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## Contents

A. Introduction .......................................................................................................................... 5

B. Glossary of Key Terms ....................................................................................................... 6

C. Injury Surveillance ............................................................................................................... 13

D. Components of Trauma Registry ..................................................................................... 17

E. Inclusion and Exclusion Criteria ....................................................................................... 21

F. Standards ............................................................................................................................. 26

G. Trauma Registry Software Vendors .................................................................................. 33

H. Data Sources ....................................................................................................................... 35

I. Data Collection Process ..................................................................................................... 39

J. Data Quality ......................................................................................................................... 42

  1. Data quality ......................................................................................................................... 42

  2. CIHI Data Quality ............................................................................................................... 43

  3. CHIMA ............................................................................................................................... 43

K. Data Dictionary .................................................................................................................... 44

L. National Trauma Registry (NTR) ....................................................................................... 45

  1. Publications ....................................................................................................................... 45

M. Data Utilization .................................................................................................................. 46

  1. Quality Improvement ......................................................................................................... 46

  2. Reports .............................................................................................................................. 46

  3. Research ............................................................................................................................ 47

N. Performance Improvement and Benchmarking .................................................................. 48

O. Skills, Qualifications and Training Courses ..................................................................... 49

P. The Registry and Accreditation ......................................................................................... 52

Q. Policies .................................................................................................................................. 53

  1. Process for Policy Development ....................................................................................... 53

  2. Policies useful to a Trauma Registry ................................................................................ 53

  3. Reference Documents ....................................................................................................... 54

R. Confidentiality & Privacy ................................................................................................... 55

  1. Federal Legislation ............................................................................................................. 55

  2. Provincial Legislation ......................................................................................................... 57

  3. Canadian Health Information Management Association (CHIMA) ............................... 61

  4. Privacy Impact Assessment (PIA) .................................................................................... 62

  5. Local Policies ................................................................................................................... 63
S. Professional Associations........................................................................................................ 64
  1. Trauma Association of Canada ........................................................................................... 64
  2. Trauma Registry Information Specialists of Canada .......................................................... 64
  3. Canadian Health Information Management Association ................................................ 65
  4. Association for the Advancement of Automotive Medicine ............................................. 65
  5. American Health Information Management Association ................................................ 65
  6. National Institutes of Health Informatics ......................................................................... 65
  7. Canadian Nursing Informatics Association ...................................................................... 65
  8. Other Professional Associations ..................................................................................... 65
T. Publications/Reference Materials/Resources ..................................................................... 66
Appendix A: Abbreviations ..................................................................................................... 69
Appendix B: Inclusion and Exclusion ICD External Cause Codes .......................................... 70
A. Introduction

Preamble

A Trauma Registry is a vital component of a trauma system. A well designed Trauma Registry containing consistent and accurate data can support all functions of a Trauma Program from basic reporting of trauma patient demographics and trends over time to informing injury prevention specialists of target populations, supporting trauma patient performance improvement and patient safety initiatives, trauma research, identifying trauma patient resource requirements and informing policy and trauma program planning.

Purpose

The purpose of this manual is to act as a resource and guide for programs setting up a Trauma Registry, as well as information sharing for those with existing Trauma Registries interested in expanding or augmenting their registries.

Background

In 2003 a small group of Trauma Association of Canada (TAC) members with an interest in and work in the field of Trauma Registries met to discuss the need to create a formal TAC subgroup representing the Trauma Registry. The goal of this subgroup would be to provide a forum to share ideas and practices specific to the management and utilization of trauma data and registries through networking. This group would also provide education and resources to the Canadian Trauma Registry community under the umbrella of TAC. In 2004 the first annual meeting took place with the establishment of the group name Trauma Registry Information Specialists of Canada (TRISC). Annual TRISC meetings have taken place since, and the need for this manual stemmed from ideas shared from members of the Trauma Registry Information Specialists of Canada (TRISC) and other TAC members. TRISC continues to provide a forum for education and learning through formal education sessions and informal networking and learning through the experiences and knowledge of one another and external experts.

Development

This manual was a joint effort with input from the TRISC membership received at Annual TRISC meetings. The content was written and pulled into a comprehensive document by a number of TRISC members who are dedicated and experienced in the workings of Trauma Registries. We hope that this document proves to be a useful resource tool for new and existing Trauma Registries as well as information for those interested in learning about Trauma Registries.
B. Glossary of Key Terms

**Abbreviated Injury Scale (AIS)** was first developed in the early 1970’s, by the American Association of Automotive Medicine (AAAM), for categorizing injury type and severity in motor vehicle crashes. “The AIS is an anatomically based, consensus derived, global severity scoring tool that ranks each injury on a 6 point scale.”

The AIS is a unique set of six digit numerical codes describing individual injuries, categorized in one of nine body regions. Each injury code is followed by a decimal point, and the AIS severity code of 1 – 6. There have been many revisions of the AIS since its initial version which have expanded to include types of injury other than motor vehicle crashes. At the time this manual was being written, the most recent version published by AAAM is the AIS 2005 Update 2008. This version includes significant restructuring in the regions of upper and lower extremities and the pelvis, allowing for increased detail. There are also changes regarding severity of injuries which should be noted when comparing data scored using previous versions.


**Canadian Classification of Health Interventions (CCI)** – “is the new national standard for classifying health care procedures. CCI is the companion classification system to ICD-10-CA”.


**Canadian Health Information Management Association (CHIMA)** – The Canadian Health Information Management Association (CHIMA) represents approximately 5,000 Health Information Management (HIM®) professionals across Canada and is the certifying body and national association that represents leadership and excellence in health information management. CHIMA supports continuing education and professional practice of HIM professionals, develops strategic partnerships to advance the development and integration of electronic HIM, and advocates for and strengthens the HIM role in health care settings across the continuum of care.

Retrieved October 9, 2014, from [https://www.echima.ca/chima/about](https://www.echima.ca/chima/about)

**Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP)** – is a Public Health Agency of Canada Program that includes the collection, analyses and reporting on cases of injury and poisoning. Data is collected in “a computerized information system that collects and analyzes data on injuries to people (mainly children) who are seen at the emergency rooms of the 10 pediatric hospitals and of 4 general hospitals in Canada. CHIRPP is a unique, richly detailed database of "pre-event" injury information.”

**Canadian Institute for Health Information (CIHI)** – “We work with our stakeholders to create and maintain a broad range of health databases, measurements and standards. We also help them better understand and use our evidence-based insight and analyses in their day-to-day decision-making. We develop reports and analyses from our own data and other data sources. We do all of this in a way that ensures privacy and value for Canadians and the Canadian health care system.”


Some data holdings of CIHI include:

**Discharge Abstract Database (DAD)** – is one of the key data holdings held by CIHI. Originally developed in 1963, the Discharge Abstract Database (DAD) captures administrative, clinical and demographic information on hospital discharges (including deaths, sign-outs and transfers). Some provinces and territories also use the DAD to capture day surgery.


**National Ambulatory Care Reporting System (NACRS)** – The National Ambulatory Care Reporting System (NACRS) is a data collection and reporting tool designed to capture information on client visits to hospital and community based ambulatory care. NACRS currently collects data on day surgery, emergency department use and other ambulatory care visits.

Retrieved September 2, 2014, from:


**National Trauma Registry (NTR)** – was established in 1996 to provide trauma health care providers, researchers, and injury prevention programs with essential information on injury, or trauma, in Canada. The NTR was a national repository which acquired, analyzed and disseminated national injury data and consisted of two distinct data sets: the Comprehensive Data Set (CDS) and the Minimal Data Set (MDS). It is one of the data holdings of CIHI. As of March 31, 2014, the NTR data will no longer be collected by CIHI. Historical NTR CDS data will be available through the data request process and MDS through the DAD and Hospital Morbidity Database (HMDB).

**Center for Disease Control and Prevention (CDC)** – was founded in 1946 to help control malaria, and has remained at the forefront of public health efforts to prevent and control infectious diseases, injuries, workplace hazards, disabilities, and environmental health threats. “CDC works with states and other partners, to provide a system of health surveillance to monitor and prevent disease outbreaks (including bioterrorism), implement disease prevention strategies, and maintain national health statistics.”

Retrieved October 9, 2014, from [http://www.cdc.gov/about/history/ourstory.htm](http://www.cdc.gov/about/history/ourstory.htm)

**Comprehensive Data Set (NTR CDS)** - The NTR Comprehensive Data Set (NTR CDS) includes demographic, administrative and clinical data on all admissions to specialized trauma centres in participating provinces. As of March 31, 2014, the NTR CDS will no longer be collected by CIHI. Historical NTR CDS data will be available through the data request process


**Death Data Set (DDS)** – contains data on all deaths due to injury and is one of three major data sets of some of the Provincial Trauma Registries.


**Digital Innovation, Inc. (DI)** – is the vendor of the trauma registry software called Collector, primarily used in Canada and the United States. They specialize “in the design, development and support of medical registry, case management and related database applications.”

Their products are currently running at more than 1,000 locations worldwide.


**Emergency Data Set (EDS)** – Includes data on injuries treated and discharged from an Emergency Department (ED). Currently, only a few provinces and facilities collect Emergency Department data. The National Ambulatory Care Reporting System (NACRS – see below) is a CIHI product which can be used to collect ED data. NACRS accommodates different data submission options for emergency department (ED) visit records. This enables facilities to submit ED wait time data before they complete diagnoses and interventions coding, allowing timely production of ED Wait Time Indicator Reports.

**HealthCareCAN** – “is the national voice of healthcare organization across Canada. We foster informed and continuous, results-oriented discovery and innovation across the continuum of healthcare.”

Formerly the Canadian Healthcare Association and the Association of Canadian Academic Healthcare Organization, the two are now combined as one under HealthCareCAN.

CHA Learning continues to offer distance courses in Health Information Management and other relevant areas of study.


**Inclusion and Exclusion Criteria** - are the criteria for including a patient in the study, and it is important that these criteria be clearly defined in an objective manner, so that anyone involved in the study (or anyone attempting to replicate the study) can reproduce patient inclusion decisions precisely. Exclusion criteria are the criteria for excluding patients from the study.

These criteria determine whether a patient record is entered into the Trauma Registry and are fundamental to the value and usability of a Trauma Registry. The appropriate patient population must be captured within a Trauma Registry in order for the Registry to be able to support the full spectrum of the needs of a trauma program from injury prevention, resource utilization, program planning, quality improvement and patient outcomes and trauma research. The needs of the program will dictate the scope of the trauma registry and the type of patient to be included. These points should be kept in mind when inclusion and exclusion criteria are being defined.

See section E for detailed inclusion and exclusion criteria.

Retrieved October 9, 2014, from [http://www.fammed.ouhsc.edu/tutor/incexc.htm](http://www.fammed.ouhsc.edu/tutor/incexc.htm)

**Injury Severity Score (ISS)** - is an internationally accepted method of assessment of overall injury severity in the multiply injured trauma patient. The ISS is a calculated score using the Abbreviated Injury Scale (AIS).

The ISS is defined as the sum of the squares of the highest AIS code in each of, up to three of the most severely injured body regions.

A brief synopsis of the ISS follows:

- The body is divided into six ISS body regions: head/neck, face, chest, abdomen, extremities and external.
- An Abbreviated Injury Scale (AIS) score of 1 to 6 is assigned to each injury:
  
  1 = minor, 2 = moderate, 3 = serious, 4 = severe, 5 = critical, 6 = maximum.
The following example should help to understand the ISS calculation. (AIS codes based on AIS 2005 Update 2008)

<table>
<thead>
<tr>
<th>ISS BODY REGION</th>
<th>INJURY</th>
<th>AIS</th>
<th>HIGHEST AIS</th>
<th>AIS² (3 highest)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEAD/NECK</td>
<td>Cerebral contusion, Single NFS Internal carotid artery, complete transection</td>
<td>3</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>FACE</td>
<td>Fractured tooth</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CHEST</td>
<td>Rib fractures left side, ribs 3-4</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>ABDOMEN</td>
<td>Gr III splenic laceration</td>
<td>3</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>EXTREMITIES</td>
<td>Fractured tibial shaft; open</td>
<td>3</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>EXTERNAL</td>
<td>Overall abrasions</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>TOTAL ISS</td>
<td></td>
<td></td>
<td></td>
<td>34</td>
</tr>
</tbody>
</table>

- If there is an AIS score of 6 in any of the body regions the highest ISS of 75 is automatically assigned, however all injuries must still be scored.
- The maximum obtainable score is an ISS of 75

The final ISS can only be tabulated once the extent of injuries is known.

**Interdisciplinary Trauma Network of Canada (ITNC)** – is a subgroup of the Trauma Association of Canada, “who actively promote optimal trauma care through an inclusive approach to trauma system development and continuous improvement.”


**International Classification of Disease, 9th Revision, Clinical Modification (ICD-9-CM)** – “is based on the official version of the World Health Organization’s 9th Revision, International Classification of Diseases (ICD-9). ICD-9 is designed for the classification of morbidity and mortality information for statistical purposes, and for the indexing of hospital records by disease and operations, for data storage and retrieval.” 10 ICD-9-CM also includes a procedural classification (ICPM).

**International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada (ICD-10-CA)** - is based on the World Health Organization ICD-10 and is wholly comparable with that classification. ICD-10-CA is the Canadian national standard for reporting morbidity statistics. It is used to classify diseases and other health problems recorded on many types of health and vital records. ICD-10 is a major structural revision of the previous version, ICD-9. ICD-10-CA was implemented for data submissions to the National Trauma Registry in April 2001.
**Major Trauma** is defined internationally as a patient with injuries sustaining an Injury Severity Score (ISS) ≥ 16. In Canada, for the purposes of data collection for the Trauma Registry, major trauma is defined as damage to the body from the transfer of kinetic, electrical or thermal energy resulting in an Injury Severity Score of >12.

**Trauma patients (major – per Accreditation Canada):** Consistent with the National Trauma Registry definition, a trauma patient is defined as any patient admitted to a hospital with an injury diagnosis, who meets the following criteria:

- Has an Injury Severity Score (ISS) greater than 12 using AIS 1990 or AIS 2005, an international scoring system created to calculate the severity of injury
- Has an ICD external injury code that meets the definition of trauma
- Meets one of the following criteria:
  - Admitted to a hospital;
  - Treated in the Emergency Department (ED) of a hospital (not admitted);
  - Died in the ED of a hospital (or another location, as specified);
  - Treatment was not initiated (not admitted)
- Can be any age unless otherwise specified in the indicator protocol

For the purpose of the indicator protocols, major trauma is defined as damage to the body from the transfer of kinetic, electrical, or thermal energy resulting in an ISS of >12.

**Major Trauma Outcome Study (MTOS)** – Champion, H.R., et al, (1990) describes the MTOS as, a retrospective descriptive study of injury severity and outcome, coordinated through the American College of Surgeons’ Committee on Trauma. From 1982 through 1987, 139 North American hospitals submitted demographic, etiologic, injury severity and outcome data for 80,544 trauma patients. Patients with unexpected outcomes were identified and statistical comparisons of actual and expected numbers of survivors were made for each institution. Results provide a description of injury and outcome and support evaluation and quality assurance activities.

**Minimum Data Set (NTR MDS)** – The NTR Minimum Data Set (NTR MDS) includes demographic, diagnostic and procedural information on all admissions to acute care hospitals in Canada because of injury. This data set will continue to be available through the Discharge Abstract Database (DAD) and Hospital Morbidity Database (HMDB) following the NTR closure on March 31, 2014.


**National Trauma Data Bank (NTDB)** – “The National Trauma Data Bank” (NTDB®) is the largest aggregation of U.S. trauma registry data ever assembled. Participation is voluntary and is one of the leading performance improvement tools of trauma care. You will find the operational definitions for the NTDB in the National Trauma Data Standard (NTDS) Data Dictionary, which is designed to establish a national standard for the exchange of trauma registry data. Registry data that is collected from the NTDB is compiled annually and disseminated in the forms of hospital benchmark reports, data quality reports, and research data sets.”
The NTDB offers a Google Group for Q&A and discussion. Here is the quick link to sign up for the NTDB Google Group: [http://www.ntdsdictionary.org/ntdbParticipants/ntdbUserGroups.html](http://www.ntdsdictionary.org/ntdbParticipants/ntdbUserGroups.html). (You must have a Gmail account to log in.) This can be a great resource, just keep in mind there may be some differences between the NTDB and our own national/provincial standards.


**NTDB National Trauma Data Standard (NTDS)** – implemented in 2009, its’ purpose is to standardize the data elements submitted to the NTDB and trauma registry data collection, to enable more comparable data elements nationally. It includes only core variables that would prove useful if aggregated on a national level.


**Trauma Association of Canada (TAC)** – The Trauma Association of Canada is committed to reduce the incidence and relieve the burden of injury by bringing together multidisciplinary health care professionals involved in the care of the injured patient to:

- Improve the quality of care provided
- Promote the highest standard of inter-professional patient care
- Provide education for its members at the local, regional and national level
- Promote and conduct basic science and clinical trauma research
- Disseminate research findings
- Establish standards and create awareness of best practices
- Develop and maintain a national Trauma Registry
- Facilitate and participate in public education on injury prevention
- Develop guidelines for, and participate in community disaster response planning
- Develop guidelines for, and participate in accreditation processes
- Advocate to governments to implement legislation designed to reduce the incidence of injury
- Build coalitions with key partners in trauma care and injury prevention

Retrieved September 2, 2014, from [http://www.traumacanada.org/page-1715161](http://www.traumacanada.org/page-1715161)

**Trauma Registry Information Specialists of Canada (TRISC)** – is a subgroup of TAC, “who promote the utilization of timely, high quality trauma information for trauma system development, program planning, resource utilization, education, research, and quality improvement that strive for the improvement of trauma care delivery, patient outcomes and injury prevention practices in Canada and provide a national forum for Trauma Registry Information Specialists to network.”

Retrieved October 9, 2014, from [http://www.traumacanada.org/page-983084](http://www.traumacanada.org/page-983084)
C. Injury Surveillance

1. Definition of Injury Surveillance as it relates to Trauma Data
   - Injury surveillance is the ongoing collection, analysis, interpretation and timely dissemination of injury data.
   - It is used to understand the trends and patterns of injury, for the purpose of informing injury prevention decisions and actions. It is important that a comprehensive and standardized surveillance system be maintained so that effective injury prevention initiatives can be developed and implemented.
   - The data is used to assess the magnitude and scope of the problem. It defines: **Who** (age, gender), **What** (types of injuries), **Why** (intentional, work-related), **When** (time of day, month, year) and **How** (by different mechanisms) people are being injured.
   - The data should be region-specific as each region has different exposures to risk factors, protective agents and social determinants of health such as socio-economical, educational and cultural differences.

References:
- BCIRPU [http://www.injuryresearch.bc.ca/support-services/datasurveillance/](http://www.injuryresearch.bc.ca/support-services/datasurveillance/)
- Inventory of Injury Data Sources and Surveillance Activities
  Public Health Agency of Canada; March, 2005
  This has 111 injury data sources for all of the provinces and territories.
  This is a great, complete resource and available on the web at: [http://publications.gc.ca/collections/collection_2008/phac-aspc/H121-3-2005E.pdf](http://publications.gc.ca/collections/collection_2008/phac-aspc/H121-3-2005E.pdf)

2. Types of Data
   There are different types of injury data:

   2.1 Systems specific injury and injury prevention
   - Trauma Registries, Motor Vehicle Collision data, for Transport Canada.

   2.2 Administrative databases
   - Data collected for administrative purposes, but still has injury data.
   - Hospital admission databases (i.e., DAD) from Canadian Institute of Health Information.
   - Worker’s Compensation database for occupational injuries.

   2.3 Hybrid Databases
   - Contain administrative and injury information, such as the coroner’s database, for example.
3. Examples of Injury-related Databases, by Data Category

3.1 Mortality Data
3.1.1 Statistics Canada, National/Provincial/Territorial Vital Statistics - Mortality Database
   • Death Certificates
3.1.2 Registry/CIHI DAD - ICD-10 nature & cause of injury, injury codes/scores
3.1.3 National/Provincial/Territorial Coroner and Medical Examiner Database
   • Cause and means of death
   • Pre-event circumstances
   • Place of death
   • Demographic variables

National death data is uploaded from provincial systems. A limitation to the Mortality Database is that not all data elements are captured electronically (i.e., injury descriptions).

3.2 Morbidity Data
3.2.1 Statistics Canada
   3.2.1.1 Canadian Community Health Survey
   3.2.1.2 National Population Health Survey
      • Capture ICD-10 data on the nature, cause, place of injury, anatomic injuries
      • Activities leading to injury event
      • Collected every 2 yrs (approximately 80% by personal interview) and for NPHS longitudinal for 18 years.

3.2.2 Health Canada
   3.2.2.1 Product Safety Information System
      • Consumer product-related injury surveillance
      • Used to identify and communicate trends in consumer safety and dangerous products, such as baby walkers or bathtub rings.

3.3 Hospital Admission and Emergency Department (ED) Data
3.3.1 Canadian Institute for Health Information
   3.3.1.1 Discharge Abstract Database
      • All hospital admissions
   3.3.1.2 National Ambulatory Care Reporting System (NACRS)
      • ED, day surgery, clinics
3.3.2 Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP)
   • Collected at 15 ED across Canada, 11 of the 15 are pediatric sites
   • Voluntary, so has inherent biases towards less severe injuries
   • Parent completed form on child injury events leading to injury
4. Trauma Registry Data

“Database to provide information for analysis and evaluation of the quality of patient care, including epidemiologic and demographic characteristics of trauma patients.”
Committee on Trauma, American College of Surgeons (2006)
Resources for Optimal Care of the Injured Patient. Chicago, IL: American College of Surgeons.

Trauma Registries contain data on
- Types, causes and severity of injury
- Patient demographics
- Pre-hospital care
- In-hospital treatment
- Outcome, follow up data

National Trauma Registry (closed as of March 31, 2014)
1. Minimal Data Set
   - All injury admissions
2. Comprehensive Data Set
   - Severe trauma/Level I and II trauma centers
3. Death Data Set
   - Deaths

Provincial Trauma Registries
- As of November 2014, the following provinces had provincial registries in Canada:
  - British Columbia
  - Alberta
  - Ontario
  - Quebec
  - New Brunswick
  - Nova Scotia
  - Newfoundland and Labrador
- There are currently no Territorial Registries.
- Most Provincial registries are based on the Collector Trauma Registry software (Digital Innovations, Inc), but have differences in the data elements, menu items and inclusion criteria, addressing specific needs of the province.

5. Other Data Sources

5.1 Motor Vehicle Data
- Transport Canada: National Collision Database/Motor Vehicle Traffic Collision Statistics. Transport Canada also has several Crash investigation Teams across the country affiliated with some Universities (i.e., London, Ottawa, Halifax, to name a few), that do in-depth reviews and crashes reconstruction (speed, crash intrusion, airbag deployment, etc).
- Traffic Injury Research Foundation (TIRF), which is based on police crash reports.
5.2 Occupational Injury
- National Work Injuries Statistics Program (Workers’ Compensation Board)
- Ministries of Labour
- Manitoba Labour, Workplace Safety & Health Division
- WorkSafe BC

5.3 Fire / Police-Crime / EHS
- Office of the Fire Commissioner (AB, MN); Fire Marshal (NWT, NS)
- Stats Canada – Crime and Justice
- BC Ambulance Service, Nova Scotia EHS

5.4 Farming
- Canadian Agricultural Injury Surveillance Program/Canadian Agricultural Injury Reporting

5.5 Sports
- International Ice Hockey Spinal Injury Survey from Think First, now continued by Parachute. It is a survey that is mailed to neurosurgeons across the country.
- Sport Injury Prevention Research Center (SPIRC)

5.6 Injury Prevention Organizations
Many injury prevention organizations have links to data sources and publications based on injury data. The following are some injury prevention organizations within Canada:
- Parachute – national organization combining SmartRisk, ThinkFirst, Safe Kids Canada and Safe Communities Canada
  http://www.parachutecanada.org
- Atlantic Collaborative on Injury Prevention (ACIP)
  http://www.acip.ca
- BC Injury Research and Prevention Unit (BCIRPU)
  http://www.injuryresearch.bc.ca
- Alberta Centre for Injury Control and Research (ACICR)
  www.acicr.ca
- CIHR Team in child and Youth Injury Prevention
  http://childinjuryprevention.ca/
- Ontario Injury Prevention Resource Center
  http://www.oninjuryresources.ca/
- TAC Injury Prevention and Surveillance Committee
  http://www.traumacanada.org/page-983075
- Public Health Agency of Canada
- Child Health BC
  http://www.childhealthbc.ca/
D. Components of Trauma Registry

A Trauma Registry has a number of different components that need to be well thought out prior to its development. This principle applies to all levels of the registry whether the Trauma Registry is at a national, provincial or individual institution level.

Different components of a Trauma Registry include:

1. Data elements with a clear definition, data collection directives and a data dictionary.
2. Data sets.
3. Trauma definition and level of severity.
4. Inclusion and exclusion criteria.
5. Data reporting capabilities.
6. Data edits.
7. Data request and access to data procedures.
8. System for security and access to the data i.e. password protection for system access.

1. Data Elements: Data elements to be included in the registry need to be decided by a multidisciplinary committee of stakeholders who will benefit from the data. Medical advisors, injury prevention, trauma researchers, trauma quality managers and members of the trauma team should be included in the process. Once a set of data elements is agreed upon, definitions for each and source of retrieval of each should be documented and kept in a data dictionary. As Trauma Registries evolve the need for added data elements can arise, the data dictionary should reflect the dates of when data collection for these additional data elements began.

2. Data Sets: Trauma Registries may be stand-alone systems or in combination of different data sets combined to provide data collection and reporting on various injury populations.

In Canada, the National Trauma Registry (NTR) was comprised of 2 data sets, the Minimal Data Set (MDS) and Comprehensive Data Set (CDS). As of March 31, 2014, the NTR data will no longer be collected by CIHI. Historical NTR CDS data will be available through the data request process and MDS through the DAD and Hospital Morbidity Database (HMDB).
2.1. The Minimal Data contains demographic, diagnostic and procedural information on all acute care hospitalizations due to trauma in Canada. The MDS includes trauma injuries, which are defined as injuries caused by a ‘transfer of energy’. Data are available from the MDS from 1994-95 to 2012-13 on injury hospitalizations in Canada.

2.2 The Comprehensive Data Set is a more detailed and extensive data set of specific patients treated at a designated trauma hospital in Canada. Inclusion in the CDS requires the patient meeting the inclusion criteria of the specific ICD cause of injury code, as well as sustaining injuries yielding an Injury Severity Score (ISS) of > 12. Data are available from the CDS from 1996-97 to 2012-13 on major trauma in certain provinces within Canada.

In the United States, the National Trauma Data Set includes one dataset which is populated by participating states. See the following link for more information re: the National Trauma Data Bank (NTDB). [http://www.ntdsdictionary.org/dataelements/datasetdictionary.html](http://www.ntdsdictionary.org/dataelements/datasetdictionary.html).

Variations exist across the Canadian provinces with respect to trauma datasets. Although all provinces participating in the NTR collect and submit data on ISS>12, not all provinces have an MDS. Presently, Ontario, Nova Scotia, and British Columbia have access to Minimal, Comprehensive and Death Data sets within their Trauma Registries. The provinces of Newfoundland and Manitoba have comprehensive data on all injury admissions; Alberta Trauma Registry includes a comprehensive dataset on all ISS>12 patients treated at trauma hospitals and Quebec has comprehensive data on all trauma related in hospital deaths (inpatient or emergency of a designated trauma center) and trauma hospitalizations admitted to a designated trauma center.

3. Definition of Trauma: A clear definition of trauma needs to be established to identify the type of patient to be included in the Trauma Registry. Some registries define trauma by certain causes of injuries (usually defined by ICD cause of injury code classification) for inclusion in the registry, others use the presence of an injury as defined by specific ICD injury codes, and others use severity of injury as the definition of trauma for inclusion in the trauma registry and some use other criteria. There are different injury severity scoring systems available that can be used to define the severity of trauma for inclusion in the registry. See Section F for more information on trauma scoring systems. If the Trauma Registry is part of a larger system i.e. submitting data to provincial or national registry, the definition of trauma may be expanded to meet the needs of specific Trauma Registries as long as the standards for the provincial and national registries are being met.
4. **Inclusion and Exclusion Criteria**: Inclusion and exclusion criteria will also need to be decided. Again, if the Trauma Registry is part of a larger system, the inclusion criteria for the provincial and national registries must be met at a minimum and the individual registry should have the flexibility to expand on the inclusion criteria to be able to satisfy local program needs. These criteria should be defined with input from the multidisciplinary committee. See Section B and E for more detailed information regarding inclusion and exclusion criteria.

5. **Data Reporting**: Data reporting capabilities of the registry as well as data requirements of the trauma community served by the Trauma Registry must be taken into consideration when creating the types of reports to be generated from the registry. A needs assessment of the trauma stakeholders could be performed to identify the needs for specific trauma data reports. See Section M for more information regarding reports. Some data reporting capabilities may need to be discussed with the software vendor if the Trauma Registry is going to be developed by an external vendor. See Section G for information on Trauma Registry software vendors.

6. **Data edits**: Data edits are an essential aspect of any database. These edits can be developed at the local, provincial and national levels. Data edits sometimes referred to as data checks are often programmed into the Trauma Registry software to reduce the amount of errors performed at data entry. A data quality program that encompasses more than just data edits should be incorporated into any Trauma Registry. See Section J for more detailed information on Data Quality.

7. **Procedures for data requests and data access**: Policies and procedures for data requests and access to data are necessary to be able to track the usage of the database as well as identifying clearly defined restrictions to the use and level of access to the data. It is recommended to have standard data request form for all data requests whether internal or external to the organization. The policy and procedures should state the process for receiving the data request as well as filling the data request. The person within the program who has authorization for release of the data should also be documented within the procedure. A list of restricted data elements on the basis of privacy could also be included in this procedure. Although it is necessary to have release and access to data procedures, the Trauma Registry should be promoted for its availability and use within the trauma system and these procedures should be in place to safeguard the data and in no way prohibit its use. See Section Q for more information on database policies.
8. **Data Security**: A system for security of the data is of utmost importance specifically due to the confidential nature of the database. The system should be password protected for secure access to the data. In the situation of a multi user environment or network based Trauma Registry, usernames and passwords should be assigned to only those staff members with authorization for accessing this data. Some systems allow various levels of access to the database i.e. full access; view only; data entering only; data reporting; administrative, etc. A database administrator should be assigned with the responsibility of administering the levels of access and usernames and passwords. Physical security of hardware must also be assured. Encryption software should also be utilized, especially if the database is housed on a laptop, which is transported to less secure locations.

9. **Governance**: Governance of the Trauma Registry refers to the body that is responsible for the decision making and overseeing of the Trauma Registry. This body may be a provincial or national committee or an institute specific committee depending on the population included in the Trauma Registry. This body may be responsible for the approval of inclusion and exclusion criteria, data elements, data access, and reporting from the Trauma Registry. Within a trauma program there is often one staff member responsible for the Trauma Registry but it is recommended that a larger multidisciplinary body provides guidance and input for the governance of the registry.
E. Inclusion and Exclusion Criteria

Inclusion and exclusion criteria vary between Trauma Registries provincially, nationally, and internationally. In Canada, many trauma registries, including the NTR, use and ISS > 12 for inclusion in the trauma registry. Some Trauma Registries include all injury admissions with a hospital stay of > 2 days, and/or a stay in an intensive care unit, all trauma transfers in and out and all trauma deaths. Others include all injury hospitalizations regardless of ISS and patient length of stay. Certain trauma registries use a combination of ISS and other criteria such as trauma team activations regardless of ISS and patients that met the trauma team activations criteria and did not have the trauma team called. Another example includes ISS > 12 for blunt trauma and ISS≥9 for penetrating trauma. Although national and provincial standards must be met, flexibility for expansion of trauma registry inclusion criteria and datasets are essential to enable individual hospital data reporting and local Trauma Program needs.

The ICD-10-CA codes used to determine inclusion and exclusion in Canada are a specific range of Cause of Injury codes (see Appendix B). In the United States, the range of ICD-9 codes used for determining inclusion and exclusion are the injury 800-999 codes. More information on trauma inclusion criteria for the NTDB can be found at the following link:

http://www.ntddictionary.org/dataElements/datasetdictionary.html

The specific inclusion criteria for the Canadian NTR were as follows:

- ISS>12
- Has an ICD External Cause of Injury Code that meets the definition of trauma as described in the ICD-10 and ICD-9 Cause of Injury codes inclusion lists (for examples of ICD-10 codes, see Appendix B)
- Meets one of the following criteria:
  1. Admitted to a trauma hospital; or
  2. Treated in the Emergency Department of a trauma hospital (not admitted); or
  3. Death in the Emergency Department of a trauma hospital after treatment is initiated (not admitted)
Examples of Inclusion Criteria:

**Ontario Trauma Registry:**

A trauma case is included in the OTR CDS if it:
- Has an ISS greater than or equal to 12 in the 2005 version of AIS, and,
- Has an ICD external cause of injury code that meets the definition of trauma in the OTR as outlined in Appendix B and;
- Meets one of the following criteria: – Admitted to a participating facility; or – Treated in the emergency department of a participating facility but not admitted; or – Died in the emergency department of a participating facility after treatment was initiated but prior to admission.
- Regardless of the above, if the Trauma Team was activated (as of April 1, 2011).

**Nova Scotia Trauma Registry:**

**Inclusion** in the Nova Scotia Trauma Program Registry’s Major Injury Dataset is based on the following criteria: Injuries resulting from a transfer of energy (mechanical, chemical or thermal) and resulting in an anatomical lesion due to an appropriate mechanism described by the Inclusion ICD-10-CA External Cause of Injury codes (National Trauma Registry ICD-10-CA External Cause of Injury Code Inclusions and Exclusions) **AND**

<table>
<thead>
<tr>
<th>Event</th>
<th>ISS ≥ 12* for blunt, burn or drowning/asphyxia trauma</th>
</tr>
</thead>
<tbody>
<tr>
<td>or…</td>
<td>ISS ≥ 9* for penetrating trauma</td>
</tr>
<tr>
<td>or…</td>
<td>Trauma Team activation with/without admission to acute care facility, regardless of ISS</td>
</tr>
<tr>
<td>or…</td>
<td>Death in the Emergency Department due to appropriate mechanism of injury, regardless of ISS</td>
</tr>
<tr>
<td>or…</td>
<td>Death within 24 hours of admission to DTC/TTC due to appropriate mechanism of injury, regardless of ISS</td>
</tr>
<tr>
<td>or…</td>
<td>Death at the scene due to appropriate mechanism of injury, regardless of ISS</td>
</tr>
<tr>
<td>or….</td>
<td>Predetermined inclusion at another trauma centre, where the individual has been treated and admitted, prior to transfer to a second, or third trauma centre for continuing care of initial injury.</td>
</tr>
</tbody>
</table>

*Effective April 2011, the ISS criteria may be met in either AIS’90 or AIS’05 and hangings, drownings and other asphyxias with an ISS >= 12 will also be included.
Effective April 1, 2015, the AIS 90 discontinued.

**Exclusions** to the NSTPR include all injuries which do not meet the above criteria, medical errors and Non-Trauma Team Activations discharged from the Emergency Department.
### New Brunswick Trauma Registry:

<table>
<thead>
<tr>
<th>Trauma Registry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inclusion</strong></td>
</tr>
<tr>
<td>1. Local Injury AND CTAS level 1, 2, 3 or not documented.</td>
</tr>
<tr>
<td>2. Injury AND CTAS 4-5 falls for patients 0-15 years.</td>
</tr>
<tr>
<td>3. Transfers seen in Emergency on arrival.</td>
</tr>
<tr>
<td>4. DOAs/DIEs.</td>
</tr>
<tr>
<td>5. Coroner’s cases.</td>
</tr>
<tr>
<td>6. All patients with any identifiable quality issue.</td>
</tr>
<tr>
<td><strong>Exclusion</strong></td>
</tr>
<tr>
<td>1. CTAS level 4 and 5 (including falls for Age &gt;15)</td>
</tr>
<tr>
<td>2. Intentional overdose</td>
</tr>
</tbody>
</table>

**Data Requirements**

- Patients with ED disposition of Discharged: See user guide for required fields
- Admitted Patients: See user guide for required fields.

**ISS > 12**

A trauma case is included in the National Trauma Registry CDS if it

- Has an ISS greater than 12, using an international scoring system created to calculate the severity of injury; or *ISS greater than 9, for all penetrating injuries*; and
- Has an ICD external cause of injury code that meets the definition of trauma; and
- Meets one of the following criteria:
  1. Admitted to a participating hospital; or
  2. Treated in the emergency department of a participating hospital (not admitted); or
  3. Died in the emergency department of a participating hospital after treatment was initiated (not admitted).

### Alberta Trauma Registry:

ISS > 12 or have a penetrating mechanism (regardless of ISS) and be admitted to the trauma center or die in the emergency department.
# B.C. Trauma Registry:

**BC TRAUMA REGISTRY INCLUSION CRITERIA - April 1, 2015 Separations Onwards**

<table>
<thead>
<tr>
<th>TTA</th>
<th>ADULT (≥ 15 YEARS OF AGE)</th>
<th>PEDIATRIC (&lt; 15 YEARS OF AGE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All admitted trauma team activations and/or all admitted patients that met Trauma Team Activation (TTA) criteria, regardless of any other factor.</td>
<td>All admitted and have an Injury Severity Score (ISS) ≥ 29. Be admitted to the Trauma Registry facility regardless of ISS.</td>
</tr>
<tr>
<td></td>
<td>This includes all admitted cases where the trauma team was activated and those where the admitted patient met TTA criteria, but an activation was not called. It also includes admitted cases where the trauma team was activated and the patient did not meet TTA criteria.</td>
<td>AND Be admitted within 21 days of sustaining the injury.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>ADULT (≥ 15 YEARS OF AGE)</th>
<th>PEDIATRIC (&lt; 15 YEARS OF AGE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All transfers out of a Trauma Registry facility for the purpose of providing trauma care and all admitted transfers into a Trauma Registry facility for the purpose of providing trauma care, regardless of ISS. Include patients seen only in the Emergency department who are transferred to a higher level of care for admission. Also include patients transferred into the Emergency department and admitted, but do not include patients who are transferred into the Emergency department and discharged home without admission. The facility that initiates the transfer to your facility or which receives the patient on transfer from your facility must be an Acute Care Facility. This does not need to be a Trauma Registry facility.</td>
<td>All treated at a Trauma Registry facility (VGH, SMH, BCCH, CHC, CH, VCH, VGH, RMH, MG, or UHNBC) for treatment of a trauma diagnosis caused by external causes of injury codes (E-codes) as defined by ICD-10-CA (V01 - V09, V10 - V19, W00 - W06, W10 - W19, W20 - W24, W30 - W39, W40 - W44, W60 - W64, W70 - W79, W80 - W84, W90 - W96, X00 - X08, X10 - X19, X20 - X21, X22 - X23, X24 - X29, X30 - X39, X40 - X44, Y00 - Y09, Y10 - Y19, Y20 - Y22, Y23 - Y29, Z00 - Z09, Z10 - Z90).</td>
</tr>
<tr>
<td></td>
<td>AND Be treated within 21 days of sustaining the injury. OR have held a continuous admission between Acute Care Facilities resulting in a length of time ≥ 21 days from the date of injury (treatment must have been initiated within 21 days of injury).</td>
<td>AND</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>ADULT (≥ 15 YEARS OF AGE)</th>
<th>PEDIATRIC (&lt; 15 YEARS OF AGE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All deaths regardless of ISS, including those patients pronounced dead in the Emergency Department (even if no intervention was performed) and those pronounced dead after receiving any evaluation or treatment during the hospital admission.</td>
<td>All treated at a Trauma Registry facility (VGH, SMH, BCCH, CHC, CH, VCH, VGH, RMH, MG, or UHNBC) for treatment of a trauma diagnosis caused by external causes of injury codes (E-codes) as defined by ICD-10-CA (V01 - V09, V10 - V19, W00 - W06, W10 - W19, W20 - W24, W30 - W39, W40 - W44, W60 - W64, W70 - W79, W80 - W84, W90 - W96, X00 - X08, X10 - X19, X20 - X21, X22 - X23, X24 - X29, X30 - X39, X40 - X44, Y00 - Y09, Y10 - Y19, Y20 - Y22, Y23 - Y29, Z00 - Z09, Z10 - Z90).</td>
</tr>
<tr>
<td></td>
<td>AND Be treated within 21 days of sustaining the injury.</td>
<td>AND</td>
</tr>
</tbody>
</table>

**EXCLUSION CRITERIA FOR ADULT & PEDIATRIC TRAUMA PATIENTS**

Exclusions include, but are not limited to:

- Daycare and Outpatient encounters
- Falls / injuries: admission for underlying problem (seizure, syncope, general debility, weakness) rather than for injuries sustained.
- Pathological fractures.
- Cellulitis/Infection/Abcess arising as complications of lacerations, animal bites, etc.
- Poisonings / overdoses.
- Decompression sickness.
- Fractures that are old or indeterminate if a fall occurred.
- Foreign body in hollow viscous (esophagus, rectum, etc.).
- Planned readmissions within 21 days of injury with definitive trauma treatment addressed in previous admission.
- Some elderly (≥65 years) patients with isolated hip fractures due to some same level falls (see Same Level Fall Guidelines for Adult Patients ≥ 65 Years of Age below).
- Some readmissions: (see Readmission Guidelines below)
### SAME LEVEL FALL GUIDELINES FOR ADULT PATIENTS ≥ 65 YEARS OF AGE

**An isolated hip and/or pelvic fracture refers to one or more of the following fractures with no other injury:**

- Femoral head
- Intertrochanteric
- Greater or lesser trochanteric
- Pubic ramus
- Ilium
- Femoral neck
- Subtrochanteric
- Acetabular
- Symphysis pubis
- Coccyx

#### EXCLUSION CRITERIA

Exclude all elderly patients (≥ 65 years of age) with isolated hip fractures and/or isolated pelvic fractures that result from *same level falls*. These same level falls must be due to a loss of balance not influenced by an external force and/or not involving recreational or sporting equipment. Exclude falls from a chair, wheelchair, not in motion, bed, curb, and same level slips on ice or snow. When excluding cases, consider the mechanism and force contributing to the fall (excluded falls could be described as crumble-like or may be due to slipping, tripping, stumbling or bumping into an object with no documented excessive force).

This exclusion rule is *regardless of ISS* and applies only when there is no other injury in addition to the hip and/or pelvic fracture(s) OR when the only additional injuries are soft tissue injuries that are assigned to the External Body Region and have a severity of either 1 or 2 in AIS 2005. These soft tissue injuries are assigned to the following AIS 2005 codes:

<table>
<thead>
<tr>
<th>Region</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>11000.1, 11020.1, 11040.1, 11060.1, 11064.1, 11064.2, 11068.1, 11080.1, 11080.2</td>
</tr>
<tr>
<td>Face</td>
<td>21000.1, 21020.1, 21040.1, 21060.1, 21064.1, 21064.2, 21068.1, 21080.1, 21080.2</td>
</tr>
<tr>
<td>Neck</td>
<td>31000.1, 31020.1, 31040.1, 31060.1, 31064.1, 31064.2, 31068.1, 31080.1, 31080.2</td>
</tr>
<tr>
<td>Thorax</td>
<td>41000.1, 41020.1, 41040.1, 41060.1, 41064.1, 41064.2, 41068.1, 41080.1, 41080.2</td>
</tr>
<tr>
<td>Abdomen</td>
<td>51000.1, 51020.1, 51040.1, 51060.1, 51064.1, 51064.2, 51068.1, 51080.1, 51080.2</td>
</tr>
<tr>
<td>Upper Extremity</td>
<td>61000.1, 61020.1, 61040.1, 61060.1, 61064.1, 61064.2, 61068.1, 61080.1, 61080.2</td>
</tr>
<tr>
<td>Lower Extremity</td>
<td>71000.1, 71020.1, 71040.1, 71060.1, 71064.1, 71064.2, 71068.1, 71080.1, 71080.2</td>
</tr>
<tr>
<td>External</td>
<td>81000.1, 81020.1, 81040.1, 81060.1, 81064.1, 81064.2, 81068.1, 81080.1, 81080.2</td>
</tr>
</tbody>
</table>

**Note:** These codes fall under one of the following guidelines in AIS 2005:

- Use the following suffix for blunt soft tissue injury to the ________. Assign to External Body Region for calculating an ISS.

  "body region (e.g., scalp, face, lower extremity, etc.)"

- Use this category if penetrating injury does not involve bone or internal structures. Assign to external body region for calculating an ISS.

#### INCLUSION CRITERIA

Include elderly patients (≥65 years of age) with isolated hip and/or pelvic fractures resulting from same level falls when the **ISS is ≥9 AND one or both** of the following is true:

- The same level fall was influenced by an increased rate of movement, an external force, and/or use of recreational or sporting equipment. For example, included falls may consist of being bumped, struck or pushed by a person or object, or a fall involving recreational or sporting equipment.
- There are additional injuries that are not soft tissue injuries as listed in the exclusion criteria. For example, include a case with a hip fracture and radius fracture, as the ISS is ≥9 and the radius fracture is an additional injury that is not a specified soft tissue injury.

Include all elderly patients (≥65 years of age) with isolated ilium, sacrum, or sacroiliac joint fractures from same level falls when the **ISS is ≥9**.
F. Standards

1. Scoring Systems
Several injury severity scales exist in practice and in the literature. They represent, literally, an alphabet soup of assessment. The sheer number of scales arises from the markedly different perspectives used in the application of the scales.

Preferences for certain scales exist among differing disciplines. The assessment of motor vehicle injuries, for example, relied mainly on the AIS (Abbreviated Injury Scale) for several years. The assessment of trauma relies today on the GCS (Glasgow Coma Scale). Even more scales have been developed to supplement and overcome the limitations of these two primary scales.

1.1 Physiologic Scores

1.1.1 Glasgow Coma Scale (GCS) – The Glasgow Coma Scale commonly referred to as GCS is a neurological scale that aims to give a reliable, objective way of recording the conscious state of a person for initial as well as subsequent assessment. It was first published in 1974. The GCS is commonly used to assess the severity of traumatic brain injuries, including closed-head injuries. The GCS evaluates visual, motor and verbal responses to stimuli. Limitations of its use include the intubated patient and those with orbital swelling.
For more information about the GCS access the following link: http://www.allabouttbi.com/glasgow-coma/.

1.1.2 Revised Trauma Score (RTS) – “The Revised Trauma Score is a physiological score, calculated from the first set of patient Glasgow Coma Scale, systolic blood pressure and respiratory rate. The RTS has been proven to be a good predictor of mortality. The RTS ranges from 0 to 7.8408 indicating dead and 7.8408 being normal.”

1.1.3 Pediatric Trauma Score (PTS) – The Pediatric Trauma Score is a trauma triage tool developed specifically for the pediatric population (< 16 years of age). Weight, airway, systolic BP, pulses, CNS, fractures, wounds are assigned values and added together to provide a total score ranging from -6 to +12. A score of +12 indicates a minor trauma and –6 is usually incompatible with life.

1.1.4 Acute Physiology and Chronic Health Evaluation (APACHE) - The Acute Physiology and Chronic Health Evaluation (APACHE) measures the severity of illness. It is used to assess medical and surgical intensive care unit patients. The APACHE system measures the patient’s preadmission health status, age, and physiologic state within the first 24 hours of admission to the intensive care unit. This tool is valuable in the prediction of mortality in different patient populations; it does not perform well in prediction of mortality in the trauma patient.
1.1.5 **Systemic Inflammatory Response Syndrome (SIRS) Score** - The Systemic Inflammatory Response Syndrome (SIRS) Score is a calculated score using an additive function of the patient temperature, heart rate, respiratory rate, and white blood cell count. The maximum score is 4. The SIRS score has been demonstrated as a tool to predict outcome in critical surgical illness.


1.2 **Anatomic Scores**

1.2.1 **Abbreviated Injury Scale (AIS)** – The abbreviated injury scale (AIS) is the only dictionary specifically designed as a system to define the severity of injuries throughout the body. In addition to a universal injury language, it provides measures of injury severity that can be used to stratify and classify injury severity in all body regions.


1.2.2 **Injury Severity Score (ISS)** - Created by Baker et al. in 1974 has been considered for over 20 years to be the gold standard to classify trauma victims, both blunt and penetrating. The ISS is an anatomical scoring system that provides an overall score for patients with multiple injuries. Each injury is assigned an Abbreviated Injury Scale (AIS) score and is allocated to one of six body regions (Head, Face, Chest, Abdomen, Extremities (including Pelvis), External). Only the highest AIS score in each body region is used. The 3 most severely injured body regions have their score squared and added together to produce the ISS score. The ISS score takes values from 0 to 75. The greater the score value, the greater the severity of patient, and, consequently greater mortality.

The ISS does have significant limitations, most notably, the ISS does not account for multiple injuries to a single body region or for differences in severity across body regions.


1.2.3 **New Injury Severity Score (NISS)** - The New Injury Severity Score (NISS) was developed in an attempt to address certain limitations of the ISS, specifically the patient with multiple injuries to one body region. The NISS uses the three most severe AIS scores in any body region.

1.2.4 Anatomic Profile (AP) –

Presented to improve on the ISS by including all the serious injuries in a given body region. It also weights head and torso injuries more heavily than those in other body regions. It summarizes all serious injuries (AIS3) into four categories:

- Category A - Head and spinal cord
- Category B - Thorax and anterior neck
- Category C - All remaining serious injuries
- Category D - All non-serious injuries.

Each component is calculated as the square root of the sum of squares of the AIS scores of all serious injuries within each region. A region with no injury receives a score of zero. Using logistic-regression analysis a probability of survival is calculated. The AP performs better than the ISS in discriminating survivors from non-survivors and may provide a more rational basis for comparing injury severity between patients.

Limitations:

- Mathematical complexity
- Only modest improvement in predictive performance

The Anatomic Profile (AP) assigns weights to injuries in each of three body regions. It allows the use of more than one AIS code per body region and includes AIS \( \leq 2 \) injuries to calculate survival probability. It has not surpassed the ISS in the prediction of mortality.


1.2.5 Penetrating Abdominal Trauma Index (PATI) – The Penetrating Abdominal Trauma Index or PATI was “designed to quantitate the risk of complications in patients with penetrating abdominal injuries requiring laparotomy. It is used to assess the severity of injury in patients with knife, gunshot or other penetrating wounds to the abdomen.

It is calculated by assigning each intra-abdominal organ a risk factor (1-5), then multiplying this number by a severity grade (from 1, minimal injury, to 5, maximal injury). The final Penetrating Abdominal Trauma Index is then obtained by adding together the individual organ scores.

PATI has been used to measure injury severity in penetrating abdominal trauma in order to assist the surgeon in categorizing the patients at risk of developing complications, and even in decision-making techniques for repairing intra-abdominal organs according to its severity score [2].

Practically, the PATI score examines fourteen organs and assigns a risk factor from 1-5 (eg, pancreas=5, spleen=3, bladder=1) to each organ. Injuries to any organ are graded by severity from 1 for minimal injury (eg, tangential wound to the pancreas) to 5 for maximal injury (eg, pancreatic proximal duct disruption). The severity grade is multiplied by the risk factor.
The final penetrating score is obtained by summing the individual organ scores. Scores of greater than 25 are associated with a complication rate of approximately 50%. The PATI score can be used to compare complication rates between different institutions.


1.2.6 ICD-based Injury Severity Score (ICISS) – “Based on readily available ICD-9 discharge diagnoses within the injury categories; ICISS was introduced in 1997 to calculate survival risk ratios. ICISS has the advantage of being calculated from readily available computer data contained in hospital discharge summaries, without incurring the additional cost of calculating AIS. Thus, in theory it can be used to compare outcomes from both trauma centers and institutions lacking dedicated trauma registries. ICISS remains incompletely validated. Newer ICISS systems based on ICD-10 codes are currently under investigation and may outperform ICISS-9 in terms of survival prediction”.


1.2.7 Harborview Assessment for Risk of Mortality (HARM) The Harborview Assessment for Risk of Mortality (HARM) is a predictor of in-hospital mortality after trauma. “The HARM score is calculated using ICD codes for anatomic injury and comorbid conditions, mechanism, intent (e.g., self-inflicted or unintentional injuries), interactions between specific injury categories (e.g., combined chest wall and liver injuries), and age, for a total of 80 variables”. One study demonstrated that the HARM score outperformed TRISS and ICISS.


1.2.8 Organ Injury Scaling (OIS) - The Organ Injury Scale, developed by the American Association for the Surgery of Trauma in 1987 grades thoracic and abdominal organ injuries on an ordinal scale from 1 to 6, with 1 being minor, and 6 being complete organ destruction incompatible with life.


1.3 Combined Scores

1.3.1 Trauma and Injury Severity Score (TRISS) – The TRISS was developed from Major Trauma Outcome Study (MTOS) and is a predictor of probability of survival in the trauma patient. It uses the RTS on admission to hospital, ISS and age in the calculation. The TRISS is not valid in the intubated patient since the RTS is based on GCS which would not have a valid verbal component if the patient was intubated.

1.3.2 A Severity Characterization of Trauma (ASCOT) – A Severity Characterization of Trauma (ASCOT) “is a probability of survival model. “ASCOT calculates Ps using age, mechanism of injury, and AIS and RTS scores by a logistic regression.


2. Outcome Measures

There are many different methods of measuring outcomes from simple hospital discharge status of alive or dead to more complex measures requiring patient follow up to evaluate level of dependence in daily functioning to level of disability, pain, general health and ability to return to work. Some outcome measures are described below.

2.1 z and W – z and W are outcome evaluation results for adult blunt, adult penetrating and pediatric (< 15 years of age) trauma patients. z measures the statistical significance of the differences between the actual number of survivors among a set of patients and the expected number of survivors from outcome norms (MTOS). W is only calculated when z is statistically significant (>/= 1.96). W measures the clinical significance of statistically significant differences between the actual number of survivors and the expected number of survivors from outcome norms (MTOS). A positive W score is the number of survivors more than would be expected from outcome norms. A negative W score is the number of survivors less than would be expected from outcome norms. Statistical power (the ability to detect differences) increases with sample size. Because of this, W values on small patient samples sizes should be considered preliminary.


2.2 Glasgow Outcome Scale (GOS) – The Glasgow Outcome Scale is a 5 point scale used to assess level of functioning of patients suffering a traumatic brain injury. It is not used for the patient’s clinical management but to assess their level of recovery post brain injury in research. Common intervals for the GOS to be evaluated in patients are 3, 6 and 12 months post injury. The Score is as follows:

<table>
<thead>
<tr>
<th>Score</th>
<th>Rating</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Good Recovery</td>
<td>Resumption of normal life despite minor deficits</td>
</tr>
<tr>
<td>4</td>
<td>Moderate Disability</td>
<td>Disabled but independent. Can work in sheltered setting</td>
</tr>
<tr>
<td>3</td>
<td>Severe Disability</td>
<td>Conscious but disabled. Dependent for daily support</td>
</tr>
<tr>
<td>2</td>
<td>Persistent vegetative</td>
<td>Minimal responsiveness</td>
</tr>
<tr>
<td>1</td>
<td>Death</td>
<td>Non survival</td>
</tr>
</tbody>
</table>

2.3 **Extended GOS (EGOS)** - The extended GOS is an adaptation of the GOS expanded to an 8 point scale. The values are:
1. Dead
2. Vegetative State
3. Lower Severe Disability
4. Upper Severe Disability
5. Lower Moderate Disability
6. Upper Moderate Disability
7. Lower Good Recovery
8. Upper Good Recovery


2.4 **Los Amigos Ranchos Scale** - The Los Amigos Ranchos Scale is another tool used to assess the level of recovery of the traumatic brain injured patient. This tool evaluates the patients cognitive functioning. It is based on an 8 level scale:
1. No response
2. Generalized response
3. Localized response
4. Confused and agitated
5. Confused and inappropriate, non-agitated
6. Confused and appropriate
7. Automatic and appropriate
8. Purposeful and appropriate


2.5 **Functional Independence Measure (FIM)** - The FIM is a measure of disability used in the rehabilitation community. It measures what the patient is able to do based on a scale with 7 levels of dependence; 1 being complete dependence and 7 being complete independence. A score of between 1 and 7 is applied to 18 activities of daily living including self-care, sphincter control, mobility, locomotion, social cognition and communication. The tool is delivered by direct observation of the patient.

For more information about the FIM see: http://www.udsmr.org.
2.6 WEE FIM - The WEE FIM is a modified FIM for children and adolescents. For more information about the WEE FIM see: http://www.udsmr.org/WebModules/.

2.7 SF 36 - The SF 36 is a health survey consisting of 36 questions resulting in an 8-scale profile designed to measure physical and mental components of Health. It has proven useful in comparing the burden of disease in specific populations. For more information about the SF 36 see: http://www.sf36.org/tools/sf36.shtml.

2.8 SF 12 - The SF 12 is a shorter version of the SF 36. It is a 1 page survey that can be performed in 2 minutes. For more information visit the following link: http://www.sf-36.org/tools/sf12.shtml.

2.9 Functional Capacity Index (FCI) - The Functional Capacity Index is a measure applied to the nonfatal injured individual or populations. It characterizes functional limitation on 10 dimensions including cognitive functioning. The predicted Functional Capacity Index was designed to assign a score based on functional state one year post injury. This was developed by a team of experts reviewing each AIS code reaching consensus on the functional state of the injured patient with only that one injury. This was initially applied to the AIS 98 and then to the AIS 2005 and update 2008. This application of the FCI has been incorporated into the AIS 2005 Update 2008 dictionary.

3. Coding Classifications

3.1 ICD – International Classification of Diseases - The International Classification of Disease, 9th Revision, Clinical Modification (ICD-9-CM) is based on the official version of the World Health Organization’s 9th Revision, International Classification of Diseases (ICD-9). ICD-9 is designed for the classification of morbidity and mortality information for statistical purposes and for the indexing of hospital records by disease and operations, for data storage and retrieval. ICD-9-CM also includes a procedural classification.

ICD-10-CA is a Canadian enhancement of the World Health Organization’s International Statistical Classification of Diseases and Related Health Problems, Tenth Revision or ICD-10. “ICD-10-CA was developed by the Canadian Institute for Health Information (CIHI) in collaboration with an expert panel of physicians, external field reviewers and the CIHI classification team.” “The Canadian modifications were made to permit specific capture of conditions and external factors contributing to disease and injury that are important to Canadian ministries of health, health care agencies and researchers.” “ICD-10-CA classifies diseases, injuries and causes of death, as well as external causes of injuries and poisoning.” “The arrangement of elements in ICD-10-CA is based on the physician point of view, i.e. diseases, injuries and health related problems as described in medical diagnoses. As a statistical classification, ICD-10-CA is confined to a limited number of mutually exclusive categories. In other words, it provides for one, and only one category for each and every possible disease or morbid condition.” Residual or catch-all categories are provided for less specific and miscellaneous conditions. Conditions have been grouped in a way that was felt to be most suitable for general epidemiological purposes and the evaluation of health care.

ICD-10-CA is described as a variable-axis classification with alphanumeric codes. The primary axes or criteria are based on epidemic diseases, constitutional or general diseases, local diseases arranged by site, developmental diseases and injuries. The classification contains two major components, the tabular list and the alphabetic index. The tabular list is the actual classification, and consists of codes organized in alphanumeric order by chapters, blocks and categories. The alphabetic index is an extensive list of diagnostic terms typically found in healthcare documentation, (Fletcher 2.7) which leads to the codes in the tabular list. Both ICD-10-CA and the Canadian Classification of Health Interventions (CCI) were adopted as the exclusive national standards for diagnosis and procedure classification as of April 1, 2001.
G. Trauma Registry Software Vendors

There are different software vendors that develop and support Trauma Registry Products.

The software vendor being used by the provinces in Canada except for Quebec is Collector Trauma Registry by Digital Innovations Inc. In selecting a software vendor it is important to ensure flexibility to customize the software to support the needs of the individual Trauma Program as well as innovation to keep up with the evolving nature of trauma systems and technology and how it relates to data collection, coding systems and reporting. A list of the common software vendors who specialize in Trauma Registry products follows:

Product: Collector Trauma Registry

Vendor: Digital Innovation, Inc.
Website: http://www.dicorp.com/

Digital Innovations, Inc.
302 Dove Court
Trauma Registry
Forest Hill, MD 21050
Phone: 410-838-4034
Toll Free in US and CA 800-344-3668
Fax: 410-893-3199
www.dicorp.com

Product: NTRACS (National TRACS)

Vendor: Digital Innovation, Inc.
Website: http://www.dicorp.com/

Digital Innovations, Inc.
302 Dove Court
Trauma Registry
Forest Hill, MD 21050
Phone: 410-838-4034
Toll Free in US and CA 800-344-3668
Fax: 410-893-3199
www.dicorp.com
Product: TramaBase 9  
Vendor: Clinical Data Management  
Website: [http://www.c-d-m.com/](http://www.c-d-m.com/)  
Clinical Data Management  
PO Box 279  
Conifer, CO 80433  
Support Department  
supporthub@c-d-m.com  
(303) 670-3331 Ext 2

Product: TraumaOne  
Vendor: Lancet Technology  
Website: [http://www.lancettechnology.com/](http://www.lancettechnology.com/)  
Corporate Office  
123 South Street  
3rd Floor  
Boston, MA 02111, U.S.A.  
Phone:  
1-617-728-7272  
Toll Free (US): 1-800-3-LANCET

Product: ImageTrend  
Vendor: ImageTrend Inc.  
Website: [http://www.imagetrend.com/](http://www.imagetrend.com/)  
20855 Kensington Blvd.  
Lakeville, MN 55044, U.S.A.  
Toll Free: 888.469.7789  
Phone: 952.469.1589  
Fax: 952.985.5671  
www.imagetrend.com
H. Data Sources

These sections include sources of data for identifying major trauma to abstract and enter data into the trauma registry, with a short description of the data source, and the relevant information for the trauma registry. This table also includes additional data sources that can be used to supplement trauma registry data for injury reporting on a larger minor injury population that may not be included in the registry.

| Patient Chart | A compiled documentation of a patient’s medical history and care for all visits to a hospital as an outpatient or as an inpatient, important facts and care of the progress of a patient from admission to discharge filed in a folder and identified with a number, usually called as HRN (health record number) or MRN (medical record number). The patient chart may be stored in hard copy or electronically. | Documentation includes: patient demographics at the time of visit, discharge summary, history and physical, physician’s orders, progress notes, diagnostic imaging results, nurse’s notes, transfer notes, and other relevant data required by the trauma registry |
| Electronic Health Record | A Clinical data repository of Online documentation linking hospitals, communities, physicians and other services, to provide a complete picture of a patient’s health history. This will help speed the flow of information into the system. Access to a patient record uses a number, such as health record number, name or provincial health care card number. Includes clinical data, practitioner alerts and reminders, and clinical decision support systems. Allows for sharing of data on a large scale. | -Patient demographics  -Patient location on admission, discharge, or transfer  -Results of patient’s laboratory tests, diagnostic imaging  -Physician’s orders and progress notes  -Multidisciplinary progress notes  -Transcribed reports such as consultations, OR reports, discharge summaries |
| **Discharge Abstract Database or DAD** | **DAD** contains patient demographic, administrative and clinical data for all hospital discharges (inpatient acute, chronic, rehab) and day surgeries in the hospital. Data collected is used by Government bodies, hospitals and health authorities to evaluate the performance of a health system, looking at health care services, health spending, health human resources and population health. Managed by the health records department of the hospital. | **-** Trauma patient population data are extracted for external cause codes, operative and injury diagnosis codes, demographics, comorbidities, complications, service transfers, consultations, etc. |
| **Emergency Health/ Medical Services** | -Responds to emergency calls through 911  
-Access to patient information are governed by the applicable Provincial legislation / Ambulance Records/ Systems  
-Patient Care Records are reports completed by EHS/EMS at the scene and through transport prior to transfer of patient care to hospital staff  
- Paper-based or electronic | -Generates Patient Care Records  
-Important data include: dates and times of injury and treatment, dates and times EMS arrived, departed scene, transferred care, mechanism of injury, vital signs (SBP, pulse, respiratory rate, GCS at the scene) and treatment given to patients while in the care of EHS/EMS |
| **Coroners Service** | -Responsible for the investigation of all sudden, unexpected and unexplained deaths.  
-Generates autopsy reports, which identify the deceased, and the cause of death.  
- Access to information is governed by the Department of Justice. | -Autopsy reports provide useful details of injuries in addition to hospital documentation  
-Death data plays a role in supporting front end of injury prevention and surveillance. |
| **Vital Statistics** | -Responsible for providing certificates for vital events such as birth, deaths or marriages  
- Access to information is governed by applicable Provincial legislation. | -Useful for patient identification and informing of all deaths in a province, including causes and demographic info.  
-Data collected is used to calculate death rates, causes and life expectancy. |
<table>
<thead>
<tr>
<th>Ministry of Health</th>
<th>Works with the various regions and health authorities to provide quality, appropriate and timely health services. The ministry sets province wide goals, standards and performance agreements. Responsible for providing funding to the health authorities for services provided.</th>
<th>Houses Minimal dataset (DAD) for some provincial registries</th>
</tr>
</thead>
<tbody>
<tr>
<td>NACRS or National Ambulatory Care Reporting System</td>
<td>-Provides data for hospital-based and community-based ambulatory care: day surgery, outpatient clinics and emergency departments</td>
<td>-Can include ED deaths, ED admissions and pseudo visits Injury surveillance for non-admitted patients.</td>
</tr>
<tr>
<td>Provincial Trauma Registry</td>
<td>A complete trauma registry containing data abstracted on patients with a traumatic mechanism from all trauma centers within the province, meeting inclusion criteria. Allows for the ability to standardize care in a system, and compare data across the province and implement performance improvement programs using the same data source.</td>
<td>-Provides injury and mechanism trends for the province -Provides data to healthcare providers to improve the quality of care to patients with a traumatic mechanism.</td>
</tr>
</tbody>
</table>
| National Trauma Registry  
| http://www.cihi.ca/ntr | -Managed by CIHI. Provides data to study national injury epidemiology, facilitates provincial and international injury comparisons, increasing awareness of injury as a public health problem in Canada, informs injury prevention program and facilitates research on injury patterns. Data is sent to the NTR from participating trauma registries across Canada. The NTR no longer exists as it is not supported anymore by the governing body. Effective March 2012, last year of data available 2010-2011. | -Includes a comprehensive data set containing data on patients hospitalized with a major trauma. Facilitates reporting major injury and hospitalizations due to injury at a national level. |
| NTDB stands for National Trauma Data Bank / TQIP  
| http://www.facs.org/trauma/ntdb.html | -The largest collection of trauma registry data from trauma centres in the United States and Puerto Rico. Goal is to inform the medical community, public and decision makers on the current state of care of the injured person. In the US and Puerto Rico, and now includes some Canadian sites. | Participant in the NTDB/TQIP is available to Canadian hospitals. Allows comparative reporting with peer hospitals in the US and to elevate the quality of care for trauma patients in your trauma centre. |
I. Data Collection Process

There are a variety of approaches to data collection for a trauma registry. Depending on the nature, resources available and use of the trauma data, these factors will determine the best data collection process to be used for the program. A concurrent data collection process involves identifying the trauma patient and collecting data upon patient admission to hospital and updating the data during the patients’ hospital stay. This system would be used if real time trauma patient reporting is required and if using the database for Trauma Performance Improvement, identifying patients for Trauma Case Management, and Clinical Trials and concurrent Trauma Research. Retrospective data collection involves collecting and entering data after patient discharge from hospital. Trauma Registry data from a retrospective data collection system is valuable for retrospective Trauma Research and reporting. A retrospective data collection process requires less staff resources since the record is typically accessed once. A combined concurrent and retrospective approach to Trauma Registry data collection may be used as well. The combined system involves identifying the trauma patient and entering select initial trauma data upon admission to hospital and collecting the remaining patient information throughout the admission and/or following discharge from hospital. This system allows for initial patient identification for Trauma Case Management, Clinical Trials, concurrent Trauma Research and preliminary demographic reporting. More detailed information on these data collection processes follow.

1. Concurrent

Concurrent data collection refers to identifying trauma patients and conducting data collection and data entry at the time of admission to the hospital and during the patients stay in hospital. The purpose of using this system would be to assist in monitoring quality of trauma patient care in order to affect change immediately and to improve timeliness of data collection and real time reporting. This system involves repeated access to the patients chart. The following is a procedure that may be followed:

- Identify the trauma population daily. Data capture could be achieved using daily admissions listing or computerized data downloading process. Select trauma-related admissions using the admitting diagnosis.
- Determine eligibility of trauma admission to the registry, i.e. does this patient meet trauma registry inclusion criteria? This step depends on the site’s definition of eligibility of trauma admission to the registry if it is different from the provincial criteria. For example, a site could define eligibility of trauma admission based on Injury Severity Score (ISS), admission status or death in emergency department or based on the patient’s length of stay (LOS) in the hospital.
- Abstract the required data elements for eligible trauma admissions to the Trauma Registry software.
- Follow the patient and enter additional information as required until patient discharge.

- Important Notes:
  To ensure completeness of trauma patient capture in trauma registry, a reconciliation process needs to be set in place. The reconciliation process may include checking admissions against discharge data to ensure that all trauma admissions and discharges per period are captured.
To ensure completeness of information required for the trauma registry, validations and checks must be run to ensure any missing information is identified and completed prior to closing of the record.

2. Retrospective

Retrospective data collection refers to identifying trauma patients and abstracting the information after discharge from hospital. In many cases this is done based on discharge diagnoses, i.e. all ICD-10 diagnoses with external cause codes meeting trauma registry inclusion criteria. The purpose of using a retrospective data collection system would be to populate a trauma registry and to support retrospective analysis of patient care, research and education. Retrospective analysis is also useful to ensure accuracy of data.

The following is a procedure that may be followed:

- Identify trauma population using ICD-10 discharge diagnoses with external cause codes or injury diagnosis codes or other trauma system patient identification process that is in place, i.e. trauma code notifications.
- Determine eligibility of trauma discharges to the registry, i.e. does this patient meet trauma registry inclusion criteria? Similar to the concurrent review, eligibility to the registry is site-specific if it is different from the provincial criteria.
- Abstract the required data elements for eligible trauma discharges to the trauma registry using Trauma Registry software.

3. Combined Concurrent and Retrospective

The combined system involves identifying the trauma patient and entering select initial trauma data upon admission to hospital and collecting and entering the remaining patient information throughout the admission and/or following discharge from hospital. The purpose of using a combined concurrent and retrospective data collection system allows for initial patient identification for Trauma Case Management, Clinical Trials, concurrent Trauma Research and preliminary demographic reporting with only two episodes of patient chart review. The combined approach can also be useful for concurrent review of a specific subgroup of the trauma population, for example all Trauma Team Activations.

The following is a procedure that may be followed:

- Identify the trauma population daily. Data capture could be achieved using daily admissions listing or computerized data downloading process. Select trauma-related admissions using the admitting diagnosis.
- Determine eligibility of trauma admission to the registry, i.e. does this patient meet trauma registry inclusion criteria? This step depends on the site’s definition of eligibility of trauma admission to the registry if it is different from the provincial criteria. For example, a site could define eligibility of trauma admission based on Injury Severity Score (ISS), admission status or death in emergency department or based on the patient’s length of stay (LOS) in the hospital.
- Abstract the data elements required for initial data collection for eligible trauma admissions to the trauma registry using Trauma Registry software.
- Upon patient discharge, access the chart and collect and enter the remaining data required for the Trauma registry using the Trauma Registry Software.
• If collecting only a subgroup concurrently, the remaining patients may be identified retrospectively via external cause codes. The concurrent cases must be reconciled against the retrospective list.

4. Data Downloads/Data Dump
The definition of a data download is the transfer of data from one computer program/file to another. Advantages of this process include: reduction in duplication of data collection and a decrease in the amount of data input errors to maximize the consistency, quality and timeliness of the data. In some instances, the institution may prefer to use a process of downloading data from other data systems into the trauma registry. This can include the download of few or many data fields. Examples of Databases with potential for Data Downloading are: the Discharge Abstract Database (DAD); Health Information Services abstracting databases such as 3M, Med2020, Meditech, etc.; and Emergency Health Services. Some common data downloads include Master Patient Index to database to registry and from local trauma registry to Provincial trauma registry (central site).
The following is a procedure that may be followed:

• Secure agreement with owner/manager of database from which data is to be obtained
• Identify specific data fields and review data definitions, field formats/sizes, tables required to ensure compatibility between databases
• Determine mapping issues and how to resolve them
• Negotiate programming required to achieve the process with the vendor/s
• Arrange format for receiving data
• Import data to Trauma Registry
• Complete additional data fields, as necessary

A database dump is also often used for backing up a database so that its contents can be restored in the event of data loss.

5. Interfaces
An interface is an interaction between computers, when data is entered into one Program or system, it automatically moves to another. There are several types of interfaces, for example:

• User interface- the keyboard, mouse, menus of a computer system. The user interface allows the user to communicate with the operating system.
• Software interface - the languages and codes that the applications use to communicate with each other and with the hardware.
• Hardware interface- the wires, plugs and sockets that hardware devices use to communicate with each other.

Contact the IT department of your facility for information of how to proceed with an interface to your Trauma Registry.
J. Data Quality

1. Data quality is the completeness, validity, consistency, timeliness and accuracy of data in relation to the use for which it has been compiled. “Garbage in, garbage out” is a negative cliché, however says it all, in relation to data quality. The quality, consistency and reliability of data must be the priority in the management of any database, in order to ensure useful information. Procedures must be in place to minimize and strive to eliminate errors, whether electronic or human. The following elements should be considered as part of the data quality process:

1.1 Qualified personnel – appropriately educated and properly trained individuals with a keen interest in detail and in achieving excellence in their work are optimal for collection, reporting and utilization of data

1.2 Source documents – complete, legible, and accessible source documents are essential

1.3 Imported/interfaced data – electronically created data must come from reliable sources and scrutinized for accuracy and compatibility with the receiving field formats and definitions

1.4 Computerized edit checks – many data fields can be electronically checked/cross-checked to improve logical accuracy, i.e., date sequence checks – discharge date/time must follow admission date/time

1.5 Tables & Pick-lists – many data fields can be limited to only accept options from a predetermined list of acceptable entries, or entries can be selected from a Pick-list to reduce text entries, often more prone to typographic errors

1.6 Data Dictionaries – complete definitions of every field in the database, the acceptable entries, formats, etc. are documented and used for training, reference and tracking of changes ensure standardization and consistency

1.7 Policies & procedures – processes and methods of practice and expectations for quality and consistency are vitally important and should be in keeping with institutional policies and Provincial and National legislation

1.8 Standards – common understanding and use of tools available within a specialized environment, such as a Data Dictionary, Coding methodologies, etc. reduces variation and interpretation of data

1.9 Re-abstracting/auditing/quality assurance activities – routine objective auditing of pertinent data fields, follow-up checks of identified problem areas, and validation of quality should be standard practice
1.10 Communications, discussions, networking – regular meetings or avenues for individuals involved in collecting and utilizing data, to address issues, questions, discrepancies, etc. enhance quality and consistency

1.11 Continuing education – maintaining up-to-date knowledge of constantly evolving technology and systems is essential, via conferences, in-person courses, on-line webinars, self-study, etc. on topics such as coding systems (ICD-10-CA/CCI, AIS), vendor software, quality indicators, abstracting, etc.

1.12 Professional associations – all Health Care professionals should maintain active membership in their professional associations, provincially and/or nationally in order to remain current in their field and contribute to the best of their ability, to data related activities of their work. Canadian Health Information Management Association (CHIMA) also publishes a variety of Professional Practice Briefs on topics relevant to data collection and utilization.

1.13 References and resources – research, articles, text books, journals, etc. accessible in libraries and via the internet provide an abundance of information.

2. CIHI Data Quality – CIHI has developed a data and information quality program for use across all of their data holdings. The following website has additional information about this program:

3. CHIMA has several Professional Practice Briefs (PPBS) regarding data quality on their website, www.echima.ca.
K. Data Dictionary

A Data Dictionary is a document describing the name, definition and attributes of all data elements contained in an information system or database. It is the master reference for tracking implementation and changes to data fields, ensuring standardization, consistency and communication for reliable utilization of the data stored in the database. All stakeholders involved in the data source, collection and utilization of the data should be involved in the development and maintenance of the Data Dictionary. The CHIMA Professional Practice Brief, PPB – 0014.08 Guidelines for Developing a Data Dictionary outlines the process for creating and maintaining this document.

Relevant Data Dictionaries for Trauma Registries include the following:

National Trauma Registry Comprehensive Data Set- Data Dictionary–

Developed by the NTR in collaboration with the Trauma Association of Canada (TAC) subgroup Trauma Registry Information Specialists of Canada (TRISC), the National Trauma Registry Advisory Council (NTRAC) and provincial Trauma Registry representatives. The purpose of the National Trauma Registry Comprehensive Data Set Data Dictionary is to have a national standardized tool to provide a clear definition of and data entry instructions for each data element to allow for consistency in data collection across the country as well as aid in the interpretation of this data.

Provincial/Institution Trauma Registry –

Every Trauma Registry should have a Data Dictionary which complies with the national standards but also includes province/institution specific data elements specific to the individual registry.

National Trauma Data Standard (NTDS) Data Dictionary –

The American College of Surgeons (ACS) developed the National Trauma Data Bank (NTDB) The NTDS Dictionary is designed to establish a national standard for the exchange of trauma registry data, and to serve as the operational definitions for the National Trauma Data Bank (NTDB). It is a dataset defining standardized data elements collected by the American College of Surgeons within the National Trauma Data Bank (NTDB). This standardized dataset includes only core variables that would prove useful if aggregated on a national level.
**L. National Trauma Registry (NTR)**

The National Trauma Registry (NTR) was formally created in 1997 and has data from some provinces since 1994. NTR is housed at the Canadian Institute for Health Information (CIHI) and consist of two data sets the Comprehensive Data Set (CDS) and the Minimal Data Set (MDS). The Comprehensive Data Set (CDS) is made up of a subset of patients hospitalized with a severe injury at a participating trauma center in Canada. Only severe injuries defined as having an injury severity score greater than 12 are included in this data set. The severity score, known as an ISS, is an international scoring system created to calculate the severity of injuries so they can be compared internationally. The Minimal Data Set (MDS) contains demographic, diagnostic and procedural information on all acute care hospitalizations due to trauma in Canada. It has baseline data for 1994–1995. Only designated trauma hospitals in provinces with a provincial/regional trauma registry or participating trauma facilities provide the trauma registry information that is included in the Comprehensive Data Set (CDS).


In 2013 CIHI notified its stakeholders it would no longer be operating the NTR Comprehensive Data Set (CDS) as of March 31, 2013. Injury data from the NTR Minimum Data Set (MDS) will continue to be available through the Discharge Abstract Database – Hospital Morbidity Database (DAD-HMDB) which can be accessed through CIHI’s data request process.

**CaNTR- Canadian Trauma Registry**

CaNTR- In 2013 the National Trauma Registry housed at CIHI was no longer open to data submissions from the provinces which brought the stakeholders to a decision to begin to explore new options for housing a national Canadian data base. Currently the Canadian Trauma Registry (CaNTR) is in the development phase.

**1. Publications**

CIHI produced a number of annual and analysis in brief reports using NTR data. These reports can be found on the CIHI website.

Data from 1994-1995 to 2012-2013 is available upon request which includes MDS- 2010-2011 and CDS 2012-2013.

Additional NTR reports, analyses and media releases can be found at: [www.cihi.ca/ntr](http://www.cihi.ca/ntr)
M. Data Utilization

1. Quality Improvement

The Trauma Registry can play an active role in Trauma Program Quality Improvement. This is more easily achieved with a concurrent data collection model. The flexibility within Trauma software to add user-defined data elements is key to being able to expand the dataset, to collect data beyond the standard Trauma Registry data points to include additional data elements to be used as quality indicators. The Trauma Program can then develop indicator reports using the Trauma Registry data for monitoring trends and identifying opportunities for improvement. Some software products are available that interface the data from the Trauma Registry into a Quality Improvement module. This enables the product to be used as a case management online document tool and can identify cases flagged by predefined indicators or patient care issues allowing for the tracking and documenting actions, follow up and closing the loop. Any individual quality review must be performed within the boundaries of the appropriate quality improvement legislation. Specific patient summary reports can be run from the Trauma Registry to facilitate the quality review process.

2. Reports

2.1 Standard reports

There are different types of standard reports that can be generated from the Trauma Registry software these include: preprogrammed reports within the software package and those standard reports as identified as a need and developed by the individual trauma program. When choosing a software vendor it is helpful to negotiate the development of certain preprogrammed reports to be included within the cost of the software. Also the capability to design and create your own program specific reports is a necessary feature of any registry software package.

Some examples of preprogrammed reports generally include reports such as:

- Patient Record Lists which identify the date record was closed or modified and the record status, i.e. if the record has been transferred to the central site or not.

- Demographic report which includes number and percentages of specific demographics of the trauma patient population, i.e. number of patients, discharge status, direct or transfers, gender, injury type, cause of injury, ISS ranges, and age ranges.

- Pre-charts which plot the Trauma Injury Severity Score (TRISS) on a graph divided by a line diagonally down the center of the graph known as the isobar which separates the patients by probability of survival above and below the line. For more information re the TRISS refer to the MTOS study [http://www.ncbi.nlm.nih.gov/pubmed/2231804](http://www.ncbi.nlm.nih.gov/pubmed/2231804)

- Audit Filters report which identifies patients that are flagged by the software program as not meeting the standard set by the ACS audit filters.

- Data Form Facsimile which is a detail of all of the data points per patient.
• Trauma Activity Report compares number and percentage from selected year with previous year on specific data within the time period selected, i.e. cases and length of stay, special care unit (SCU) cases and SCU length of stay, age, operating room visits and times, ISS and number and place of death.

2.2 User defined standard reports would include the type of report specifically required on a regular basis by the Trauma Program that is not included in the preprogrammed reports. It is good practice to inform all members of the trauma program staff of the variables available within the Trauma Registry in an effort to work together to develop reports that are meaningful to the team. Some examples could include:
• A log of all trauma deaths that could be used for a trauma death review.
• Patient summary which includes specific details of the patient event that can be used as either a rounds tool or a case management tool.
• Weekly or monthly summary lists of the patients that have been treated during the selected time frame. These reports could include data such as patient name, age, date of trauma, admission unit, cause of injury, list of injuries, if the trauma team was called, discharge status, ISS, etc.
• Counts of patients treated at the facility by month or quarter depending on the needs.
• Any quality reports that have been requested, such as indicator reports to be generated on a monthly or quarterly basis.
• Reports for physician billing purposes if applicable.
• Feedback letters for referral centers.
• Information requests from referral centers.
• Data accuracy and completeness reports.
• Counts by cause of injury.
• Statistical Reports for AVG, STD, MIN, MAX, Count, Sums, and Percent
• Data Table Reports which are listing reports.

2.3 Ad hoc Reports

Ad hoc reports are generally any report that is created as requested for a specific purpose that is not needed on a regular basis. These reports could either be statistical counts or data tables or in some instances reports written in the report language the software is built on. On the occasion of large dataset requests the data may be exported into either a dbase format or excel for further data manipulation. When creating a report for an ad hoc request, be sure to document the specific patient population or any internal queries that were used and the name of the file. This information will prove useful in the future if a similar data request is received.

3. Research

Trauma Registries are a useful tool for trauma research programs. Consistently and accurately collected trauma data can help answer some research questions using retrospective data or identify a research question that can be answered with a concurrent or combined concurrent retrospective data collection process. At times the registry may be used to identify a trauma population that may require further chart review and data extrapolation outside of the registry. In some instances the registry data set could be expanded to collect the additional information for a prospective study. The Trauma registry has great potential for supporting trauma research. The Trauma Registry should be promoted as a point of initiation for trauma research projects.
**N. Performance Improvement and Benchmarking**

Performance improvement (PI) is defined as a continuous multidisciplinary effort to measure, evaluate and improve the process of care and outcome. To increase efficiency, effectiveness and improve patient outcomes, it is imperative that trauma systems and trauma centers monitor, evaluate and improve their performance. In order to do this, there must be a reliable method of collecting data to provide the reliable, high quality data to support a performance improvement (PI) process. Therefore, the trauma registry is a key element in any PI program.


There are several initiatives within the Trauma Association of Canada (TAC) that involve PI, the most important of which was the establishment of a national Performance Improvement and Patient Safety Committee (PIPS). This multidisciplinary PIPS Committee and involves members of ITNC and TRISC. The purpose is to look at our trauma system nationally and investigate ways to measure, monitor, evaluate and ultimately improve care of trauma patients.

In addition to this, the Pediatric Trauma Committee of TAC initiated a national study of pediatric trauma care quality indicators at all pediatric trauma centers in Canada. After an extensive review process by which the pediatric trauma centers were surveyed and quality indicators collated and ranked, it was decided to collect 14 key quality indicators nationally. Some of these data will be collected by Trauma RNs and Coordinators and other trauma program staff and others can be downloaded by the Trauma Data Analysts from the COLLECTOR trauma registry. While this study is still ongoing, once these data are collected, and reviewed, comparisons in data and processes can be undertaken and national benchmarks set for best practices.

CanTR- In 2012 the National Trauma Registry housed at CIHI was no longer open to data submissions from the provinces bringing the stakeholders to a decision to explore new options for housing a national Canadian database. Currently the Canadian Trauma Registry (CanTR) is in the development phase.

A manuscript on “Canadian Benchmarks in Trauma” was published in the Journal of Trauma in 2007 from The Canadian Trauma Research collaborative of TAC, and which included members of TRISC and ITNC. It was the first study to define national survival benchmarks for the Canadian trauma population. It was based on over 1 million non-penetrating trauma patients admitted to an acute care hospital between the years 1994-2000. The results can be used to assess survival of patients with the ICISS (ICD-9) based Injury Severity Score (ISS) methodology for continued trauma outcome assessment, performance improvement and trauma care research in Canada.

O. Skills, Qualifications and Training Courses

1. Health Information Management Programs, recognized by the Canadian Health Information Management Association (CHIMA), generally provide a combination of academic study and practical applications in the healthcare field. Program content includes courses such as: medical terminology; anatomy and physiology; clinical pathology, biomedical sciences, computer sciences, health informatics, health data retrieval (abstracting); health classification systems and disease/intervention coding; health information analysis; records management; health care delivery systems; health care statistics; epidemiology; ethical and legal aspects of health information; etc.

1.1 Distance Learning – diploma in HIM:

1.1.1 Canadian Healthcare Association (CHA), HIM Program, see: www.cha.ca
1.1.2 Saskatchewan Institute of Applied Science & Technology, SK, see: www.siast.sk.ca
1.1.3 The Canadian Centre for Distance Education (CD-ED) http://www.cd-ed.com/programs/health-information-management/
1.1.4 Ryerson University Part time program http://www.ryerson.ca/undergraduate/admission/programs/him.html

1.2 Community Colleges – diploma in HIM:

1.2.1 British Columbia
1.2.1.1 Douglas College, New Westminster, BC, see: www.douglascollege.ca

1.2.2 Alberta
1.2.2.1 Southern Alberta Institute of Technology Wascama Campus, Calgary, AB, see: www.sait.ab.ca

1.2.3 Saskatchewan
1.2.3.1 Saskatchewan Polytechnic Regina Campus Health Information Management Program see: http://saskpolytech.ca

1.2.4 Manitoba
1.2.4.1 Red River College, Winnipeg, MB, see: www.rrc.mb.ca

1.2.5 Ontario
1.2.5.1 George Brown Community College, Toronto, ON, see: www.georgebrown.ca

1.2.5.2 Fleming College, Peterborough, ON, see: http://flemingcollege.ca/

1.2.5.3 St. Lawrence College, Kingston, ON, see: www.sl.on.ca
1.2.5.4 Westervelt College, London ON see: http://www.westervelt.ca/programs/health-care/health-information-management/
1.2.6 Quebec
1.2.6.1 College Ahuntsic, Montreal, QC, See: [http://www.collegeahuntsic.qc.ca/](http://www.collegeahuntsic.qc.ca/)

1.2.6.2 College O’Sullivan de Montreal, Montreal, QC, see: [www.osullivan.edu](http://www.osullivan.edu)

1.2.6.3 Cegep Regional de Lanaudiere a l’Assomption, L’Assumption, QC, see: [www.collanaud.qc.ca](http://www.collanaud.qc.ca)

1.2.6.4 College LaFleche, Trois-Rivieres, QC, see: [www.clafleche.qc.ca](http://www.clafleche.qc.ca)

1.2.7 New Brunswick
1.2.7.1 New Brunswick Community College, Moncton, NB, see: [www.nbcc.ca](http://www.nbcc.ca)

1.2.8 Nova Scotia
1.2.8.1 Nova Scotia Community College, Halifax, NS, see: [www.nscc.ca](http://www.nscc.ca)

1.2.9 Newfoundland
1.2.9.1 Eastern College, St John’s, NL, see: [www.easterncollege.ca](http://www.easterncollege.ca)

1.3 Universities – degree programs in Health Information Management

1.3.1 The University of Western Ontario, Faculty of Health Sciences – Bachelor of Health Sciences with Honours specialization in Health Information Management, see: [www.uwo.ca](http://www.uwo.ca)

1.3.2 Ryerson University, School of Health Services Administration - Bachelor of Health Administration in Health Information Management, see: [www.ryerson.ca](http://www.ryerson.ca)

1.3.3 The University of Ontario Institute of Technology, Faculty of Health Sciences – Bachelor of Health Science (Honours) with specialization in Health Information Management, see: [www.uoit.ca](http://www.uoit.ca)

1.3.4 McMaster University HIM [www.mcmaster.ca](http://www.mcmaster.ca)
1.3.5 Conestoga College – Bachelor Applied Health Information Science Degree [http://www.conestogac.on.ca/](http://www.conestogac.on.ca/)

2. Other Health Professions - (such as Nursing, Paramedicine, etc.) – other healthcare disciplines which include course content in common with Health Information Management or have a Health Informatics component and can be applied to Trauma Registry data collection, analysis and dissemination for the purposes of trauma care; research; injury prevention and control initiatives and to assist in public policy legislative injury initiatives could be applicable.
3. Continuing Education Courses

3.1 Canadian Health Information Management Association’s (CHIMA) see website, www.echima.ca offers members access to various short online and web-based courses along with continuing profession education (CPE) sessions. A number of Professional Practice Briefs are also accessible online.

3.2 Canadian Institute for Health Information (CIHI) Educational Resources - offers continuing educational opportunities through self learning courses, web conferences and workshops. Some of these deal with the general use of ICD-10-CA and CCI, while others are disease or diagnosis specific. Other available resources include the Canadian Coding Standards for ICD-10-CA and CCI, and the Online Coding Query Database, see: www.cihi.ca
P. The Registry and Accreditation

Accreditation Canada, formerly Canadian Council on Health Services Accreditation (CCHSA) performs accreditation on all services delivered through the health care institutions. In 2010 Accreditation Canada and TAC have partnered together to develop a Trauma Distinction Program. The Trauma distinction follows 3 sets of standards.

1. Trauma System Standards – the standards are applied at system level and cover key components of an effective trauma system
2. Acute Trauma Services – this standard applies to the trauma centre level and covers the essential components a Level I to V trauma centre should have to function as a successful trauma system.
3. Rehabilitation System – this standard focus on rehabilitation services integrated within the trauma system.

The Trauma Distinction program also includes for participating centres the process of submitting data from a core list of performance indicators as well a list of optional indicators. These indicators are to be submitted on a regular basis either quarterly or twice a year and meet thresholds. There is also an annual few once you receive trauma distinction.

The trauma registry is an integral part of the trauma system and is a requirement for Level I, II and III trauma hospitals and trauma systems to be accredited by a formal trauma system accreditation at both the adult and pediatric levels. Similar systems of accreditation, in some countries termed verification, are found between Canada, Australasia and the United States. A consultation visit as well as a full verification/accreditation site visit may be provided depending on the need of the requesting organization.

Link to Accreditation Canada Trauma Distinction Standard is: https://accreditation.ca/trauma-distinction

- The Australasian Trauma Verification Program Manual can be found at: http://www.surgeons.org/for-hospitals/trauma-verification

- The American College of Surgeons Committee on Trauma (ASCOT) verification criteria is found in the Resources for Optimal Care of the Injured Patient. More information about their process is available at: http://www.facs.org/trauma/vcprogram.html.
Q. Policies

Policies should be developed which will govern the conduct of a department, program or service, and describe a definite course or method of action, to guide and determine present and future decisions. Policies are official statements, which the members of the organization will be held accountable.

1. Process for Policy Development
   - determine that a need for a policy exists
   - meet with group who will be affected by the policy, for input
   - research other programs/services for similar policies
   - research existing legislation (provincial, national)
   - review professional standards
   - draft policy using standard format and language used by your institution/program
   - involve stakeholders
   - obtain approval of Manager/Director responsible for the service
   - implementation
   - effective date
   - review annually
   - revise as your needs/processes change
   - date revisions, maintain previous versions for reference

2. Policies useful to a Trauma Registry
   2.1. Confidentiality/Privacy
       - describes how personal health information will be protected during Collection, Analysis, Reporting, and Dissemination
       - includes a “Confidentiality Statement” to be signed by Registry staff
       - includes a process for security of computers containing confidential information, such as locks, encryption
       - includes process for access to the database (user ID’s, passwords)
       - ideally a Privacy Impact Assessment should be done
       - prevents disclosure of confidential information via report generation, communication via facsimile or email
       - complies with Provincial and National privacy legislation
   2.2. Release of Information
       - describes the process for releasing the Trauma Registry data/information
       - includes a form for requesting information
       - includes a “Confidentiality Statement” to be signed by the requestor
       - indicates who authorizes the release of information
       - informs requestor how handle the original information upon completion of purpose
       - complies with Provincial and National privacy legislation
       - may involve collaboration with local Research Ethics boards and Privacy Officers
2.3. Data Quality and Completeness

- describes the minimal mandatory dataset
- describes process for acquiring missing data
- refers to local or national Data Dictionary
- describes data quality processes
- includes data submission schedules to Central Sites or National Trauma Registry

2.4. Database Maintenance

- provides for periodic review and updating of dataset, software, tables, user-defined fields, etc.

2.5. Retrieval of information from external sources

- describes the process for obtaining information from other databases, accessing patient records, etc.

2.6. Document Management

- describes security, storage and destruction of hard copy documents, used in the course of data collection, research or other processes

3. Reference Documents

- Legislation
  - Provincial, such as: Hospitals Act, Freedom of Information & Protection of Privacy Act, Personal Health Information Act
  - National, such as: Personal Information Protection and Electronic Documents Act

- Professional Standards, such as CIHMA Professional Practice Briefs: Health Data Access, Use, and Control for Secondary Uses; Data Standards, Quality and Interoperability; Facsimile Transmission of Health Information; Wireless Communication: Safeguarding Privacy and Security; Privacy and Security in a Health Information Exchange; Assessing and Improving HER Data Quality

- Institution/Program policies

- Other Institution/Program policies
“What are Privacy and Confidentiality”:

Privacy is often defined as an individual’s right to:
- control the circulation of personal information
- Freedom from unreasonable interference in a person’s private life
- Protection against misuse or unjustified publication of personal information.

Confidentiality is defined as the obligation or duty of a person or organization to protect the personal information with which it has been entrusted. Thus health service providers, information managers and other types of health information custodians are obliged to respect individuals’ privacy rights through the proper management of the personal health information to which they are entrusted. (CIHI, An Approach to Conducting Privacy Impact Assessment, November 2004, pg. 2)

1. Federal Legislation

Federal legislation takes precedence over existing provincial legislation if the federal standards are more stringent.

The Privacy Commissioner of Canada is mandated by Parliament to act as an ombudsman and guardian of privacy in Canada. The Commissioner enforces two federal laws for the protection of personal information: the Privacy Act, which applies to the federal public sector; and the Personal Information Protection and Electronic Documents Act (PIPEDA), which applies to commercial activities in the Atlantic Provinces, Ontario, Manitoba, Saskatchewan and the Territories. Quebec, Alberta and British Columbia each has its own law covering the private sector. Even in these provinces, PIPEDA continues to apply to the federally regulated private sector and to personal information in interprovincial and international transactions. For an overview of these two laws, please refer to: https://www.priv.gc.ca/resource/fs-fi/02_05_d_15_e.asp

Personal Information Protection and Electronic Document Act (PIPEDA) – incorporates the ten privacy standards established by the Canadian Standards Association Model for the Protection of Personal Information (CAN/CSA – Q830-96). The ten privacy standards are listed below (Schedule 1 of the Act). See full document at: http://www.canlii.org/ca/sta/p-8.6/whole.html

1.1 Accountability – An organization is responsible for the personal information under its control and shall designate an individual or individuals who are accountable for the organization’s compliance with the following principles.

1.2 Identifying Purposes – The purposes for which personal information is collected shall be identified by the organization at or before the time the information is collected.
1.3 Consent – The knowledge and consent of the individual are required for the collection, use, or disclosure of personal information, except where appropriate.

1.4 Limiting Collection – The collection of personal information shall be limited to that which is necessary for the purposes identified by the organization. Information shall be collected by fair and lawful means.

1.5 Limiting Use, Disclosure, and Retention – Personal information shall not be used or disclosed for purposes other than those for which it was collected, except with the consent of the individual or as required by law.

1.6 Accuracy – Personal information shall be as accurate, complete, and up-to-date as is necessary for the purposes for which it is to be used.

1.7 Safeguards – Personal information shall be protected by security safeguards appropriate to the sensitivity of the information.

1.8 Openness – An organization shall make readily available to individuals specific information about its policies and practices relating to the management of personal information.

1.9 Individual Access – Upon request, an individual shall be informed of the existence, use, and disclosure of his or her personal information and shall be given access to that information. An individual shall be able to challenge the accuracy and completeness of the information and have it amended as appropriate.

1.10 Challenging Compliance – An individual shall be able to address a challenge concerning compliance with the above principles to the designated individual or individuals accountable for the organization’s compliance.
On August 3, 2002, Industry Canada published the *Process for the Determination of "Substantially Similar" Provincial Legislation by the Governor in Council* in the Canada Gazette on August 3, 2002, which outlines the policy and criteria used to determine whether provincial legislation will be considered as substantially similar. Under the policy, laws that are substantially similar: provide privacy protection that is consistent with and equivalent to that found under PIPEDA; incorporate the ten principles in Schedule 1 of PIPEDA; provide for an independent and effective oversight and redress mechanism with powers to investigate; and restrict the collection, use and disclosure of personal information to purposes that are appropriate or legitimate.

Organizations that are subject to provincial legislation deemed substantially similar are exempt from PIPEDA with respect to the collection, use or disclosure of personal information occurring within the respective province. Accordingly, PIPEDA continues to apply to the collection, use or disclosure of personal information in connection with the operations of a federal work, undertaking or business in the respective province, as well as to the collection, use or disclosure of personal information outside the province.

2. Provincial Legislation

Legislation varies amongst provinces, applicable Acts and websites for more detailed information, are listed below:

2.1 Nova Scotia

2.1.1 Personal Health Information Act (PHIA) – came into effect on June 3, 2013. PHIA governs the collection, use, disclosure, retention, disposal and destruction of personal health information.

  http://nslegislature.ca/legc/bills/61st_2nd/3rd_read/b089.htm

2.1.2 Freedom of Information and Protection of Privacy Act (FIOPOP) - provides a formal process to obtain access to records under the control of the provincial government, while protecting the privacy of individuals who do not want their personal information made public. The Act strives for balance between an individual’s right to know and an individual’s right to privacy.

  http://nslegislature.ca/legc/statutes/freedom%20of%20information%20and%20protection%20of%20privacy.pdf

2.1.3 Hospitals Act

  http://nslegislature.ca/legc/statutes/novahos.htm
2.2 Prince Edward Island

2.2.1 Freedom of Information and Protection of Privacy Act (FOIPP) of Prince Edward Island and other acts which govern the health services of Prince Edward Island, allow us to collect, use and disclose the personal information needed to provide health service.


2.2.2 Health Information Act (HIA), received Royal Assent on May 14, 2014. Prior to this new legislation, personal health information was shared between the public and private sectors without any clear set of rules governing the management and control of this type of information. The HIA, which has not yet been proclaimed, attempts to balance the competing interests of protecting privacy of personal health information and the needs of health care providers to collect, use and disclose the information to provide health care and manage the health care system. For more information: http://www.mondaq.com/canada/x/318022/Data+Protection+Privacy/PEI+Introduces+New+Legislation+on+Health+Privacy

2.3 New Brunswick

2.3.1 Personal Health Information Privacy and Access Act (PHIPAA) provides a set of rules that protects your privacy and the confidentiality of your personal health information. At the same time, the Act ensures that information is available, as needed, to provide health services to those in need and to monitor, evaluate and improve the health system in New Brunswick. Effective: September 1, 2010

https://www.gnb.ca/0051/acts/index-e.asp

2.3.2 Right to Information and Protection of Privacy Act, effective: September 1, 2010.


2.4 Newfoundland

2.4.1 Personal Health Information Act (PHIA) is a health-sector specific privacy law that establishes rules that custodians of personal health information must follow when collecting, using and disclosing individuals’ confidential personal health information. PHIA also sets out the rights of residents of the province regarding obtaining access to and exercising control of their personal health information.

PHIA was proclaimed into force on April 1st, 2011. http://assembly.nl.ca/Legislation/sr/statutes/p07-01.htm

2.5 Quebec

2.5.1 Act Respecting Access to Documents Held by Public Bodies and the Protection of Personal Information (current as of May 1st, 2007), applies to the personal information holdings of the provincial, regional, municipal and local governments.

2.5.2 Act Respecting the Protection of Personal Information in the Private Sector (current as of May 1st, 2007) applies to personal information held by private sector businesses operating in Québec. [Link](http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=2&file=/P_39_1/P39_1_A.html)

2.6 Ontario

2.6.1 Freedom of Information and Protection of Privacy Act

[Link](http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90f31_e.htm)

2.6.2 Personal Health Information Protection Act, 2004

The Personal Health Information Protection Act is an in-depth piece of legislation designed to address very complex issues concerning the collection, use and disclosure of personal health information by health information custodians.

[Link](http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_04p03_e.htm)

2.7 Manitoba

2.7.1 Freedom of Information and Protection of Privacy Act

[Link](http://web2.gov.mb.ca/laws/statutes/ccsm/f175e.php)

2.7.2 Personal Health Information Act (PHIA) provides the right to:

1. access your personal health information, and
2. have your personal health information kept private

when that information is held by a health care provider, health care facility or public body (referred to in the Act as “trustees”).

[Link](http://web2.gov.mb.ca/laws/statutes/ccsm/p033-5e.php)
2.8 Alberta

2.8.1 Freedom of Information and Protection of Privacy Act
http://foip.alberta.ca/

2.8.2 Personal Information Protection Act (PIPA)

2.8.3 Health Information Act and the regulations made under it establish the rules that must be followed for the collection, use, disclosure and protection of health information in the health sector. The Health Information Act Guidelines and Practices Manual is designed as a reference tool to help custodians and affiliates apply and administer the Act. http://www.qp.alberta.ca/documents/Acts/H05.pdf

2.9 Saskatchewan

2.9.1 Freedom of Information and Protection of Privacy Act

2.9.2 Local Authority Freedom of Information and Protection of Privacy Act

2.9.3 Health Information Protection Act (HIPA) is designed to improve the privacy of people’s health information while ensuring adequate sharing of information is possible to provide health services. Development of the Act started in 1997 and it was proclaimed in force on September 1, 2003. New regulations created under the authority of this Act called The Health Information Protection Regulations came into force on July 22, 2005. http://www.qp.gov.sk.ca/documents/english/Statutes/Statutes/H0-021.pdf

2.10 British Columbia

- There are several laws that affect the privacy of your personal health information:
  The E-Health Act applies to certain designated databases http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_08038_01
  The Ministry of Health Act gives the Minister of Health power to do things with personal health information for a wide range of purposes
  The Public Health Act
  The Health Authorities Act
2.11 Yukon

2.11.1 Access to Information & Protection of Privacy Act (ATIPP Act)

2.11.2 Health Information Privacy and Management Act The act will help protect personal health information while also ensuring Yukon health-care providers have the information they need to provide optimal care. http://www.gov.yk.ca/legislation/acts/hipm.pdf

2.12 Northwest Territories

2.12.1 Access to Information and Protection of Privacy Act

2.13 Nunavut

2.13.1 Access to Information and Protection of Privacy Act (ATIPP):
- provides individuals with a right of access to records held by public bodies and specifies limited exceptions
- prevents unauthorized collection, use or disclosure of personal information
- gives individuals the right to access the personal information public bodies have about them and to request corrections to that information

3. Canadian Health Information Management Association (CHIMA)

3.1 Professional Practice Briefs – are guiding principles or position statements written as reference tools on common topics of interest. Below are two which are relevant to Confidentiality and Privacy. (Accessible to CHIMA Members)

3.1.1 Privacy and Security in a Health Information Exchange (HIE): PPB – 0016.08

3.1.2 Health Data Access, Use, and Control for Secondary Uses: PPB - 0003.07
4. Privacy Impact Assessment (PIA)

A Privacy Impact Assessment is a tool used to assess the possible privacy impacts of new or amended initiatives, such as programs, legislation, technological systems and to determine whether they meet basic privacy requirements.

Most provinces have tools/templates for conducting a PIA.

PIA’s generally address:

- purpose and authority for the data collection
- the specific data elements to be collected
- data collection, use and disclosure
- data flow – source of the data and how it travels
- consent and notification
- impacts to privacy
- mitigating strategies

Ten fundamental privacy principles should guide how a PIA is conducted:

- **Accountability**: Each government department must put someone in charge of making sure privacy policies and practices are followed.

- **Identifying purposes**: Canadians must be told why their personal information is being collected at or before the time of collection.

- **Consent**: Canadians must give their consent to the collection, use and disclosure of their personal information.

- **Limiting collection**: Only information that is required should be collected.

- **Limiting use, disclosure and retention**: Personal information can only be used or disclosed for the purpose for which it was collected. Further consent is required for any other purposes. Personal information should only be kept as long as necessary.

- **Accuracy**: Government departments must make every effort to reduce the risk that incorrect personal information is used or disclosed.

- **Safeguards**: Government departments must protect personal information from loss or theft. They must create safeguards to prevent unauthorized access, disclosure, copying, use or modification.
- **Openness**: Government departments must make their privacy policies readily available to Canadians.

- **Individual access**: Canadians have the right to ask to see any of their personal information held by government. They have the right to know who the information has been given to. They can challenge the accuracy of personal information and ask for corrections.

- **Challenging compliance**: Canadians must be able to challenge a government department’s privacy practices.

These principles are usually referred to as the “fair information principles”, and are articulated in the Canadian Standards Association *Model Code for the Protection of Personal Information*. They are also included in the *Personal Information Protection and Electronic Documents Act (PIPEDA)*, Canada's private-sector privacy law. [https://www.priv.gc.ca/resource/fs-fi/02_05_d_33_e.asp](https://www.priv.gc.ca/resource/fs-fi/02_05_d_33_e.asp)

5. **Local Policies**

Every institution, program or organization which utilizes patient information should have policies in keeping with Federal, Provincial and local legislation for the protection, privacy, access to and use of patient information.
S. Professional Associations

1. **Trauma Association of Canada (TAC)** – The Trauma Association of Canada is committed to reduce the incidence and relieve the burden of injury by bringing together multidisciplinary health care professionals involved in the care of the injured patient to:

   - Improve the quality of care provided
   - Promote the highest standard of inter-professional patient care
   - Provide education for its members at the local, regional and national level
   - Promote and conduct basic science and clinical trauma research
   - Disseminate research findings
   - Establish standards and create awareness of best practices
   - Develop and maintain a national Trauma Registry
   - Facilitate and participate in public education on injury prevention
   - Develop guidelines for, and participate in community disaster response planning
   - Develop guidelines for, and participate in accreditation processes
   - Advocate to governments to implement legislation designed to reduce the incidence of injury
   - Build coalitions with key partners in trauma care and injury prevention


2. **Trauma Registry Information Specialists of Canada (TRISC)** – “is a subgroup of the Trauma Association of Canada (TAC) who promote the utilization of timely, high quality trauma information for trauma system development, program planning, resource utilization, education, research, and quality improvement that strive for the improvement of trauma care delivery, patient outcomes and injury prevention practices in Canada. TRISC provides a national forum for Trauma Registry Specialists to network.” Retrieved September 2015, from: [http://www.traumacanada.ca/TRISC/strategic_plan_jun26.pdf](http://www.traumacanada.ca/TRISC/strategic_plan_jun26.pdf)

   TRISC holds an annual meeting in conjunction with the TAC annual Scientific Conference which includes a business meeting, educational sessions, software/technology presentations, topics of interest and opportunity for networking.
The website, http://www.traumacanada.org/page-1017336, includes current information about TRISC, as well as a members’ only section, posting recent presentations, meeting minutes, and the TRISC Forum for members to ask Trauma Registry related questions, which are answered and shared by TRISC members. Anyone involved in a Trauma Registry is welcome.

3. **Canadian Health Information Management Association (CHIMA)** – represents approximately 5,000 Health Information Management (HIM®) professionals across Canada and is the certifying body and national association that represents leadership and excellence in health information management. CHIMA supports continuing education and professional practice of HIM professionals; develops strategic partnerships to advance the development and integration of electronic HIM; and advocates for and strengthens the HIM role in health care settings across the continuum of care. Retrieved September 2015, from https://www.echima.ca/about-us

4. **Association for the Advancement of Automotive Medicine (AAAM)** - is a professional multidisciplinary organization dedicated to limiting injuries from motor vehicle crashes. It was founded in 1957 by the Medical Advisory Committee to the Sports Car Club of America (six practicing physicians whose avocation was motor racing). Since 1964, full and equal membership status has been available to all road safety professionals and the focus has expanded to encompass the globe. AAAM members enjoy the benefit of online subscriptions to articles from the journals: Accident Analysis and Prevention as well as Traffic Injury Control. Retrieved September 2015, from: http://www.aaam.org/

5. **American Health Information Management Association (AHIMA)** – The American Health Information Management Association (AHIMA) is the premier association of health information management (HIM) professionals worldwide. Serving 52 affiliated component state associations and more than 101,000 members, it is recognized as the leading source of "HIM knowledge," a respected authority for rigorous professional education and training.

   Founded in 1928 to improve health record quality, AHIMA has played a leadership role in the effective management of health data and medical records needed to deliver quality healthcare to the public. Retrieved September 2015, from: http://www.ahima.org/

6. **National Institutes of Health Informatics (NiHi)** – see website http://www.nihi.ca/

7. **Canadian Nursing Informatics Association (CNIA)** - exists to help nurses across Canada to learn, share, research, and create informatics-related projects and experiences that can help to boost the competencies, theory, and practice of informatics on a national level. Retrieved September 2015, from http://www.cnia.ca/

8. **Other Professional Associations** – whatever the professional background of Trauma Registry staff, active membership in their professional associations, provincially and nationally should be maintained on a current basis:

   - Nursing - Canadian Nurses Association - see http://www.cna-aiic.ca/en
   - Paramedics – Paramedic Association of Canada - see http://www.paramedic.ca/
T. Publications/Reference Materials/Resources

1. Websites, Publications and Newsletters

1.1 ParachuteCanada.org – Parachute is a national, charitable organization, formed in July 2012, which unified the former organizations of Safe Communities Canada, Safe Kids Canada, SMARTRISK, and ThinkFirst Canada into one strong leader in injury Prevention. Parachute offers many programs across Canada that are designed to help people reduce the risks of injury. They have many tools and resources, ranging from ATVs to helmets to playground safety.

1.2 Canadian Institute for Health Information (CIHI), www.cihi.ca
The National Trauma Registry was closed as of March 31, 2014. Data remains available through the CIHI website by request.
1.2.1 National Trauma Registry Report: Major Injury in Canada (Jan, 2013)
1.2.2 National Trauma Registry Report: Cycling Injury Hospitalizations 2009-2010

1.3 Trauma Registry Information Specialists of Canada (TRISC) – Injury Surveillance and Trauma Registry Information Management Orientation Manual is available to all TRISC members and also on the TAC website, www.traumacanada.org.

1.4 Canadian Health Information Management Association (CHIMA), www.echima.ca.
1.4.1 The CHIMA Connection published bi-monthly, for the members of the Canadian Health Information Management Association, and is available on their website.
1.4.2 Professional Practice Briefs are discussion papers on topics in interest for the Health Information Management Professional, available to members only through their website.

2. Reference Materials

2.1 Canadian Healthcare Association (CHA), Fundamentals of Health Information Management 2nd Edition, is a text book based on the latest research and cover’s CHIMA’s three domains of practice. It features chapters on the Canadian health care system; health informatics; the legal aspects of health information practice; electronic health records; health information standards; ethics issues; and each chapter discusses the role of the HIM Professional.

2.2 American College of Surgeons, Committee on Trauma (ACS COT), [www.facs.org](http://www.facs.org).
2.2.1 *Resources for Optimal Care of the Injured Patient: 2014* – guidelines for care of the injured patient and outlines the essential and desirable requirements for trauma centres pursuing consultation or seeking to gain or maintain verification.

2.2.2 *National Trauma Data Bank TM Annual Report, 2013*, presents a summary of information on the NTDB, which is the largest aggregation of U.S. trauma data ever assembled. The NTDB and can be downloaded from the ACS website.


2.3 *Trauma, fifth edition*, McGraw-Hill, Medical Publishing Division, editors: Ernest E. Moore, MD, David V. Feliciano, MD, Kenneth L. Mattox, MD is a textbook covering all aspects of trauma care, including chapters on Injury Severity Score and Trauma Outcomes.

2.4 *Injury Surveillance Guidelines*, Holder Y, Peden M, Krug E et al (Eds). Geneva, World Health Organization (WHO), 2001. This manual shows how to set up systems for collecting, coding and processing data even if there is no electronic equipment, few staff, and/or staff with many other demands on their time and no expertise in research. It is downloadable through the WHO website, [www.who.int](http://www.who.int).


2.6 *Inventory of Injury Data Sources and Surveillance Activities*, Public Health Agency of Canada, March 2005, describes provincial, territorial and national injury data sources in Canada within a common framework, and is downloadable through the website, [http://publications.gc.ca/site/eng/272815/publication.html](http://publications.gc.ca/site/eng/272815/publication.html).

3. Journals

3.1 *Journal of Trauma and Acute Care Surgery*, published 12 times per year by Lippincott Williams & Wilkins. Content focuses specifically on traumatic injuries. It is sponsored by the American Association for the Surgery of Trauma and is the official publication of Trauma Association of Canada/L’Association Canadienne de Traumatologie (TAC).


3.2 *Journal of Registry Management*, is the official journal of the National Cancer Registrars Association (NCRA), published four times per year. It is a peer-reviewed journal which publishes papers on topics related to the management of health registries and the collection, management and use of cancer, trauma, AIDS and other health registry data.

3.3 *Annuals of Emergency Medicine*, is the official journal of the American College of Emergency Physicians, is an international, peer-reviewed journal dedicated to improving the quality of care by publishing the highest quality science for emergency medicine and related medical specialties.


3.4 *Canadian Journal of Emergency Medicine (CJEM)*, is the official journal of the Canadian Association of Emergency Physicians (CAEP), published every two months presenting articles of interest to emergency care providers in rural, urban, or academic settings.


3.5 *Canadian Journal of Surgery (CJS)*, contributed to the effective continuing medical education of Canadian surgical specialists, using innovative techniques when feasible, and to provide surgeons with an effective vehicle for the dissemination of observations in the areas of clinical and basic science research.


3.6 *Air Medical Journal (AMJ)*, is the official journal of the five leading air medical transport associations in the United States. It is the premier provider of information for the medical transport industry, addressing the unique concerns of medical transport physicians, nurses, pilots, paramedics, emergency medical technicians, communication specialists, and program administrators.


3.7 *Injury, International Journal of the Care of the Injured* was founded in 1969 and is an international journal dealing with all aspects of trauma care and accident surgery. Their primary aim as to facilitate the exchange of ideas, techniques, and information among all members of the trauma team. Topics covered include: trauma systems and management; surgical procedures; epidemiological studies; surgery (of all tissues); resuscitation; biomechanics; rehabilitation; anesthesia; radiology and wound management.

Appendix A: Abbreviations

AIS - Abbreviated Injury Scale
CanTR – Canadian Trauma Registry
CCI - Canadian Classification of Health Interventions
CHIMA - Canadian Health Information Management Association
CHA - Canadian Healthcare Association
CHIRPP - Canadian Hospitals Injury Reporting and Prevention Program
CIHI - Canadian Institute for Health Information
CDC - Center for Disease Control and Prevention
CDS - Comprehensive Data Set
DDS Death Data Set
DI - Digital Innovation, Inc.
DAD - Discharge Abstract Database
EDS - Emergency Data Set
ISS - Injury Severity Score
ITNC - Interdisciplinary Trauma Network of Canada
ICD-10-CA - International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada
MTOS - Major Trauma Outcome Study
MDS - Minimal Data Set
NACRS - National Ambulatory Care Reporting System
NTDB - National Trauma Data Bank
NTDS - National Trauma Data Standard
NTR - National Trauma Registry
OIS – Organ Injury Scale
TAC - Trauma Association of Canada
TRISC - Trauma Registry Information Specialists of Canada
Appendix B: Inclusion and Exclusion ICD External Cause Code Examples from the 2012/2013 NTR CDS Data Dictionary

The following lists the categories used for trauma reporting purposes based on the NTR definition. “Incident” and “unintentional” have been substituted for the terms “accident” and “accidental” used in the ICD definitions.

<table>
<thead>
<tr>
<th>ICD-10-CA</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>V01–V99</td>
<td>Transport Incidents</td>
</tr>
<tr>
<td>V01–V06, V09–V90</td>
<td>Land Transport Incidents</td>
</tr>
<tr>
<td>V91–V94</td>
<td>Water Transport Incidents</td>
</tr>
<tr>
<td>V95–V97</td>
<td>Air and Space Transport Incidents</td>
</tr>
<tr>
<td>V98–V99</td>
<td>Other and Unspecified Transport Incidents</td>
</tr>
<tr>
<td>W00–W19</td>
<td>Unintentional Falls</td>
</tr>
<tr>
<td>W20–W46, W49</td>
<td>Exposure to inanimate Mechanical Forces</td>
</tr>
<tr>
<td>W50–W60, W64</td>
<td>Exposure to Animate Mechanical Forces</td>
</tr>
<tr>
<td>W65–W70, W73, W74</td>
<td>Unintentional Drowning and Submersion</td>
</tr>
<tr>
<td>W75, W76, W77, W81, W83, W84</td>
<td>Other Unintentional Threats to Breathing, Except Due to Inhalation of Gastric Contents, Food or Other Objects</td>
</tr>
<tr>
<td>W85–W94, W99</td>
<td>Exposure to Electric Current, Radiation and Extreme Ambient Air Temperature and Pressure</td>
</tr>
<tr>
<td>X00–X06, X08, X09</td>
<td>Exposure to Smoke, Fire and Flames</td>
</tr>
<tr>
<td>X10–X19</td>
<td>Contact With Heat and Hot Substances</td>
</tr>
<tr>
<td>X30–X39</td>
<td>Exposure to Forces of Nature</td>
</tr>
<tr>
<td>X50</td>
<td>Overexertion and Strenuous or Repetitive Movements</td>
</tr>
<tr>
<td>X52</td>
<td>Prolonged Stay in Weightless Environment</td>
</tr>
<tr>
<td>X58–X59</td>
<td>Unintentional Exposure to Other and Unspecified Factors</td>
</tr>
<tr>
<td>X70–X84</td>
<td>Intentional Self-Harm, Excluding Poisoning</td>
</tr>
<tr>
<td>X86, X91–X99, Y01–Y05, Y07–Y09</td>
<td>Assault, Excluding Poisoning</td>
</tr>
<tr>
<td>Y20–Y34</td>
<td>Event of Undetermined Intent, Excluding Poisonings</td>
</tr>
<tr>
<td>Y35–Y36</td>
<td>Legal Intervention and Operations of War</td>
</tr>
</tbody>
</table>
The following lists the ICD-10-CA external cause codes that are *excluded* from the National Trauma Registry based on the definition of trauma.

<table>
<thead>
<tr>
<th>ICD-10-CA Code Exclusions</th>
<th>Definition</th>
</tr>
</thead>
</table>
| W76–W80                    | W78 Inhalation of Gastric Contents  
W79 Inhalation and Ingestion of Food Causing Obstruction of Respiratory Tract  
W80 Inhalation and Ingestion of Other Objects Causing Obstruction of Respiratory Tract |
| X20–X29                    | Contact With Venomous Animals and Plants                                                                                                   |
| X40–X49*                   | Unintentional Poisoning and Exposure to Noxious Substances                                                                             |
| X51                        | Travel and Motion                                                                                                                       |
| X53, X54, X57, Y06         | X53 Lack of Food  
X54 Lack of Water  
X57 Unspecified Privation  
Y06 Neglect and Abandonment                                                                 |
| X60–X69*                   | Intentional Self-Harm by Poisoning                                                                                                         |
| X85, X87–X90*              | Assault by Poisoning                                                                                                                     |
| Y10–Y19*                   | Poisoning of Undetermined Intent                                                                                                          |
| Y40–Y59                    | Drugs, Medicaments and Biological Substances Causing Adverse Effects in Therapeutic Use                                                  |
| Y60–Y69                    | Misadventures to Patients During Surgical and Medical Care                                                                                |
| Y70–Y82                    | Medical Devices Associated With Adverse Incidents in Diagnostic and Therapeutic Use                                                       |
| Y83–Y84                    | Surgical and Other Medical Procedures as the Cause of Abnormal Reaction of the Patient or of Later Complication, Without Mention of Misadventure at the Time of the Procedures |
| Y85–Y89                    | Sequelae of External Causes of Morbidity and Mortality                                                                                 |
| Y90–Y98                    | Supplementary Factors Related to Causes of Morbidity and Mortality Classified Elsewhere                                                   |

*These cases will be excluded but will be reported on separately.*