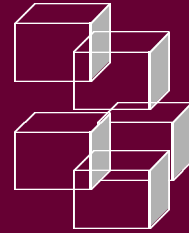




This lecture will overview a current and broad-based project in injury research; the ICE Injury Statistics Project. This effort, as you will see, incorporates many of the concepts covered in previous lectures, including injury surveillance, injury data sources, classification of injuries, and injury coding.

The International Collaborative Effort (ICE) on Injury Statistics is a research activity that seeks to improve the international comparability and quality of injury data. This effort, in turn, has the potential to lead to a better understanding of the causes of injury and suggest areas and means for prevention. ICE is sponsored by the National Center for Health Statistics (NCHS), US Centers for Disease Control and Prevention, with funding from the National Institute on Child Health and Development, National Institutes of Health. A web page for the group is currently available at the following site: <http://www.cdc.gov/nchswww/about/otheract/ice/ice.htm>.

ICE Focus



- Injury Data Collection
- Injury Coding in Datasets
- Injury Classification
- Categorization of Injury Intent

The aim of the ICE project is to improve data comparability and quality across countries. This effort is currently focused on four areas; What data are collected, how injuries are coded, how they are grouped and how they are characterized.

International Studies



Why pursue them?

Why are international comparisons important in injury research?

International studies and other investigations of differences in injury rates by geographical area represent another form of epidemiologic study. At their core, international studies represent “natural experiments”. Epidemiology is built upon natural experiments. In this type of situation, investigators look to see if a difference in an injury rate exists between two areas. Specific attention is given to areas with large differences, as this represents a scenario where an underlying factor may be markedly different between the two areas. The task of the investigator is to look for clues on the factor or factors which underlie the disparity in injury rates. It is an ideal situation to begin to look for clues for causal relationships to a disease or an injury. When conducted properly, international studies can easily highlight areas of high or low morbidity.



ICE History

1st Symposium	May 1994	Bethesda, MD
Working Group Meeting	Mar 1995	
Working Group Meeting	Feb 1996	Melbourne
Working Group Meeting	Nov 1996	Washington
Working Group Meeting	May 1998	Amsterdam
2nd Symposium	June 1999	Washington
Working Group Meeting	Mar 2000	New Delhi

The ICE project began in May of 1994 with a symposium held to identify research areas for study and collaborative work. The work from this symposium and several working sections led to the publication of the book, *Proceedings of the International Collaborative Effort on Injury Statistics, Volumes I and II*. This book provides a nice overview of the importance of injuries in several countries and suggests a framework for studying injuries in the future. It laid the groundwork for collaboration on a number of injury areas. The second symposium was recently held in Washington, DC. It updated the current activities of the group and discussed the impact of the adoption of ICD-10 classification on injury mortality.

ICE Projects



- Framework for Presenting Mortality Data
- Comparing Injury Mortality Data
- International Classification of External Causes of Injuries (ICECI)
- Identifying a Minimum Basic Dataset for Injury Monitoring
- Framework for Presenting Morbidity Data
- Comparisons of Occupational Injuries

The task of working towards data comparability across countries can be complex. First, injury surveillance mechanisms can differ between countries. Second, injury data sources will likely differ. Third, the definition of injuries or reporting of injuries within records or data sets may differ. Several ICE projects have been developed to address these issues and work towards common definitions, sources, and standards. This list identifies six of the projects. Others are outlined at <http://www.cdc.gov/nchswww/about/otheract/ice/project.htm>.

The work of the ICE group represents one of several types of research efforts. Previously, we described both descriptive and analytic approaches to injury research. In this context, international studies most often represent another form of descriptive study.

Framework for Presenting Injury Mortality Data

Mechanism/ Cause	Manner/Intent			
	Unintentional	Intentional		
		Homicide	Suicide	etc.
Fall				
Firearm				
MVA				
Poison				
etc.				

One of the first projects of the ICE activity was the development of a standard framework for looking at and presenting injury mortality statistics. Until this effort, injury mortality was defined in various different formats. This led to problems in trying to compare data across and within countries. To allow for comparisons, it is important to show that the methods underlying the data are similar. If the methods are not similar, then it is possible that any differences found in injury death rates between Area A and Area B are not real differences, but are due to the effects of the methods used.

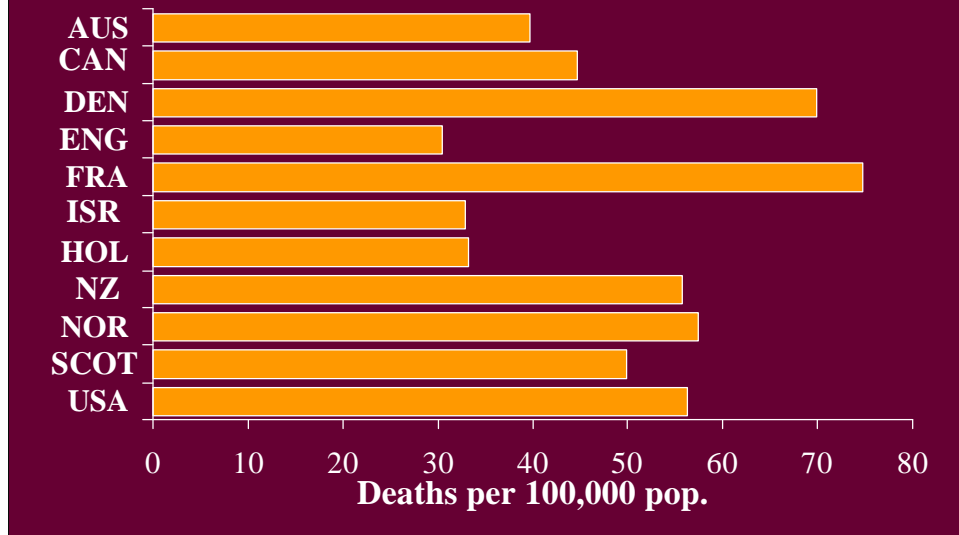
The effort to identify a common injury mortality framework is important because it starts to outline how injury deaths should be classified. The framework was published in 1997. A copy of the framework can be obtained from <http://www.cdc.gov/epo/mmwr/preview/mmwrhtml/00049162.htm>. If this framework becomes widely used, it will represent a standard for classifying injury deaths.

Basic Elements in the Framework for Presenting Injury Mortality Data

- **Mechanism/Cause**
 - Cut/Pierce
 - Drowning
 - Fall
 - Firearm
 - Motor Vehicle Crash
 - Poisoning
 - Other
 - Unspecified
- **Manner/Intent**
 - Unintentional
 - Intentional
 - Suicide
 - Homicide
 - Undetermined
 - Other

Two basic elements of injuries form the basis for the framework on Injury Mortality Data. These elements are the mechanism of the injury and the intention underlying the injury. The mechanism of the injury addresses the situation of the injury; was it due to a motor vehicle accident, an assault, a fall, a poisoning, etc. The intention underlying the injury addresses if the injury was unintentional “an accident” or intentional “harm purposely inflicted”.

Average Annual Injury Death Rates, Injury ICE Countries

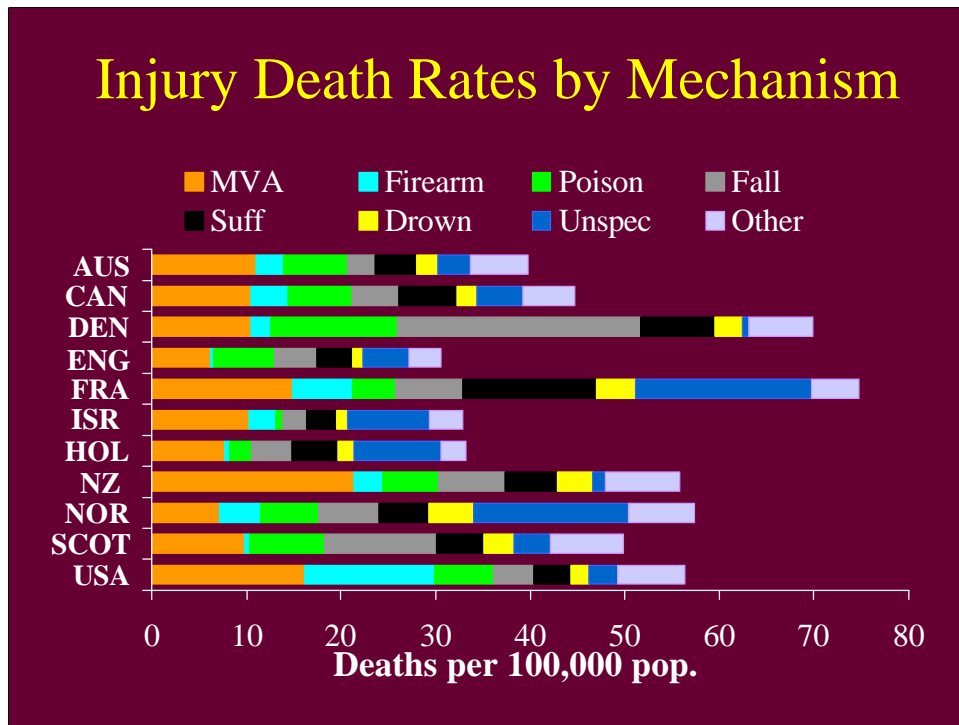


Comparing Injury Mortality Statistics

The first active effort to apply the framework outlined above is demonstrated in the publication, “International Comparative Analysis of Injury Mortality”. In this work, injury data were obtained from national vital statistics offices in 11 countries. Information on injury deaths was categorized by the groupings recommended in the matrix. All of the countries, except for Denmark coded injury deaths using ICD-9. Denmark used ICD-10. Death rates were determined by gathering population data for each area.

The results suggest sizable differences in injury death rates between countries. France and Denmark had the highest rates, while England & Wales, Israel and the Netherlands had the lowest rates.

Injury Death Rates by Mechanism



A look at the injury deaths by mechanism and cause suggests potential areas where intervention may be worthwhile. For example, in this slide, one can observe that death rates from motor vehicle accidents are much higher in New Zealand than anywhere else. Deaths from firearms are disproportionately high as well. This type of information is similar to other “ecologic studies” in epidemiology. When combined with other information, (like the high gun ownership rates in the US), it provides a clue to possible associations. It does not, however, prove that the association actually exists. This requires further analytic studies.

This example portrays the potential benefits that may be obtained by having international comparisons. In these presentations, though, it is important that the methods of analysis and data collection are similar in each area. The ICE project was able to succeed in having a similar framework for information examined and presented. However, there may still be differences between the countries in the data itself or the methods in which the data were collected. For example, the manner in which death is assigned by a medical professional may differ between countries. Some areas will allow any medical doctor to complete a death certificate. Other areas might require a coroner to complete the death certificate.

Further information of this effort can be found in the ICE publication, “International Comparative Analysis of Injury Mortality”.

ICECI

Standardizing the Cause of Injury

At the time of injury.....

- What were you doing?
- How did it happen?
- Where were you when it happened?
- Was the injury associated with an organized activity?
- Were you using any objects?

International Classification of External Causes of Injury

Another project associated with the ICE group is the move to standardize the manner in which information on the external causes of injuries are collected and coded.

For several years now, the classification of cause of injury has been dependent upon E-codes. This system arises from the ICD classification scheme and has been focused primarily upon mortality. Morbidity from injuries, though, is much more frequent than mortality. When considering morbidity, an E-code system has many insufficiencies. For example, the current system often only allows a single dimension (one cause) to injury events, and neglects the multi-factorial nature of many events. Injury researchers typically want to know more about cases than is revealed by E-codes.

Work to apply standards to the classification of injury cause began in 1990 and continues today under the ICECI project. Credit for much of this work goes to the Consumer Safety Institute in Amsterdam. Variables included in the standardization effort address the basic questions outlined on this slide. They include the intent underlying the injury, the mechanism of injury, the place of occurrence, the object producing the injury, and the activity the person was engaged in when the injury occurred. In addition, two modules have been developed by the group; a transport module and a violence module. Included within the violence module are elements such as the relationship of the victim to the perpetrator, the context of the assault, and the precipitating factors behind suicide events. At present, the group is field testing the ability to characterize several of these data elements in injury research.

Minimum Basic Dataset for Injury Monitoring

Core Information

- Victim Data - age, gender, residence
- Intent
- Place
- Nature of Injury
- Anatomical Site(s)
- Activity

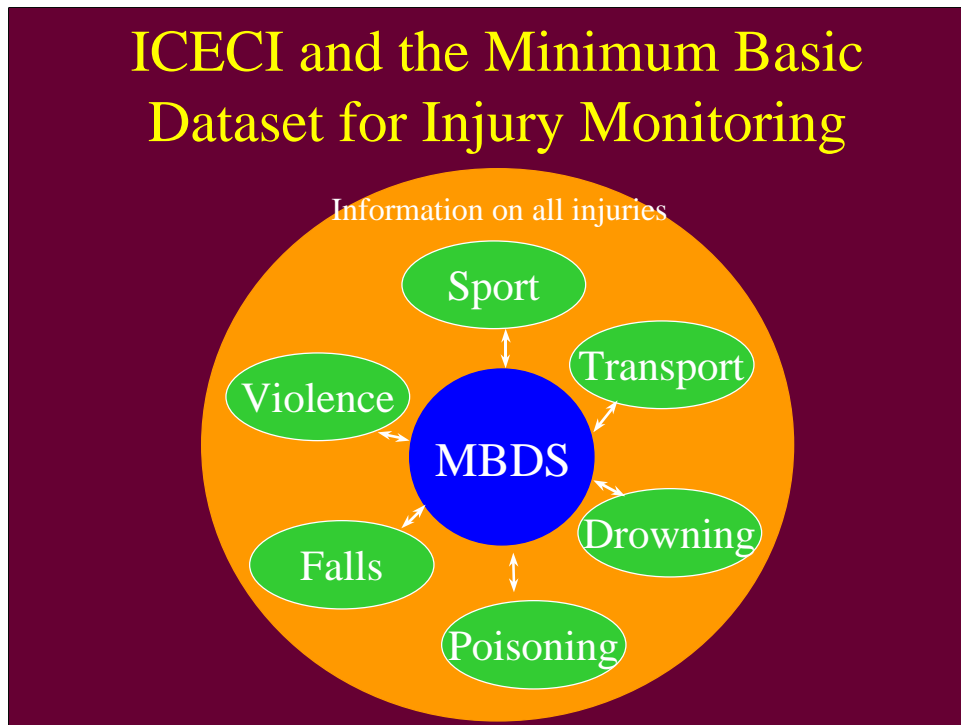
Minimum Basic Data Set for Injury Monitoring

Another dynamic project of the ICE group is work towards the development of a minimum basic dataset for injury monitoring. The rationale behind this effort is to improve the information arising from injury surveillance systems. Why is this important? To answer this question, let us reconsider the reasons why injury surveillance systems are implemented. In general, a surveillance system may be used for several purposes. These include purposes such as identifying the magnitude of the injury problem, studying injury risk over time, comparing geographical regions for risk to identify “hot spots” for injuries, and evaluating injury prevention efforts.

At their core, injury surveillance systems try to gather information on the number of injury events taking place. In reality, the systems are often specific to certain types of injuries or injury definitions. This translates to the existence of many different systems with inconsistent data between them. The Working Group on Identifying a Minimum Basic Data Set for Injuries is seeking to change this practice by establishing core data elements that should be gathered in all injury monitoring systems.

What this activity can do is to improve the uses of surveillance systems and provide more accurate data on potential “hot spots” of injuries. It can also set a standard for all of injury research to follow.

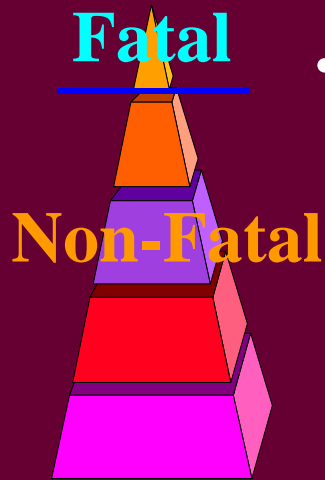
ICECI and the Minimum Basic Dataset for Injury Monitoring



The efforts of the work to standardize information on the cause of injury and the work to establish core injury data elements in surveillance systems are inter-related. In the diagram shown here, the large orange circle represents the global scale of the ICECI project. The desire is to standardize the information gathered on injuries. At the core (in the blue circle) lies the data comprising the minimum basic data set for injury monitoring. These data elements are common to all types of injuries.

In the second tier, data specific to certain injury types or injury mechanisms enters the equation. The outer (green) circles represent standard data elements that should be gathered for specific injury categories. This information will be focused upon the specific injury and will not necessarily apply to all injuries. As an example, consider the proposed violence module to ICECI. The data elements recommended for collection regarding injuries from violence include; (1) the relationship of victim to perpetrator, (2) context of the assault, (3) precipitating factors for suicide, etc. This type of information pertains only to violence and not to other categories of injury.

Injury Morbidity Issues



- Medical care datasets record details surrounding health care visits and not injury events
 - Incidence vs. readmission
 - Financing

Morbidity Issues in the Registration of Injuries

Perhaps the greatest challenge in the International Collaborative Effort on Injury statistics is clarifying and classifying the picture related to non-fatal injury events. Non-fatal injuries represent a significant portion of the injury pyramid and range from events that are self-treated to those seen in Emergency Departments to those requiring overnight hospital stays.

Particular challenges exist in most databases. For example, most medical care data sets are based upon the circumstances surrounding the use of medical care. In this milieu, it can be difficult to separate incident events (new injury cases) from those that are re-admitted for treatment of a previous injury. Another example is the situation of a person with a head injury seen first in a general hospital and then transferred to a trauma center. Two visits would be recorded as one injury event.

In an international setting there will be other challenges as well. Accessibility or cultural factors that influence the use of health services may differ across countries. In the USA, for example, the lack of health insurance coverage may preclude the use of health services for minor injuries. Utilization management (cost constraints) may also influence the level of care provided.

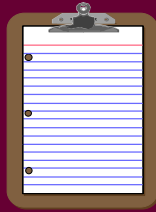
Matrix for Presenting Injury Morbidity Statistics

Body Region	Nature of Injury
• Head Injuries	• Fractures
• Neck	• Dislocations
• Spine & Back	• Sprains
• Abdomen	• Crushing Injury
• Extremities	• Open Wounds
• Neck of Femur	• Contusions
• etc.	• Burns

ICE is currently attacking the use of injury statistics for non-fatal events through two projects. The first plan is to develop a matrix for presenting injury morbidity statistics. The idea is similar to that for injury mortality. One should develop a standardized framework for classifying and presenting non-fatal injury data.

The current focus of the group working on this issue is to develop a matrix that considers the body region (head, spine, extremities, etc.), affected by the injury and the nature of the injury, (fracture, laceration, etc.).

This work is particularly exciting as it has the potential to standardize the way that researchers define head injuries or neck injuries. Very often in the past, this definition has been made by the local researcher based upon the data available. Comparing results between studies of head injuries, for example, has been difficult because of these differing definitions.



Hospitalized Injuries

What population are the data based upon?

What hospitals are included or excluded?

What is the definition of a hospital admission?

What injury-related data are available?

Are denominator data included?

The second project is a questionnaire on hospital injury morbidity data. This project seeks to gather information on the various databases that currently record in-patient hospital admissions data. The goal is to identify areas where similarities exist and the areas where methodologic differences exist. In that way, it will be possible to better characterize the hospital data available on injuries.

For example, if area A and area B have similar methods for defining and recording hospital events, then you can be more confident of the comparisons identified between area A and area B. By similar methods, one might consider the definition of how an event gets entered into the database, one might consider the types of hospitals that report to the database, or one might consider the specific injury data elements that are recorded.

Conclusions

- Much can be gained by comparing injury data across countries and across studies
- Most current injury data systems have deficiencies that limit comparability
- The ICE on Injury Statistics represents a concerted action to standardize injury data elements and data collection
- This work has the potential to provide “defacto” standards for all injury researchers