Trauma Registry Information
Specialists of Canada

Injury Surveillance and
Trauma Registry Information Management
Orientation Manual

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This document was made possible through the commitment and contributions of certain dedicated TRISC members with a desire to share knowledge and expertise in the area of Trauma Registries, and we would like to thank and acknowledge them.

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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) and adoption of bylaws and an elected executive. Annual TRISC meetings have taken place every year 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." Retrieved April 20, 2010, from http://www.aaam1.org/ais/. [1]
Unique six digit numerical codes describe 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. The version presently being used as the standard for inclusion in the Canadian National Trauma Registry is the Abbreviated Injury Scale (AIS) 1990. At the time this manual was being written, the most recent version published by AAAM is the AIS 2005 Update 2008.

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". Retrieved April 26, 2010, from http://www.cihi.ca/cihiweb. [2]

Canadian Health Information Management Association (CHIMA) – is a membership-based organization of approximately 3,000+ health information management professionals. The members manage security, privacy and accuracy of patient records in hospitals across Canada. They are also responsible for the data used in creating policy, including healthcare planning, facility funding and research. The original Canadian Association of Medical Record Librarians chartered The Canadian College of Health Record Administrators (CCHRA) in 1972, to oversee educational standards and professional certification of the health information management professional. In 1976 the college and association combined under one leadership. The Canadian Association of Medical Record Librarians (CAMRL) name was changed to Canadian College of Health Record Administrators (CCHRA) in 1976. In 2003 the college was renamed to the Canadian College of Health Information Management and the credential of the Health Information Manager was changed to CHIM, Certified in Health Information Management.
Retrieved August 23, 2010, from https://www.echima.ca/history .[3]

Canadian Healthcare Association (CHA) – "is the federation of provincial and territorial hospital and health organizations across Canada. Through its members, CHA represents a broad spectrum of care, including acute care, home and community care, long term care, public health, mental health, palliative care, addiction services, children, youth and family services, housing services, and professional and licensing bodies."
Retrieved April 20, 1020, from http://www.cha.ca. [4]
CHA's mission is to improve the delivery of health services in Canada through policy development, advocacy and leadership. CHA's distance learning programs, conferences and publishing services contribute to this national leadership.

Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) – is a Health Canada Program that includes the collection, analyses and reporting on cases of injury and poisoning. Data is collected primarily at pediatric facilities but also four general hospitals in Canada.

Canadian Institute for Health Information (CIHI) –"is an independent, not-for-profit organization that provides essential data and analysis on Canada's health system and the health of Canadians." Retrieved April 26, 2010, from http://secure.cihi.ca/cihiweb. [5] One of the data holdings of CIHI is the National Trauma Registry.

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 April 20, 2010, from http://www.cdc.gov/about/history/ourstory.htm. [6]

Comprehensive Data Set (CDS) - contains detailed data on severely injured patients treated at participating hospitals and provincial trauma programs. It is one of two major data sets of the National Trauma Registry, the inclusion criteria varies somewhat between Trauma Registries across the country, based primarily on Injury Severity Score (ISS). Data categories included are: demographic, injury detail, pre-hospital care, referring facility care, emergency department care, inpatient care and outcome. There is a list of the NTR CDS data elements on the CIHI website. Please see http://secure.cihi.ca/cihiweb/en/downloads/services_ntr_e_cdselements.pdf for Data Element List, as of December 2001.

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. Currently, an initiative is in place developing the national level DDS through Statistics Canada and the Public Health Agency of Canada.

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." Retrieved April 26, 2010, from http://www.dicorp.com. [7] Their products are currently running at more than 1,000 locations worldwide.

Discharge Abstract Database (DAD) – is one of the key data holdings held by CIHI. It contains data relating to health care services provided to inpatient hospital discharges (acute, chronic, rehabilitation) and same-day surgeries. The database includes: demographic, clinical and administrative data. Retrieved April 28, 2010, from http://secure.cihi.ca/cihiweb. [8]

Emergency Data Set (EDS) – would contain data on all injuries treated and discharged from an Emergency Department (ED). This data set is yet to be developed. Currently, only a few provinces, and facilities collect Emergency Department data. The National Ambulatory Care Reporting System (NACRS) is a CIHI product which can be used to collect ED data.

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. Retrieved April 30, 2010, from http://www.fammed.ouhsc.edu/tutor/incexc.htm.
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 detail inclusion and exclusion criteria of the NTR and other Trauma Registries.

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 90)

ISS BODY REGION	INJURY	AIS	HIGHEST AIS	AIS^2 (3 highest)
HEAD/NECK	Cerebral contusion Internal carotid artery, complete transection	3 4	4	16
FACE	Fractured tooth	1	1	

CHEST	Rib fractures left side, ribs 3-4	2	2	
ABDOMEN	GR III splenic laceration	3	3	9
EXTREMITIES	Fractured tibia; displaced	3	3	9
EXTERNAL	Overall abrasions	1	1	

ISS =34

- If there is an AIS score of 6 in any of the body regions the highest ISS of 75 is automatically assigned.
- 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." Retrieved April 20, 2010, from http://www.traumacanada.org/TCC/TCC.htm.[9]

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.

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.

Major Trauma Outcome Study (MTOS) – Champion, H.R., et al, (1990)[11] 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.

Minimal Data Set (MDS) – contains demographic, diagnostic and procedural data on all admissions to acute care hospitals due to injury. It is one of three major data sets of the National Trauma Registry (NTR) that includes data from the Canadian Institute for Health Information (CIHI) Discharge Abstract Database (DAD) and provincial Ministries of Health. There is a list of the core set of NTR MDS data elements included in the MDS, on the CIHI website. Retrieved April 27, 2010, from http://secure.cihi.ca/cihiweb/en/downloads/NTR_OTR_MDS_Data_Element_List.pdf. [12]

National Ambulatory Care Reporting System (NACRS) – is a CIHI product for collecting, processing, analyzing and reporting summary data on hospital ambulatory care services, such as: Emergency Department, Day Surgery, and Clinic visits. The database includes: demographic, clinical, administrative, financial and service-specific data. Retrieved April 27, 2010, from http://secure.cihi.ca/dihiweb. [13]

National Trauma Data Bank (NTDB) – The American College of Surgeons (ATC) established the NTDB as a public service in order to provide the trauma care community and the public with a central database and inform them about the wide variety of issues that characterize the current state of care for injured persons. It contains over two million records from trauma centers in the U.S.A. and Puerto Rico. They have a standard data dictionary describing the dataset and the NTDB Data Center is maintained and supported by Digital Innovation, Inc. (DI). Retrieved April 27, 2010, from http://www.ntdsdictionary.org/. [14]

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. Retrieved April 27, 2010, from http://www.ntdsdictionary.org/. [15]

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 acquires, analyzes and disseminates national injury data and consists 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. Retrieved April 27, 2010, from http://secure.cihi.ca/hihiweb. [16]

Trauma Association of Canada (TAC) – "is a multi-disciplinary Society of the Royal College of Physicians and Surgeons of Canada, who:
- strive to improve the quality of care provided to the injured patient, including pre-hospital management and transport, acute care hospitalization, and reintegration into society,
- support, conduct, and apply basic science, clinical and outcome research related to trauma,
- encourage effective and efficient use of health care resources in the delivery of trauma care, and
- foster professional and community education in the field of injury prevention and in the care of the injured patient". Retrieved April 27, 2010, from http://www.traumacanada.org. [17]

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 April 27, 2010, from http://www.traumacanada.org. [18]

C. *Injury Surveillance*

1. Definition of Injury Surveillance as it relates to Trauma Data

- Injury surveillance is the on-going, systematic collection, analysis and interpretation of injury data.
- It is used to plan, implement, and evaluate public health interventions, injury prevention programs, to see how effective they are and how to improve them.
- 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:**
  Graitcer PL. *J Safety Res*. 1987; 18:191-198;
  http://www.injuryresearch.bc.ca/categorypages.aspx?catid=2&subcatid=14&catname=Research%20Activities&subcatname=Surveillance
- 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://www2.itssti.hc-sc.gc.ca/clf/clfinventory.nsf/Inventory-pdf/$FILE/InventoryE.pdf?OpenElement

  The Public Health Agency of Canada's website also has current injury Statistics available at:
  http://dsol-smed.hc-sc.gc.ca/dsol-smed/is-sb/index-eng.php

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 or and 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 Vital Statistics, Mortality Database
3.1.2 Death Certificates, ICD-10 nature & cause of injury
3.1.3 National Coroner and Medical Examiner Database

- Cause of death
- By what means
- Involvements
- Place of death

Death data is uploaded from provincial systems. A limitation to the Mortality Database is that not all data 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
- Includes the location and severity of injury-related to products and is used to identify 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
>4.1.1 Discharge Abstract Database
- All hospital admissions
>4.1.2 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 paediatric 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."[19]

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
1. Minimal Data Set
   - All injury admissions
2. Comprehensive Data Set
   - Severe trauma/Level I and II trauma centres
3. Death Data Set (in development)
   - Deaths

Provincial Trauma Registries
- all provinces, except Prince Edward Island, have provincial registries in Canada. All but one of the 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, Traffic Accident Information Database. 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 o police crash reports

5.2 Occupational Injury
- National Work Injuries Statistics Program (Workers' Compensation Board)
- Manitoba Labour, Workplace Safety & Health Division
- Ministries of Labour – report serious incidents, fatalities in the Fatalities Surveillance Database

5.3 Fire
- Federal Fire Loss Reporting System
- Office of the Fire Commissioner (AB, MN)

5.4 Farm
- Canadian Agricultural Injury Surveillance Program

5.5 Sports
- International Ice Hockey Spinal Injury Survey from Think First. It is a survey that is mailed to neurosurgeons across the country.

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:
- SMARTRISK-Ontario Injury Resource Centre-Ontario Injury Compass www.smartrisk.ca
- ThinkFirst Canada-International Ice hockey Spinal Registry www.thinkfirst.ca
- Safe KIDS Canada www.safekidscanada.ca
- Atlantic Collaborative on Injury Prevention (ACIP) www.acip.ca
- BC Injury Research and Prevention Unit (BCIRPU) www.injuryresearch.bc.ca
- Alberta Centre for Injury Control and Research (ACICR) www.acicr.ca

D. *Components of Trauma Registries*

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 clear definitions, data collection directives and a data dictionary
2. Datasets
3. Trauma Definition and level of severity
4. Inclusion and Exclusion Criteria
5. Data reporting capability
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
9. Governance

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 this 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 a combination of different datasets combined to provide data collection and reporting on various injury populations. In the US, 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
In Canada, the National Trauma Registry (NTR) is presently comprised of 2 data sets, the Minimal Data Set (MDS) and Comprehensive Data Set (CDS) with a third, the Death Data Set (DDS) which is under development.

1. The Minimal Data Set (MDS) contains data from records selected by specific cause of injury codes from the Discharge Abstract Database and Hospital Morbidity Database. This data set includes all injury hospitalizations admitted to a hospital in Canada. Data are available from the MDS since 1994/95 on injury hospitalizations in Canada.
2. The Comprehensive Data Set is a more detailed and extensive data set of specific patients treated at a designated trauma hospital in Canada participating in the

NTR. 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 ≥13. Data are available from the CDS since 1996/97 on major trauma in certain provinces within Canada.

3. The Death Data Set (DDS) is a collaborative effort between the Medical Examiner's office, Statistics Canada and the Public Health Agency of Canada. This data set is under development with the aim to include all trauma related deaths in the country.

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 or DDS. Presently, Ontario, Nova Scotia and British Columbia have access to Minimal, Comprehensive and Death datasets 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 deaths and trauma hospitalizations with selected criteria independent of ISS.

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 cause 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 form the multidisciplinary committee. See sections 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 levels of access to the data. It is recommended to have a 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 be included in this procedure. Although it is necessary to have a 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 the data. Some systems allow various level 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 basically 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 institution specific committee depending on the population included in the Trauma Registry. This committee 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 an ISS cut off of >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 all Trauma Team Activations regardless of ISS and patients that met the Trauma Team Activation 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 data sets are essential to enable individual hospital data reporting and local Trauma Program needs.

The ICD codes used to determine inclusion and exclusion in Canada are a specific range of Cause of Injury codes (Tables 1-4, see Appendix B). In the US, the range of ICD 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.ntdsdictionary.org/dataElements/datasetDictionary.html

The specific inclusion Criteria for the Canadian NTR are as follows:
- ISS >12
- has an International Classification of Disease External Cause of Injury Code that meets the definition of trauma as described in the ICD10 and ICD 9 Cause of injury codes inclusion lists (Tables 1-4, Appendix B)
- meets one of the following criteria:
    - admitted to a trauma hospital; or
    - treated in the Emergency Department of a trauma hospital (not admitted); or
    - death in the Emergency Department of a trauma hospital after treatment is initiated (not admitted).

F. *Standards*

1. Scoring Systems

1.1 Physiologic Scores

1.1.1 Glasgow Coma Scale (CGS) – The Glasgow Coma Scale (GCS) is a neurological scale used to assess patient prognosis and the degree of brain injury by evaluating the level of consciousness. It was first published in 1974. The GCS evaluates visual, motor and verbal responses to stimuli. The score from each category is added. This tool is used in the field, as well as in the resuscitation room. 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 Trauma Score (TS) – The Trauma Score (TS) is a simple physiological measure of injury severity. "The TS combines GCS values with measurements of systolic blood pressure, respiratory efforts, and capillary refill".[20]

1.1.3 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:, 0 indicating dead and 7.8408 being normal.".[21]

1.1.4 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. See also: http://www.thechildren.com/trauma/_pdf/en/assessing-trauma-severity.pdf

1.1.5 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.[22]

1.1.6 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. It is a good predictor of mortality and length of stay in trauma patients.[23]

1.2 Anatomic Scores

1.2.1 Abbreviated Injury Scale (AIS) – See Section B Glossary of Key Terms

1.2.2 Injury Severity Score (ISS) - See Section B Glossary of Key Terms

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.[24]

1.2.4 Anatomic Profile (AP) - 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 </= 2 injuries to calculate survival probability. It has not surpassed the ISS in the prediction of mortality.[25]

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 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."[26]

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".[27]

1.2.7 Organ Injury Scaling (OIS) - The Organ Injury Scale, developed by the American Association for the Surgery of Trauma in 1987grades 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. Retrieved April 27, 2010, from http://www.trauma.org/. [28]

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.
Retrieved April 27, 2010, from http://www.trauma.org/. [29]

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." [30]

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1.3.3 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-9 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.[31]

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 5 levels are:

1. Dead
2. Vegetative State (meaning the patient is unresponsive, but alive; a "vegetable" in lay language)
3. Severely Disabled (conscious but the patient requires others for daily support due to disability)
4. Moderately Disabled (the patient is independent but disabled)
5. Good Recovery (the patient has resumed most normal activities but may have minor residual problems).
   Retrieved April 27, 2010, from http://www.nervous-system-diseases.com/glasgow-outcome-scale.html. [32]

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
   Retrieved April 27, 2010, from http://www.nervous-system-diseases.com/glasgow-outcome-scale.html [33]

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
   Retrieved April 27, 2010, from http://www.rancho.org/patient_education/bi_cognition.pdf [34]

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.sf-36.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.[35]

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."[36] "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."[37]

"ICD-10-CA classifies diseases, injuries and causes of death, as well as external causes of injuries and poisoning."[38] "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."[39] Residual or catch-all categories are provided for less specific and miscellaneous conditions.[40] 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.[41] 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.

3.2 CCI

The *Canadian Classification of Health Interventions* or "CCI was developed by CIHI to accompany the implementation of ICD-10-CA."[42] CCI "replaced the Canadian Classification of Procedures (CCP) as the national standard for classification of health care interventions beginning April, 2001."[43] It has been designed to meet the needs of various users across the continuum of health care, ensure ongoing relevance and utility in Canada, and be controlled by Canadians to reflect medical and technological advances. CCI classifies a broader range of interventions than its predecessors,[44] and contains a comprehensive list of diagnostic, therapeutic and other associated healthcare interventions (Folio, Introduction to CCI) (> 18,000 codes).[45] "The CCI utilizes a code-building logic within a multi-axial framework. The code structure is designed to identify different criterion (axes) within one code."[46] "As in ICD-10-CA, the tabular list is the classification itself and is a listing of intervention codes in alphanumeric order."[47] "The alphabetic index is an alphabetic listing of terms leading to the codes in the tabular list."   This alphanumeric structure allows for a potential code length of 10 characters. This framework consists of 6 fields. "The first five characters (fields 1 to 3) make up the rubic and describe "what" is being done. The qualifiers (fields 4 to 6), when put together, describe "how" the intervention is done. The rubics are the most stable part of the code and should not change much over time",[48] but the qualifiers make CCI dynamic and expandable. Therefore it can be "updated to accommodate changes in practice and technologies used to perform various interventions. Blocks of codes have been reserved to allow for future growth."[49]

G. _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:

Vendor	Product (s)
Digital Innovations, Inc.	Collector Trauma Registry
134 Industry Lane	
Suite 3	Cales Trauma Registry
Forest Hill, MD 21050	
Phone: 410-838-4034	National TRACS (NTRACS)
Toll Free in US and CA 800-344-3668	
Fax: 410-893-3199	
www.dicorp.com	
Clinical Data Management	TraumaBase 7
6851 Highway 73, Suite 200	
Evergreen, Colorado 80439, U.S.A.	
Phone: (303) 670-3331	
Fax: (303) 670-3394	
www.c-d-m.com	
Lancet Technology	TraumaOne
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	
www.lancettechnology.com/products/traumaone.shtml	
ImageTrend Inc.	ImageTrend
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*

This section includes possible sources of data for abstraction and data entry into the trauma registry, 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 injury population that may not be included in the registry.

1. Hospital Patient Records

Source of Data	Description	Relevant information
Patient Chart	A documentation of a patient's medical history and care for all visits to a hospital as an outpatient or as an inpatient, 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, 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

2. Hospital Discharge Abstracting Systems

Source of Data	Description	Relevant information
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 using external cause codes.

3. Emergency Health/Medical Services, Ambulance Records/Systems

Source of Data	Description	Relevant information
Emergency Health/ Medical Services	-Responds to emergency calls through 911 -Access to patient information are governed by the Freedom of Information and Protection of Privacy Act 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 ad times of injury and treatment, 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

4. Coroner/Medical Examiner's Office

Source of Data	Description	Relevant information
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.	-Autopsy reports provide useful details of injuries in addition to hospital documentation -Death data plays a role in supporting front end of injury surveillance.

5. Vital Statistics

Source of Data	Description	Relevant information
Vital Statistics	-Responsible for providing certificates for vital events such as birth, deaths or marriages	-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.

6. Ministry of Health

Source of Data	Description	Relevant information
Ministry of Health	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. Is usually a link through an advisory council that governs and provides direction and mandates of the registry.	Houses Minimal dataset for some provincial registries

7. NACRS

Source of Data	Description	Relevant information
NACRS or National Ambulatory Care Reporting System	-Provides data for all hospital-based and community-based ambulatory care: day surgery, outpatient clinics and emergency departments	-ED deaths Injury surveillance for non admitted trauma patients

8. CHIRPP Link: http://www.phac-aspc.gc.ca/injur-bles/chirrp/index-eng.php

Source of Data	Description	Relevant information
CHIRPP stands for Canadian Hospitals Injury Reporting and Prevention Program	-Collects data on injuries sustained specifically by children seen in emergency departments of eleven pediatric and four general hospitals in Canada -Partner in injury prevention efforts for communities	Provide detailed information about events and factors contributing to the injury event. Allows for reporting on contributing factors of injury when population based reporting is not required.

9. Provincial Trauma Registry

Source of Data	Description	Relevant information
Provincial Trauma Registry	-Provides information on injuries from all trauma centers within the province. 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.	-Data Dictionary -Provides injury trends for the province -Provides data to coordinate and inform health care resources, policy, standards of care

10. National Trauma Registry Link: http://www.cihi.ca/ntr

Source of Data	Description	Relevant information
National Trauma Registry	-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	-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.

11. NTDB Link: http://www.facs.org/trauma/ntdb.html

Source of Data	Description	Relevant information
NTDB stands for National Trauma Data Bank	-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.	Participant in the NTDB is available to Canadian hospitals. Allows comparative reporting with peer hospitals in the US.

I. *Data Collection Process*

There are different approaches to data collection for a trauma registry. Depending on the nature, resources available and use of the trauma data 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 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. Enter 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, for missing data are identified close to the time of injury such as ambulance reports or close to the point of care such as missing laboratory or diagnostic reports.

2. Retrospective

Retrospective data collection refers to identifying trauma patients retrospectively. 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.
- Enter 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 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 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.

- Enter 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.

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, decrease in the amount of data input errors and 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: Discharge Abstract Database (DAD); Health Information Services abstracting databases, such as 3M, Med2020, Meditech, etc.; Emergency Health Services.

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

5. Interfaces

An interface is an interaction between computers, when data is entered into one Program or system, it automatically moves to another. Contact the IS 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 pre-determined 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

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 is the organization that houses and manages the Canadian National Trauma Registry (NTR) as well as many other data holdings. They have developed a data and information quality program for use across all of their data holdings. The following website has additional information about this program: http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=quality_e

3. CHIMA has developed a **Data Quality Toolkit,** available for purchase from the CHIMA 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:

1. National Trauma Registry – currently developing a data dictionary 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.

2. 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

3. National Trauma Data Standard (NTDS) – The American College of Surgeons (ACS) developed the National Trauma Data Bank (NTDB) which now contains over 2 million cases from over 600 U.S. trauma centres. The NTDS is the new data dictionary for the NTDB. It is a dataset defining standardized data elements collected within the NTDB for analysis at the national level. More information is available at: http://www.facs.org/trauma/ntdb.html

L. *National Trauma Registry (NTR)*

The National Trauma Registry (NTR) was formally created in 1996 and has data from some provinces since 1994. NTR is housed at the Canadian Institute for Health Information (CIHI) and guided by the National Trauma Registry Advisory Committee (NTRAC). This is a multidisciplinary committee made up of stakeholders from across the country. The goals of the NTR are:

- To examine national injury epidemiology, facilitate provincial and international injury comparisons,
- To increase awareness of injury as public health issue in Canada
- To assist injury prevention programs
- To facilitate injury research

More information about the NTR can be found at:
http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=services_e#ntr

1. Data Submission

Data is submitted annually to the National Trauma Registry Comprehensive Data Set (NTR CDS), which is managed by the Canadian Institute for Health Information.

Data submission specifications are produced annually by CIHI. A representative from each Provincial Trauma Registry is responsible for extracting the relevant data elements from their own database. Submissions are transmitted to CIHI over the secure eDSS transmission system. Data received by CIHI is put through a data checking routine. Any errors in the loading process are sent back to the Provincial Trauma Registry and the Province is asked to correct and resubmit the data. Provinces who do not submit their data in a timely manner run the risk of having their data excluded from the annual Major Injury in Canada Report.

2. Publications

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

Injury Hospitalizations Report (historical): used the NTR Minimal dataset (a subset of the DAD, also held at CIHI). Please see:
http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=AR_8_E

Major Injury in Canada Report: uses NTR CDS dataset. Please see:
http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=AR_26_E

Trauma e-reports: The NTR MDS moved to an electronic reporting system as of 2006, with interactive tables for members of the health care and research community to use. To gain access to the system email to: ntr@cihi.ca

Additional NTR reports, analyses and media releases can be found at: 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 pre defined 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: pre programmed 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 TRISS on a graph divided by a line diagonally down the centre 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.[50]
- 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 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 are 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 centres.
- Information requests from referral centres.
- Data accuracy and completeness reports.
- Counts by cause of injury.

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 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 centres 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.[51]   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. It will 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 centres in Canada. After an extensive review process by which the pediatric trauma centres 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.

The National Trauma Registry Advisory Committee is presently working with the Canadian Institute for Health Information to develop a national benchmarking report. The National Trauma Registry expansion project will allow for a more comprehensive report with inclusion of additional data elements for which to benchmark.

A manuscript on **"Canadian Benchmarks in Trauma"** was published in the *Journal of Trauma*[52] in 2007 from the Research Committee of TAC, and included members of TRISC. 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:
1.2
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

1.2 Community Colleges – diploma in HIM:

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

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

1.2.3 Saskatchewan
1.2.3.1 Saskatchewan Institute of Applied Science & Technology, Regina, SK, see:
www.www.siast.sk.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: www.flemingcollege.ca
1.2.5.3 St. Lawrence College, Kingston, ON, see: www.sl.on.ca

1.2.6 Quebec
1.2.6.1 College Ahuntsic, Montreal, QC, see:
www.collegeahuntsic.qc.cq/accueil/accueil_sansflash.html
1.2.6.2 College O'Sullivan de Montreal, Montreal, QC, see: www.osullivan.edu
1.2.6.3 Cegep Regional de Lanaudiere a l'Assomption, L'Assumption, QC, see:
www.collanaud.qc.ca
1.2.6.4 College LaFleche, Trois-Rivieres, QC, see: www.clafleche.qc.ca

1.2.7 <u>New Brunswick</u>
1.2.7.1 New Brunswick Community College, Moncton, NB, see: <u>www.nbcc.ca</u>

1.2.8 <u>Nova Scotia</u>
1.2.8.1 Nova Scotia Community College, Halifax, NS, see: <u>www.nscc.ca</u>

1.2.9 <u>Newfoundland</u>
1.2.9.1 CompuCollege, St John's, NL, see: <u>www.compucollege.ca</u>

1.3 Universities – degree programs in Health Information Management

1.3.1 <u>The University of Western Ontario</u>, Faculty of Health Sciences – Bachelor of Health Sciences with Honours specialization in Health Information Management, see: <u>www.uwo.ca</u>

1.3.2 <u>Ryerson University</u>, School of Health Services Administration - Bachelor of Health Administration in Health Information Management, see: <u>www.ryerson.ca</u>

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

2. Other Health Professions - (such as Nursing, Paramedicine, etc.) – other healthcare disciplines which include course content in common with Health Information Management or has 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, <u>www.echima.ca</u> , 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: <u>www.cihi.ca</u>

3. 3 American Trauma Society (ATS) Trauma Registrar Training - offers two courses developed by the American Trauma Society, see: www.amtrauma.org

3.3.1 The Trauma Registrar Course Basic is a two day introductory course designed to cover basic information needed to manage a trauma registry efficiently. The course includes basic background information in anatomy and physiology, medical terminology, computer technology, coding and scoring, chart abstraction, standard reports and process and quality improvement.

3.3.2 The Trauma Registrar Course Advanced is a one and one-half day course targeting trauma registrars with at least two years experience. This course is designed to provide advanced knowledge in various reporting methodology, and quality and process improvement. This course will also provide fundamental information about ICD-9-CM coding, and Abbreviated Injury Scaling. Confidentiality and disclosure issues are addressed during this seminar. Practical experience is provided through hands-on laboratory sessions. These are on-site courses offered once a year at varying sites in the USA.

3.4 Trauma Registry Information Specialists of Canada (TRISC) Annual Meeting and Education Day – is usually held in conjunction with the Trauma Association of Canada's (TAC) Annual Scientific Meeting. The education section generally includes a Review of one body region with a physician specialists' presentation, ICD-10-CA and AIS coding overview and case studies; member presentations on relevant trauma registry topics; project work of TRISC; vendor demonstration of new/upcoming products; and networking. The TRISC page on the TAC website also includes a members' only section with recent presentations and "Ask the expert". See:
http://www.traumacanada.org/TRISC/TRISC.htm

4. Abbreviated Injury Scoring (AIS), Association for the Advancement of Automotive Medicine (AAAM) - offers an Injury Scaling: Uses and Techniques course. This course is available as a 2 day in person classroom course or as a webex on line course including 8 1.5 hour classes and individual review of online lectures delivered by the AAAM international faculty. This course is designed for anyone working with trauma registries such as trauma nurses, trauma coordinators, trauma registrars, trauma analysts, physicians, hospital records personnel and trauma researchers, see: www.AAAM.org

5. Vendor Training and Education

5.1 Digital Innovations Incorporated (DI)
5.1.1 Annual Users Conference - offers an annual DI Users Conference for trauma registry users. The conference offers education opportunities through both lecture format, as well as hands-on workshops, group discussion forums and presentations delivered by key note guest speakers. The conference also provides an opportunity for networking.

This conference is held at varying locations in the USA. More information about the users conference can be found at http://www.dicorp.com/News_TUC_Info.html

5.1.2 Digital Innovations Web Training Sessions - DI offers web training on a wide range of topics including data entry, program set up and report writing. These are lecture based sessions with examples, see: www.dicorp.com

5.1.3 Digital Innovations on site training – DI also offers on site regional or individual facility on site training.

More information regarding software training can be found at http://www.dicorp.com/Support_Training.html#On-line

6. Certification

6.1 CHIMA Certification - The Canadian Health Information Management Association national certification exam is administered twice each year. Graduates of CHIMA approved HIM programs must successfully challenge the exam to be eligible to use the professional credential Certified in Health Information Management (CHIM) and to receive a certificate of registration in the Canadian College of Health Information Management. The exam is usually written at the students educational institution, or in the case of distance students, in their local area under the supervision of a local invigilator. More information is available at: https://www.echima.ca/home

6.2 AIS Certification - AAAM has established a certification program for AIS Coding Specialists through a certification exam administered by the Professional Testing Corporation. It is suggested that candidates have a minimum of one year experience using the Abbreviated Injury Scale. More information is available at www.AAAM.org and www.ptcny.com/clients/AISC.B/

6.3 CSTR Certification - The American Trauma Society offers a certification exam which results in the registered designation of Certified Specialists in Trauma Registry (CSTR). More information is available at: www.amtrauma.org

7. Computer Skills - data entry, word processing, spreadsheets, report writing, statistical, database management

8. Research Skills - epidemiology, biostatistics

P. The Registry and Accreditation

Although Accreditation Canada, formerly Canadian Council on Health Services Accreditation (CCHSA) performs accreditation on all services delivered through the health care institutions, specific trauma accreditation processes exist which focus solely on the trauma system.

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.

Links to each association's accreditation/verification guidelines are listed below:

- The Trauma Association of Canada Accreditation guidelines can be found at: http://www.traumacanada.org/accreditation_committee/Accreditation_Guidelines_Jun_07.pdf

- The Australasian Trauma Verification Program Manual can be found at: http://www.surgeons.org/Content/NavigationMenu/FellowshipandStandards/FellowshipServices/Trauma/2009-08-04_Trauma_Verification_Manual.pdf

- 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.

In 2007 TRISC created a document outlining a list of detailed standards applicable to a trauma registry which was submitted to the TAC accreditation executive committee. This document can be found in Appendix C.

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.

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
- obtain approval of Manager/Director responsible for the service
- 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
- describes how confidential 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
- 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

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
  - National, such as: Personal Information Protection and Electronic Documents Act
- Professional Standards, such as CIHMA Position Statements: Principles and Guidelines for Access and Release of Health Information, Code of Practice for Safeguarding Health Information: Record Security; Security of Computerized Health Information; Transmission of Health Information by Facsimile; Data Quality; Electronic Transmission of Health Information
- Institution/Program policies
- Other Institution/Program policies

R. *Confidentiality & Privacy*

"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.[53]

1. Federal Legislation

Federal legislation takes precedence over existing provincial legislation if the federal standards are more stringent.
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. 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. Retrieved April 27, 2010, from http://www.csa.ca/cm/ca/en/privacy-code/publications/view-privacy-code. [54]

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 Freedom of Information and Protection of Privacy Act (FIOPOP) - the *Freedom of Information and Protection of Privacy (FOIPOP) Act* 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://www.gov.ns.ca/legislature/legc/statutes/freedom.htm
2.1.2 Hospitals Act

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. http://www.gov.pe.ca/law/statutes/pdf/f-15_01.pdf

2.3 New Brunswick
2.3.1 Protection of Personal Information Act – follows the same ten privacy standards outlined in PIPEDA.
2.3.2 Right to Information Act - http://www.gnb.ca/0062/acts/acts/r-10-3.htm

2.4 Newfoundland
2.4.1 Access to Information and Protection of Privacy Act –
http://www.assembly.nl.ca/legislation/sr/statutes/a01-1.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 May1st, 2007) applies to personal information held by private sector
businesses operating in Québec.
http://www.privcom.gc.ca/legislation/leg-qc_031211_e.asp

2.6 Ontario
2.6.1 Freedom of Information and Protection of Privacy Act
http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90f31_e.htm

2.6.2 Personal Health Information Protection Act, 2004
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
http://web2.gov.mb.ca/laws/statutes/ccsm/f175e.php
2.7.2 Personal Health Information Act
http://www.ombudsman.mb.ca/pdf/PHIA%20Act.pdf

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)
http://pipa.alberta.ca/index.cfm?page=legislation/act/index.html
2.8.3 Health Information Act
http://www.assembly.ab.ca/HIAReview/Health_Information_Act.pdf

2.9 Saskatchewan
2.9.1 Freedom of Information and Protection of Privacy Act
http://www.qp.gov.sk.ca/index.cfm?fuseaction=publications.details&p=527
2.9.2 Local Authority Freedom of Information and Protection of Privacy Act
http://www.qp.gov.sk.ca/index.cfm?fuseaction=publications.details&p=605
2.9.3 Public Disclosure Act
http://www.qp.gov.sk.ca/index.cfm?fuseaction=publications.details&p=782

2.10 Yukon
2.10.1 Access to Information & Protection of Privacy Act (ATIPP Act)
http://www.gov.yk.ca/legislation/acts/atipp.pdf

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.

3.1.1 Privacy and Security in a Health Information Exchange (HIE): PPB – 0016.09. For more information see:

https://www.echima.ca/media/documents/PPB/00016.08_Security%20HIE.pdf

3.1.2 Health Data Access, Use, and Control for Secondary Uses: PPB - 0003.07

For more information see:

https://www.echima.ca/media/documents/PPB/0003.07_HealthDataAccess.pdf

3.2 Privacy, Access & Disclosure Toolkit – is available for sale through the CHIMA website.

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

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) –"is a multi-disciplinary Society of the Royal College of Physicians and Surgeons of Canada, who:
- strive to improve the quality of care provided to the injured patient, including pre-hospital management and transport, acute care hospitalization, and reintegration into society,
- support, conduct, and apply basic science, clinical and outcome research related to trauma,
- encourage effective and efficient use of health care resources in the delivery of trauma care, and
- foster professional and community education in the field of injury prevention and in the care of the injured patient." Retrieved April 27, 2010, from http://www.traumacanada.org/mission.htm. [55]

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 April 27, 2010, from http://www.traumacanada.org/mission.htm. [56]
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/TRISC/TRISC.htm, includes: Bylaws, Strategic Plan, Executive Members list, Newsletters, Minutes, News/Updates, etc. There is also a members' only section, posting recent presentations and an "Ask the Expert" section. Anyone involved in a Trauma Registry is welcome.

3. *Canadian Health Information Management Association* (CHIMA) – is a national professional association representing certified, affiliate, student and retired Health Information Management (HIM) professionals, whose skills and knowledge support clinical research and provide the information for medical and health care statistics. Retrieved April 30, 2010, from https://www.echima.ca/about-us. [57]

4. *Association for the Advancement of Automotive Medicine* (AAAM) - is an international multidisciplinary organization of professionals committed to reducing motor vehicle trauma and improving highway safety. Founded in 1957, AAAM, a nonprofit organization, provides a communication forum for solutions to the traffic injury problem. AAAM's membership incorporates clinical, research and policy making backgrounds to form a unique blend of leaders in traffic injury control. Retrieved April 30, 2010, from http://www.carcrash.org/. [58]

5. American Health Information Management Association (AHIMA) – is the American professional association of Health Information Management professionals. For more information, see http://www.ahima.org/ .

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

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 April 30, 2010, from http://www.cnia.ca/intro.htm. [59]

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:
a) Nursing - Canadian Nurses Association - see http://www.cna-nurses.ca/CNA/nursing
b) Paramedics – Paramedic Association of Canada - see http://www.paramedic.ca/

T. *Publications/Reference Materials/Resources*

1. Publications and Newsletters

1.1 SMARTRISK – *Heads Up!*, published on a quarterly basis, this newsletter is distributed throughout Canada to practitioners, teachers, government officials and others interested in preventing issues. The newsletter offers recent news and research on injury prevention, and tips to help you see and manage risk. It also features profiles of SMARTRISK Heroes injury survivors, their high-profile ambassadors and other members of the SMARTRISK organization. To view on-line, see http://www.smartrisk.ca/downloads/publications/headsup.
SMARTRISK also publishes numerous articles related to Seasonal Tips, accessible on their website.

1.2 Canadian Institute for Health Information (CIHI), www.cihi.ca
1.2.1 CIHI Update, *Trauma Registry Update*, Newsletter
1.2.2 *National Trauma Registry Report: Major Injury in Canada*
1.2.3 *National Trauma Registry Report: Injury Hospitalizations*
1.2.4 *Provincial Report, Injury Hospitalizations*

1.3 Trauma Registry Information Specialists of Canada (TRISC) – *TRISC News* is available to all TRISC members and also on the TAC website, www.traumacanada.org

1.4 Digital Innovation Incorporated (DI), *The Difference* – is a semi-annual newsletter written for the users of Digital Innovation, Inc.'s registry software products, available on the DI website, www.dicorp.com

1.5 Canadian Health Information Management Association (CHIMA), www.echima.ca
1.5.1 *The CHIMA Source*, published three times per year, for the Members of the Canadian Health Information Management Association, and is available on their website.
1.5.2 *Professional Practice Briefs*, are discussion papers on topics of 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*, is a textbook based on the latest research and covers 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. Retrieved April 30, 2010, from http://www.cha. [60]

2.2 American College of Surgeons, Committee on Trauma (ACS COT), www.facs.org
2.2.1 *Resources for Optimal Care of the Injured Patient: 2006* – guidelines for care of the injured patient and outlines the essential and desirable requirements for trauma centers pursuing consultation or seeking to gain or maintain verification.
2.2.2 *National Trauma Data Bank ™ Annual Report*, presents a summary of information on the NTDB, which is the largest aggregation of U.S. trauma data ever assembled. The report contains an executive summary and tables and graphics on highlights from the NTDB and can be downloaded from the ACS website.
Retrieved April 30, 2010, from http://web4.facs.org. [61]

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 Scoring 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

2.5 *The Major Trauma Outcome Study: Establishing National Norms for Trauma for Trauma Care*, HR Champion, WS Copes, WJ Sacco, et al, published in The Journal of Trauma: Injury, Infection, and Critical Care, 1990.

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://www2.itssti.hc-sc.gc.ca/clf/clfinventory.nsf/Inventory-pdf/$FILE/InventoryE.pdf?OpenElement

3. Journals

3.1 *Journal of Trauma: Injury, Infection and Critical Care*, 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 the Eastern Association for the Surgery of Trauma and the Trauma Association of Canada/L'Association Canadienne de Traumatologie (TAC). Retrieved April 30, 2010, from www.jtrauma.com. [62]

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. Retrieved April 30, 2010, from http://www.ncra-

usa/i4a/pages/index.cfm?pageid=3307.[63]   The Fall 2008 edition had a special focus on Trauma Registries.

3.3 _Annals 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. [64]

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. Retrieved April 30, 2010, from http://www.cma.ca/cjem. [65]

3.5 _Canadian Journal of Surgery (CJS)_, contributes 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. Retrieved April 30, 2010, from http://www.cma.ca/cjs. [66]

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. Retrieved April 30, 2010, from www.airmedialjournal.com. [67]

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; anaesthesia; radiology and wound management. Retrieved April 30, 2010, from, http://www.injuryjournal.com. [68]

Appendix A: Abbreviations

AIS - Abbreviated Injury Scale

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 Codes

Inclusion List – ICD10 CA

External Cause Code Category	Definition
V01-V99	Transport incidents
V01-V06, V09-V90	Land transport incidents
V91-V94	Water transport incidents
V95-V97	Air and space transport incidents
V98-V99	Other and unspecified transport incidents
W00-W19	Unintentional falls
W20-W45, W49	Exposure to inanimate mechanical forces
W50-W60, W64	Exposure to animate mechanical forces
W65-W70, W73, W74	Unintentional drowning and submersion
W75, W76, W77, W81, W83, W84	Other unintentional threats to breathing except due to inhalation of gastric contents, food, or other objects
W85-W94, W99	Exposure to electric current, radiation and extreme ambient air temperature and pressure
X00-X06, X08, X09	Exposure to smoke, fire and flames
X10-X19	Contact with heat and hot substances
X30-X39	Exposure to forces of nature
X50	Overexertion and strenuous or repetitive movements
X52	Prolonged stay in weightless environment
X58-X59	Unintentional exposure to other and unspecified factors
X70-X84	Intentional self-harm, excluding poisoning
X86, X91-X99, Y00-Y05, Y07-Y09	Assault, excluding poisoning
Y20-Y34	Event of undetermined intent, excluding poisonings
Y35-Y36	Legal intervention and operations of war

Table 1

Inclusion List – ICD9

	Definition
E800–E807	Railway incidents
E810–E819	Motor vehicle traffic incidents
E820–E825	Motor vehicle non-traffic incidents
E826	Pedal cycles
E827–E829	Other road vehicle incidents
E830–E838	Water transport incidents
E840–E845	Air and space transport incidents
E846–E848	Vehicle incidents not elsewhere classifiable
E880–E888	Unintentional falls
E890–E899	Incidents caused by fire and flame
E900–E902, E906–E909	Incidents due to natural and environmental factors
E910 and E913	Incidents caused by drowning and suffocation
E914–E915	Foreign bodies (excluding choking)
E916–E928	Other incidents
E953–E958	Suicide and self-inflicted injury (excluding poisoning)
E960–E961, E963–E968	Homicide and injury purposely inflicted by other persons (excluding poisoning)
E970–E976, E978	Legal intervention
E983–E988	Injury undetermined whether unintentionally or purposely inflicted
E990–E998	Injury resulting from operations of war

Table 2

Exclusion List – ICD10 CA

ICD-10-CA Code Exclusions	Definition
W78-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*	Poisonings 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

* Indicates that these cases will be excluded but will be reported on separately

Table 3

Exclusion List – ICD9

ICD-9 E Code Exclusions	Definition
E911- E912	Inhalation and ingestion of food and other objects causing obstruction
E905	Venomous animals and plants
E850-E858, E860-E869*	Poisonings by drugs or gases
E903	Travel and motion
E904	Hunger, thirst, exposure, neglect
E950-E952*	Suicide and self inflicted injury (poisonings)
E962*	Assault by poisoning
E980-E982*	Poisoning undetermined whether unintentionally or purposely inflicted
E930-E949	Drugs, medicinal and biological substances causing adverse effects
E870-E876	Misadventures
E878-E879	Complications
E929, E959, E969, E977, E989, E999	Late effects

Indicates that these cases will be excluded but will be reported on separately

Table 4

Appendix C: TRISC Recommended TAC Accreditation Registry Standards

The Trauma Registry and data play an integral role in the Trauma Program, Trauma Centre and regional Trauma System. For TAC Accreditation, a trauma centre must be able to demonstrate this role from a local and regional perspective.

Mandatory components of a Trauma Registry should include
- Defined inclusion /exclusion criteria
- Data Dictionary including any additional user defined data elements specific to the institution
- Recognized severity indices, i.e. Abbreviated injury Scale (AIS) and Injury Severity Score (ISS)
- Recognized international coding classification system, i.e. ICD coding classification
- Data quality program, including edit checks
- Specific timelines for data completion and transmission to central site

Procedures required for the Trauma Registry
- Procedure for data collection
- Procedure for data transmission to central site (provincial)
- Procedure for data quality including running data edit checks
- Procedure for internal/external data requests (i.e. Data request form)
- Procedure for central site receipt of data from individual sites
- Procedure for preparation of data file for the National Trauma Registry (NTR)
- Procedure for transmission of data to the National Trauma Registry (NTR)

Policies required for the Trauma Registry
- Policy for release of information
- Policy for confidentiality of disclosure of trauma registry data
- Policy for data completeness

Data usage
- List of standard reports with report description and frequency of generation
- Annual Report Data Summary for the last fiscal year
- List of research projects over the past 3 years based on the Trauma Registry data
- Inventory of Data Requests including use of data (i.e. media release, Masters thesis, etc.) for the last year
- Demonstration of data utilized to improve trauma care (i.e. clinical protocols, outcomes) and control (i.e. Injury Prevention programs).
- Description of the role of the Trauma Registry within the Quality Improvement program

Trauma Program staff
- Qualifications of the Trauma Registry staff
- Trained with most recent ICD coding and AIS coding
- Trauma Registry representative at Accreditation interviews

Reference List

[1] Association for the Advancement of Automotive Medicine, "Abbreviated Injury Scale", http://www.aaam1.org/ais/, accessed April 20, 2010.

[2] Canadian Institute for Health Information, "Canadian Classification of Health Interventions", http://www.cihi.ca/cihiweb, accessed April 26, 2010.

[3] Canadian health Information Management Association, https://www.echima.ca/history , accessed August 23, 2010.

[4] Canadian Healthcare Association, "About CHA", http://www.cha.ca, accessed April 20, 2010.

[5] Canadian Institute for Health Information, "About CIHI", http://secure.cihi.ca/cihiweb, accessed April 26, 2010.

[6] Centers for Disease Control and Prevention, "About CDC", http://www.cdc.gov/about/history/ourstory.htm, accessed April 20, 2010

[7] Digital Innovation, Inc., "DI Home", http://www.dicorp.com, accessed April 26, 2010.

[8] Canadian Institute for Health Information, "Discharge Abstract Database", http://secure.cihi.ca/cihiweb, accessed April 28, 2010.

[9] Trauma Association of Canada, "Interdisciplinary Trauma Network of Canada", http://www.traumacanada.org/TCC/TCC.htm, accessed April 20, 2010.

[10] Pucket, Craig D., (1999). *The Educational Annotation of ICD-9-CM 4th Edition*, page xvi. Reno, Nevada: Channel Publishing, Ltd.

[11] Champion, H. R., Copes, W. S., Sacco, W.J., et al, (1990). Published in *The Journal of Trauma: Injury*, Infection, and Critical Care.

[12] Canadian Institute for Health Information, http://secure.cihi.ca/cihiweb/en/downloads/NTR_OTR_MDS_Data_Element_List.pdf , accessed April 27, 2010.

[13] Canadian Institute for Health Information, "National Ambulatory Care Reporting System", http://secure.cihi.ca/dihiweb, accessed April 27, 2010.

[14] American College of Surgeons, Committee on Trauma, "National Trauma Data Standard, NTDB", http://www.ntdsdictionary.org/", accessed April 27, 2010.

[15] Ibid.

[16] Canadian Institute for Health Information, "National Trauma Registry", http://secure.cihi.ca/hihiweb, accessed April 27, 2010.

[17] Trauma Association of Canada, "TAC Mission Statement", http://www.traumacanada.org, accessed April 27, 2010.

[18] Trauma Association of Canada, "Trauma Registry Information Specialists of Canada (TRISC)", http://www.traumacanada.org, accessed April 27, 2010.

[19] Committee on Trauma, American College of Surgeons (2006). *Resources for Optimal Care of the Injured Patient*. Chicago, IL: American College of Surgeons.

[20] Moore, Ernest E., Feliciano, David V., Mattox, Kenneth L.,(Eds.). (2004). *Trauma, fifth edition. (respiratory rate & respiratory expansion), Page 87*. McGraw-Hill, Medical Publishing Division.

[21] Committee on Trauma, American College of Surgeons (2006). *Resources for Optimal Care of the Injured Patient*. Chicago, IL: American College of Surgeons.

[22] Moore, Ernest E., Feliciano, David V., Mattox, Kenneth L.,(Eds.). (2004). *Trauma, fifth edition. Page 87-90*. McGraw-Hill, Medical Publishing Division.

[23] Ibid.

[24] Ibid.

[25] Ibid.

[26] Ibid.

[27] Ibid.

[28] Trauma.org, "Organ Injury Scaling", http://www.trauma.org/, accessed April 27, 2010.

[29] Trauma.org, "Trauma Score – Injury Severity Score: TRISS", http://www.trauma.org/, accessed April 27, 2010.

[30] Moore, Ernest E., Feliciano, David V., Mattox, Kenneth L.,(Eds.). (2004). *Trauma, fifth edition. Page 89*. McGraw-Hill, Medical Publishing Division.

[31] Ibid, *Page 89-90*.

[32] Nervous System Diseases, "Glasgow Outcome Scale (GOS)", http://www.nervous-system-diseases.com/glasgow-outcome-scale.html, accessed April 27, 2010.

[33] Ibid.

[34] RANCHO LOS AMIGOS, NATIONAL Rehabilitation Center, "Family Guide to The Rancho Levels of Cognitive Functioning", http://www.rancho.org/patient_education/bi_cognition.pdf, accessed April 27, 2010.

[35] Gennarelli, Thomas A., MD, Woodzin, Elaine (Eds.) (2005) *Abbreviated Injury Scale 2005, Update 2005,* page15. Barrington, IL, USA: Association for the Advancement of Automotive Medicine.

[36] International Statistical Classification of Diseases and Related Health Problems Tenth Revision, Canada (ICD-10-CA) 2009, FOLIO, Preface, para. 2.

[37] Fletcher, J. (2004). ICD-10-CA/CCI classification primer (3rd ed). Surrey, BC: Joy Fletcher, p. 2.1.

[38] Ibid.

[39] Ibid, p. 2.2.

[40] Ibid, p. 2.2.

[41] Ibid, p. 2.3, 2.7.

[42] Canadian Institute for Health Information. (2003). Introduction to ICD-10-CA and CCI 2003. Ottawa, ON, Introduction p. 4.

[43] Fletcher, J. (2004). ICD-10-CA/CCI classification primer (3rd ed). Surrey, BC: Joy Fletcher, p. 3.1.

[44] Canadian Institute for Health Information. (2003). Introduction to ICD-10-CA and CCI 2003. Ottawa, ON, Introduction p. 4.

[45] Canadian Classification of Health Interventions (CCI) 2009, FOLIO, Introduction to CCI, para. 1.

[46] Fletcher, p. 3.1.

[47] Ibid

[48] Ibid, p. 3.5.

[49] Ibid, p. 3.1.

[50] Champion, H. R., Copes, W. S., Sacco, W.J., et al, (1990). Published in *The Journal of Trauma: Injury, Infection, and Critical Care*.

[51] Committee on Trauma, American College of Surgeons (2006). *Resources for Optimal Care of the Injured Patient*. Chicago, IL: American College of Surgeons.

[52] Bergeron E, Simons R, Linton C, Yang F, Tallon JM, Charyk Stewart T, de Guia N and Stephens M. Canadian Benchmarks in Trauma. *J Trauma*. 2007; 62(2): 491-497.

[53] CIHI, An Approach to Conducting Privacy Impact Assessment, November 2004, pg 2.

[54] CSA Standards "View Privacy Code", http://www.csa.ca/cm/ca/en/privacy-code/publications/view-privacy-code, accessed April 27, 2010.

[55] Trauma Association of Canada, "TAC Mission", http://www.traumacanada.org/mission.htm, accessed April 27, 2010.

[56] Trauma Association of Canada, "Trauma Registry Information Specialists of Canada (TRISC)", http://www.traumacanada.org/mission.htm, accessed April 27, 2010.

[57] Canadian Health Information Management Association, "About Us", https://www.echima.ca, accessed April 30, 2010.

[58] Association for the Advancement of Automotive Medicine, "Home", http://www.carcrash.org/, accessed April 30, 2010.

[59] Canadian Nursing Informatics Association (CNIA), "Intro", http://www.cnia.ca/intro.htm, accessed April 30, 2010.

[60] Canadian Healthcare Association, "On-line Store",
http://www.cha.ca/cart/catalog/product_info.php/cPath/32/products_id/84, accessed April 30, 2010.

[61] American College of Surgeons – eStore, http://web4.facs.org/ebusiness/ProductCatalg/, accessed April 30, 2010.

[62] The Journal of Trauma, Injury, Infection, and Critical Care, "About the Journal",
http://journals.llww.com/jtrauma/pages/aboutthejournal.aspx, accessed April 30, 2010.

[63] National Cancer Registrars Association, "Journal of Registry Management", http://www.ncra-usa/i4a/pages/index.cfm?pageid=3307, accessed April 30, 2010.

[64] Annals of Emergency Medicine, "Scope and Stature of the Journal",
http://www.annemergmed.com/aims, accessed April 30, 2010.

[65] Canadian Medical Association, "Canadian Journal of Emergency Medicine", http://www.cma.ca/cjem, accessed April 30, 2010.

[66] Canadian Medical Association, "Canadian Journal of Surgery", http://www.cma.ca/cjs, accessed April 30, 2010.

[67] Air Medical Journal, "Aims and Scope", http://www.airmedicaljournal, accessed April 30, 2010.

[68] Injury, International Journal of the Care of the Injured, "Aims and Scope",
http://www.injuryjournal.com/aims, accessed April 30, 2010.