Donation Program
Ms. Carla L Atkinson, Unit Manager, Trauma Services and Unit 44
Ms. Dawn McKevitt, Trauma Coordinator, Trauma Services
Mr. Kevin Pugh, Past Trauma Coordinator, Trauma Services
Ms. Crystal Wilson, Trauma Nurse Practitioner, Trauma Services
Ms. Sukhi Lally, Analyst, Trauma Services
Ms. Alma Rados, Analyst, Trauma Services
Ms. Desiree Young, Analyst, Trauma Services
Ms. Clara Chan, Analyst, Trauma Services
Ms. Mary Ann Parentila, Analyst, Trauma Services
Ms. Rose Wright, Administrative Assistant, Trauma Services
Dr. Jimmy Xiao, Trauma Services Research Coordinator

**Please note that these are individuals who were in the role during the 2015 year.**
How Do We Collect Our Data?

What is the Trauma Registry?

As part of the American College of Surgeons Committee on Trauma (ACS CoT) guidelines, an accredited trauma center requires a trauma registry. A trauma registry is a system that provides the statistical groundwork for quality assurance activities that can lead to improved quality of care for trauma patients. Trauma Services uses the software, Collector, which was developed by an American company and is supported by Digital Innovation based out of Maryland, USA. This application is used by over 200 hospitals worldwide including hospitals in Canada, the U.S., Australia, New Zealand and Sweden. It is a comprehensive data management tool and report writing package.

Which patients qualify for the trauma registry?

Not all admitted trauma patients are included in the trauma registry. To qualify, a patient must have an Injury Severity Score (ISS) > 12 or have a penetrating mechanism and be admitted to the trauma center or die in the emergency department of the trauma center. ISS is an anatomical scoring tool that provides an overall score for patients with single system or multiple system injuries. Each injury is assigned an Abbreviated Injury Scale (AIS) score and is allocated to one of six body regions (head, including cervical spine; face; chest, including thoracic spine; abdomen, including lumbar spine; extremities, including pelvis; and external). Only the highest AIS score in each body region is used when calculating the ISS. In 2015, the implementation of the updated AIS05 occurred. The three most severely injured body regions have their highest score squared and added together to produce the ISS score. Not included in these numbers are individuals who've experienced serious trauma injury and who died at the scene as we do not collect coroner data.

The higher the ISS score means the more severe the patient’s injuries.

How do you identify trauma patients?

To ensure that all appropriate patients are included into the trauma registry, all injury admissions, discharges and emergency department resuscitations are examined at FMC. This year, 2640 FMC patient records were reviewed and of those records, 1132 patients qualified. Once registry eligibility was determined, data was abstracted from the patient record and manually entered into the trauma registry. Patients with an Injury Severity Score (ISS) ≥ 12, who die in the emergency department or who have any penetrating injury (if they have been admitted to a hospital) qualify. Penetrating injury is defined as an injury that occurs when an object pierces the skin and enters the body, creating an open wound.
What data is collected?

Data collected includes patient demographics, mechanism of injury information, pre-hospital information, sending hospital information, trauma center emergency department information, trauma center inpatient information including operative information, injury diagnosis information, outcome information and specific audit filters and performance indicators. There are a total of 390 unique data elements in the Alberta Trauma Registry which may be applicable for each qualifying patient. Some of those elements have multiple entries, such as injury type or date and time.

Effort is made to gather as much information as possible. In some cases, tracking of missing documents and follow-up is necessary with pre-hospital providers and sending hospitals.

Why is this data collected?

Data is retrieved and analyzed for internal quality improvement initiatives with the Calgary Zone Trauma Services and with departments involved in the care of the trauma patient at FMC, PLC, SHC and RGH. Following the appropriate approval process, the registry is also used as a source of data for research, resource utilization, education and injury prevention initiatives, and outcome studies. Collector supports unique projects by providing the ability to customize the trauma registry and to write queries and reports.

The FMC submits data to the Alberta Trauma Registry (ATR) central site based at the University of Alberta Hospital (U of A) in Edmonton, Alberta. The central site also captures data from the U of A Hospital/Stollery and the Royal Alexandra Hospital in Edmonton and the Alberta Children’s Hospital in Calgary as well as 5 district centers in rural Alberta.

Foothills Medical Centre continues in submitting our trauma data to the National Trauma Data Base (NTDB) with the American College of Surgeons Committee on Trauma (ACS CoT) and, for the first time with 2015, to Trauma Quality Improvement Program (TQIP). We will then be benchmarking with other Level One trauma centers across North America. The analysts at FMC currently dual abstract the required data elements for the NTDB and the data is submitted annually. The Alberta Health Services Surgical Strategic Clinical Network is working with the Alberta Trauma Services Core Leadership Team to use TQIP reports to further improve the delivery of trauma care.
How good is quality of the data?

The reliability of the data abstracted from the patient health records and placed into the registry is extremely important to ensure its validity. In an effort to maintain a high standard across the ATR, work is ongoing to ensure the data dictionary used by all the analysts across the province is current and up to date. This helps to ensure consistency in the information collected.

Data validation is a process used to improve the quality of the data. This is done on a regular basis (either bi-weekly or monthly, depending on the number of abstracted charts). Reports and queries are generated and examined by the analysts to identify potential errors. Any errors are then corrected in the trauma registry and recurring errors are discussed amongst the analysts during their education sessions in order to present valid and clean data to the Alberta Trauma Registry.

Inter-rater reliability is another process used to improve the quality of the data. This is done on a monthly basis within the Calgary Zone Trauma Services analyst team. Random charts are selected from the previous months and specific data elements are chosen for all analysts to abstract and then discuss for any discrepancies in responses.
Clinical

Ongoing clinical work included:
- Ongoing clinical care and comprehensive management of over 4,000 injured patients.
- Ongoing review and revision of clinical protocols and guidelines.
- Ongoing evaluation and improvement of the Massive Transfusion Protocol.
- Continued refinement of the ED to OR Communication Tool Policy and Procedure along with the Trauma Bay resuscitation and team functioning.

Additional clinical work this year included:
- Participation in revision of Provincial Trauma Resuscitation Record.
- Refinement and implementation in electronic History and Physical Assessment form.
- Full implementation of 4 high observation beds within Unit 44 for continuous cardiac monitoring and arterial line monitoring capability
- Introduction of continuous ketamine infusions as an option for acute pain management within the trauma population on Unit 44.

Education

Educational activities included:
- Orientation for Residents new to Unit 44 and Trauma Services.
- The continued revisions of educational material for Residents to address recurring issues arising on the trauma unit.
- Weekly Trauma Noon Rounds and Trauma Journal Club including evaluation (Please see Appendix for a full listing of rounds and presenters) as CMA approved learning activities.
- Ad hoc Morbidity and Mortality Rounds facilitated through the Department of Surgery.
- ATLS student and instructor courses coordinated by ATLS Calgary.
- ATOM courses.
- Rural Trauma Team Development Course (RTTDC)
- Trauma Nursing Core Course (TNCC).
- Continuation of a three day classroom orientation for Registered Nurses working on the inpatient trauma unit including the use of simulation.
- Expansion of the use of simulation into the re-certification days for unit staff

Guidelines and Algorithms being updated/developed
- Trauma Team Activation Criteria
- Ongoing terms of reference reviews
- Massive Transfusion Pack utilization and configuration review.
- Unit 44 Cardiac Monitoring Guidelines and Arterial Line Guidelines.
Quality Assurance/Improvement

Highlight: the Trauma Coordinator continues to work with the Analysts to refine a concurrent QA review process for patients with ISS ≥ 12 on the trauma unit. Patients are initially screened by the Trauma Coordinator and/or Analyst. Using a data collection tool, the Trauma Coordinator review charts while the patients were still in the hospital.

- Retrospective review of all trauma patients in the trauma registry with flagged performance indicators and/or audit filters and simultaneous concurrent abstraction.
- Continued process where the Trauma Coordinator is tracking trends in addition to taking individual cases for review to the Quality Management Meetings.
- Regular Trauma Quality Management Committee meetings were conducted at FMC. If required, Site quality reviews can be requested.
- Review of traumatic deaths within 24 hours and other deaths as needed.
- Data Validation reviews to ensure both our quality assurance processes and the processes used to screen, abstract and enter patients into the trauma registry. This includes a review of the quality of the data and implementing methods to improve the reliability of our data now that there are four Data Analysts at FMC.
  - Continued work on creating operational definitions and coding notes for our data dictionary
  - Inter-rater reliability testing lead by the Trauma Research Coordinator
  - Increased the number of data validation checks
- Development of a trauma database to provide early identification of quality assurance issues in patient care and provide a platform for tracking these issues and follow-ups.
- Organizationally driven phase one implementation of CoAct along with general Accreditation organizational practices for improvement of quality patient care for all patients.

Administration

Administrative support is essential to the co-ordination and achievement of the various Trauma Services activities. Many administration support activities were included in the previous sections. Additional administrative support activities included:

- Ongoing participation in the Alberta Trauma Services Core Leadership Team.
- Quarterly Adult Trauma Care Committee FMC site meetings
- Submitting of ad hoc and regular reports to AHS executive.
- Tracking of TAC accreditation recommendations and review for the Southern Alberta Trauma System, including the FMC, ACH, PLC, RGH, Medicine Hat, Red Deer and Lethbridge sites.
- Maintaining ongoing links with the Trauma Association of Canada.
- Participation in the FMC Emergency Disaster planning meetings to ensure input from Trauma Services and access to updates on new developments. Regional Trauma Services participated actively in the Calgary Zone disaster plan.
- Strategic planning and implementation of the NP-led trauma follow-up clinic.
Research

Trauma Services has a strong commitment to research and promotion of evidence based practice. Clinical research trials on resuscitation and treatment of the acutely injured patients are conducted in collaboration with partners in clinical and academic centers locally, nationally and internationally.

Research projects in which Trauma Services participates and/or leads include:

2. Randomized trial of Management of post-traumatic hemothorax.
3. Study of the intra-abdominal inflammation, injury, hypertension and the abdominal compartment syndrome, including the following trials:
   - A randomized controlled trial of peritoneal vacuum therapy to reduce the systemic inflammatory insult from the intra-peritoneal sepsis/injury/hypertension: a randomized comparison of baseline wall suction versus the KCl AbThera™ Abdominal Dressing (www.peritonealvac.com).
   - Percutaneous Catheter Decompression in the Treatment of Elevated Intra-Abdominal Pressure.
   - Prospective measurement of intra-abdominal pressure in critical illness.
4. Novel trials of real time acute trauma tele-sonography between remote and central sites.
5. Hyper-Realistic Surgical Simulator (Cut-Suit) Training for first responders for damage control surgery in the ultimate austere environment. This project is in collaboration with the Flight Research Laboratory of the National Research Council of Canada.
8. AAST multi-center prospective, observational study on immune dysfunction in subjects who present with traumatic brain injury and receive beta adrenergic receptor blockers.
9. The incident and management of blunt abdominal trauma with intra-abdominal free fluid and without solid organ injury.
10. Use of a novel energy technology for arresting ongoing liver surface and laceration hemorrhage: The Foothills Medical Centre experience.
11. Randomized trial of performance of biologic mesh materials in abdominal wall reconstruction.
12. Multi-center Trauma Registry Data Benchmark study.
13. Retrospective study on the diagnosis and management of pancreatic injuries.
14. Epidemiology and Characteristics of Traumatic Aortic Disruption Presenting in the City of Calgary.
Nurse Practitioner

The day to day function of the Trauma Nurse Practitioner is to provide continuity in patient care and treatment management amongst the medical team. She acts as a team resource, covers the junior trauma pager when required, carries a patient load, and ensures that necessary service documentation is current on each patient.

Being accountable to the trauma population by assisting in the disclosure of and reporting incidental findings remains a key role for the Nurse Practitioner on service. The successful integration of reporting Incidental Findings into the existing Regional Trauma Services Adult Trauma Database has streamlined the review of 2015’s findings.

This year’s review had 25.7% of the trauma population found to have incidental findings on their imaging; of those patients, only 52.3% had family physicians to report to. This statistic has improved from last year but on a whole it continues to be noted as an ongoing problem within the population we serve.

The top three reportable findings this year are renal cysts at (47.7%), pulmonary nodules (26.7%), and hepatic lesions (29%).

2015 saw the role and scope of the Trauma NP expanded to include the Trauma Follow Up clinic. This clinic facilitates the follow up of admitted trauma patients upon their discharge to ensure they are continuing their recovery once they leave hospital. It also assists with following up incidental findings for patients who do not have family physicians. The clinic is also building in follow up with a rehab physiatrist for select patients who require further treatment.
Foothills Medical Centre
**Who Experienced Major Trauma in 2015?**

Patients are included in the Trauma Registry if they were admitted with an ISS ≥ 12, died in the Emergency Department (ED), or had penetrating injuries, regardless of ISS. Patients that were seen in the ED, but were not admitted, are not included in the Trauma Registry.

With the change to AIS05, it is now possible to have patients included in the registry with an ISS of 0 or <12 if that patient died in the Emergency Department. In 2015, 2 patients were included who had an ISS of 0 as they died in ED and no cause of death or injury diagnosis was included in their health record. There were also 6 trauma patients who died in the ED due to blunt trauma with an ISS<12 (because of incomplete documentation) who were included.

**Admissions**

Major trauma admitted to the hospital is important for resource allocation. The following charts look at admissions by year, month and day of the week.
Admissions by Month

Jan: 83  
Feb: 81  
Mar: 82  
April: 96  
May: 101  
June: 107  
July: 114  
Aug: 124  
Sept: 97  
Oct: 80  
Nov: 82  
Dec: 85  

Admissions by Day of the Week

Sunday: 180  
Monday: 155  
Tuesday: 137  
Wednesday: 137  
Thursday: 161  
Friday: 163  
Saturday: 199  

The following chart illustrates the number of major trauma patients admitted to hospital according to age:

**Age Distribution**

```
<table>
<thead>
<tr>
<th>Age Group</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-14</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15-19</td>
<td>84</td>
<td>0</td>
</tr>
<tr>
<td>20-24</td>
<td>115</td>
<td>0</td>
</tr>
<tr>
<td>25-34</td>
<td>190</td>
<td>0</td>
</tr>
<tr>
<td>35-44</td>
<td>148</td>
<td>0</td>
</tr>
<tr>
<td>45-54</td>
<td>144</td>
<td>0</td>
</tr>
<tr>
<td>55-64</td>
<td>153</td>
<td>0</td>
</tr>
<tr>
<td>65-74</td>
<td>125</td>
<td>0</td>
</tr>
<tr>
<td>75-84</td>
<td>105</td>
<td>0</td>
</tr>
<tr>
<td>85+</td>
<td>68</td>
<td>0</td>
</tr>
</tbody>
</table>
```

Note: 26% (298) of major patients are over the age of 65. However, the age group at highest risk for major trauma remains the 25-34 groups (16.7% of all patients).
How Did These Injuries Occur?

Mechanism of Injury

Mechanism of Injury (MOI) is divided into five categories: Transportation, Falls, Self-harm, Assault and “Other”. Definitions of each are provided in the following pages.

There were 1132 major trauma patients who qualified for the registry in 2015; Transportation became the highest mechanism for trauma admissions at the FMC this year surpassing falls. This is primarily attributed to the change to AIS05 as the number of patients who would have qualified with the former coding no longer qualify for the registry.
How many of these injuries were work-related?

Trauma Services also abstracts data based on whether or not the injuries occurred at work.

Work Related Injuries vs Non-work Related

For 2015, Falls and “Other Cause of Injury” were equivalent at 38% each of work related injuries. Most work related injuries occurred in industrial and construction sites.
Transportation

Transportation refers to trauma caused by a device designed primarily for, or being used for, conveying persons or goods from one place to another. The following chart breaks down transportation injuries into various sub-categories.

**Note:** 79% (339) of these patients had an ETOH level documented. Of those patients, 69 (21%) had an ETOH blood level higher than 17.0 mmol/L (the legal limit).

Falls

Falls (accidental) refer to both multi-level and ground-level falls. “Other/unspecified” refers to cases where the type of fall was not documented.

**Note:** 52% (197) of these patients had an ETOH level documented. Of those patients, 47 (24%) had an ETOH blood level higher than 17.0 mmol/L.
Assault

Assault refers to injuries inflicted by another person with intent to injure or kill by any means.

Self-inflicted

Self-inflicted refers to a suicide or intentional self-harm. Suicide is the voluntary and intentional act of taking one’s life most commonly carried through use of firearms, hanging & drug overdose. However, drug overdose is not included in the Trauma Registry as it is not one of the qualifying criteria. Self-harm is the intentional and deliberate hurting of oneself commonly done by cutting.
**Other Mechanism of Injury**

“Other” is defined as a mechanism of injury unspecified or not within the four categories defined in the previous pages. Of the total number of patients admitted with major trauma referred to on page 7, “Other” MOI contributed to 9% of the total major traumas at FMC.

![Bar Chart](chart.png)

**Note:** Mechanical injuries are caused by machinery or any other device. Animate-injuries are caused by contact with another person or animal.
Mechanism of Injury by Age Range

The 15-24 year old group had the highest number of transportation related injuries while fall and transportation are similar and remained high at the ages > 55. Consistent with previous years, individuals in the 15-34 year old age groups are more likely than any other age group to be involved in a transportation related injury. Individuals over 65 are much more likely to be involved in a fall related injury.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-54</td>
<td>27%</td>
</tr>
<tr>
<td>55-64</td>
<td>40%</td>
</tr>
<tr>
<td>65-74</td>
<td>60%</td>
</tr>
<tr>
<td>75-84</td>
<td>76%</td>
</tr>
<tr>
<td>85+</td>
<td>84%</td>
</tr>
</tbody>
</table>

The percentage of injuries caused by falls is as follows:

- **45-54**: 27%
- **55-64**: 40%
- **65-74**: 60%
- **75-84**: 76%
- **85+**: 84%
Where Were These Patients Injured?

Place of injury

We continue to look into a breakdown of where traumas occurred. Place of injury information increases awareness for injury prevention activities and understanding of the trauma patient.
Mechanism of Injury at home

- Falls, 177, 64%
- Self-inflicted, 25, 9%
- Assault, 49, 18%
- Transport, 2, 1%
- Other, 22, 8%

Mechanism of Injury in the street

- Transport, 349, 77%
- Assault, 64, 14%
- Self-inflicted, 6, 1%
- Other, 7, 2%
- Falls, 25, 6%
What Injuries Did These Patients Sustain?

In this annual report, traumatic injuries are described in two different ways—either by type of injury or by Injury Severity Score (ISS).

Type of Injury

To better understand the type of injuries major trauma patients sustain, they are broken down into three categories: blunt, penetrating and burn.

The number of reported penetrating injuries increased this year due to the change in the inclusion criteria. The Provincial Trauma Committee (PTC) requested “All Penetrating Injuries regardless of “ISS” be captured and reported. Penetrating injury is defined as:

1) An object pierced the skin;
2) The patient was admitted; and
3) The penetrating injury was the primary mechanism of injury.
4) Psychiatric patients that are admitted to hospital for psychological evaluation following penetrating injury (lacerations or punctures) that require a surgical/trauma consult.

This definition is under continual refinement by the PTC.
Injury Severity Score (ISS) and Type of Injury:

The following table depicts ISS scores categorized by type of injury:

<table>
<thead>
<tr>
<th>Type of Injury</th>
<th>1-11</th>
<th>12-16</th>
<th>17-25</th>
<th>26-35</th>
<th>36-45</th>
<th>46-55</th>
<th>56-65</th>
<th>66-74</th>
<th>&gt;=75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blunt</td>
<td>6</td>
<td>341</td>
<td>433</td>
<td>127</td>
<td>39</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Penetrating</td>
<td>134</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Burn</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Majority of patients (68%) admitted with major blunt trauma had an ISS of 12-25. As mentioned above, much of the penetrating trauma reported is specific to patients with an ISS < 12. These injuries include, for example, ocular injuries, nail gun injuries requiring surgical removal and tendon repair. Major penetrating trauma currently makes up 3% of all major trauma patients. As indicated previously, there were 6 trauma patients who died in the ED due to blunt trauma with an ISS<12 who were included in the registry.
What Happened to the Patients Before They Arrived at FMC?

What happened at the scene?

When EMS/STARS arrive at the scene, they assess the patient and provide care prior to and during transport. Most of these actions are collected and recorded in the Trauma Registry by the Analysts at Trauma Services. Historically, these interventions were not included in the annual report. There are certain interventions (or lack of intervention), however, that are of special interest and/or may generate a quality review by our Trauma Coordinator. These include intubation, cricothyroidotomy, implementation of spinal precautions, intra-osseous insertion and needle decompression.

The following table delineates the frequency of interventions among the 945 patients that were treated at the scene. For more information on scene assessment and intervention, please contact Trauma Services at 944-2888.

<table>
<thead>
<tr>
<th>Interventions at Scene</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intubation</td>
<td>58</td>
</tr>
<tr>
<td>Spinal Precaution</td>
<td>497</td>
</tr>
<tr>
<td>Intraosseous Infusion</td>
<td>23</td>
</tr>
<tr>
<td>Cricothyroidotomy</td>
<td>2</td>
</tr>
<tr>
<td>Needle Decompression</td>
<td>19</td>
</tr>
</tbody>
</table>

Although the lack of spinal precautions does not automatically trigger a quality review by the trauma registry, the trauma coordinator does look for this intervention when reviewing charts. 497 (44%) of patients receiving scene intervention were placed on spinal precautions.
Where are the patients coming from?

Determining whether patients are coming directly from the scene or whether they are being transferred from other hospitals is important in evaluating the effectiveness of a trauma system. As a major trauma system matures, there should be an increase in patients coming directly from the scene or from level III trauma centers as opposed to transfers from rural facilities.

The number of patients that came directly from the scene to the FMC is 62%.
Where did the transfer patients come from?

Trauma Services is the Level I trauma center not just for central and southern Alberta but also for parts of southeastern BC and southwestern Saskatchewan. The chart below demonstrates where our transfers are coming from. District Centers refer to the southern Alberta Provincial Level 3 trauma centers in Red Deer, Medicine Hat and Lethbridge. The category “other” is sending facilities outside of Alberta, Southeastern BC and Southwestern Saskatchewan. Other also includes out of country hospitals.

Transfers from Other Hospitals

- District Centers, 99, 23%
- Rural Hospital, 114, 26%
- Calgary Interhospital, 145, 33%
- BC/SK Hospitals, 51, 12%
- Edmonton Area, 3, 1%
- Other, 21, 5%

There were 433 transfers from other hospitals. Of those transfers, (99) 23% were from our district centers (Medicine Hat Hospital = 34, Chinook Regional Hospital = 53, Red Deer Hospital = 46), 26% (114) were from other rural hospitals, 9% (51) were from BC and SK, and 33% (145) were from other hospitals within Calgary.

While we encourage each facility to grow their trauma process, we anticipate an expedited transfer for patients needing Level One trauma care. These numbers do not reflect those patients that Emergency Medical Services (EMS) determines too unstable to stop at the nearest facility; they follow an established EMS Bypass Protocol.
What happened at the other hospitals?

Trauma Services also collects data on what occurred at the hospitals where the patients were taken prior to arriving at FMC. One audit filter that elicits close review by Trauma Services involves the length of time spent at these hospitals. Preferably, patients that require definitive treatment at FMC should be transferred as soon as possible. The following chart represents the number of patients that stayed longer than 2 hours at a hospital outside of Calgary.

![Pie chart showing 65% patients were at the first hospital for >2 hours, 26% were not, and 9% unknown.]

65% patients were at the first hospital for >2 hours. As indicated earlier, each case was reviewed as part of our quality assurance process. The goal of review process is to identify those patients that were unstable and required immediate or expedited transfer. Each site is encouraged to develop its own trauma process through exposure to traumatic cases. It is an expectation that each site be able to quickly identify the unstable patient, activate stabilization techniques and initiate the transfer process in a timely manner. Time spent on non-essential activities prompts a letter to individual physicians and/or site educators to assist in meeting these expectations.
How did the patients get to the FMC?

Emergency transport to FMC can occur via “ground” or by “air”. Ground transport refers to road ambulance. Air transport can refer to either fixed or rotary wing aircraft.

In cases where both air and ground were used, as is frequently the case with fixed wing transport, the patients were included in the “air” category.

The number of patients using ground emergency transport has remained consistently high over the past five years. Conversely, there has been a decrease in air transport in recent years.

1088 patients used some form of emergency transport, of these, 84% used ground transport and 16% came by air. Of the patients that came by air, 81% came via rotary wing aircraft (typically STARS)
What Happened When the Patients Arrived at the Trauma Centre?

Trauma team activation (TTA):

Certain patient factors trigger a full Trauma Team Activation (TTA). A TTA will bring a number of different services to trauma bay to see the patient within 20 minutes, including the Trauma Team Leader (TTL). The algorithm below depicts both over and under TTA’s according to this criteria. There were 12 over-activations and 23 under-activations.

TTA Criteria:
- Confirmed shock defined by BP systolic <90 or Heart rate > 120
- Temperature ≤ 30 °C
- Patient intubated
- Patient with GCS ≤8
- Gunshot wound to the head, neck, or torso
- Need for Blood transfusion en route to hospital or in the ED

Trauma Team Activation (TTA) Criteria in the Major Trauma Population

```
TTA Criteria Met
n=293 (27%)

Was there a TTA?
Yes 270 (92%)
No 23 (8%)
Unk 0(0%)

Was the TTL response time within 20 minutes?
Yes 238 (88%)
No 7 (3%)
Unk 25 (9%)

TTA Criteria Not Met
n=798 (73%)

Was there a TTA?
Yes 12 (2%)
No 786 (98%)

Was the TTL response time within 20 minutes?
Yes 6 (50%)
No 1(8%)
Unk 5 (42%)
```
The Trauma Activation Criteria is under continual review and refinement by the Adult Trauma Care Committee (ATCC) in an effort to maintain high quality and responsive care by our team.

Trauma Team over activation is defined as activation when the criterion was not strictly met. The Trauma Team may be activated at any point at the discretion of the Emergency Physician. Under activations are defined as no Trauma Team activation even though the criteria was met. Over activation do not elicit a chart audit. However, under activations are always reviewed.

Trauma Team Leader response time is captured regardless of whether it's an over or under activation. Accreditation requires the TTL to have a response time of less than 20 min from activation. All response times over 20 min from activation are reviewed.

Ongoing challenges remain in the collection of accurate arrival times of the TTL to the Trauma Bays. A lack of documented time of activation or arrival time leaves these numbers as unknown. This is an area for continued tracking, education and improvement for all involved.

Trauma Services reviews all patients who meet the criteria but have no TTA. All activations are also reviewed to ensure that the Trauma Team Leader (TTL), the trauma general surgeon on call, saw the patient within 20 minutes.

There were 8% of the time that the trauma team was not activated when the TTA criteria was met and there were 9% of the time when TTA was activated but the arrival of TTL is unknown. This has sparked a number of quality reviews which have demonstrated that Trauma Services needs to tighten up the TTA criteria and provide more education on the criteria in the emergency department. This is one of Trauma Services quality improvement initiatives for the next fiscal year.

Five Year comparison of Trauma Team Activations

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TTA Criteria Met</td>
<td>257</td>
<td>270</td>
<td>377</td>
<td>289</td>
<td>293</td>
</tr>
<tr>
<td>TT Activated</td>
<td>176</td>
<td>192</td>
<td>221</td>
<td>252</td>
<td>270</td>
</tr>
</tbody>
</table>
Where did the patients go after they left the Emergency Department?

After resuscitation in the Emergency Department, patients may then go to Intensive Care Unit (ICU), an inpatient ward/unit, or to the Operating Room (OR).

### Post ED Destination

<table>
<thead>
<tr>
<th></th>
<th>ICU</th>
<th>Ward</th>
<th>OR</th>
<th>Died in ED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>181</td>
<td>812</td>
<td>106</td>
<td>33</td>
</tr>
</tbody>
</table>

The vast majority of trauma patients were admitted directly to an inpatient unit from the ED. Excluding patients who died in the ED, 74% were admitted to the inpatient units.

The ICU and OR numbers above do not reflect the total number of ICU admissions and OR visits for major trauma patients, only those that were admitted to ICU or the OR directly from the Emergency Department. The total numbers of ICU admissions and OR visits can be found in the next two sections. In the 2015 fiscal year, 33 patients died in the ED. All of these patients, along with any other patients that died within 24 hours, are reviewed by Trauma Services.
Who admitted these patients from ED/OR?

The following graph describes which services admitted the major trauma patients at FMC.

Admitting Service

The majority of the trauma patients were admitted to the General Surgery/Trauma Surgery service.

According to AHS Data Analytics (DIMR) reports, the in-patient trauma unit (Unit 44) had 1457 admissions (includes transfers in and admits) and 1459 discharges (includes discharges, transfers out and deaths). That averages 4 admissions and 4 discharges every
ICU admission

The following graphs refer to all ICU major trauma admissions from anywhere in the hospital at any point during the patient’s acute care stay.

Monthly ICU Admission

These numbers correlate with the overall trauma admissions to the hospital.

ISS Ranges for ICU Stay

The total number of ICU days used by major trauma patients was 2909.
What happened in the Operating Room?

Of the total major trauma population at FMC, 38% required at least one surgery. The following chart delineates Operating Room utilization by Physician Service. “Number of Cases” refers to the number of times the service went to the OR whereas the “Number of Procedures” refers to the number of interventions done in the OR by that service.

<table>
<thead>
<tr>
<th>Physician Service</th>
<th>Number of Cases</th>
<th>Number of Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trauma/General Surgery</td>
<td>132</td>
<td>330</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>92</td>
<td>152</td>
</tr>
<tr>
<td>Orthopedics</td>
<td>272</td>
<td>511</td>
</tr>
<tr>
<td>Plastics</td>
<td>130</td>
<td>285</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Thoracic</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Vascular</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Nephrology</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Urology</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Note: Totals reflect all services involved rather than total OR cases

In 2015, physicians performed 1324 surgical procedures on 647 major trauma patients at the FMC. The procedures were done during 651 visits to the operating rooms, requiring 1929 operating room hours. Notably, there were no patients that died in OR.
Trauma Laparotomies:

Trauma Laparotomies include all patients with suspected intra-abdominal injuries requiring a laparotomy. Nurses and/or physicians reviewed all patients who underwent any type of laparotomy to categorize the surgery and determine the need for follow-up regarding process/system issues. Therapeutic laparotomies were categorized based on the following criteria:

**Category 1: Hemorrhagic shock.**
This includes patients with confirmed and consistent blood pressure, systolic \(< 90\) in the trauma room, confirmed, or a need for \(> 4\) units of packed red blood cells in the first hour, for hemorrhage due to injury. These patients should be taken to the OR for a laparotomy in \(<1\) hour.

**Category 2: Hemodynamically stable patients requiring emergency laparotomies.**
This includes patients presenting with truncal injury requiring emergency laparotomy who do not meet the criteria for shock. Transfusion requirements are \(< 4\) units in the first hour. BP systolic is \(> 90\). Typically, these represent patients with injuries identified at the time of CT scanning. These patients should be taken to the OR for a laparotomy in \(<4\) hours.

**Category 3: Patients requiring delayed laparotomy.**
This includes patients for whom acute indications for emergency laparotomy were not identified at the time of initial trauma assessment and resuscitation (i.e. patients with stable visceral injury with delayed development of bleeding, or patients with occult intra-abdominal injuries, diagnosed after admission.

Sixteen patients required a Category I (emergency) laparotomy in 2015. 13 (81%) of these patients were taken to the OR within 1 hour of arrival to the FMC ED. The 3 (19%) patients who did not go to the OR within 1 hour were reviewed by Trauma Services and followed up accordingly.
What were the Outcomes for Major Trauma Patients?

One patient outcome that helps describe the resources required to care for major trauma patients includes looking at length of stay (LOS).

Length of stay (LOS)

1. Average Emergency Department LOS by Hour of Admission

Efforts are always made to minimize the patient’s LOS in the Emergency Department. LOS can be influenced by a number of factors including resuscitation requirements, time to receive diagnostic tests, consulting and admitting physician availability, and availability of inpatient beds.

Average ED LOS by hour of admission
2. Intensive Care Unit and Hospital LOS

The longest ICU LOS was 89 days.

The longest hospital LOS was 440 days.
Where Did the Patients Go After Their Acute Care Visit?

Discharge Disposition

A comprehensive trauma system also monitors discharge location. At this time, functional outcomes are not collected by Trauma Services in Calgary; however this is a long term goal for our service.

The majority of patients (61%) were discharged home. Many patients (11%) were transferred to another acute care facility. This was usually done to repatriate patients to facilities closer to their homes. Rehabilitation locations that are collected in the trauma registry include: neuro-rehab at FMC Unit 58, any transition unit and Musculoskeletal Rehabilitation Glenmore Park Care Centre (MSK).
Survival

The following chart outlines the survival in each ISS category. Of note, the category ISS 17-25 has increased the number of non-survivors-older patients with TBI and co-morbidities.

In addition to looking at overall survival rates, Trauma Services also examines mortality rates within and greater than 24 hours after admission. This is an important number for quality improvement initiatives. Deaths within the first 24 hours are usually related to hemorrhagic shock. FMC recorded 2 deaths the ED that did not have an ISS. QI efforts are directed towards refining triage, evaluating trauma team response, timeliness and appropriateness of OR intervention. After 24 hours, deaths are related to multi-system organ failure, sepsis and severe traumatic brain injury. QI processes are directed towards inter-facility triage, ICU care, management of severe head injury and historically identification of occult injuries.
For the FMC, the overall mortality rate is 11%. Of the 124 deaths, 45 (36%) died within 24 hours.

It is also interesting to look at mortality in each MOI category.

**Mechanism of Injury Outcome**

47% of all deaths occurred due to falls, followed by transportation at 28%.
Trauma Injury Severity Score (TRISS) Methodology

TRISS is an internationally accepted method of estimating the probability of survival by combining age, RTS, ISS, and method of injury. For example, patients with a TRISS of > 0.5 would not be expected to die. For the purpose of this annual report, TRISS is also used to benchmark FMC mortality with international standards. The z score compares observed death rates at FMC compared with the international standards delineated in the Major Trauma Outcome study (MTOS) (Champions, Copes, Sacco, et al., J Trauma, 1990). Z scores can only be calculated for those patients with a known TRISS probability of survival. Of our 1331 patients, only 898 had the information required to calculate TRISS. W measures the clinical significance of the differences between the actual and unexpected survivors. W is the number of survivors more than would be expected from the outcome norms per 100 patients treated. W can only be calculated if the absolute value for the z score is equal or greater than 1.96. Due to the physiologic parameters used in the Revised Trauma Score, patients who do not have a recorded Glasgow Coma Scale (GCS) will not have a TRISS value calculated.

January 01 2015 – December 31 2015

<table>
<thead>
<tr>
<th>Age Category</th>
<th>Z score</th>
<th>W score</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Blunt</td>
<td>.44</td>
<td>-</td>
<td>715</td>
</tr>
<tr>
<td>Adult Penetrating</td>
<td>1.09</td>
<td>-</td>
<td>131</td>
</tr>
<tr>
<td>Pediatric</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Total Subset</td>
<td>.68</td>
<td>-</td>
<td>846</td>
</tr>
</tbody>
</table>

In the past, a secondary calculation of the w and z was completed using the total number of qualifying trauma patients from the beginning of the Trauma Registry at FMC (since 1995). However, because of the change to AIS05, this comparator was no longer possible. Going forward, we will provide a cumulative TRISS calculation.
Where Are We Going From Here?

Trauma Services has a number of ongoing goals for the upcoming year. These are partly due to ongoing projects as well as areas for improvement identified in this report. These include:

- Inter-rater reliability testing to improve the quality of the data continues.
- Concurrent screening for trauma patients and TQIP submission.
- Concurrent data abstraction.
- Monthly Data Analyst “lunch and learns” for Alberta.
- Ongoing education/Lync sessions for Regional Trauma Services Data Analysts—this includes the Trauma data dictionary review/revision.
- Development of clinical practice guidelines that is relevant to the trauma population seen at the FMC.
- Ongoing review and refinement of the E0 Communication Policy.
- Continued quality improvement initiatives as identified through trend tracking/chart reviews.
- Review of the new Accreditation Canada Trauma Distinction required operating procedures (ROP) to prepare for distinction accreditation in the Fall of 2017.
- Continued working with all of the Zone trauma centers, trauma service providers and the Alberta Trauma Services Core Leadership Team to fully realize an inclusive provincial trauma system.
- Continued strengthening of the relationship between Trauma Services and the inpatient trauma unit (Unit 44).
- Continual revision of the Trauma Team Activation Criteria.
- Continuation of a dedicated trauma follow-up clinic to better provide service to our trauma population.
- Implementation of quality improvement initiatives identified through the analysis of the TQIP benchmarking reports and participation in the TQIP learning collaborative.
# FMC Performance Indicator and Provincial Audit Filters

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>N</th>
<th>Yes</th>
<th>No</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. If the patient sustained an open fracture did the patient receive an IV antibiotic within 1 hr. of hospital arrival?</td>
<td>77</td>
<td>65</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>2. If patient had a laparotomy, was it “therapeutic” only?</td>
<td>59</td>
<td>36</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>3. Pt on bed rest, did he/she receive DVT prophylaxis within 24 hours?</td>
<td>924</td>
<td>915</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>4. Dislocated joint, was there an attempt to reduce it within one hour?</td>
<td>37</td>
<td>23</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>5. Ischemic limb secondary to severe fractures or penetrating arterial injury was it reduced within 6 hours of injury?</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6. ORIF of spinal FXs completed within 7 days of injury?</td>
<td>78</td>
<td>66</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Audit Filter</td>
<td>N</td>
<td>Yes</td>
<td>No</td>
<td>UNKNOWN</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>----</td>
<td>-----</td>
<td>-----</td>
<td>---------</td>
</tr>
<tr>
<td>1. Pre-hospital ambulance reports on chart?</td>
<td>1084</td>
<td>947</td>
<td>137</td>
<td></td>
</tr>
<tr>
<td>2. Acute SDH or EDH craniotomy &gt; 4hrs after arrival to ER?</td>
<td>32</td>
<td>15</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>3. C-spine injury &gt; 48hrs of admission or at discharge or death if pt. died or discharged within 48 hours?</td>
<td>1096</td>
<td>0</td>
<td>1096</td>
<td></td>
</tr>
<tr>
<td>4. Category 1 Lap performed &gt; 1hr of arrival?</td>
<td>16</td>
<td>3</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>5. Gunshot to abdomen managed non-operatively?</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>6. Femur fracture OR done &gt; 24 hours</td>
<td>37</td>
<td>4</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>7. Open fracture of the radius, ulna, humerus, tibia, fibula and/or femur &gt; 8hrs for type III</td>
<td>11</td>
<td>7</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>8. Unplanned return to OR</td>
<td>427</td>
<td>5</td>
<td>422</td>
<td></td>
</tr>
<tr>
<td>9. Admitted to non-surgeon or non-intensivist</td>
<td>1099</td>
<td>72</td>
<td>1027</td>
<td></td>
</tr>
<tr>
<td>10. Missed injury &gt;48 hours that required surgery.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>11. TTA activation response &gt;20mins</td>
<td>270</td>
<td>7</td>
<td>238</td>
<td>25</td>
</tr>
<tr>
<td>12. &gt; 2 hours Hospital LOS outside of Calgary?</td>
<td>288</td>
<td>187</td>
<td>74</td>
<td>27</td>
</tr>
<tr>
<td>13. Die during transport</td>
<td>124</td>
<td>0</td>
<td>124</td>
<td></td>
</tr>
<tr>
<td>14. Die within 24hours of arrival</td>
<td>124</td>
<td>45</td>
<td>79</td>
<td></td>
</tr>
</tbody>
</table>

(Unknown numbers are due to lack of documentation)
2015

Peter Lougheed Centre, Rockyview General Hospital and South Health Campus
Introduction

The Peter Lougheed Hospital (PLC), Rockyview General Hospitals (RGH) and the South Health Campus are level IV trauma Centers within Calgary city limits. The Peter Lougheed Hospital is located in Northeast Calgary and specializes in Vascular Surgery. The Rockyview General Hospital is located in the Southwest Calgary and specializes in Ophthalmology and Urology services. South Health Campus is located in Southeast Calgary and, although it has not been officially classified as a Level IV site, it is anticipated that will be included in our next accreditation. All sites have General Surgery and Orthopedic Services. Single system injuries appropriate for these services can be treated and managed at each facility.

Patients present to our Level IV sites by several means; walk-in (not brought by EMS), patients brought by EMS with a PHI (Pre-hospital Index) <4, or patients with a PHI ≥4 but too unstable for transport across the city to the level one site.

A review of the monthly injury discharges, daily admission lists, and manual chart audits identifies the trauma population at these sites. The inclusion criteria for the fiscal year 2015 includes admitted trauma patients with an Injury Severity Score (ISS) ≥12 and Emergency department deaths. ISS is an anatomical scoring tool that provides an overall score for patients with single system or multiple injuries. The ISS scores entered into the Alberta Trauma Registry (ATR) ranges between 1 and 75; the higher the ISS, the more serious the injury. The numbers of penetrating trauma admissions for each site where collected but the records were not abstracted.

Patients that are admitted to the hospital with a trauma related mechanism of injury and any of the following injuries prompts a chart audit:

- Head injury and or comatose/unspecific comatose
- Rib fracture > 1 or unknown with pneumothorax/hemothorax
- Multiple body regions injury
- Abdominal injury
- Spinal injury
- Any significant mechanism of injury
- Emergency Department deaths

The following reports reflect the trauma population that was identified and reviewed by Trauma Services, based on the evaluation process list identified above.

**Just and additional word to clarify, as with the FMC report, the coding changed to AIS05 occurred in 2015. This had clear impact on the number of patients who qualified for the registry.
Who Experienced Trauma in 2015?

To describe who experienced trauma in 2015, this report looks at admissions to the PLC, the SHC and the RGH. Admissions include all patients with an ISS ≥ 12 with a blunt or penetrating traumatic mechanism, a penetrating injury regardless of ISS who were admitted (only the total number where collected), or patients that died in the Emergency Department (ED). Patients who were seen in the ED but were not admitted are not included in the trauma registry.

Penetrating trauma is an injury that occurs when an object pierces the skin and enters the body, creating an open wound. This includes any patient where;

- an object has pierced the skin
- the patient was admitted to or died in the ER
- the penetrating was the primary mechanism of injury
- psychiatry patients that are admitted to hospital for psychological evaluation following a penetrating injury (laceration and puncture) that require a surgical/trauma consult.

Admissions

![Total Trauma Admission (N by year 2015)](chart.png)
There was a noted decrease for SHC and RGH attributed to the AIS05 coding changes. It is interesting that PLC was the only Calgary site to record an increase in major trauma admits for 2015.

**Gender**

The chart below represents the proportion of male to female trauma patients admitted to each site.

As per national trends and previous years, males comprise the majority of the trauma patients.

**Age**
When Did the Trauma Occur?

Knowing when major trauma occur and are admitted to the hospital help with appropriate resource allocation. The following charts look at admissions by the day of the week and by the month of the year.

**Admissions by Day of the Week**

- Sunday: [Data]
- Monday: [Data]
- Tuesday: [Data]
- Wednesday: [Data]
- Thursday: [Data]
- Friday: [Data]
- Saturday: [Data]

**Admissions by Month**

- Jan: [Data]
- Feb: [Data]
- Mar: [Data]
- Apr: [Data]
- May: [Data]
- Jun: [Data]
- Jul: [Data]
- Aug: [Data]
- Sep: [Data]
- Oct: [Data]
- Nov: [Data]
- Dec: [Data]
How Did The Trauma Occur?

Mechanism of Injury

Mechanism of injury (MOI) is divided into five categories: Transportation, Falls, Intentional Self-harm, Assault, and “Other”.

- Transportation refers to trauma caused by a device designed primarily for, or being used for conveying persons or goods from one place to another. This would include MVC, pedestrian, off road vehicles, animals, bicycles, water craft, aircraft and other forms of transportation.

- Falls refer to both ground and multi-level falls.

- Intentional Self-harm and Assault includes either with or without an object.

- Injuries inflicted by mechanical forces, animals, fire/explosion/electric, environmental and drowning are included in “Other”.

Falls continue to be the number one mechanism of injury seen in these Calgary acute care facility Emergency Departments.
Where Did The Trauma Occur?

Determining where major traumas occur, it helps with injury prevention activities and programs.
**What Injuries Did These Patients Sustained?**

The type of injuries sustained by major trauma patients is broken down into three major categories: Blunt, Penetrating, and Burns. There were no Burn patients seen at any of the sites which would have qualified for the trauma registry.
What Happened to the Patients Before They Arrived at Hospital?

Where are the patients coming from?

Determining whether patients are coming directly from the scene or are being transferred from other hospitals is important in evaluating the effectiveness of a trauma system.

How did the patients get to the PLC, RGH and SHC?

The majority of patients were transported by Ground Ambulance to all sites.
**What Happened Once They Got to the Hospital?**

When patients arrive at the Emergency Department of the 3 facilities, resuscitation is conducted according to ATLS principles. Aspects of this resuscitation such as blood products required, airway management, and diagnostic procedures are all recorded in the PLC, RGH and SHC trauma registry. For more information please contact the Trauma Services at 403-944-2888.

For quality assurance purposes, Trauma Services has several audit filters measuring documentation in the Emergency Department. Documentation of the trauma patient should occur at least once per hour from arrival in the ED until admission, death or transfer.

**Admitting Service**

Our audit filters also singled out who admitted the trauma patients.

![Admitted by a Non-Surgeon](chart.png)

The majority of non-surgeon admissions are to the hospitalist group. Many of these patients are elderly patients who have sustained single system injuries (ie. subdural hemorrhage) from a ground level fall with pre-existing co-morbidities and require in-hospital monitoring. Other patients were admitted as palliative patients not requiring surgical intervention.
Mortality

This graph demonstrates the number of patients that died within the first 24 hours after arrival to any of the sites. This is an important number for quality improvement initiatives. Deaths within the first 24 hours are usually related to hemorrhagic shock. QI efforts are directed towards refining triage, evaluating trauma team response and timeliness/appropriateness of OR intervention. After 24 hours, deaths are usually related to multi-system organ failure (MSOF), sepsis and severe traumatic brain injury. QI processes are directed towards inter-facility triage, ICU care, management of severe head injury and historically identification of occult injuries.

The total number of qualifying trauma patients seen and admitted to the PLC that died was 3. None died within the first 24 hours.

The total number of qualifying trauma patients seen and admitted to the RGH that died was 6. One of these patients died within the first 24 hours.

The total number of qualifying trauma patients seen and admitted to SHC that died was 4. Three of these patients died within the first 24 hours.

Died within 24 Hours
Mortality by ISS Range

As would be expected, the higher the ISS the higher the Mortality rate seen.

**Plots for PLC, RGH, and SHC**
Where Were Our Patients Discharged to?

This graph shows the majority of trauma patients discharge destinations. It only includes patients that had been admitted to an inpatient unit. It does not include patients seen in the Emergency department and transferred from there to FMC. Home continues to be the most common destination for our admitted trauma patient discharges.
How Many Patients Were Transferred to FMC?

Upon arrival to the hospital, the ED physician will determine if the patient requires the services provided at a Level I adult trauma center. In these cases, the patient is transferred to FMC. The chart below demonstrates transfers of major trauma patients from our level IV site Emergency Departments to the level I site, FMC.
### RGH Performance Indicator and Provincial Audit Filters

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<td>4. Ischemic limb reduced within 6 hours of injury</td>
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<td>5. OR of spinal fractures completed within 7 days of injury</td>
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## PLC Performance Indicator and Provincial Audit Filters

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## APPENDIX A

### 2015 Noon Rounds Presentation

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<td>Jan 9/15</td>
<td>Dr. Kody Johnson</td>
<td>Splenic Lacerations and Embolization</td>
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<tr>
<td>Jan 16/15</td>
<td>Dr. Jeremy Kubik</td>
<td>Bladder Trauma</td>
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<td>Jan 23/15</td>
<td>Dr. Yiming Qian</td>
<td>Flail Chest</td>
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<td>Jan 30/15</td>
<td>Dr. Allison Finningley</td>
<td>Traumatic Brain Injury – Fluids and Electrolytes</td>
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<td>Feb 6/15</td>
<td>Dr. Hilary Ambrose</td>
<td>Traumatic Rhabdomyolysis</td>
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<td>Feb 13/15</td>
<td>Dr. Catherine Girard-Martel</td>
<td>Resuscitation Fluids in Trauma</td>
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<td>Feb 20/15</td>
<td>Dr. Laura Kosakoski</td>
<td>Epidural Anesthesia in Patients with Traumatic Rib Fracture Is there Evidence?</td>
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<td>Dr. Ben Rempel</td>
<td>Management of Clavicle Fractures</td>
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<td>Mar 6/15</td>
<td>Dr. Sean Fair</td>
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<td>Dr. Julia Saar</td>
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<td>Ms. Julie Lannigan</td>
<td>Heterotrophic Ossification in Traumatic Brain Injured Patients</td>
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<td>Mar 27/15</td>
<td>Dr. Katie LIN</td>
<td>The Use of Ultrasound in Trauma</td>
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<td>April 17/15</td>
<td>Dr. Ryan Tong</td>
<td>Occult Pneumothorax - Now you see me. Why should we care?</td>
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<td>Apr 24/15</td>
<td>Dr. Chris Rusnak</td>
<td>Emergency Lateral Canthotomy</td>
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<td>May 1/15</td>
<td>Dr. Diana Murray</td>
<td>Pediatric Trauma</td>
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<td>May 8/15</td>
<td>Dr. Neal Austin</td>
<td>Introduction to Traumatic Pelvic Fractures</td>
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<td>May 22/15</td>
<td>Dr. Patrick LaFlesche</td>
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<td>June 12/15</td>
<td>Ms. Michelle Malig</td>
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<td>June 19/15</td>
<td>Dr. Rebecca Hartly</td>
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<td>June 26/15</td>
<td>Dr. Paul Dawson</td>
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<td>July 17/15</td>
<td>Dr. Natalia Frolova</td>
<td>Cricothyroidotomy</td>
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<td>July 24/15</td>
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<td>July 31/15</td>
<td>Dr. David Ben-Israel</td>
<td>The Physiologic and Stress Inflammatory Response to Trauma and its Influence on Early Nutrition</td>
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<td>Aug 7/15</td>
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<td>Oct 9/15</td>
<td>Dr. Magalie Cadieux</td>
<td>Traumatic Burns</td>
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<td>Oct 30/15</td>
<td>Dr. Erin Martin</td>
<td>Bladder Ruptures</td>
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<td>Nov 6/15</td>
<td>Dr. Tony Seguin</td>
<td>Delayed vs Immediate Resuscitation in Trauma</td>
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<tr>
<td>Nov 13/15</td>
<td>Dr. Joseph Kendal</td>
<td>Incomplete Spinal Cord Injuries</td>
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<tr>
<td>Nov 20/15</td>
<td>Dr. Maher Sababal</td>
<td>Vascular Trauma of Head and Neck</td>
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<tr>
<td>Nov 27/15</td>
<td>Dr. Gabriel Marcil</td>
<td>Geriatric Trauma: Evaluation and Consideration</td>
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<td>Dec 4/15</td>
<td>Dr. Michael Gysel</td>
<td>Penetrating Neck Trauma</td>
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<tr>
<td>Dec 11/15</td>
<td>Dr. Catherine Truchon</td>
<td>Quebec Ministry of Health and Social Services</td>
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