

## **Morbidity issues in registration of injuries**

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Injuries are a major public health problem around the globe. The consequences of injuries are primarily documented in a significant mortality. In addition to mortality, the burden of injury is evident by a large number of non-fatal injuries. Burden of non-fatal injuries is in high costs of treatment and rehabilitation, short and long term dysfunction and impairments, lost productivity, and quality of life losses.

### **Definition**

Injuries occur in a wide range of severity levels, from trivial injuries that majority do not notice and do not call an injury to a severe life-threatening multiple trauma patients. There is no clear cut-off point for what severity should be counted as injury. In practice, one uses two approaches. The first is to count as injury all events resulting in contact with health services. This approach is common in injury surveillance systems operating on hospital or community levels. Examples are European Home and Leisure Injury Surveillance System (EHLASS), National Injury Surveillance System in Australia, injury registration in Victoria, Australia, Norwegian National Injury Register. The second approach is to include also injuries that result in activity limitation, but not necessarily in the contact with health services. Such definition of injury is usually applied in surveys of health status in the population. Usually one applies a cut-off point for the duration of the limitation (e.g., half-a-day limitation in performing usual activities). Example is the National Health Interview Survey in the U.S. Further differences exist in definition of injury. For example, back pain is usually not considered an injury in Europe but it is in the U.S.

Based on these variations, the reported rates of injuries vary among the countries. The most commonly reported overall rates are between 10-20 injury events per 100 population annually.

### **Level of care**

Injuries can be treated at various levels of health services. A smaller portion of injuries is treated on in-patient basis. In majority of the health care systems acute care hospitals operate ERs that treat injuries on outpatient basis. Some health care systems operate also emergency clinics in communities that usually treat injuries of light to medium severity. How large number of injuries is treated in physician offices varies among the health care systems. In some systems this may represent a large portion, in others it is minimal. In addition to patients that present with injuries, a portion of patients can make only a phone consultation. This is often a case with poisoning. Finally, a portion of minor injuries is self-treated or not treated.

## Data sets

Data sets on injuries are health care data and other data sources.

Health care data are usually viewed as the most reliable source of information on injuries. There are several different sources of health care data on injuries. Hospitals discharge registers are relatively uniform source of data based on the common core elements (e.g., age, sex, and date of admission, nature of injury). To varying degree these data also include information about the external cause of injury (E-codes). Discharge registers are administrative sources of data and their quality is questionable. More information is often available in medical records. The limitation is that these records usually require manual or semi-manual search for the information and are therefore less available. Other types of health services data exist in different systems. Claims data and health plan utilization data can be a good source of information on injuries.

In addition to the health services, other sources of data on injuries are available. Most common are police reports on traffic accidents, reports on occupational injuries, school records about the injuries to students, insurance companies data on car damages and other.

Finally, data are available from various general and injury-specific surveys.

## Dimensions

Injury occurs as the consequence of injury event and results in some consequences. Different types of information around injury are needed for different purposes. For prevention purposes it is the information about the circumstances of the injury event, what has happened that has caused the injury, that is the most useful.

Several dimensions and levels of details in information are used to describe injuries.

*Case identification* is the minimum information. *Nature of injury* is the next level of information that is often available for all cases. *Circumstances* of the event occurrence is the information collected in a specially designed surveillance systems. *Severity of injury* is measured by the AIS scale and is not routinely collected. *Utilization of care services* is at minimum provided as the level of service. Extended information includes length of stay, major surgical and medical procedures and possibly more detailed clinical utilization information. Limited information about the *consequences* of injuries is collected in the registration systems (e.g., dead and alive). More extended information requires special follow-up designs.

## Purpose of the registration

Registration of injuries can be done for different purposes. General *surveillance* is the most common purpose and is used for population health surveillance. Registration is also performed for setting up of priorities in injury prevention. Other uses are to guide prevention efforts, estimate burden of injury to communities and societies, advocacy for injury control. Finally, injury data are used for the evaluation of the interventions and other research purposes.

## **Circumstances of injury events**

Circumstances (external causes) of injuries are collected to a various degree of details in the registration systems. There is sometimes a misunderstanding about what data on circumstances of injuries describe. It happens often that data on circumstances of injuries are assumed to describe etiologic causes of injuries. That is not necessarily the case. Etiologic causes of injuries are much more complex and consists of both external and intrinsic causes (e.g., osteoporosis). The information about the intrinsic causes are rarely routinely collected.

## **Use of health care utilization data**

Health care utilization data such as discharge registers are the most common and easily available source of morbidity data. Limitations of such data sets should be remembered. First, these data represent a mixture of both incident and prevalent cases of injuries. Often it is difficult to differentiate between first time contacts and transferals. In many countries there are multiple providers that serve the same population making it difficult to define the denominators for the rates. Finally, changes in the health care system and medical practices affect these data.

## **International comparisons**

What possibilities exist to use morbidity data for the international comparisons? The purpose of the international comparison is to analyze possible differences in the risk of injury in the population. This may appear a challenging task. As explained above, the information that is available is the information about the utilization of health services. Numerous other factors but the risk of injury affects these data. Examples are differences in the accessibility (e.g., health insurance coverage, physical accessibility due to distances). Cultural factors play an important role in the utilization of services. Health systems have various strategies to manage the utilization of the services. Further, coding systems and practices may differ among the systems.

These factors make it difficult but not impossible to compare injury morbidity among the countries. The possible approaches that may work is to use population based hospitalization rates for injuries. Such rates are only an indicator of injury risk in the population as they may depend on many other factors. To improve validity of the comparisons based on the hospital separation data it is needed to define indicator injuries (e.g., hip fractures). Case definition of the hospitalization should be standardized. If possible, the population rates should be derived.

In summary, morbidity data on injuries depend on many factors but injury risks. If these data should be used for the research purposes it is important to resolve several issues. Case definition should be made more precise. The purpose of the comparison should be clearly defined. The comparisons should be probably based on few indicator conditions.

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ICE conference  
Washington, DC June 2-3



## Morbidity

- Non-fatal injury
  - rate of 10-20 per 100 population
- Importance of non-fatal injury
  - costs of treatment and rehabilitation
  - lost productivity
  - permanent and long term impairment

## Level of care

- Treated by health services
  - in-patients (65,000)
  - ER & Emergency Clinics (400,000)
  - Other levels (???)
  - Other types of contact (e.g. phone call) ???
- Self-treated & not treated (???)

## Data sets

- Health services
  - Hospital (administrative) discharge registers
  - Medical records
  - Claims data
  - Health insurer data

## Data sets outside the health services

- Traffic accidents
- Occupational injuries
- School records
- Sport clubs records
- Surveys

## Dimensions

- Case identification
- Nature of injury
- Circumstances of the event occurrence
- Severity of injury
- Utilization of care
- Consequences of injury
- Outcomes of care

## Purpose of the registration

- Surveillance
- Setting up of priorities in injury prevention
- Guides prevention
- Burden of injury
- Advocacy
- Evaluation of interventions
- Research

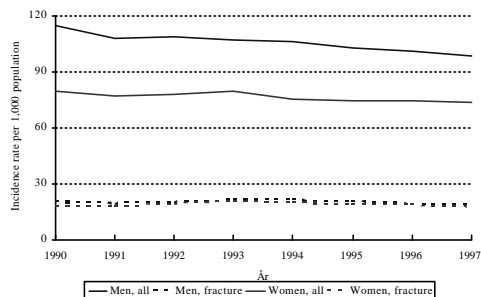
## Circumstances of injury events

- Circumstances (external causes)
- Etiologic causes
  - external
  - intrinsic
- Prevention does (should) not necessarily focus on external causes

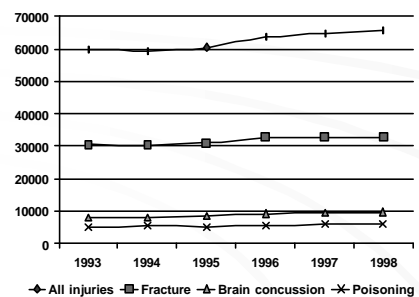
## Use of health care utilization data

- Incident vs. prevalent case
- Referrals and transferals
- Re-admissions
- Denominator unknown
- Sensitive to changes in health care utilization

## Incidence rate of injuries, Norway 1990-1997



## Hospitalized injuries, Norway 1993-1998



## International comparisons

- Risk of injury in the population
- Factors that influence utilization of health services
  - accessibility (e.g. insurance, physical accessibility)
  - cultural factors
  - utilization management
- Coding differences

## Possible approaches

- Available:
  - Population based hospitalization rates
  - Other?
- Required:
  - Indicator conditions
  - Case definition
  - Population based injury incidence rates

## Challenges

- Case definition
- Purpose of the registration
- Scope of the registration
- Collection of data about the cases or the exposures?
- Epidemiologists, clinicians, health services researchers

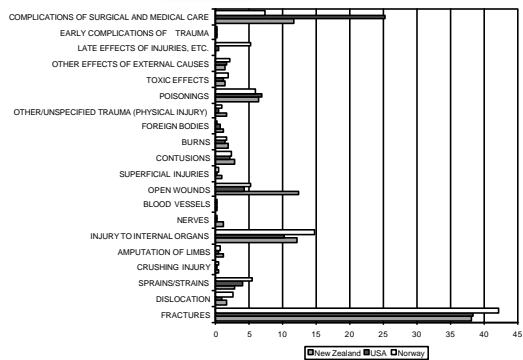
## Nature -- site matrix International comparison

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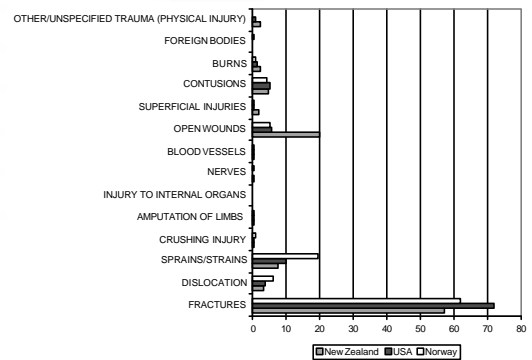
## Data contributions

- US -- Ellen McKenzie
- New Zealand -- John Langley
- Norway -- Branko Kopjar

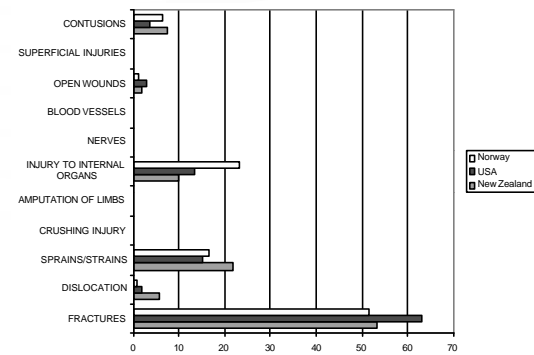
## Nature of injury



## Upper extremity



## Spine & back



## Recommendation

- Analyses appear interesting
- Expanding number of countries
- Calculating population based rates
- In-depth analyses
- Expanding to include non-hospitalized injuries