IDB-JAMIE Manual

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Working together to make Europe a safer place

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About this report

This Manual is one of the products that resulted from the JAMIE project which is co-funded by the European Commission under the EU-Health Programme (Grant agreement 2010 2205).

The Manual describes the purpose, scope and methodology of injury data collection in emergency departments at hospitals. With the Manual two Data Dictionaries are published with serve as companion documents to the IDB JAMIE Manual, i.e. the Data Dictionary for the Full Data Set (FDS) and the Dictionary for the Minimum Data Set (MDS).

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Content

1 Policy background of JAMIE-project

This Chapter summarises the various policy initiatives by the World Health Organization and the European Commission (EC) with a view to raise attention for injury prevention and in particular for enhanced efforts in getting better injury data available. It then will focus on a series of initiatives supported by the European Commission assisting Member States (MSs) in collecting data and facilitating exchange of data at EU-level. Finally the reasons for initiating the JAMIE-project are being explained and the main objectives of JAMIE will be clarified.

The global picture

Worldwide, about 5.1 million people die each year due to injuries. This accounts for 9% of the world's deaths, or nearly a third more than the number of fatalities that result from malaria, tuberculosis, and HIV/AIDS combined. The World Health Organization (WHO) has worked over the past few decades to bring injuries higher up on the international public health agenda, through a number of actions, including the launch of the World report on violence and health (Krug et al., 2002); the World report on road traffic injury prevention (Peden et al., 2004); the World report on child injury prevention (Peden et al.,2008), and the World report on disability (WHO, 2011), being the first ever comprehensive reports in their respective fields. In response to these reports, the World Health Assembly (WHA) adopted a series of resolutions urging for policy initiatives on behalf of the member states as well as WHO, including recommendations to improve injury data collection in and exchange among WHO-member states. Many technical guidance documents on how to prevent violence and unintentional injuries have been published by the WHO over the past few years and have been widely disseminated, accompanied by a series of learning tools.

The need for proper injury surveillance systems has long been recognised by the World Health Organization (WHO). In a document titled "Injury Surveillance Guidelines" (Holder et al., 2001) the WHO clearly outlines why injury surveillance systems are indispensable "to develop effective prevention strategies, most countries need better information. In particular, countries need to know about the numbers and types of injuries that occur and about the circumstances in which those injuries occur. Such information will indicate how serious the injury problem is, and where prevention measures are most urgently needed." The document also refers to the added benefits of an injury surveillance system, such as:

- Increased understanding of the injury problem confronting the local community, region or country and maximised use of existing resources to best advantage;
- Surveillance can help to argue for more resources. For instance, an increase in the budget provided by local, regional or national government or more cooperation and support from other agencies in the field;
- Assistance to health care agencies in benchmarking their performance by comparing surveillance results and evaluating our success in addressing the problem; and
- By conforming to international standards, such systems will contribute international statistics that will not only enable comparisons between countries to be made, but will also provide a more accurate global picture of the injury problem. In turn, country comparisons and an accurate global picture will help countries, through international agencies like WHO, to cooperate and coordinate their efforts to prevent and treat injuries.

Collaborative work on injury surveillance methodology development has led to a the development of an International Classification of External Causes of Injuries (ICECI, 2004), a Related Classification in the WHO's Family of International Classifications, which has been designed to help researchers and

prevention practitioners to describe, measure and monitor the occurrence of injuries and to investigate their circumstances of occurrence using an internationally agreed classification. Other guidance produced in this framework is provided by the Guidelines for conducting Community Surveys on Injuries and Violence (Sethi, 2004).

The policy response in Europe

Also within Europe, injuries threaten the economic and social development of region. Although a neglected health problem until recently, injuries and violence account for 9% of all causes of death in the WHO-European region, with about 800 000 people losing their lives to injury-related causes each year. Injuries are the leading cause of death among people 5-44 years old and are responsible for 14% of all the disability adjusted life-years (DALYs, i.e. years lost due to death or lived with disability) lost in the WHO European Region (Sethi, 2006).

The burden is unequally distributed both within and between countries: people living in low- and middle-income countries in the Region are nearly four times more likely to die from injuries than those in high-income countries. Within the WHO-European Region, the response of countries to the problem of injuries has varied. Many countries, particularly those in northern Europe, started addressing the problem systematically a few decades ago, whereas others have only acknowledged the extent of the problem of injuries and the ability to prevent them and started taking action in more recent years.

To support MSs in addressing this problem more comprehensively, resolution EUR/RC55/R9 on prevention of injuries in the WHO European Region (WHO-Euro, 2005) was issued, which places now violence and injury prevention firmly on the public health agenda and call for the reporting of national activities. the Resolution invites the WHO office for the European region:

- To support MSs in their efforts to strengthen injury prevention and to draw up national action plans;
- To facilitate the identification and sharing of good practice in the prevention of violence and unintentional injuries;
- To stimulate and support the network of national focal points and further develop collaboration with other relevant networks of experts and professionals;
- To provide assistance in building capacity at the technical and policy level in order to strengthen national response to injuries to include surveillance, evidence-based practice and evaluation;
- To provide technical assistance to improve pre-hospital treatment and care for victims of unintentional injuries and violence; and
- To promote the development of partnerships and collaboration with the European Union and other international organizations.

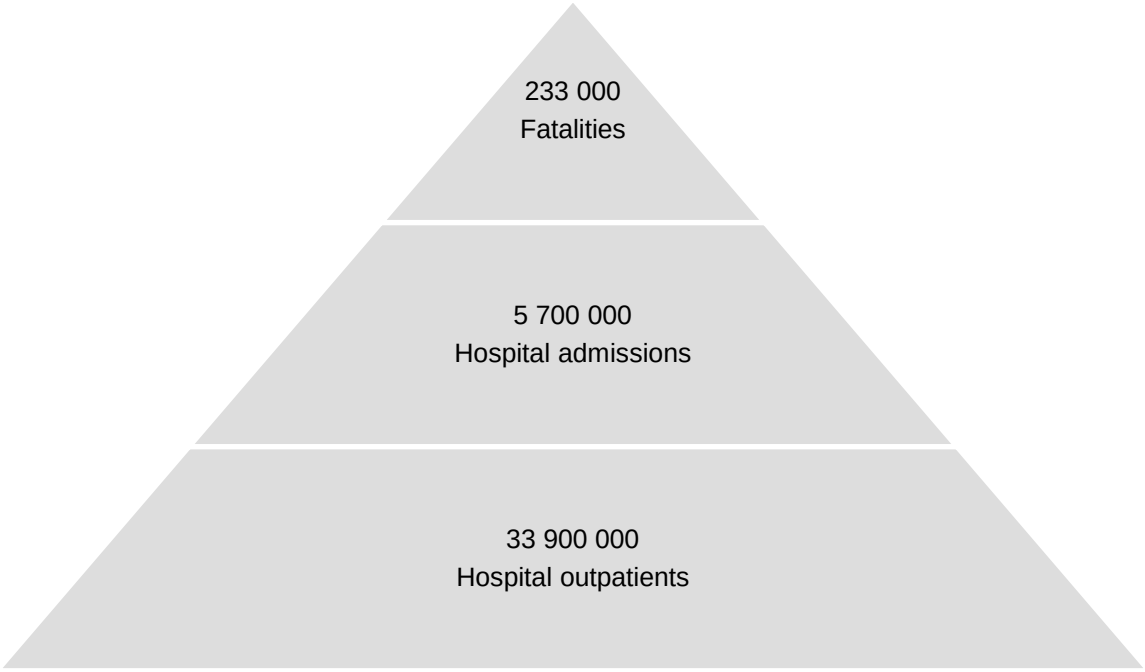
Following suit, the Council of the European Union adopted a Council Recommendation on the prevention of injury and the promotion of safety (Council of the European Union, 2007). Also in European Union region (EU), injuries due to accidents or violence constitute a major public health problem within all EU-MSs.

Among the EU-population, accidents and injuries are the fourth leading cause of deaths and impose a considerable burden on individuals, families and societies, in particular on the health care systems in all MSs. Injuries due to accidents and violence are a major public health problem, killing more than 230 000 people in the EU-27 each year (annual average 2008-2010) and disabling many more. Injuries are the fourth most common cause of death, after cardiovascular diseases, cancer, and respiratory diseases.

Every two minutes one EU-citizen dies of an injury. For each fatal injury case, 25 people across the EU are admitted to hospital, 145 are treated as hospital outpatients and many more seek treatment

elsewhere, e.g. by family doctors. This means that each year a staggering 5.7 million people are admitted to hospital and 33.9 million people are treated as hospital outpatients as a result of an accident or violence related injury (see figure 1.1).

Figure 1.1 The injury pyramid for the European Union



Source: WHO – mortality database, WHO – Health for All database, Eurostat – hospital discharge statistics, EU IDB. See Annex 1 "List of figures and tables" for more details.

The costs for the health care systems are estimated today at approximately 78 billion Euros per year in the EU (table 1.1). There are huge disparities amongst EU-MSs regarding the risk of injuries and accidents, as the risk of dying from an injury is five time higher in the Member States with the highest injury rate than those with the lowest rate.

Table 1.1 Estimated direct medical cost due to injuries (in billion euro) and estimated cost per capita (in euro) *

Country	Direct Medical Cost	Population	Direct Cost per capita
AT	3.4 B	8.2 M	415
NL	2.4 B	16 M	150
SE	3.5 B	8.3 M	422
UK	3.5 B	56 M	63
Wales	0.4 B	2.8 M	145

**Sources:* CSI, Injuries due to accidents, violence and self-harm, Factsheet 23 (ISBN 978-90-6788-456-3), CSI (Consumer Safety Institute), Amsterdam, 2011/) Ekman. R, Use of local injury surveillance for injury prevention, Swedish Civil Contingency Agency, Karlstad, Sweden, 2012/ R.A. Lyons et al., UK burden of injuries study, Inj Prev16:A150, 2010/ Macey, S.M. (2010). Assessing the excess health service utilisation and direct medical costs of injuries. PhD. Thesis. Swansea University: UK.

The EU-Council Recommendation provides a stronger public legitimacy for further actions and notably the elaboration of national action plans in the area of injury prevention and safety promotion. The Council Recommendation recommends MSs to:

- Develop a national injury surveillance and reporting system, which monitors the evolution of injury risks and the effects of prevention measures over time;

- Set up national plans for preventing accidents and injuries initiating interdepartmental co-operation; and to
- Ensure that injury prevention and safety promotion is introduced in a systematic way in vocational training of health care professionals.

The EU-Council Recommendation recommends the Commission to:

- Support a Community-wide injury surveillance exchange based on injury data provided by the MSs;
- Establish a Community-wide mechanism for the exchange of information on good practice and disseminate this information to relevant stakeholders;
- Provide MSs with the necessary evidence for inclusion of injury prevention knowledge into the vocational training of health professionals; and to
- Support the development of good practice and policy actions in relation to the seven priority areas.

The Regulation on Community statistics on public health and health and safety at work (Council of the European Union, 2008/L 354/70) is also relevant in this perspective as it aims at harmonized reliable health information which supports Community actions as well as national strategies in statistics in the field of public health. Annex I to the Regulation identifies “accidents and injuries” as one of the core subjects to be covered within this common framework and as element in the domain "Health status and health determinants" as defined by the regulation. This domain covers the "statistics on health status and health determinants that are based on self-assessment and compiled from population surveys such as the European Health Interview Survey (EHIS), as well as other *statistics compiled from administrative sources* such as those on morbidity or accidents and injuries". The harmonised and common data set to be provided by the Regulation "shall cover the subject of accidents and injuries, including those related to consumer safety, and, whenever possible, alcohol- and drug related harm".
Even more specifically related to consumer product safety, the Council adopted a Regulation on requirements for accreditation and market surveillance relating to the marketing of products (Council of the European Union, 2008/L 218/30). This Regulation requires MSs“ to establish adequate procedures in order to follow up complaints or reports on issues relating to risks arising in connection with products subject to Community harmonization legislation; [and] monitor accidents and harm to health which are suspected to have been caused by those products […]”. In practices this requires MSs to continuously survey product related injuries in a way that facilitates the assessment of product related injuries and the circumstances in which they occur. This call for monitoring product related accidents and injuries had been recently also echoed by European consumers unions and by the engineering industry (Orgalime/ ANEC, 2009).

Despite the magnitude of the problem and policy initiatives, there was still no systematic and comprehensive EU-wide initiative initiated by Member States in view of monitoring of accidents and injuries that could serve as a basis for benchmarking and designing appropriate prevention policies, both at EU and national levels.
Therefore, the Recommendation put an emphasis on the need to develop a Community information system on accidents and injuries with a view to achieving representative and comparable data for benchmarking within MSs and with other countries.

This message was repeated again in September 2009 in a letter from the then Commissioners for Health Policy and of Consumer Protection, Mrs Vassiliou and Mrs Kuneva, to the national Ministers of Health urging them to continue to work actively towards (see copy of letter on *next page*):

Letter sent by European Commissioners for consumer protection (Mrs Kuneva) and Health policy (Mrs Vassiliou) to the Ministers of Health in the respective EU-countries.

MEGLENA KUNEVA
MEMBER OF THE EUROPEAN COMMISSION

ANDROULLA VASSILIOU
MEMBER OF THE EUROPEAN COMMISSION

Brussels, 28.09.2009
D/MK (2009) 500
D/AV (2009) 1146

Dear Mr Harney,

Injuries are among the leading causes of death and morbidity in countries in Europe. Indeed, for young people and adults up to middle age, they are the leading cause of death. They are a major source of chronic disability leading to significant loss of years of good health and quality of life.

It is our firm belief that in order to successfully address injury prevention issues it is crucial to possess accurate data on the circumstances under which accidents occur and injuries are sustained. Through such information it is possible to monitor injury risks, assess whether interventions at national or EU level are needed (e.g. legislation on product safety, strengthening of the joint market surveillance actions, etc.). Injury data is also indispensable to enable proper assessment of the health burden of injuries with respect to different consequences: mortality, morbidity and disability.

On 31 May 2007 the European Council adopted the Recommendation on the prevention of injuries and the promotion of safety (2007/C 164/01). This Recommendation urges Member States to make better use of existing injury data and, where appropriate, enhance their injury surveillance and reporting instruments. The Commission is invited to report on the implementation of this Recommendation by 2011.

The European Commission has long supported injury data gathering and has invested in identifying cost-efficient methods for obtaining injury data and for exchanging these data at EU level. Today twelve EU Member States have sustainable injury surveillance systems in place based on a national sample of hospitals applying the harmonized methodology of the European Injury Data Base (IDB). These data are publicly accessible through a web site of the European Commission, https://webgate.ec.europa.eu/idb/. Nine other countries in Europe are currently pilot testing the system.

We are grateful for your country's commitment to working towards a sustainable system of injury data collection through participation in the abovementioned pilot project. We would like to urge you to continue to work actively towards full national representativity of your injury data and active participation in the European Injury Data Base.

From our side we remain committed to assisting efforts of advancement in this important field. This can, for example, be done by sharing the positive experiences and best practices gained by applying the IDB methodology, capacity building and supporting the evaluation of your pilot project.

We thank you for your positive reception of this letter and look forward to receiving your response.

Yours sincerely,

Meglena Kuneva

Androulla Vassiliou

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- A sustainable system of injury data collection in their country;
- Full representativity of injury data delivered;
- Active participation in the European Injury Data Base (IDB).

The need for comprehensive injury indicators

Injury data can be obtained from a number of sources within EU-countries. Regrettably, these sources are currently limited in their size and scope, and incomplete and insufficient to identify the external causes and circumstances in which accidents and injuries occur. Within the EU, much of the injury information generated until now is not comparable between countries, and not between registers, due to the lack of resources and political commitment in a number of EU-Member States and the lack of sufficient EU-level funding and coordination.

What information is available tends to focus on fatal injuries. So also most of the targets of EU- and national policies with respect to road traffic safety, safety at work, consumer safety, violence and suicide prevention have been primarily focused on the reduction of deaths. However, deaths are only one aspect of the total injury problem; for every person killed, many more are seriously and permanently disabled and many more again suffer minor, short-term disabilities. Not only the costs of injury mortality but also the costs of morbidity are immense, not only in terms of lost economic opportunity and demands on national health budgets, but also in terms of personal suffering.

It is now increasingly acknowledged that deaths are only one measure of the magnitude of the road accident problem. In fact, in many EU Member States deaths in road traffic or for instance at work, have been declining over the last several decades due in part to improvements in medical care (prompt emergency response, early diagnosis, and treatment capabilities) as well as to advances in road and vehicle design and in technology. As a result, non-fatal injuries are increasing in importance in terms of both societal and economic costs as well as loss of productivity. Consequently, there is a growing need for separate targets related to the reduction of non-fatal injuries, in particular those leading to permanent impairments. Such indicators are gradually being introduced at the EU level for target setting and for measuring progress in policies for road safety and for health and safety at work.

However the concept of ‘severity’ is being operationalized in various manners. For road safety it is being advised to define a “serious casualty” as someone who is “sent to hospital” following an injurious event. For workplace accidents, only events that result in three or more days sickness absence are counted as an injurious event.
Therefore it is important to apply a common and practical definition for injury cases: cases that lead to medical treatment in an hospital, either as out-patient or as in-patient. This would reduce the subjectivity of current classifications of injury severity.

Injury surveillance in the EU – and in most Member States – can be characterized as operating on an incomplete puzzle of data sources that provides only a notion of the importance of the issue and lacks the information that is required for policies and actions (Kisser et al, 2009)
However these challenges can by met by using health based data that provide the ‘cement’ to glue the jigsaw pieces of understanding the injury field together and is the common denominator for all policy sectors and MSs (figure 1.2).

Figure 1.2 Matrix place of injury by severity of injury outcome and source of data

It is obvious that the health sector provides the best setting for collecting information on all injuries that need medical observation and/or treatment in hospital and for an objective assessment and identification of the most severe cases resulting in permanent impairments. In order to monitor injury incidence, statistics based on hospital records are one of the most comprehensive methods compared to others. Compared to surveys recall bias is avoided and more detailed information on nature of injury can be obtained.

Injury surveillance initiatives in Europe

Over the past few years, in a number of EU-MSs specific national systems targeting on causes and circumstances of injuries have been established in order to fill this information gap. And as a result, in countries where such registers are primarily set up for the purpose of prevention and where they are available for many years (e.g. Scandinavian countries, the Netherlands, UK), the injury rates tend to be lower then elsewhere.

In past years - for consumer protection purposes as well as for public health use - some investments have been made to harmonize these data collection systems and make them comparable through the European Injury Data Base (IDB) (EuroSafe, 2009). Several projects have also been supported by the Commission to develop enhanced exchange of injury data at the EU level based on data collected in accident and emergency departments at general hospitals. In 2010, thirteen MSs were routinely collecting injury data in a sample of hospitals and delivering these data to the Commission, in line with the European Injury Data Base (IDB) methodology.

The European Injury Data Base (IDB) is based on a systematic injury surveillance system that collects accident and injury data from selected emergency departments of Member State (MS) hospitals, existing data sources, such as routine causes of death statistics, hospital discharge registers and data sources specific to injury areas, including road accidents and accidents at work. IDB collects around 300,000 cases a year in a sample of hospitals from 12 European countries. In order to keep the data collection expenditures to a minimum, an innovative approach has been turned out to fit best the needs of most MSs: The register is based on national samples of hospitals, which provide enough information for prevention purposes and allow for national estimates of incidence rates.
IDB is hosted by the European Commission, and was set up by DG SANCO under the Injury Prevention Programme in 1999, in order to provide central access to the data collected in the Member States under the EHLASS Programme (European Home and Leisure Accident Surveillance System). The European Injury Data Base (IDB) is the only data source in the EU that contains standardised cross-national data for developing preventive action against the rising tide of home and leisure accidents in Europe. The purpose of the database is to facilitate targeted injury prevention and improve safety in the MSs and at EU level by contributing to a comprehensive overview of the injury

spectrum within the Community, and to facilitate comparisons among MSs, through trans-national aggregation and harmonization of data, and through reporting and identification of best practice (benchmarking). This is well in line with the Community aim of a common information system on accidents and injuries to provide all stakeholders with the best available information about the magnitude of the European burden of injuries, including high-risk population groups as well as major health determinants and risks linked to certain consumer products and services.
Owing to this work, EuroSafe and KfV could produce in 2009 a report on Injuries in the European Union, Statistics Summary 2005-7 (EuroSafe, 2009).This is the most comprehensive report to date on the scale of the injury problem across the EU-27 countries. Each year injuries result in an estimated 256,000 deaths, 7,200,000 hospital admissions, a further 34,800,000 emergency department (ED) attendances and 18,600,000 other medical treatments, totalling 60,600,000 medical treatments.

Owing to the progress made in injury data collection in at least a number of countries, the IDB-JAMIE data source has been judged as credible and sustainable enough to be included into the health information system and the so-called called ECHI-list (European Community Health Indicators, ECHIM, 2011). The European Community Health Indicators-list contains 88 health indicators which focuses on a wide range of conditions. With respect to injuries there are a few indicators related to home and leisure injuries -reported by survey or from registries (indicators 29a and 29b)- and indicators related to road traffic injuries (30a and 30b), work related injuries (31) and suicide attempts (32). The home and leisure injury indicator 29(b) is being defined as injuries that have occurred in and around home, in leisure time and at school resulting in an injury that required treatment in a hospital. These data are expected to be provided from national hospital discharge information systems as well as national ED-based injury data in line with the IDB-JAMIE methodology.

Challenges

The work so far in Europe represents good progress but it also serves to identify the challenges of developing a comprehensive system of injury surveillance across the EU. There are many challenges to implementation of such a system, including: financing the detailed data collection envisaged in the IDB-JAMIE, particularly in less well resourced settings; ensuring that such surveillance systems also support prevention initiatives and research to improve prevention at local, MS and EU levels; and that sufficient data are captured to measure the impacts of injury on individuals and society. Merely measuring the incidence of injuries may not be enough to ensure that policy responses adequately reflect the scale of the problem. Policy makers often ask quite simple questions which the scientific community struggles to answer, e.g. questions such as “how common are injuries due to a specific cause?” and “how much variation is there between countries in injury incidence?” To answer these simple questions requires intelligent use of data from many sources, including data on hospitalised admission or ED treatment and discharges.

For any prevention policy particular information is needed on the so-called “pre-injury” characteristics, i.e. information on the activities that took place shortly before the injury event, the setting in which it happened, and the products or environmental features that were involved in the event. Prevention policies need to address these risk factors in order to be effective and the common health statistics (e.g. hospital discharge registers, mortality data) do not provide this kind of information.
To answer these simple questions requires intelligent use of data from many sources, including mortality data, morbidity data on cases resulting in hospitalised admission or ED treatment and discharge, and estimates of disability associated with different injury types. Too narrow a focus on a single area, such as measuring incidence, would risk missing a unique opportunity to develop an injury surveillance system capable of answering the above questions.

Joint action on injury monitoring

In response to these challenges the European Commission, Directorate for Health and Consumers (DG SANCO), is funding a **J**oint **A**ction on **I**njury **M**onitoring in **E**urope known as JAMIE. The JAMIE project, which runs from 2011 to 2014, aims at having by 2015 a common hospital-based surveillance system for injury prevention in operation in all MSs. Such a system should report on external causes of injuries due to accidents as part of the Community Statistics on Public Health.
The JAMIE project, co-funded by the EU-Health Programme, will contribute to the realisation of this ambition by initiating a series of actions over the coming three years (mid 2011 - mid 2014) that lays the ground for a genuine EU-wide injury information system:

- Within twelve months, criteria for IDB-JAMIE data quality, such as representativeness and comparability, shall be clearly defined, in line with the respective requirements of the European Statistical System (ESS);
- Over the years 2012-2014, an increasing number of countries will report injury data in accordance with these quality criteria for uploading in the European Injury Data Base (IDB), hosted by the European Commission, DG Health and Consumers;
- By the end of the action (mid 2014), in at least 26 countries IDB-National Data Administration Centre ("NDA"), designated by the competent national or regional authority, shall be in full operation;
- By the end of the action, at least 22 countries shall report IDB data in a sustainable manner, applying the full IDB-JAMIE coding of external causes in at least one reference hospital. Four more countries shall have implementation plans in place endorsed by the competent authorities.

By the end of the action (mid 2014), in at least 26 countries a IDB-National Data Administration Centre ("NDA") shall be designated by the competent national or regional authority and be in full operation, and at least 22 countries shall report IDB-JAMIE data in a sustainable manner. Four more countries are expected to have implementation plans in place endorsed by the competent authorities.

Work plan-JAMIE

First of all, the project is supposed to define criteria for IDB-JAMIE data quality like representativeness and comparability. In line with the EuroStat (ESS) fundamental quality criteria the practically achievable level of quality will be defined by the project team in consultation with an international scientific advisory group (including one expert from CDC, USA) and the EuroStat experts for injuries and public health statistics. Of additional note is that the data collection systems proposed by JAMIE will be based on the WHO officially acknowledged International Classification of External Causes of Injury (ICECI, 2004). That is, JAMIE will be building on the work already undertaken in developing ICECI classification and will not be completely starting again from scratch.
The current IDB-JAMIE Manual is the result of that first most important phase in the project.

The next step is to train and coach IDB-National Data Administrators (NDAs), project leaders in reference hospitals or key persons responsible for national injury reporting in the basic principles set out in the IDB-JAMIE Manual. Two-days training events will be held, and training material, implementation guidelines and tools (based on previous experiences) will be provided. Annual meetings of the network of IDB-NDAs will be held for consultation and decision making on general rules. A standardized implementation reporting tool will be implemented, reflecting the level of compliance with the standards.

Depending on the current level of IDB-JAMIE implementation a country specific work plan will be developed and executed as far as possible. For "new-comers" seed-money will be offered and on-site-consultations (with hospital staff and key-stakeholders from the relevant target groups) will be held.

With IDB-JAMIE reference hospitals standardized collaboration contracts will be concluded, including a formal designation procedure with view to providing visibility and reputation for these hospitals. For all IDB-NDAs central support for the implementation will be provided (counselling on technical and other practical questions).

And last but not least the current data base will be maintained and uploaded with new data from an increasing number of countries participating in the JAMIE-project. The MSs-data (including quality statements) will be centrally checked and released for annual upload by DG SANCO. Continuous input will be provided to the SANCO database operators in order to contribute to a most attractive and useful data access. In order to make both existing data universes (HLA and AI data) jointly accessible, the common denominator of both coding systems will be defined and a trans-coding procedure implemented in collaboration with DG SANCO. Two new annual reports on “Injuries in the EU” will be produced and disseminated to target groups. Queries from target groups will be answered in the form of brief IDB-JAMIE data reports centrally by the IDB-JAMIE data clearing house.

The project is being implemented with a strong involvement of all MSs national authorities and their designated competent bodies, participating either as associated partner or as collaborating partner. Over the past few years, all these partners have had extensive exchange on injury data collection experiences in the framework of annual consultation meetings that have been organised by DG SANCO/C2. This network has recently formalized its cooperation with the adoption of bylaws and data protection policy in 2007 (see Chapter 8).

The project is carried out by a consortium of centres of excellence in injury surveillance based in the EU region:

- the Austrian Road Safety Board (KfV), Vienna, Austria;
- the European Association for Injury Prevention and Safety Promotion (EuroSafe), Amsterdam, the Netherlands;
- National Institute for Health Development (NIHD), Budapest, Hungary;
- the Swansea University School of Medicine, Health Information Research Unit (SU), Swansea, Wales, UK; and
- Brandenburg University of Technology, Information Systems Unit, Cottbus, Brandenburg, Germany.

The EuroSafe organisation provides leadership to the project.

The way ahead

Whilst from an EU perspective the main focus of JAMIE is to develop a system to enable the incidence of home and leisure injuries to be monitored by expanding the IDB-JAMIE network and supporting the calculation of ECHI 29b, it is clear that there are many other needs for injury data to support policy development, appraisal, prevention and research in relation to injuries from defective products, or resulting from self harm or external violence, to name but a few. Detailed data from a relatively small sample of hospitals, albeit covering all MSs would not be sufficient to meet the wider needs of policy makers or those of the practitioner prevention and research communities.

However, with not too much effort and within the existing resources provided through JAMIE it would be possible to provide tools to answers all of these questions by utilising developments from previous EU funded studies and existing international collaborations.

Analysis of the cost of IDB-data collection in three of the most advanced countries reveals that the additional costs are only at average 13 euro a case and, if collected only in a 10% sample of all ED cases, these additional costs are only marginally compared to the overall direct medical costs as a

result of these injuries (see Table 1.2). These additional costs represent an almost negligible 0.03 % of the total direct medical cost while the mere availability of these data will spark off significant injury reduction initiatives and benefits exceeding this additional marginal cost.

For the EU-region the overall direct medical costs are conservatively estimated at 78 billion euro annually. An 0.03% part of that amount, i.e. 23 million euro, would help to compile comprehensive information about causes and circumstances of injuries from at least 1.8 million cases collected a representative EU-sample of Emergency Departments (EDs) across the EU.

Table 1.2 Share of cost of injury data collection in the overall direct medical costs of injuries for three countries*

	National estimate of annual number of ED-cases	**Estimated direct medical costs of injuries X 1.000 €**	**Average costs** of data collection per case**	**Estimate cost of collecting IDB-data on a 10% sample of ED-cases X 1.000 €**	**Share of IDB-data collection in total direct medical cost**
AT (2006-2010)	824.000	3.400.000	€ 13.00	€ 1.071	0.3 ‰
NL (2006-2010)	880.000	2.400.000	€ 8.50	€ 748	0.3 ‰
SE (2009-2010)	710.000	3.500.000	€ 17.00	€ 1.207	0.3 ‰

* Sources: KfV, Vienna 2012/ CSI, Amsterdam, 2011/ Ekman. R, Karlstad 2012

** Relates to the total cost of data collection, processing and reporting work, including the direct contribution to local hospitals for their data capture work, which is in all 3 countries around 4-5 € per case or record delivered to the national coordinating body.

The EU has adopted principles of subsidiary and proportionality. These mean that activities which can best be carried out by MSs are best done at that level and that the amount of effort and resource required addressing problem should not be excessive. It follows analyses to support monitoring, research and the prevention of injuries should be shared between the EC and MSs. The JAMIE project will provide the methodologies and tools to enable such calculations at individual member state or EU level.

It is important that JAMIE is used to maximise participation in an European injury surveillance system. It is quite clear from the review of existing systems in Chapter 2 that injury surveillance in Europe is much more patchy and less comprehensive than in other major economies such as the US. Participation in detailed surveillance system provides the greatest benefit but this is quite resource intensive and entirely born by MSs. Not all states have committed investments so far and many which have done so have funded a relatively small number of sites. Many MSs are facing difficult financial situations and it is not certain that all MSs will invest in a sufficient number of injury surveillance sites under such circumstances.

JAMIE should facilitate the participation of all MSs by maximising opportunities to do so and not creating new barriers. In resource poor settings, and even in more affluent settings, it makes sense to facilitate and widen participation by allowing MSs to provide some data which requires less resource to collect but which contributes to meeting the needs identified above. That is why JAMIE proposes to allow MSs to supply ED injury data with two levels of depth on injury determinants, the minimum and full level datasets as further explained in Chapter 3. The combination of much greater amounts of data at a lower level of detail with some data at high levels provides a very efficient mechanism of meeting all the needs outlined above. It is also a major help in developing the accurate extrapolation factors needed to accurately measure or estimate population incidence and burden from relatively small

samples of hospitals implementing the full IDB-JAMIE dataset in all MSs. It is important that the number of states and hospitals implementing the full IDB-JAMIE is expanded to ensure that responsibilities for ensuring consumer protection through product safety monitoring are met.

JAMIE will also provide the tools and guidance for MSs to calculate their own national burden of injury estimates. The preliminary results of the UK Burden of Injuries Study (UKBOI) show the benefits of such an approach. These results were presented at the Safety2010 World Injury Prevention Conference in London in September 2010 (Lyons et al, 2010) and at the 3rd European Conference on Injury Prevention and Safety Promotion in Budapest in September 2011. The Safety2010 conference organisers chose to use two metrics from the many among the UKBOI results in a press release as these were felt to have the greatest impact on the general population and policy makers: injuries occurring in the UK in 2005 were estimated to cost the health service £2.1 billion for direct medical care and society another £36 billion. The value of these data and the desire to produce them for European countries was confirmed at the Budapest meeting (EuroSafe, 2011).

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2 Review of injury surveillance systems and classifications

Several initiatives have been developed in view of developing datasets for injury surveillance, e.g. in the USA, Australia, Canada, Scandinavia and the UK. This gave rise to a WHO-coordinated initiative to develop an International Classification of External Causes of Injury (ICECI) published by in July 2004.
The following sections provide more detail on these developments, starting with the international initiatives engendered by WHO and EC-sponsored projects followed by a description of methodologies applied in respectively the USA, Australia, Canada and the Scandinavian region.
As there are so many nuances in the coding structures, paraphrasing would inevitably lead to misrepresentation. Therefore, some of the content of the following sections has been copied directly from websites and publications, in each case referenced, to prevent having to paraphrase.

WHO- International Classification of External Causes of Injury

The International Classification of External Causes of Injury (ICECI, 2004) is a system of classifications to enable systematic description of how injuries occur. It is designed especially to assist injury prevention. The ICECI is designed for use in settings in which information is recorded in a way that allows statistical reporting – for example, injury surveillance based on collection of information about cases attending a sample of hospital emergency departments. The ICECI is a Related Classification in the World Health Organization Family of International Classifications (WHO-FIC). The ICECI is related to the External Causes chapter of the WHO International Classification of Diseases (ICD). Both the ICECI and the External Causes chapter of the ICD provide ways to classify and code external causes of injuries. The ICECI is designed to have a role complementary to the ICD-10 external causes classification. The ICD, including its external causes classification, is the reference classification for international reporting of mortality. The ICD - often in a clinical modification - is widely used to classify hospital in-patient cases. As a specialised system focusing on external causes of injury, the ICECI enables more detailed and flexible classification in its subject area. The ICECI can be used in many settings, including emergency departments, clinics, in-patient hospital settings; in ad hoc studies and surveys; and specialised mortality registration systems.

The ICECI is multi-axial, modular and hierarchical. The multi-axial structure of the ICECI enables numerous factors to be recorded independently of one another. Coding of, for example, objects or substances involved in the occurrence of an injury is possible irrespective of how, or whether, other items have been coded (intent, for example).
The ICECI can be used in its full form - that is, using all items in all modules, all at their most detailed coding level. Parts of the ICECI can also be used, when that is more convenient. The modular and hierarchical features of the ICECI facilitates this. The modular structure of the ICECI groups together sets of items which are likely to be used together. For example, the Core module includes items that are generally useful for injury surveillance. The Sports module includes items that might be used when sports injury is a special focus of a data collection. A data collection with a more general purpose might omit the Sports module, opting to rely on the less detailed coverage of external causes of sports injury provided by the Core module.
The hierarchical structure of items in the ICECI allows users to choose from up to three levels of detail for data collection and reporting. The level used can differ between items and modules.
The modular structure of the ICECI groups together sets of items which are likely to be used together. The *Core* module includes a set of items which were chosen to provide a good overview of the external causes of injury cases in general. *Mechanism* records HOW the injury came about, and *Objects/Substances* records WHAT types of things were involved in this process. *Place* gives insight into WHERE the injurious event occurred. The type of *Activity* of the person when injured can give insights that are useful for linking formal responsibilities (e.g. of employers and others for occupational

safety) to needs and opportunities for injury prevention. The role of human *Intent* in the occurrence of injuries can sometimes be difficult to determine, but is important for developing strategies for intervention. Certain psycho-active substances are important risk factors for injury, and items are provided in the Core module for *Alcohol Use* and use of other *Drugs.*

The WHO guidelines on surveillance (Holder et al, 2001) provide examples of minimum data sets for different settings. The proposed core Minimum Data Set (MDS) comprises the following eight variables or "classes": identifier, age, sex, intent, place of occurrence, activity, nature of injury and mechanism of injury. Age is classified into seven unequal age groups and an unknown group. There are a considerable number of additional codes for variables such as disposition following treatment. The MDS codes, whilst restrictive in the number of choices available are comprehensive in terms of classification and always include other and unknown categories. The guidelines also recommend injury data collectors to include a narrative incident summary as a free text field that describes the circumstances surrounding the incident. It is designed to detail answers to questions such as: "What were you doing at the time of the incident?" and "How did it happen?"

EU-Injury Data Base (IDB-JAMIE)

The European Injury Data Base (IDB) is based on a systematic injury surveillance system that collects accident and injury data from selected Emergency Departments (EDs) of Member States (MSs) hospitals, providing a complement to existing data sources, such as routine causes of death statistics, hospital discharge registers and data sources specific to injury areas, including road accidents and accidents at work. IDB-JAMIE is hosted by the European Commission (EC), and was set up by DG SANCO under the Injury Prevention Programme since 1999, in order to provide central access to the data collected in the MSs under the EHLASS Programme (European Home and Leisure Accident Surveillance System). Given the adoption of the existing IDB-JAMIE in 13 countries in Europe it makes sense to built on this and extend the data collection to all member states where possible.

The IDB-JAMIE dataset comprises 18 data elements and a narrative field in the core dataset and five modules with in total 11 data elements only to be coded for specific types of injuries. In most of these data elements it is possible to provide additional levels of detailed information relating to the injury sustained. IDB is comprised of core data elements and additional element. The additional elements are not implemented in every setting. The main data element headings are (see for detailed information on IDB the *EU-webgate* .

- The "Core IDB data elements": intent, place of occurrence, mechanism of injury, activity when injured , object/substance producing injury, transport injury indicator and a narrative description of the event leading to the (suspected) injury; as well as: recording country, unique national record number , age, gender, country of permanent residence, date and time of injury and hospital attendance, type of injury and part of body injured, treatment given and follow-up.
- Additional, i.e. optional, IDB data elements include modules on hospital admission, violence, intentional self harm, transport, and sports.

European formats for Minimum Data Sets (MDSs)

In 2001 the Consumer Safety Institute produced a background report and proposal on the development of minimum data sets for Europe (Bloemhoff et al, 2001). As part of the development of proposed datasets this report reviewed the development of MDSs in Europe and elsewhere including:

- Denmark: Minimum Data Set on Injuries of the National Patient Register (NPRMDS)
- Germany: Minimum Dataset for Injury Monitoring (MDIM)
- Great Britain: Accident and Emergency Minimum Data Set (NHS-MDS)
- Netherlands: Basic Data Set of the Dutch Injury Surveillance System (LIS-BDS)

- Norway: Minimum Data Set for General Practitioners (GP-MDS)
- Wales: All Wales Injuries Surveillance System (AWISS)
- World: WHO Injury Surveillance Guidelines for Less-resourced Environments
- (WHO-ISG)
- Australia: National Data Standards on Injury Surveillance (NDS-IS)
- Australia: Victorian Emergency Minimum Dataset (VEMD)
- Canada: Minimum Dataset Injury Surveillance (MDIS)
- New Zealand: National Minimum Data Set on Injury Surveillance (NMDS-IS)
- United States: Short version ICECI (International Classification of External Causes of Injury).

The report, prepared for the EC, considered both objectives and settings for injury surveillance and produced a matrix with 16 cells (4 objectives by 4 settings). The objectives were: 1, monitoring the total number of injured persons; 2, monitoring the total number of injured persons by intention; 3, monitoring the total number of injured persons by major accident type, major type of violence and major type of intentional self harm, and; 4, monitoring the total number of injured persons by more specific categories. The settings categories were: 1, coroner's office; 2, hospital admission centre; 3, emergency department, and; 4, other health care settings. After reflection on redundancy across the matrix, this 4x4 table was reduced to five proposed levels of MDSs. In the context of this report the proposed four MDSs for EDs are most relevant:

- MDS 1 contains information on the following variables: date, injury (Y/N), age, gender, country of residence and area of residence and nature of injury and body part affected.
- MDS 2 adds information on intent to MDS 1,
- MDS 3 adds place, activity and moving vehicle status to MDS 2, and
- MDS 4 which includes additional variables covering mechanism, type of sport, mode of transport and counterpart for motor vehicle collision injuries, follow up and narrative.

Additionally, two levels of data depth were also proposed to consider.

US National Electronic Injury Surveillance System

NEISS is a system of standardised data abstraction from a probability sample of emergency departments across the US, designed by the US Consumer Products Safety Commission (CPSC) to estimate the national number of product related injury events. This estimate is compared with the observed number of total emergency room visits (ERVs) derived from a separate system in order to create a ratio adjustment which is then used for population estimates of product related injuries and other injuries in the US. Web access to NEISS allows certain estimates to be retrieved on-line (National Electronic Injury Surveillance System-NEISS, 2011).

In 2010, NEISS consisted of 96 hospitals out of 4,843 eligible hospitals. The total number of ERVs recorded in these hospitals was 127,499,443 and the estimate from NEISS was 140,980,831. Thus, the NEISS sample would overestimate national incidence by 10.6% if the ratio adjustment was not used. NEISS records about 700,000 cases a year at a cost of $3.4M or about $5 per case for data collection costs. Some 400,000 are product related injuries. Product related means that a product was involved in the mechanism of injury but does not mean that the product was necessarily either faulty or misused. Around 5% of cases are admitted to hospital. There is considerable variation in the scale of hospital ED activity from around 200 or so cases per year to about 51,000. All records are examined and on-site-sampling is not used.
Hospitals use multiple systems to collect the primary data. CPSC works with the participating hospitals to improve data recording practices. Data are abstracted by CPSC funded staff (hospital employees or contractors) to abstract data in a standard way into CPSC laptops, and the data are then uploaded daily to CPSC. NEISS is therefore a standardised data abstraction system rather than a standardised data collection system. Hospitals are using a variety of technologies primary data collection, including

electronic health records (around 50% of hospitals currently) and paper records, some of which are subsequently scanned into image repositories.
Abstractors/coders are trained in reading the ED medical records, determining whether a case fits the NEISS reporting rules, and abstracting narrative to the comment field and coding this using the CPSC codes. There are some 800+ product codes and coding depth depends on particular areas of interest. Coders are required to pay attention to information on the "Who, What, When, Where and Why" as well as the details of the injury or illness related to products or related to work conditions.
Since 2000, NEISS has been expanded to collect data on all injuries. Some medical (non injury) cases are included in NEISS under the NIOSH definition: "Injury or illness resulting from event or exposure in the work environment that either caused or contributed to the resulting condition or significantly aggravated a pre-existing condition." The Expanded NEISS Reporting Rule includes the following cases:

1. All injuries and poisoning treated in the Emergency Department
2. Illnesses associated with consumer products or recreational activities
3. Illnesses apparently caused by work-related experiences
4. Illnesses apparently caused by medical devices

NEISS is operated by CPSC, whose remit focuses on product safety including poisonings and chemical burns. NEISS also supports activities of other US agencies, such as the Department for Transportation, National Highway Traffic Safety Administration (NHTSA), Food and Drug Administration (FDA), and the Centres for Disease Control (CDC). NHTSA uses the data to report on motor vehicle crashes and non-crashes. NEISS data are used by the FDA to report on injury and illness associated with medical devices. CDC includes the National Institute for Occupational Safety and Health (NIOSH) that is responsible for reporting on topics such as work related injuries, adverse drug reactions, firearms injuries, assaults and self-inflicted injuries, and the National Center for Injury Prevention and Control (NCIPC) which deals exclusively with injury and violence prevention in non-occupational settings.
NEISS-Work includes the following case definition for work-related injuries: work for pay or other compensation; work for chores related to agriculture; and/or work conducted as a volunteer for an organized group. The NEISS-Work guidelines state that "the work-relationship of each injury or illness may be indicated in numerous parts of the hospital record system including admissions, billing, ambulance run sheets, nurse triage notes, doctor's dictations, a myriad of places in the paper chart or electronic health records, and/or in records from a separate physical location considered to be part of the main hospital ED. To identify a case as work related, your assessment of the chart notes and other records should indicate that the injury or illness meets the work-related case definition; the medical records have a positive response to the form question "Injury at work" or related check box; or the expected source of payment in the employer, employer's or union's insurance, or workers' compensation. Commonly, you will identify or confirm that a case is work-related from the nurse's and/or the doctor's chart notes. Often the chart notes may simply state "happened at work". This is sufficient to identify a case as work related if it appears to meet the other criteria."
The "where" data are the most challenging to collect, with about 30% of cases missing data on" locale".

NEISS is designed around product safety and thus does not cover all injuries. For example the following types/causes of injury are excluded: road traffic collisions, injuries from illegal drug use or medical devices, assaults and suicide attempts (unless victim and perpetrator both < 12 years), accidents where no consumer product is involved (e.g. simple falls), injuries from street furniture, and injuries from broken glass or metal (where product is unknown). NEISS collects very in depth information on product involvement using a four digit coding system which covers thousands of product codes (NEISS, 2012).

Age is collected in single years after the age of one. There is a narrative section which collects detailed information on the incident sequence. There are four intent codes and nine incident location codes. There is no separate mechanism of injury list of codes as this aspect is covered through the nature of injury, products involved and narrative sections. Nature of injury codes are obtained by collecting a list of 30 diagnostic codes and 26 groups of body parts. NEISS codes for nature of injury and body parts affected were devised by NEISS from studying codes and categories used in EDs and are not based on ICD or ICECI but logically map closely to the Barell Matrix (2010).

Injury Surveillance in Australia

There are a variety of injury surveillance systems operating in Australia. The *Queensland Injury Surveillance Unit (QISU, 2011)* has been collecting Level 2 injury surveillance data from participating hospital emergency departments across Queensland since 1988. QISU currently collects data from 17 hospitals in Queensland. Emergency departments provide data either electronically or on standardised forms which are then coded in accordance with the National Data Standard for Injury Surveillance (NDS-IS) and stored on the QISU database. QISU collects injury surveillance data from participating Queensland hospitals using different collection methods.

The Emergency Department Information System (EDIS) is a large multiuser application that captures information relevant to most Australian hospital emergency departments. This software is used by clerical and clinical staff to co-ordinate care within the emergency department. EDIS is currently in operation in approximately 30 hospitals across Queensland and in the state Victoria. An injury surveillance screen is activated within EDIS when a triage nurse indicates that the patient has presented with an injury, or when an ICD 10 diagnosis code in the injury range is entered. Using this module within EDIS QISU collects patient demographic and Level 2 National Data Standards for Injury Surveillance (NDS-IS) data.

Other hospitals in Queensland use the Hospital Based Clinical Information System (HBCIS) to co-ordinate patient care within the emergency department. This system also has the capacity to collect patient demographic data as well as Level 1 NDS-IS data. Level 2 data collection is possible though collection of additional text strings. Injury data collection is triggered on entry of an ICD 10 code in the injury range.
Paper-based data collection is used where QISU participating hospitals either do not use the above electronic systems or prefer to have patients complete part of the injury surveillance forms. The forms collect Level 2 NDS-IS data.

Regardless of the data collection method, each record is entered or imported into the InjurEzy-database and individually cleaned and coded by trained injury coders at the Queensland Injury Surveillance Unit (QISU). This data is exported to an SQL database. The database can be interrogated to retrieve injury data using a variety of search strategies.

Data items collected include: age, gender, postcode, country of birth, injury text description, cause of injury (e.g. fall), intent, place of injury, activity, nature of injury and body location (or ICD10 code), mechanism and major injury factor (e.g. grinder), triage category (indication of severity), and admission status.

The *Australian National Data Standards for Injury Surveillance* are available on the National Injury Surveillance Unit's website based at Flinders University in South Australia.

There are 2 levels of data collected in this system. Level 1 is a minimal level and is proposed for use in basic, routine public health surveillance. Level 1 has 5 major data items:

1. Narrative short description of the injury event (100 characters).
2. External cause with major groups (30 categories), and intent (11 categories), which includes mechanism and role of injured person for road traffic collisions.
3. Place of injury occurrence (13 categories).
4. Activity when injured (9 categories).
5. Nature of main injury (32 categories) and bodily location of main injury (22 categories).

Level 2-surveillance data standard builds on the first with more extensive classification of some items and several additional data items. This data set is suitable for use in emergency departments in hospitals and has been developed to reflect the need for a standard for use in the emergency departments of hospitals and in other settings where at least some resources are available for injury surveillance data collection. Level 2 includes identification of products involved in the causation of injury and has much more depth in terms of intent, mechanism, activity, location and nature of injury, the latter being collected by use of ICD9 or ICD10.

The standard is based on extensive experience with injury surveillance using the method developed in the National Injury Surveillance and Prevention Project. It is designed to balance the competing needs for simplicity in data collection, for sufficient information to be useful for public health purposes, and for compatibility with other relevant data standards (notably, the International Classification of Diseases, and the National Health Data Dictionary).

Injury surveillance in Canada

The Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP**)** is a computerized information system that collects and analyzes data on injuries to people (mainly children) who are seen at the emergency rooms of 10 paediatric hospitals and of 4 general hospitals in Canada. CHIRPP is a unique, richly detailed database of “pre-event” injury information obtained by asking three questions:

- What was the injured person doing when the injury happened?
- What went wrong?
- Where did the injury occur?

Data collection began in April 1990 at the paediatric hospitals and between 1991 and 1995 in the general hospitals. Since then, more than 1.5 million records have been collected nationally; more than 80% of these records concern children and youth 19 years of age and younger. Records from the general hospitals also provide information on injuries sustained by adults. The CHIRPP database provides information for summary reports on injury occurrence and may also be used for more detailed research using variables or text searches in an on-line system. It is important to note that the injuries described do not represent all injuries in Canada, but only those seen at the emergency departments of the 14 hospitals in the CHIRPP network. Since the bulk of CHIRPP data comes from hospitals in cities, and most are paediatric hospitals, injuries suffered by the following people are under-represented in the CHIRPP database: older teenagers and adults, who are seen at general hospitals; First Nation and Inuit people and other people who live in rural and remote areas.

CHIRPP is a program of the Injury and Child Maltreatment Section of the Health Surveillance of the Public Health Agency of Canada, Epidemiology Division, Centre for Health Promotion, Public Health Agency of Canada.

Injury surveillance in Scandinavia

Nordic countries have a long history of injury surveillance. The Nordic Medico-Statistical Committee (NOMESCO was set up in 1966, following a recommendation by the Nordic Council. In 1979, the Committee was made a permanent statistical committee under the Nordic Council of Ministers with separate funding from the Nordic Committee on Social Policy. The aim of NOMESCO is:

- To be responsible for the co-ordination of the health statistics in the Nordic countries.
- To initiate new projects, partly to improve comparisons of statistics, and partly to ensure the most rational use of Nordic expert knowledge in the field.
- To inform about Nordic statistical activities, mainly by publishing annual statistics as well as the results of special projects, surveys, etc.
- To co-ordinate and take part in international statistical collaboration, including activities in the Baltic countries.

NOMESCO has produced a number of disease, medical procedure and external cause of injury coding systems. The 4th revised edition of the NOMESCO Classification of External Causes of Injuries (NCECI) was published in Copenhagen in 2007. This and previous versions of the NCECI were fundamental for the development of classifications like the IDB-classification and the ICECI, in particular its multi-axial, modular and hierarchical structure.

To conclude

The datasets listed above tend to be quite detailed. However, there are also a number of very minimal datasets in operation. When confronted with a very minimum datasets people and organisations often express a desire to collect more detailed data, often influenced by local epidemiology and circumstances. As a result, a number of medium level datasets have been developed around the world to fill the gap between very minimal and full datasets.
The challenge is now to select the level of minimum data set that suits all partner-countries in the JAMIE-project, at the same time allowing more extended data collection for those who can afford.

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3 Two-level Emergency Department datasets

This chapter of the report follows the previous chapters on discussions of data needs and the review of injury surveillance. It describes the rationale behind the proposal for two levels of emergency department datasets to be implemented within JAMIE to support injury surveillance, prevention and research across Europe, and by individual Member States (MSs).

It is clear from the literature review that despite long standing proposals, Europe as an entity is a considerable way behind other parts of the world in terms of the depth and breadth of injury surveillance, particularly the US and Australia. Consideration of the varying needs for surveillance, the difficulties of implementing standardised datasets across thirty plus countries each with their own requirements and funding arrangements, and subsequent deliberations of the JAMIE Steering Group, led to a decision to propose a two level system for Europe based on:

1. Expanding implementation of the existing full level IDB-JAMIE dataset to every country; and

2. The implementation of a very minimal level dataset which could be widely adopted in virtually all hospitals in all MSs, which would enable the European Community Health Home and Leisure indicator to be implemented reliably and precisely across Europe.

Basic principles

It is clear from the review of existing surveillance systems and guidelines that whilst there are considerable similarities between systems in use across Europe and worldwide (which would be expected) there are also considerable differences in coding depth and breadth, and groups used in classifications, reflecting the different needs catered for in the design of the systems and also the amount of additional resource needed to collect such data.

Following the review it is also clear that progress with implementation in Europe as a whole (notable exceptions of the implementation of IDB-JAMIE and system in Scandinavia aside) has in general been slower than in many other parts of the world. This undoubtedly reflects the difficulties of making data collection for injury surveillance and prevention mandatory, or even usual practice, without providing substantial additional resources into busy work environments in which the major focus is naturally on clinical care. It also highlights a minor clash of philosophy between classification coherence and pragmatism. Very often classification systems have so many unspecified and unknown codes in even the most minimal datasets that implementation is very difficult without major redesigns of data collection systems, which then require funding. However desirable, such changes are challenging to coordinate across EU/EFTA-countries in Europe, with a plethora of different or no systems in place.

Taking these issues into account and consideration of how to meet all the needs for data outlined In Chapter 1 efficiently, a two level system is proposed. This involves the implementation of emergency department datasets at different levels of sophistication:

1. IDB-Full Data Set (*FDS*), previously implemented as the Injury Data Base-Coding Manual or IDB; and

2. A new Minimum Data Set (*MDS*) rather than create confusion with changes of names it is proposed that the IDB name is retained but from now on including both the existing FDS and proposed MDS. Decision about the content of these datasets was based on a review of the existing literature and practices around the world and discussion between experts on the

feasibility of collecting such data whilst ensuring consistency as far as possible with existing classification systems.

There was considerable discussion about the need to create a simple MDS which was feasible to collect in all settings and which would contain the most useful codes for variables needed for prevention and calculation of the ECHI on home and leisure injuries, whilst not being overly constrained by the tradition of including rarely used categories from comprehensive classification systems.

JAMIE therefore recommends that:

- All countries should implement the core FDS in a representative sample of emergency departments. Where possible this should be based on injuries from all external causes. In some circumstances where this is not possible it may be limited to home and leisure related injuries only.
- Where FDS has not been previously implemented and resources are scarce each country should implement the FDS in at least one hospital.
- In addition all countries should widely implement the MDS unless the FDS in operation provides a sufficiently large and representative sample at a country level. In which case there is no need for an additional MDS to be collected.

The Multi Screen Full Data Set (FDS)

This is the full surveillance data set in operation in a considerable number of countries in Europe, known as the European Injury Data Base (IDB-JAMIE). The IDB-JAMIE dataset comprises 18 data elements and a narrative field in the core dataset and five modules with in total 11 data elements only to be coded for specific types of injuries. In most of these data elements it is possible to provide additional levels of detailed information relating to the injury sustained. The main data element headings are listed below.

IDB-JAMIE does differ somewhat in the level of detail collected on product involvement and some other fields from the NEISS and Australian Level 2 datasets and also to some extent from the NOMESCO system collected in Nordic countries. Whilst, in some ways it would make sense to have a unified international system there are a number of substantial barriers to be overcome before this could happen. As this is outside the scope of the JAMIE project it is not considered further in this report. However, it is worth noting that since all the systems are based on the ICECI mother classification, but may also have been adapted slightly, the provision of bridge coding between the different classifications will allow data to be compared between systems to a very large extent.

Given the adoption of the existing IDB-JAMIE in 13 countries in Europe it is strongly recommended to built on this and extend the data collection to all member states where possible. It will be necessary to develop mapping tables between NOMESCO and the FDS to ensure that it is possible to report on home and leisure injuries across Europe. Bridge codes are reported in Chapter 7.

The core IDB *FDS* data elements are:

- *Recording country - Country that provides the data*
- *Unique national record number - Number of the emergency department case or record*
- *Age of patient - Person's age at the time of the injury*
- *Sex of patient* - Person's sex at the time of the injury
- *Country of permanent residence* - Person's country of residence at the time of the injury
- *Date of injury* - The date the injury was sustained

- *Time of injury* - The time the injury was sustained
- *Date of attendance* - The date the injured person attended the Emergency Department
- *Time of attendance* - The time the injured person attended the Emergency Department
- *Treatment and follow-up* - Status of treatment after attendance at the Emergency Department
- *Intent* - The role of human purpose in the injury event
- *Transport injury event* - Any incident involving a transport device and resulting in injury
- *Place of occurrence* - Where the injured person was when the injury event started
- *Mechanism of injury* - The way in which the injury was sustained (i.e. how the person was hurt)
- *Activity when injured* - The type of activity the injured person was engaged in when the injury occurred
- *Object/substance producing injury* - Matter, material or thing being involved in the injury event
- *Type of injury* - Type of injury sustained
- *Part of the body injured* - Region or part of the body where the injury is located
- *Narrative* - Description of the event leading to the (suspected) injury

Additional (optional) IDB (FDS) data elements:

Admission module
- Number of days in hospital – The number of days the injured person is admitted in the recording hospital

Violence module
- Victim/perpetrator relationship - The relationship of the person committing the violent act to the injured person
- Sex of perpetrator - The sex of the person who inflicted the injury
- Age group of perpetrator - The age group of the person who inflicted the injury
- Context of assault - The circumstances surrounding the violent injury event

Intentional Self-harm module
- Proximal risk factor - The most recent crises that led to the self-harm incident
- Previous intentional self-harm - Whether or not the injured person attempted intentional self-harm before

Transport module
- Mode of transport - The means by which the injured person was travelling from one place to another
- Role of the injured person - How the injured person was involved with the specified mode of transport at the time of the injury event
- Counterpart - The other vehicle, object, person, or animal (if any) with which the injured person, or the vehicle in which the injured person was travelling, collided

Sports module
- Type of sport/exercise activity - The type of sport or exercise activity in which the injured person was engaged at the time of the injury
- Collection of data using additional modules varies across Europe.

Minimum Data Set (MDS)

The simple MDS for Europe which is proposed reflects the need to meet many different agendas in relation to data collection, such as supporting the development of high level European and country level injury indicators, being feasible to implement in countries with wide variation in existing practice, and maximising the potential to support prevention and research. The final categories of external cause variables which are included reflect the responsibility of the major agencies and bodies involved in prevention in many countries, including the prevention of injuries from specific mechanisms and settings such as falls, road traffic injuries, those occurring during work, or at home, or due to violence or self harm.

In creating such a dataset we were guided by the need to be able to capture the required variables efficiently and from a variety of staff in emergency departments including reception staff and clinicians. In response to the latter requirement we have chosen terminology for categories which are widely understood both by the general public and clinical staff. Technically correct classification terminology can sometimes be difficult to understand by those not trained in such systems, and even problematic for those with training as evidenced by a perusal of the different terminology used in the different systems outlined in the appendices. Of course, training materials are needed to ensure consistency of application. We have provided descriptors of data inclusion and exclusion criteria for variables which could be interpreted variably in different countries. Care and attention will need to be applied to these descriptors when translating into different languages.

We also decided not to be prescriptive on how the information could be captured, reflecting the diversity of existing practice across Europe, and to prevent the imposition of unnecessary burdens by insisting on a standard solution. There are a variety of possibilities, including: a dataset which requires only four boxes to be ticked on a single computer screen; or completed on a small area of paper clinical records; or by recoding from a full or medium level datasets from an existing system; or derived from coding of narrative text on the circumstances which led to the injury where this is collected. Coding from narrative is also quite common in some countries and is often more intuitive to clerical and clinical staff as they only need to describe the circumstances around the occurrence of the injury rather than be trained in coding.

There are a number of medium level datasets around the world. When confronted with the minimum and full datasets many people and organisations express a desire to collect more detailed data, often influenced by local epidemiology and circumstances.

Completing medium or full level datasets is quite challenging and requires a sufficient resource of trained core staff who have the necessary time to complete the fields or additional staff funded for this activity. Missing data is quite common in even well run systems. For example, analysis of the 325,520 cases from 2008 on the public access IDB system reveals a considerable proportion of cases with unspecified codes for place (16.2%), activity (15.5%), and mechanism (7%). Attempting to implement a higher level data set widely without substantial additional funding may be less productive than envisaged. The perfect should not be the enemy of the good.

It will be up to each MS and hospital to decide how best to compile the JAMIE-MDS from the various options possible for data collection in each setting.

Contents of the JAMIE- MDS

The simple MDS proposed for adoption in JAMIE contains information on four of the five major components of aetiology: intent, location (setting), activity, and mechanism. It is not possible to collect information on the fifth component (product involvement) in an JAMIE-MDS and that aspect of aetiology can only be served by the implementation of the FDS. In the JAMIE-MDS location (setting) and activity may be combined within a single category to ease data collection, but of course are separated into their component parts when reporting data. Whilst the JAMIE-MDS is quite sparse with a maximum of 20 items, of which only 4 need to be ticked, the combination of variables can provide very informative high level data to support monitoring, prevention and research. Again, in order to meet data recording needs for single screen/small area of clinical notes and the need to use lay terminology only 6 categories are provided for major mechanisms of injury. There will be a number of countries or hospitals which would like to collect a greater number (effectively creating a medium level dataset) and this is fine as long as it is possible to collapse the larger group into the categories within the JAMIE-MDS.

The JAMIE-MDS is designed to maximise data collection on important categories of injury causation in Europe. By its very nature it will not meet the needs for detailed information on all permutations of intent/activity/mechanism and location but will provide high level data to allow enumeration of injuries

in the home, home and leisure (combined), during work, and due to road traffic, falls, sports or burns/scalds, and resulting from accidents, self harm or assaults (reflecting the main focus of prevention strategies in Europe).

Road traffic injury is included within the major mechanism category because of the importance of monitoring and supporting road traffic injuries in almost all settings. Of course, road traffic injuries occur due to a variety of mechanisms including cutting/piercing, burns, sheering stresses but the vast majority are due to blunt force from contact with hard objects. This example serves to demonstrate the limitations of an JAMIE-MDS. The exclusion of many other specific and non specific codes provides a potential for some biases in recording. Potential biases are different to actual biases and many potential biases do not occur sufficiently frequently to be more than a theoretical concern. The scale of any such biases can be evaluated by analysis of the detailed mechanisms of injury in the FDS. For example, it is possible to describe the proportion of road traffic injuries due to blunt forces. Analysis of 18,256 transport related injuries recorded in IDB-JAMIE in 2008 in the Netherlands revealed that 96% were due to blunt force. Blunt force is included within the “other mechanism” category in the JAMIE-MDS and is not included as a term on its own despite being one of the commonest mechanisms of injury. This decision was taken because it can be inferred from a combination of the other variables in the vast majority of cases.

Similarly, drowning or near drowning are not amongst the core data items within the JAMIE-MDS because whilst this is an important cause of child death near drowning are relatively infrequent in Europe and those resulting in substantial concern or morbidity will nearly always be admitted to hospital. Hence in most cases mortality and hospital discharge register data would be better sources of information on this problem.

As noted above however it is accepted that the proposed JAMIE-MDS may not allow sufficient injury information to be collected within every country across Europe to meet local needs. Consequently the option exists for data items that are not originally part of the JAMIE-MDS to be added where necessary. In this way the MDS is designed to be flexible allowing countries to add additional categories from the FDS if they wish in order to reflect their own particular injury circumstances. Despite this it is strongly recommended that additional categories of aetiology are only added in cases where it is absolutely necessary, given the need for a single screen/single page JAMIE-MDS to be maintained.
The European Community Health Home and Leisure injury indicator (29b)relates to all unintentional injuries which are not due to paid work or road traffic injuries. Hence details on these two factors need to be collected in order to subtract them from all injuries to enable calculation of the ECHI.

The Single Screen JAMIE- Minimum Data Set (MDS) - mandatory fields

1. External cause data elements (aetiology)

1.1. Intent:

- Accidental (unintentional) injury
- Deliberate (intentional) self harm
- Assault related injury
- Unknown intent

In some settings it may not be possible to collect data on intent or data may only be collected on unintentional injuries. Data could be supplied under an “All injury” code which effectively means including an “Unknown intent” category or an “Accidental injury only” category in circumstances where data are only collected on unintentional injuries, or “Accidental home and Leisure injuries” where data collection is limited to this category. Whilst many purists are unhappy with the term “Accidental injury”, preferring the term “Unintentional injury” this is not a term that is in common usage in many countries or understood by all clinicians and ED clerical staff. Hence, we have decided to stick with the

"Accidental injury" descriptor. The "Unknown intent" code does not necessarily need to be on the screen/paper but could be deduced when codes for all the specific terms were blank.

1.2. Location (setting):

- Road (incl. pavement)
- Educational establishment (and surrounding grounds)
- Home (includes garden)
- Other (includes health facilities)
- Unknown

This variable effectively combines location with major categories of activity to reduce respondent burden as otherwise separate sections would be needed. The variable is described under the location (setting) heading as most categories fit this descriptor best. Work and sports are exception which has been included as a separate activity variable (see further down).

1.3. Selected mechanisms:

- Road traffic injuries
- Fall
- Cut/pierce
- Poisoning
- Thermal mechanism(Burn/Scald)
- Other
- Unknown

1.4. Selected activities:

- Paid work
- Sports
- Other
- Unknown

For the reasons discussed above it is not intended to introduce a detailed set of activity codes to include other categories. The category of paid work includes all paid work plus voluntary work under some form of (liability insurance benefit) contract.

This simple JAMIE-MDS has 13 useful response categories (excluding the other and the unknown responses which are useful for quality assurance but are otherwise uninformative). Combinations of variables can be used to derive important metrics, e.g. deliberate self harm by poisoning. Such a simple JAMIE-MDS cannot provide information in the same level of detail as the full data dataset (IDB-JAMIE-) or medium level datasets. However, it represents a very useful high level dataset of up to 90 (3x3x5x2) combinations of injury determinants in addition to sports injury.

2. Additional variables to be collected or derived from existing systems:

2.1 Five year age group
2.2 Gender
2.3 Month of attendance
2.4 Year of attendance
2.5 Permanent resident of country
2.6 Country supplying data
2.7 A hospital code (can be anonymised)
2.8 Unique national record number
2.9 Whether admitted to this (or any hospital) or not
2.10 Nature of injury (x2 – in case two injuries have been sustained)
2.11 Body part affected (x2 – in case two injuries have been sustained)
2.12 Narrative on circumstances of injury event (optional but highly recommended).

Rationale for these additional data items:

2.1 Five year age group
This is needed for describing the demography of the sample, calculation of age specific and European standardised rates, and the derivation of extrapolation factors to derive estimates of national incidence. Also, age is an important risk factor.

2.2. Gender
This is needed for describing the demography of the sample, calculation of gender specific and standardised rates, and the derivation of extrapolation factors to derive estimates of national incidence. Also needed to be able to show differences in risk groups.

2.3 Month of attendance
This is needed for describing the pattern of attendances and trends over time.

2.4 Year of attendance
This is needed for describing the pattern of attendances and trends over time.

2.5 Permanent resident of country
This is needed to calculate valid national estimates.

2.6 Country supplying data
This is needed for calculation of country specific rates.

2.7 Hospital code
This is needed for calculation of correct confidence intervals around the national incidence rates, by providing the capacity to adjust for sample differences between participating hospitals.

2.8 Hospital admittance
This is needed to match data with hospital discharge data and to assess the average severity of ED-cases in a given hospital.

2.9 Whether admitted to this or any hospital or not
This is needed to derive correct extrapolation factors for the calculation of national incidence and also to support IDB-National Data Administrators (NDAs) in calculating an important metric of the national burden of injuries known as Disability Adjusted Life Years (DALYs) if desired.
(Note: Within the FDS the “Transferred to another hospital” category within the “Treatment and Follow-up” data item should be assumed to mean that the patient has been admitted).

2.10 – 2.17 Nature of injury and part of the body injured

Such information is needed to understand the distribution of anatomical injuries and to support injury prevention and clinical research. For example. it is important to distinguish skull and arm fractures. Such data are also included in the MDS in order to allow measures of the burden of injury, such as Disability Adjusted Life Years (DALYs), to be calculated.

There are a number of classification systems in operation including the International Classification of Diseases (ICD) system in which version 9 (ICD9) or 10 (ICD10) are in operation and ICD11 is near finalisation. The ICD10 operated a 4 digit code for anatomical injuries which has 1789 codes for specific nature of injury categories by body part e.g. S062, diffuse brain injury. For reporting purposes these need to be grouped into more useful smaller categories. There are several categorisations possible. The International Collaborative Effort (ICE) on Injury Statistics developed the Barell Matrix Barell, 2002), a matrix classification of “Body Region” by “Nature of the Injury” and filled the cells with ICD9CM codes.

There are different combinations of anatomical regions with the simplest being a five category system (head and neck; spine and back; torso; extremities; and unclassified) and the most complex with 36 categories and an intermediate with 9 categories in the “Body Region” axis. There are 12 categories in the “Nature of Injury” axis (fracture; dislocation; sprains and strains; internal; open wound; amputations; blood vessels; contusion/superficial; crush; burns; nerves; and unspecified).

In many ED settings coding each injury to ICD9/10 is deemed to be too resource intensive and clinically logical local categories have evolved. There are many of these local classifications which they tend to have 10-20 or so groups or categories of “nature of injury” and a similar or smaller number of categories for body part affected.
Such information is clearly useful for clinical purposes and can also be used for epidemiology and in the measurement of population burden of injury.

In relation to measurement of the population burden of injury (see Chapter 6 for more details) it is important to map the local codes on types of injuries (e.g. fracture, sprain, burn) and body parts affected (e.g. head, leg) or ICD codes (if used) to the categories used to derive disability weights in burden of disease studies. Mapping to common “nature of injury/body part” codes is needed for descriptive purposes, to provide a method to measure case mix (may be needed to explain differences in national or local incidence), and to facilitate calculation of Disability Adjusted Life Years (DALYs), if so desired. There are several “nature of injury/body part” classifications in use for burden of injury studies, including: a 13 group classification used in Dutch and the UK Burden of injuries (UKBOI) studies (Meerding et al, 2004; Lyons et al, 2007, Lyons et al, 2011). A further set of groupings is being produced for the 2012 update of the GBD study but these are not yet finalised.

It is clear that a variety of classifications are in use combining nature of injury with body part affected in surveillance systems in emergency departments. It is also essential that the IDB FDS can be mapped onto the MDS to enable extrapolations from the JAMIE-MDS for estimation of more specific patterns of mechanisms/location/activity/product involvement to be made. A table of how the FDS maps to the JAMIE-MDS is given in Chapter 7.

It would be extremely helpful if the nature of injury/body parts affected categories chosen in the JAMIE-MDS could also support the calculation of national burden of injury estimates using DALYs. The following section examines which codes would be needed to support countries in calculating the national burden of injury. An important issue to consider in the inclusion or exclusion of categories in any final dataset is the impact of that decision on the population burden of injuries. Hence, the exclusion of rare categories, even with high and persisting disabilities, would have little impact on the calculation of population burden of injuries, compared with the exclusion of common injuries with much lower disability weights. In a paper by Gabbe et al (2011) modelling long term disability following injury using data on 13,315 cases from the Victoria State Trauma Register and Victoria Orthopaedic Trauma Outcomes Registry it is clear that many of the categories in the GBD 2011 revision are extremely rare and excluding those individually making up < 1% of cases would have little effect on the overall population burden. In reality, the vast majority, if not all, cases of the most serious injuries will be admitted to hospital and data for calculation for the population burden on these categories should only be sought from inpatient datasets. ED diagnoses of many of these conditions are often tentative and may be unreliable. Often such diagnoses can only be made following detailed imaging, other diagnostic tests and additional time for the clinical presentation to develop; in many situations these events take place in surgical theatres or critical care units and the data do not flow back into the ED notes or codes. This means that a limited nature of injury/body part affected matrix in an JAMIE-MDS would still be able to support estimation of population burden by concentrating on injuries which are not admitted (hence the importance of the disposal code = admittance to hospital code).
The following categories of injury (taken from categories used in burden of injury studies) will nearly always be admitted in countries with well developed and accessible health services: moderate and severe traumatic brain injuries; spinal cord injury (neck or thoracic-lumbar); internal organ injury

(excluding delayed diagnoses); severe chest injury ; lower airway burns; burns>20% TBSA; hip fracture; hip dislocation (excluding prostheses); fractured femoral shaft; traumatic amputation of limbs, thumb or fingers (excluding tips of fingers); and multi-trauma. In addition, it is likely that any serious injury to blood vessels and nerves would also be admitted for repair and non admitted cases would generally be similar in nature to open wounds, soft tissue or minor crush injuries.

The following is a list of nature of injury categories and body parts affected which would need to be included in an JAMIE-MDS which could contribute the non admitted ED component to the estimation of population burden of injuries. In order to reduce the number of the nature of injury and body parts affected categories within the MDS some of the categories from the full IDB-JAMIE list have been combined (for example the FDS type of injury categories of “Open wound” and “Abrasion” have been combined, as have “Concussion” and “Other specified brain injury”; as have “Burns”, “Scalds”, “Corrosion (chemical)”, “Electrocution”, “Radiation (sunlight, X-rays)” and “Frostbite”; as have “Injury to nerves and spinal cord”, “Injury to blood vessels” and “Injury to muscle and tendon”). Other FDS type of injury categories such as “Crushing injury”; “Traumatic amputation” and “Suffocation” have been incorporated within the “Other” MDS category. With regards to the “No injury diagnosed” category this is not necessary in the JAMIE-MDS since only ED attendances associated with an injury are to be included in the JAMIE-MDS.

Nature of injury codes

01 Contusion, bruise
02 Open wound and abrasion
03 Fracture
04 Dislocation and subluxation
05 Sprain and strain
06 Concussion/brain injury
07 Foreign body
08 Burns and scalds
09 Injury to muscle and tendon, blood vessels and nerves
10 Injury to internal organs
11 Poisoning
12 Multiple injuries
98 Other
99 Unknown

Part of the body injured

01 Head/skull
02 Face (excl. eye)
03 Eye
04 Neck
05 Thoracic/lumbar spine
06 Chest wall
07 Abdominal wall
08 Internal organs
09 Pelvis
10 Upper arm/shoulder
11 Elbow
12 Lower arm
13 Wrist
14 Hand
15 Fingers
16 Hip
17 Upper leg

18 Knee
19 Lower leg
20 Ankle
21 Foot
22 Toes
23 Multiple body parts
98 Other
99 Unknown

2.11 Narrative on circumstances of injury event (optional but highly recommended).
Collecting the underlying narrative on how the injury occurred has been found to be very helpful in many different systems and hence is included as a highly recommended optional field. Such text allows local systems to identify emerging hazards and is particularly helpful in quality control and in providing data where categories are incomplete or contain non specific codes. Narrative is widely used for quality control in the FDS. Narrative would be restricted to these uses and will not be uploaded to the central database.

How to deal with missing information items

1) Records shall contain only valid values according to the actual data dictionary (e.g. Data Dictionary for the Minimum Data Set MDS or the Coding Guide for the Full Data Set FDS)
2) If an item is not specified, because no information could be captured for this specific case ("not answered" or "unknown"): insert always 9,99,999,…
3) Leave an item only blank,
- if it is not mandatory and therefore not specified, i.e. the hospital code or the narrative, or
- if it is not specified, because not applicable in a specific case (e.g. "no product involved" in the FDS, or "no second injury", or "no second part of body injured").
4) Add leading zeros to the left, if the actual valid code according to the manual is shorter than the field length, e.g. if there is a one-digit code, but the foreseen field length is two-digits: e.g. if the actual FDS code is 2.12, and the field length is nn.nn (Mechanism), insert 02.12; or if the code is 6.0220, and the field length is nn.nnnn (Product/Substance), insert 06.0220.

Case definition

Injury data collection efforts should include all acute physical injuries attending Emergency Departments for diagnosis, investigation or treatment, which fall into the nature of injury categories listed in the dataset. It should relate to both patients that are admitted to hospital for further observation and treatment and those that are sent home after diagnosis and treatment (ambulant care). An outpatient is defined as a patient who is admitted to a hospital or clinic for treatment that does not require an overnight stay. In case there are national variations in defining in-/ outpatients, these national rules shall be applied.

Return visit should not be included, nor should psychological consequences of injury. Data should be collected on *all injury related attendances*, not just home or leisure or unintentional injuries. Non-injury related health conditions should be excluded. However, in some circumstances data may only be collected on subgroups of injury (such as unintentional home and leisure) and valid comparisons can still be undertaken on sub-groups across countries. Where this occurs should be clearly documented with the dataset.

In order to calculate national incidence rates it is necessary to distinguish injuries among residents of the host country from visitors and normal place of residence should be used for this purpose. Given

that calculation of residence based rates across many countries will underestimate the overall European rate, by excluding cross-border flows, it would be helpful to include all injuries (irrespective of residence) and include a yes/no residency indicator to the dataset.

Implementation

It is envisaged that all countries should be capable of collecting and providing the JAMIE-MDS in a substantial number or proportion of hospitals, if not all. Indeed there is a case to be made for the collection of the JAMIE-MDS to be mandatory for all hospitals to support local injury prevention and control measures. Each country should also collect the FDS in a number of hospitals to meet responsibilities for the assurance of consumer safety in relation to products and to maximise the benefits of extrapolations from the JAMIE-MDS to estimate numbers affected by specific mechanisms and aetiologies. Guidance on minimum and appropriate samples sizes is given in Chapter 4.

The JAMIE-MDS should be completed following the use of standard questions which can be asked by reception or clinical staff, depending on the practices and preferences of local settings.
The following lists three questions which derive the basic data on intent, and activity, mechanism and location at time of injury. Much of this information is already collected in emergency departments across Europe but is non-standardised or is implemented in ways which may impose additional burdens on staff. The following sequence of questions is designed to reduce this burden:

Q1: What is the problem / what brings you here?
This question, or a variant, is asked in virtually all departments. The responses nearly always elicit whether the complaint is due to an injury or not, and if so, whether the causation fields need to be completed. Often patients reply with details which include information on: intention, mechanism, activity and location and these fields can then be completed. If not, the following sequence of additional questions should be used.

Q2: How did the injury happen?
People usually reply with details including intention, mechanism, activity and location. If information on activity or location is not provided then the following questions can be asked:

Q3: 'Where were you?' or 'What were you doing?'
The exact question will depend on the response to Q2 and should provide the necessary information to complete the JAMIE-MDS.

Technology platforms

The JAMIE-MDS is designed to be implemented in many different ways, including the creation of de novo computer systems, the adaptation of existing systems, or using check boxes in existing or new paper based clinical records. Implementation of a de novo system with drop down boxes should not pose any real problems with the inclusion of "other" and "unknown" categories.

The problems arise when the interface uses checkboxes on paper records, either from existing or newly created records which have major space constraints ,which is often the case with clinical records, or from mapping from an existing but partially inadequate system. Many of the ED systems in use have a small number of boxes to collect major categories of interest in one, two or three fields (but not the 4 needed for intent, place, activity, and mechanism). Often they have boxes for work, home, school and sport categories. Using the responses across all boxes it is generally possible to recode "other" and "unknown". Whilst these are not comprehensive they still have a lot of utility. Of course, one would like hospitals to implement better systems and a lot of time has been spent in trying to

achieve this. However, as such changes are not possible in the short term then JAMIE aims to maximize the use of data from existing systems. Analyses included earlier in this report showed missing data in 7-15% of key fields in IDB in 2008. No system is perfect. As one of the aims of JAMIE is to get every country in Europe supplying data to IDB-JAMIE it will be necessary to work with countries over time to improve data quality rather than set an impossibly high bar for entry at the initial stage.

The data set as set out in separate tables by aetiology and nature of injury appears to contain a number of duplicate items, e.g. burns as both a mechanism and nature of injury group. It is necessary to describe the data in this manner but the data should not need to be collected twice. This depends on the choice of technology platform. If different individuals are collecting external causes (e.g. clerical staff, triage nurses) from those determining diagnosis and coding diagnosis (e.g. clinicians) using paper records then it might be best to collect some items in duplicate. In other technology platforms (or where a single individual is collecting all the data) it makes sense to collect these data items only once. Data can then be extracted into the relevant parts of the dataset.
The data dictionary for the JAMIE-MDS is included in Annex and Chapter 7 provides a conversion table for mapping from the FDS to the MDS.

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4 Sampling issues and guidelines for calculating national estimates of injury incidence

An important purpose of the IDB-JAMIE injury data collection is to provide national estimates of rates of injury cases that are reported at Emergency Departments (EDs) for each of the Member States (MSs), which includes hospital admissions as well as ambulatory treated injury ED-cases (outpatients). In almost all MSs solid national statistics on hospital discharges are available that include valid information on diagnoses. The challenge is to get sufficiently reliable data as to the number of outpatients and, based upon that, the total number of hospital-treated patients in a given country.

The ECHI indicator 29b (home, leisure and school injuries) is based on the calculated ED-based injury incidence rate. The calculation of the valid national incidence rate is the responsibility of each MS. However, comparability requires a standardized methodology. In most MSs injury relevant ED contacts are only registered in a sample of hospitals in a systematic and harmonised manner. Therefore the incidence rate calculation must be based on extrapolation from the sample to the national level and the uncertainty of the national estimate should be described by a confidence interval around the estimate. In some MSs within-hospital case sampling is performed which shall be a random sampling.

Consequently this Chapter deals with the following fundamental issues of sampling and the production of national estimates:

- Strategies for the selection of hospitals performing injury recording and sampling within hospitals;
- Methods to extrapolate from a sample of hospitals to produce national incidence estimates; and
- Methods to ensure that appropriate metrics are used for uncertainty around such national incidence estimates.

Selection of hospitals and sampling of cases within hospitals

Ideally, hospital injury statistics should be based on recording at all hospitals in a country. In this way the statistic is essentially “exact” and the recorded number of cases varies only due to random error, which for injury types with a substantial number of cases is negligible. However, for several reasons it may not be possible to record injury information at all hospitals in a country, in particular for the Full Data Set (FDS), but this may also be the case for the Minimum Data Set (MDS). Instead, injury information may be recorded only at a sample of hospitals or samples within hospitals.

Selection and sampling of hospitals

Special attention should be given to the choice of the sample of hospitals. Ideally, it should be a large random sample taken from the hospital population in the country. However, this is rarely the case. In order to be a representative sample, special attention should be drawn to the geographical distribution of the sample hospitals and to specialisation of the hospitals. It is important that the sample represents all specialisations and represents the major regions in a country. Further, the sample should be stratified by hospital size. This means that the sample should include both large and smaller hospitals, because the types of injuries treated at large hospitals may be different from those treated as smaller hospitals. The representativeness of the hospital sample should be evaluated and documented describing the characteristics of the hospital sample compared to all hospitals in the country. Instructions as to the national IDB file information to be provided are included in Chapter 8.

A minor deviation in age distribution is not critical because this is adjusted for in the extrapolation, but e.g. differences in hospital specialisation (e.g. on children, seniors, trauma centre, hospital with only few specialities, academic hospital), urban/rural settings and geographical region may result in bias

when extrapolating from the sample to national figures. In some cases it may be relevant to exclude hospitals from the sample in order to improve representativity.

Several types of bias may be the result of a poor hospital sample:

- Several hospitals are specialised, e.g. as a children's hospital, and consequently does only injuries that occur typically in children, for instance more accidental poisonings than recorded among adults.
- The hospitals is mainly placed in an area where the injuries differ from those in the rest of the country, e.g. in a skiing area. There may be other and more subtle differences between geographical regions, e.g. trampoline injuries are more common in the Western part of Denmark than in the Eastern part, possible due to larger gardens in the Western regions providing room for their placement.
- Access to the sample hospitals may differ from the general access in the country, e.g. differences in local referral rules or due to geographical distances. Studies have shown that ED-treatment rates in areas with long distances to hospital are much lower than in areas close to a hospital (e.g. Lyons et al, 1995; Laursen and Nielsen, 2008) Therefore, hospitals in rural area may have fewer recorded injury cases, but those treated are probably the more severe cases.
- The hospitals may be mainly placed in deprived areas, resulting in a different injury pattern compared to the national mean (e.g. Lyons et al, 2003).

All these factors should be taken into account when the hospital sample is designed. It is not a problem that cases at one of the hospital are biased, but the sample as a whole should be as unbiased as possible. As said before, bias in age and gender may not be the most severe problem, as this can be adjusted for if age and gender information for the injured population at national level exists, or if the reference population is categorised by age and gender.

The US-NEISS for instance is based a probability sample of emergency departments across the US. The sample has been defined in 1997, using four layers of hospitals according to size & ratio of child treatments. The resulting national estimate is compared with the observed number of total emergency room visits (ERVs) derived from a separate system in order to create a ratio adjustment which is then used for population estimates of product related injuries and other injuries in the US.
In 2010, NEISS consisted of 96 hospitals out of 4,843 eligible hospitals. The total number of ERVs recorded in these hospitals was 127,499,443 and the estimate from NEISS was 140,980,831. Thus, the NEISS sample would overestimate national incidence by 10.6% if the ratio adjustment was not used.

As the envisaged system for Europe depends on decentralised national coordination structures, an EU- (federal) sampling protocol cannot (yet) been prescribed to MSs. Therefore, countries have to make sure that their national samples are as representative as possible, taking into account the potential sources of biases as summarised above.

In order to obtain sufficiently precise injury incidence rates and correspondingly narrow confidence intervals for these, there are some minimum requirements for the number of hospitals as indicated in Table 4.1.

Table 4.1 Recommended minimum number of injury reporting hospitals according to population size of the respective countries.

Population of country	Countries	Recommended no. of IDB hospitals
Less than 3 Mio.	LU, EE, MT, CY, IS, LI, ME, SI, LV	3
3-12 Mio.	DK, IE, FI, AT, HR, SE, LT, MK, SK, BG, HU, NO, RS, BE, CZ, EL, PT	5
12-40 Mio.	NL, PL, RO	7
More than 40 Mio.	DE, FR, IT, UK, TR, ES	9

For some countries with regions like UK, Germany and Spain, it may not be possible to get a representative sample for the whole country. Instead it may be possible to get a representative sample of a region. It is then possible to calculate extrapolated numbers and incidence rates for this region using the methods shown below. This incidence rate may then be the "best guess" for the national incidence rate.

Sampling within hospitals

In some countries a sampling of cases within the hospitals is taken, e.g. by recording on selected days. This is not a recommended procedure as it may introduce biases, e.g. due to underreporting of less severe injuries, and seldom gives the expected cost savings in data collection due to additional quality control work to be performed.

When using such a scheme it must be ensured that the selection of cases is representative of all cases treated at the hospital; ideally it should be a random sample. It should be documented that the sample scheme works properly and that the sample is representative. An example of such a scheme is to sample every eight day. This will, on a yearly basis, result in a nearly equal distribution of weekdays and seasons. When using within-hospital sampling, the estimated total number of cases in each hospital can be calculated by multiplying by a factor, e.g. about 8 as in the above example. Within-hospital sampling will result in a larger uncertainty of the national incidence rate compared to sampling all cases in a hospital, in particular for rare types of injuries. This is taken into account when using the model for determining incidence rates described below as it will result in larger variation between hospitals.

Methods to extrapolate from a sample of hospitals to produce national incidence

The ECHI 29b indicator is based on the incidence rate of home and leisure injuries. It should not be misunderstood as an indicator of morbidity, but rather as an indicator of the burden on the hospitals. In principle, this incidence rate is calculated as the national number of home and leisure injuries for people with permanent residence in the country. It may, however, also be relevant to include injuries among non-residents as well because injuries among non-residents may not registered elsewhere resulting in a too low EU-wide incidence rate. Therefore the IDB-NDA should calculate incidence rates for residents and incidence rates including non-residents as well.

In order to estimate national figures of injury incidence, extrapolation methods must be applied. Several extrapolation methods can be used, based on what information is available in a country, Each of these methods has its advantages and disadvantages.

1. HDR based extrapolation (recommended)

If a national hospital discharge register exists and includes valid information on diagnoses, then extrapolation can be based on these data. If there are N admitted patients with an injury diagnosis at national level a given year, and S admitted patients with an injury diagnosis at the sample hospitals, then the number of recorded cases at the sample hospitals can be extrapolated to national level by multiplying the number by the extrapolation factor N/S. This factor can be determined separately for each age group. The HDR method may introduce some bias due to differences in injury severity; if the injures treated at the hospitals in the sample more often result in hospital admission than the national average, S will be too large and the extrapolation factor N/S too low resulting in underestimation of the total number of injuries treated in the country. Further, it is important only to include incident cases and to exclude re-admissions, transfers to other hospitals, etc. as these may vary strongly between hospitals. Further, complications of medical or surgical care should be excluded.

2. EDR based extrapolation

If the hospital discharge register includes information on emergency contacts with or without admission (EDR data) and has national coverage then extrapolation can be based on these data

instead of HDR data. If there are N emergency patients at national level in a given year, and S emergency patients at the sample hospitals, then the number of recorded cases at the sample hospitals can be extrapolated to national level by multiplying this number by the factor N/S. As before, this factor can be determined for each age group, separately. By using EDR data, the extrapolated number of cases will not depend on a severity bias for admission at the sample hospitals. However, emergency cases include both ill and injured individuals. If possible, only injured patients should be included. This is particularly important if ED records cannot be separated from other outpatient treatments.

3. Extrapolation based on catchment population (not recommended)

In some countries for each hospital a so-called reference population can be defined, i.e. a geographical area in which injured persons are expected to be treated at one particular hospital. If the population in the catchment areas for all hospitals in the sample is C and the national population is P, then the extrapolation factor from the sample to national level is P/C, which can be determined for each age and gender subgroup. It is essential that the reference area corresponds to an administrative area for which population data exist.

Very often the catchment area assumption is not true: persons may get injured at work, in traffic or during vacation and may be treated at a hospital close to the place where the injury occurred. This is in particular the case in large cities with several hospitals. Further, hospital specialisation (level 1 trauma centres, children's hospitals) may invalidate this method because the catchment area may differ for different injuries or age groups.
Therefore, the catchment area method should only be used if the other methods are not available.

The extrapolation methods 1-3 can be performed by using an EXCEL spread sheet prepared for this purpose. Guidance and tool can be downloaded from the project website: *Extrapolation guide ECHI-29b* and *Extrapolation tool ECHI-29b and confidence intervals, (# 8 on the list*.
If several of the extrapolation methods above are possible, it is important to know in what way they differ from each other.

Comparison between the three extrapolation methods

If the hospital sample is unbiased the national estimate of incidence rate of injuries will be the same, independent of the methods used. However, if the sample is biased, the estimation methods may provide different results. Some results are shown below for the situation when the injuries treated in the hospital sample are far more frequent and somewhat more severe (more patients are admitted) than in the country as a whole. This is shown in the Table 4.2 below:

Table 4.2 Example of data for comparison of the extrapolation methods

Annual numbers	Hospital sample	The whole country
Number of ED cases	20,000	400,000
Number of admitted	2,500	40,000
Reference population	200,000	8,000,000

Case 1 – differences between HDR and EDR method

When using the HDR method, the extrapolation factor is calculated as the national number of HDR (admitted) cases, divided by the admitted cases in the sample; here this factor is 40,000 /2,500 = 16. In a sample of hospitals, 20,000 cases are treated. The extrapolation with the factor of 16 gives 20,000*16 = 320,000 which is 20% less the real number. This corresponds to a national incidence rate of 320,000 / 8,000,000 = 0.04 (or 4,000 per 100,000 population-years), again less than the real figure of 0.05.

When using the catchment area method, the incidence rate is 20,000 / 200,000 = 0.10 (or 10,000 per 100,000 population-years). The national incidence rate is assumed to be the same, and the extrapolated number of injuries is 8,000,000*0.1 = 800,000 or the double of the real number.

In practice, injury incidence rates seldom differ that much. But injury treatment rates may differ if there are regional differences in the health care system or access to hospitals, etc. This may result in large differences in incidence rate of hospital treated injuries even if the injury incidence rates are the same. However, since the purpose of the extrapolation is to calculate the national number of hospital treated injuries, the HDR method is better than the catchment area method.

Case 2 – difference between HDR/EDR method and reference area method
When using the EDR method, the extrapolation factor is calculated as the national number of ED cases, divided by the number of ED cases in the sample; here this factor is 400,000 /20,000 = 20.
In the sample of hospitals, 20,000 cases are treated. The extrapolation with the factor of 20 gives 20,000*20 = 400,000 which is exactly the real number. This corresponds to a national incidence rate of 400,000 / 8,000,000 = 0.05 (or 5000 per 100,000 population-years), the true incidence rate. In comparison, the HDR method gave 320,000 national cases and an incidence rate of 0.04 (or 4000 per 100,000 population-years).
In the EDR method it may seem superfluous to calculate the national number of ED cases when it is already known, but the method can be used for calculating the number of other types of injuries, e.g. home and leisure injuries and injuries due to falls and for these types of injuries the national numbers are usually not known.

Incidence rate calculations

While the catchment area method directly results in injury incidence rates, these rates are calculated from the extrapolated numbers when using the HDR or EDR method by dividing by the size of the national population. For example, if the extrapolated number of hospital treated home and leisure injuries in a country is 300,000 in a year and the population is 8,000,000 then HLI incidence rate is 300,000/8,000,000*100,000 = 3000 per 100,000 population-years. In order to compare incidence rates between countries the incidence rate can be adjusted to an age standardised population. If the incidence rate in each age group is IR_y, and the share of the standard population in this age group is POP_y, the standardised incidence rate is $IR_{standard}=\sum IR_y*POP_y$.
An *spread sheet* (# 8 on the list) has been developed for calculating incidence rates, standardised incidence rates and extrapolated number of injuries, as well as the confidence intervals described below. This spread sheet and a user guide can be downloaded from the JAMIE website.

Methods to calculate confidence intervals

All estimates from sampling are subject to sampling errors. Therefore, national estimates of injury incidence should be accompanied by appropriate derived 95% confidence intervals (95%CIs) to enable data users to judge the degree of uncertainty in the estimates and also to facilitate comparison between countries or between years. Estimates which do not have overlapping 95% CIs can be considered different from one another.
In order to estimate the national incidence rate based on a sample of hospitals we must assume that the hospital sample is a random sample. Further, for each hospital, patient arrivals are assumed to be a Poisson process, i.e. each arrival is independent of the others. This is usually the case with the exception of transport or road accidents resulting in mass casualties, after which many patients may arrive with similar types of injuries. Finally, we assume that there are no differences between the recorded injuries at the different hospitals (except for differences in number), e.g. there is no hospital cluster effect.

Based on these assumptions, the following calculations are valid. If the extrapolation factor is N/S, the number of cases of a particular type of injury in the hospital sample during a year is N, the national population is P, then the estimated incidence rate is: IR = N/S*n/P per year, and the standard deviation of IR is IR/√n. The 95% confidence interval for large n is then [IR-1.96*IR/√n;IR+1.96*√n]. Table 4.3 shows examples of this.

Table 4.3 Confidence interval calculation. Extrapolation factor N/S=10, population = 8 million

N	Estimated N	Estimated IR*1000	Lower CI*1000	Upper CI*1000
10	100	0.0125	0.0048	0.0202
100	1000	0.125	0.100	0.150
1000	10000	1.25	1.17	1.33
10000	100000	12.5	12.25	12.75

Table 4.4 also illustrates that with increasing number of recorded cases, the confidence interval of the estimate becomes narrower. If we assume that there are no differences between hospitals it does not matter whether the cases are recorded at one large hospital or several small hospitals.
However, the variation of specific types of injuries varies more between hospitals than expected due to random variation without hospital clustering. Table 4.5 shows some example of cases recorded at three Danish hospitals.

Table 4.4 Number of injury cases recorded at three Danish hospitals for selected injury mechanisms

Injury type	Hosp. 1	Hosp. 2	Hosp.3	Mean	Standard deviation (SD)	SD, adjusted for total cases at each hospital	SD expected assuming the Poisson distribution
Strangling	24	20	30	24.7	5.0	7.4	5.0
Bitten by person	35	19	34	29.3	9.0	15.8	5.4
Poisoning by liquid	118	186	363	222.3	126.5	38.8	14.9
Fall, 1 meter or more	358	405	604	455.7	130.6	60.9	21.3
Pinching, crushing btw. objects	641	749	1080	823.3	228.7	117.4	28.7
Cut, slice, slash	1781	2172	3997	2650	1182.8	66.0	51.5
Fall, same level	3183	5337	8786	5769	2826.3	1021.1	76.0
Total injuries	19617	22841	42290	28249.3	12266.0	-	-

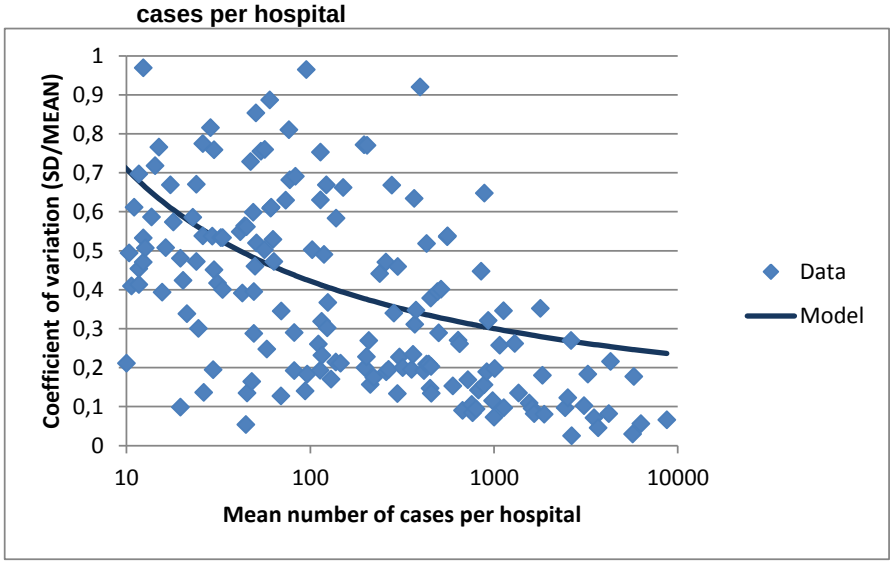
Source: Bjarne Laursen, National Institute of Public Health, 2012

Table 4.5 shows that the variation between hospitals is larger than expected based on the assumption that all hospitals have the same injury pattern, in particular when the number of cases is high. There may be several explanations for this. The obvious explanation is that the injury patterns at the three hospitals differ due to the different locations and related differences in social settings, industrial activities in the immediate region, transport infrastructures and other environmental factors. However, it should not be neglected that part of the difference may be due to differences in coding practice, despite quality control efforts.
The between-hospital variation can be accounted for in different ways. The immediate solution is to estimate the confidence interval directly from the data. A consequence of this is that confidence intervals may vary wildly as the estimated SDs in Table 4.5.
A model for the confidence interval calculation may solve this problem, by assuming that the variation between hospitals only depends on the number of cases and does not on the specific injury type.

Such a function is the “generalised variance” used by the US-CPSC for the NEISS-data. In this model the standard deviation (SD) of an incidence rate or number is calculated as SD = MEAN / (A + B*ln(N)), where N is the absolute number of recorded cases, and A and B are constants to be determined once for each country and year, based on a large amount of data.

Figure 4.1. presents the coefficient of variation (SD/MEAN) between hospitals as a function of the mean number of cases per hospital. The data are from the three Danish hospitals that participated in the INTEGRIS-project (INTEGRIS, 2011). Each data point corresponds to a specific category of injury type, body part, activity, intent, place, mechanism, type of sport. The categories of “unknown” and “other” are not included in the model. From the Figure it seems that the model reasonably fits the data, although the fit is not perfect for large N.

Figure 4.1 Coefficient of variation (SD/MEAN) between hospitals as a function of the mean number of cases per hospital



Source: INTEGRIS, 2011

The consequence of all the above mentioned methods is that the width of the confidence intervals not only depends on the number of recorded cases, but also on the number of hospitals involved. Thus, 1000 cases recorded at each of 10 hospitals may result in narrower confidence intervals than 10,000 cases at one hospital. It is therefore important to include as many hospitals as possible in the sample. Because the confidence interval calculation is based on the randomness of the hospital sample, the uncertainty of the differences between years may be smaller than estimated if the same hospital sample is used every year. In such cases trends may be significant although the confidence intervals are wider than the changes between years.
Finally, the estimated confidence interval does not adjust for bias and errors in the data collection. If e.g. 20% of the cases are not recorded in the hospital sample, the national estimates will be 20% too low. It is therefore essential that the quality of the recorded data is as high as possible.

The *Extrapolation guide ECHI-29b* and *Extrapolation tool ECHI-29b, # 8 on the list* helps to calculate the confidence intervals of the incidence rates.

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5 Quality of injury statistics produced through the JAMIE methodology

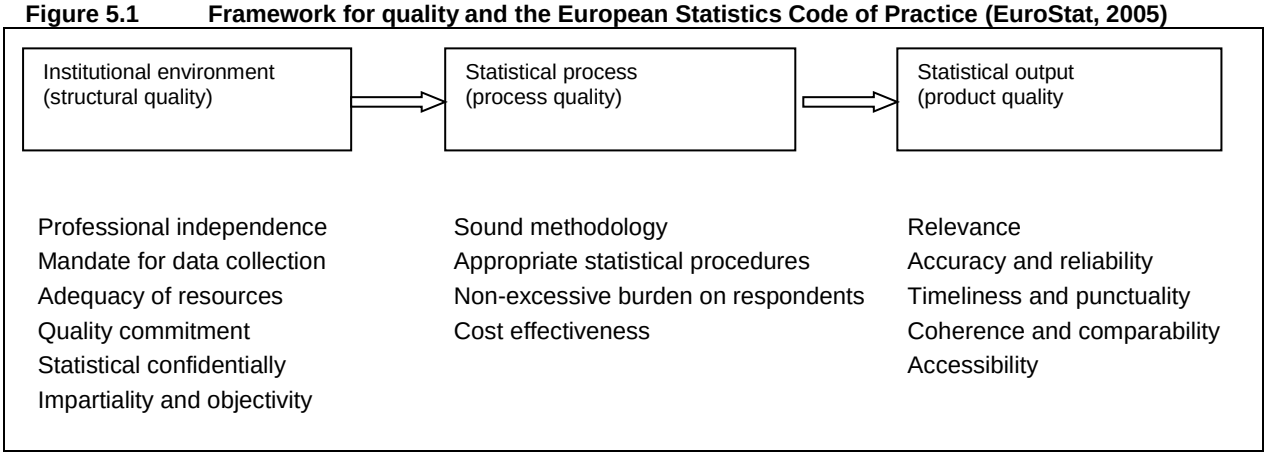
The purpose of this chapter is to specify the quality principles and procedures as they are being applied in the JAMIE-project in conformity with principles defined within the European Statistical System and laid down in the European Statistics Code of Practice (2005). This Code sets within Europe the standard for developing, producing and disseminating national and community statistics. The European Statistics Code of Practice was adopted by the Statistical Programme Committee on 24 February 2005 and was revised by the European Statistical System Committee in September 2011. Governance authorities and statistical authorities in the European Union have committed themselves to adhering to the principles fixed in this code.

Key principles

The European Statistics Code of Practice sets out 15 key principles for the production and dissemination of European official statistics and the institutional environment under which national and Community statistical authorities operate. A set of indicators of good practice for each of the 15 principles provides a reference for reviewing the implementation of the Code. The 15 principles are divided into three sections (Figure 5.1):

- Principles related to the "*Institutional environment*": Institutional and organisational factors have a significant influence on the effectiveness and credibility of a statistical authority producing and disseminating European statistics. The relevant issues here are professional independence, mandate for data collection, adequacy of resources, quality commitment, statistical confidentiality, impartiality and objectivity.
- Principles related to the *"Process of data collection"*, i.e. the methodology and statistical procedures used. Statistics shall comply with European quality standards and serve the needs of European institutions, governments, research institutions, business concerns and the public generally.
- Principles related to the "*Statistical output*": The important issues concern the extent to which the statistics are relevant, accurate and reliable, timely, coherent, comparable across regions and countries, and readily accessible by users.

Figure 5.1 Framework for quality and the European Statistics Code of Practice (EuroStat, 2005)



Institutional environment

Professional Independence
This relates to the independence of the statistical authority from political and other external interference in producing and disseminating official statistics is specified in law. The statistical authority should be of sufficiently high hierarchical standing to ensure and of the highest professional calibre.

Currently IDB-JAMIE data is being collected and delivered to the EC by national competent authorities designated by the national Ministries of Health at the invitation of the EC, DG SANCO. In case a designated body represents a private entity, such a body had to testify and "declare its independence from commercial and/or political interests", before entering into the JAMIE-project and serving as a co-beneficiary of the project grant.

The actual data collection and development, production and dissemination of JAMIE reports is being done free from political and private sector interference under the responsibility of the IDB-NDA-network guided by its house-rules (IDB 2008).

Mandate for data collection
IDB-data collection currently takes place under the EAHC co-funded JAMIE-project (EAHC-agreement 2010 22 05) running from April 1, 2011 till March 31, 2014.
The mandate to collect information for the production and dissemination of official statistics is not yet specified in law, neither the role of the statistical authority to use administrative records for statistical purposes. However at this stage there are a couple of legal provisions that call for EU-level exchange of injury data in an harmonised manner:

- Council of the European Union, Recommendation on the prevention of injury and the promotion of safety, Official Journal of the European Union 2007/C164/01 of July 18, 2007, which (a) recommends Member States to make better use of existing data and develop, where appropriate, representative injury surveillance and reporting instruments to obtain comparable information, monitor the evolution of injury risks and the effects of prevention measures over time and assess the needs for introducing additional initiatives on product and service safety and in other areas; and (b) invites the Commission to gather, process and report Community-wide injury information based on national injury surveillance instruments.

- Council of the European Union, Regulation setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation 2008/ L 218/30 of 13 August, 2008, which requires MSs to establish adequate procedures in order to follow up complaints or reports on issues relating to risks arising in connection with products subject to Community harmonization legislation; [and] monitor accidents and harm to health which are suspected to have been caused by those products […]. In practices this requires MSs to continuously survey product related injuries in a way that facilitates the assessment of product related injuries and the circumstances in which they occur.

- Council of the European Union, Regulation on Community statistics on public health and health and safety at work 2008/ L 354/70 of 16 December 2008, which aims to harmonise reliable health information which supports Community actions as well as national strategies in statistics in the field of public health. Annex I to the Regulation identifies "accidents and injuries" as one of the core subjects to be covered within this common framework.

- "European Community Health Indicators and Monitoring" (ECHIM) and the list of health indicators as agreed with the MSs' competent authorities under the Health Information programme. The home and leisure injury indicator 29(b) is being defined as injuries that have occurred in and around home, in leisure time and at school resulting in an injury that required treatment in a hospital. These data are

expected to be provided from national hospital discharge information systems as well as national injury surveillance systems in line with the IDB-JAMIE methodology.

Adequacy of resources

This principle relates to the adequacy of staff, financial, and computing resources and the question whether the scope, detail and cost of the envisaged European statistics are commensurate with needs. This is a more political question as to the willingness of EU and MSs to make resources and capacity available, for a sustainable EU-wide injury data collection and exchange system. What is clear at this stage is that:

- over the past decades various initiatives have been taken by Commission services to establish a more harmonised collection and exchange of injury data originally primarily focussing on consumer product related injuries, but in the mid-1990s extended to all injuries treated in accident and emergency centres. This has resulted in a data set of over five million cases reported by thirteen EU-MSs over the years more than ten years;

- 22 MSs (and 4 more are joining in the course of the project) are now actively participating in the Joint Action called JAMIE and have underwritten the ambition to work towards a sustainable system for injury data exchange within the EU by the year 2015.

Up to present resources have been made available by the participating Member States for their national data collection efforts as well as by the EC through co-funding of the previous JAMIE-projects and the current JAMIE-project. The EC also hosts the IDB-JAMIE data base and makes it accessible through the "*Health in Europe: Information and Data Interface*".

Quality commitment

This relates to the requirement to have processes in place to monitor the quality of the collection, processing and dissemination and product quality regularly being monitored according to the ESS quality components, including the availability of well trained staff and quality guidelines that are publicly accessible.

Quality assurance is a core component in the JAMIE-project, resulting in the IDB-JAMIE-Manual and qualified NDA's that have taken part in a series of three consultation meetings and two IDB-JAMIE-training courses.

Procedures are available to check the quality of the data collected as part of JAMIE, including checks undertaken prior and after data submission (see Chapter 8). In the training courses and through bi-lateral coaching teleconferences, IDB-NDA's are being been instructed in applying these procedures.

Each data file (= set of all valid cases from one country for one year) is accompanied by metadata information, the co-called National IDB file information. The national IDB file information document contains basic information for the NDA-network coordinator and end users of the data as to the origin, content and quality of the data. The national IDB file information document answers the most important questions regarding the method of hospital sampling, the data quality according to the principles of the European Statistical System (ESS) and the specifications as required in chapter 8 of this manual.

Statistical confidentiality

IDB-JAMIE data (FDS as well as JAMIE-MDS) are in principle personal data and therefore subject of Directive 95/46/EC and related national implementation laws, and Regulation 45/2001 and the proposed successor, the General Data Protection Regulation (COM 11, dated 25/1/2012).

Physical and technological provisions are in place to protect the security and integrity of statistical databases in order to ensure that only anonymised records are provided for the EU-data base.

Instructions and guidelines are in place on the protection of statistical confidentiality in the production and dissemination processes. These guidelines are spelled out in writing and made known to the public.

Within the IDB-JAMIE system, usually the Ministry of Health acts as “data controller” and a subordinated institution like a National Public Health Institute or University acts as “data processor”. Traditionally, the national data processor is called the “IDB National Data Administrator (NDA)”. “Controller” means the natural or legal person which (...) determines the purposes and means of the processing of personal data; where “processor” refers to the natural or legal person, (...) which processes personal data on behalf of the controller (95/46/EC Article 2).
As national data collection is financed by the national authorities, these bodies continue to own and to stay in legal control of their data, even when the data have been uploaded to the joint data base, hosted by DG SANCO. The Commission does not acquire any ownership rights on the data, but only facilitates to the exchange among MSs (or IDB-NDAs strictly speaking).

IDB-NDAs form an informal association (“network”), wherein IDB-NDAs who have data supplied to the joint data base, are full members (with voting rights etc.) and others who intent to deliver data at a later stage are taking part as “observers”. The bylaws (“house rules”) of the network (European IDB Network 2008) define the decision making process. Based on its bylaws the network has adopted a “Data access policy” (IDB, 2010a) regulating the access to single case data. Access is granted to:

- IDB-JAMIE data suppliers (as long as they provide data according to the common quality criteria);
- The head of the Health Programme Management Unit at the EC (as long as EC/DG SANCO hosts the database);
- The head of the Product and Service Safety Unit at the EC (as long as EC/DG SANCO hosts the database);
- Service providers linked to the EC by contract to fulfil specific (e.g. technical) tasks related to the IDB-JAMIE (access is temporary and will be suppressed at the end of the contract).

Only top-level, aggregated, statistics and figures produced as part of JAMIE will be made available to the public. Only anonymised records are provided by the countries, wherein personal identifiers and hospital identifiers are removed. Moreover, statistics and figures from IDB are made available only at aggregated level. For reasons of data protection the IDB Public Access data do not:

- provide any single case information;
- contain any details of date or time;
- provide a narrative description of the course of the accidents;
- show the age in single years (only aggregated into 5-years age groups); nor will
- display the number of cases if less than 5 cases are in the database.

Access to more detailed statistics/figures will require permission to be granted. Strict protocols apply to external users accessing statistical micro-data for research purposes. Access can be granted to researchers and injury prevention professionals upon request (access is temporary and will be suppressed at the end of their analysis).

Researchers, who are not IDB-NDAs, have to apply with the form “Request for research access”, explaining the purpose of their research and why they need access to the personal data. Actually, each single request for disclosure needs the consent of each data supplier. The elected Network-coordinator acts as a kind of secretary of the Network and handles such requests. Currently, the Austrian Road Safety Board acts as coordinator and requests shall be directed to that agency. The data controller at DG SANCO unlocks data only to those that have been given consent.
As a precondition, all data users have to agree (in writing) with the “Terms of Use” (IDB, 2010b):

- Single-record data are to be used for internal purposes only. The user will not give access to single-record data to a third party;
- Single-record data will not be published or disseminated to the public, neither to a third party;

- The user will not link IDB data to other information in order to identify natural persons;
- The user may use the data only for the general purpose of research or analyses with the goal of deriving general findings to enhance safety and prevent injuries (...);
- Whenever publishing any results of such research or analyses, the user will indicate the source ("Source: EU Injury Database – The IDB Network & the EU Commission, DG SANCO") in texts, tables, figures, and list of literature;
- Data suppliers, network-coordinator, or data controller cannot be hold responsible for any outcome or conclusions of research and analyses; (...)
- The user will use data only during the agreed period of time. Any internal copies of data will be deleted immediately after the termination of the user account.

Impartiality and objectivity

This relates to the principle that statistics are to be compiled on an objective basis determined by statistical considerations and proper and transparent selection of sources and statistical techniques.

The JAMIE-approach is based on international good practices in injury surveillance and scientific evidence as to emergency departments being the most appropriate and cost-efficient setting to collect objective information on injuries treated and related causal factors (Kisser et al., 2009).
Much of the injury information generated up until now is not comparable between countries, and not between registers, due to a lack of harmonised methodology and classification. Injury surveillance in the EU - and in most MSs - can be characterized as operating on an incomplete puzzle of data sources that provides a notion of the complete picture but lacks important details. However, these requirements can be met by the means of ED-based data, as all countries have emergencies departments available and easily accessible for the public. The information from these EDs will provide the "cement" for the jigsaw parts to glue together and provides the common denominator for all policy sectors and MSs.

It is obvious that the health sector is the best setting for collecting information on all injuries that need medical observation and/or treatment in hospital and for an objective assessment and identification of the most severe cases resulting in permanent impairments. As to the non-fatal injuries a common and practical definition is being applied: i.e. all cases that led to medical treatment in an hospital, either as out-patient or as in-patient. Work should also start on applying the globally-accepted Abbreviated Injury Scale (AIS) which is used in trauma hospitals around the world for assessing injury severity (ETSC, 2008). This would reduce the subjectivity of current classifications of injury severity, while avoiding the dependence of the proposed surrogate scheme upon hospital admission policies.

Statistical processes

Sound methodology

The data collection and analysis system proposed by the JAMIE project is based on the World Health Organization (WHO) officially acknowledged International Classification of External Causes of Injury (ICECI, 2004) , and best practice methodologies published in the scientific peer reviewed literature (e.g. Holder, 2001). The JAMIE-approach has been reviewed by the International Scientific Advisory Committee and its actual implementation will be monitored by this Committee. Members of this committee as well as one member of the JAMIE-project team are member of the ICD-11 Development Team, i.e. the Injury Technical Advisory Group. Through this exchange it is envisaged to safeguard that concepts, definitions and classifications applied in JAMIE remain consistent with that of other international networks on injury statistics.

Staff attends international relevant training courses and conferences, and liaise with statistician colleagues at international level in order to learn from the best and to improve their expertise. members of the JAMIE-team are active members of the scientific community and work to improve methodology

and review the quality and effectiveness of the methods implemented and promote better tools, when feasible.

Appropriate statistical procedures
The procedures for sample selection and sample weights are well described and regularly reviewed, revised or updated as required. Each NDA is be obliged to document the relevant metadata (characteristics of sample of hospitals) by using the standardised 'national IDB file information' (chapter 8).

Routine procedures for data collection, data coding and data delivery are comprehensively described in the IDB-JAMIE Manual. All IDB-NDAs have been trained in their applying these procedures. The methodologies which JAMIE uses for calculating incidence rates are an extension of best international epidemiological practice dealing with sampling, population extrapolation and adjustment for clustering.

The definitions and concepts used for the administrative purpose are in plain language and are a good approximation to those required for statistical purposes.
Field operations, data entry, and coding are routinely monitored and revised as required. Revisions in instructions (IDB-JAMIE Manual) follow a standard and transparent procedures (IDB-NDA-house-rules), which include a mandatory consultation with all IDB-NDAs and data users (EC-SANCO).

Non-excessive burden on respondents
Most of the data elements that are included the JAMIE-MDS is being collected at emergency departments by the medical and administrative staff. Patients do not need to provide more information than is usually exchanged for a medical examination. The difference is that it is being collected in a systematic manner by asking 3 standard questions:

Q1: What is the problem / what brings you here?

Q2: How did the injury happen?

Q3: 'Where were you?' or 'What were you doing?'

JAMIE at MDS-level data collection also utilises in most cases the data collection systems already in place as part of the existing patient register in hospitals. The Minimum Data Set (MDS) has been designed to explicitly limit the burden on hospitals and countries and actually can be provided without much additional efforts on behalf of data providing hospitals.
For the FDS additional efforts are required also on the longer term. However, the number of FDS-collecting hospitals can be kept at the minimum affordable level of 1-3 hospitals per country.

Cost effectiveness
The in-hospital costs of collecting additional information on the causes and circumstances of injuries are estimated at 4-5 euro per case (see Chapter 1, Table 1.1). The cost of collecting information through household surveys is many times higher compared to household surveys ED-based hospital registration systems provide better information at lower cost levels (Kisser, et al, 2009).
In hospitals, routine clerical operations (e.g. data capture, coding and validation) are being automated to the extent possible in order to reduce costs. Existing administrative records cab be automatically extracted through linkage with in-hospital data bases in order to avoid duplication of work. The productivity potential of ICT is being optimised for data collection, processing (e.g. by automated text analysis and coding) and dissemination (through *EU-webgate*).

Technological developments in medical administration and data linkage, offers new opportunities for recording information that is also relevant for injury prevention. In the health area in particular, there are important e-health developments including health information management and networks. Technical

work to develop electronic health records is being supported by the EC, including supporting the interoperability of health systems within and across national boundaries. This includes the encouragement of the development, adoption and use of technical standards, namely on information and communications technology (ICT), common vocabularies, classifications, nomenclatures and thesauri, guidelines and best practice.

Statistical output

Relevance

JAMIE is designed to meet the requirement of the European Union's Home and Leisure Injury Indicator 29(b), one of 88 health indicators called ECHIs (European Community Health Indicators). This indicator is defined as "injuries that have occurred in and around home, in leisure time and at school resulting in an injury that required treatment in a hospital". In addition IDB-JAMIE data serve a range of potential data users. The information is used for policy purposes by a variety of stakeholders:

- Commission services, i.e. DG SANCO (Directorate B- Consumer Affairs and Consumers Health), DG TREN (Road safety), DG Justice (Violence against children, young people and women), DG Employment (health and safety at work) and Eurostat;
- National governmental departments such as the Health Ministries and the Ministries for Transport, Consumer Policies, Justice, Social Affairs and Employment and the respective enforcement agencies and safety inspectorates;
- EU-consultative committees, such as the Workgroup of governmental experts on injury prevention, the Consumer Safety Network and the Network of IDB-NDAs;
- EU- and national standardization and certification bodies;
- Health, accident and liability insurance business, manufacturers, wholesale, trading houses, public and private sector service providers; and
- Representative bodies such as consumer organizations and victim organizations.

Processes are in place to consult users, monitor the relevance and practical utility of existing statistics in meeting their needs, and advise on their emerging needs and priorities, i.e. through interim reporting and reviews foreseen in the JAMIE-project. User satisfaction surveys will be undertaken periodically among those who requested specific analysis and reports from data in the IDB data base.

Accuracy and reliability

Sampling errors may be due to:

1. Selection of hospitals in the national sample:
   In most countries such data is collected in a sample of EDs, respectively hospitals. For the appropriate sampling procedure see Chapter 4. Generally speaking, the sample size shall not be less than three hospitals and 10.000 cases per year. As general principle, the sample of hospitals needs to be balanced in order to ensure sufficient representativity, taking into account the most prevalent sources of variation. The sample has to:
   - Cover large, middle-size, and small hospitals, e.g. defined by number of beds and/or ED visits;
   - Include urban and rural areas and includes residents as well as non-residents (e.g. tourists, migrant workers),
   - Include hospitals that cover all relevant disciplines (e.g. ophthalmology, burn unit, dental clinic, paediatric ward), and accessible for all age groups (e.g. hospitals solely specialised in children should be excluded unless balanced by other sources of data).
   - Be sufficiently large for deriving incidence rates for important segments of the universe of injuries: inpatients vs. ambulatory treatments, major age groups, major settings (home, school, sport, and other leisure activities, work, road traffic), or accidents vs. violence.

2. Sampling of cases visiting a hospital:
   In some countries a sampling of cases within the hospitals is taken, e.g. by recording on selected days. When using such a scheme it must be ensured that the selection of cases is representative of all cases treated at the hospital; ideally it should be a random sample. It should be documented that the sample scheme works properly and that the sample is representative.
   Within-hospital sampling will result in a larger uncertainty of the national incidence rate compared to sampling all cases in a hospital, in particular for rare types of injuries. This is to be taken into account when using the model for determining incidence rates and needs also to be described in the 'national IDB file information' document (chapter 8).

Non sampling errors may be due to:

1. Differences between countries in the health care system:
   In some countries, only severe injuries are hospital treated while in other countries almost all injuries are hospital treated. This may even vary between years and regions within a county, resulting in incidence estimates that are not comparable.
   There is a considerable body of research which shows that factors other than injury severity influence the likelihood that a case of similar nature and severity of injury will attend for medical care in different settings (Lyons et al, 2006). Such factors will of course vary between countries as distance to access, direct payments or co-payments and other predictive factors of attendance also vary between countries and within countries over time.
   A way to measure the impact of such conditions is to compare attendance rates at EDs or admission rates to inpatient settings between countries for conditions which always lead to attendance or admission against all injury attendances or admissions. For ED attendances a group of fractures (Selected Radiologically Verifiable Fractures, SRVFs) have been proposed as such an indicator. This is because in the vast majority of settings such fractures inevitably attend emergency EDs and are detected. In essence this group can be simplified to long bone fractures and typically account for 10-20% of all ED injury attendances. Knowing the proportion of injuries due to long bone fractures allows one to assess the impact of a combination of factors on ED attendances.
   This information is very helpful when assessing variability between countries or within countries over time. Of course, it is susceptible to changes in particular exposures which often result in fractures but as there is a large number of such exposures this indicator should be relatively robust.
   It may not be possible to entirely remove system differences between countries but the judicious and explicit use of sub-indicators when applied to measuring the incidence of hospital attended injuries should remove concerns about misinterpretation.
   It is proposed that these indicators will be used to assess the accuracy of extrapolation factors and provide insight into system differences within the JAMIE project.

2. Quality of registration. If many of the injuries are not registered or injury codes are just "unspecified", the estimates will be too low. The required 'national IDB file information', presenting the share of "unspecified" and "other" for each variable, will give the proper indicators as to the quality and accuracy of data provided. But if e.g. self-harm is registered as a HLI, it is not visible. Therefore, additional indicators will be developed for such errors, e.g. by looking into the coding of drug poisonings among adults.

Other non-sampling errors that should be taken into consideration are:

- Possible over-coverage of cases due to recording re-visits and a new case;
- Possible under-coverage due to patient by passing emergency register (e.g. strait to paediatric clinic);
- Multiple listings in case of for instance a work related road accident;

- Different protocols for interviewing and variations in Interviewing skills of staff involved in interviewing patients;
- Non-response due to patient refusing to provide information, e.g. in case of violence or self-harm or as a matter of principle (confidentiality); and
- Nonresponse for key variables (e.g. information on the perpetrator in the case of violence).
- Data editing and coding in particular when information has to be retrieved from handwritten records.

Quality checks in view of increasing the accuracy of data delivered are undertaken prior, during and after the data is submitted. Such checks include:

- Rigorous process of training, quality control, on going feedback on queries about coding accuracy;
- Cross-checking the codes entered with the accompanying narrative free-text, together with identifying inconsistencies between data variables, the presence of duplicates and the extent of incompleteness (% missing/unspecified); and
- Comparison of new data loads with old data loads to ensure data appear reliable.

Validity checks are currently applied in a all countries by either:

- Comparison of logical inconsistencies between narrative and coded fields; or/and
- Audits by the IDB-NDA-team, or other external expert team, of a day's workload of cases in each of the hospitals by having these cases independently coded by the IDB-NDA-team and compared with the local codes, which will result in a list of true positives/ false positives/ false negatives and offers an opportunity to produce a "completeness score"; or/and
- Comparison of between the entire data sets, and/ or individual records, of inpatients submitted by each of the participating hospitals for the national IDB-data set and the set/ records submitted to the national HDR-system

Quality control initiatives will vary by country and would be expected to vary between the FDS from a small number of hospitals and the JAMIE-MDS when implemented in a much larger number of hospitals. Each MS (MS) submitting IDB data will be expected to produce a quality statement outlining the quality checks on the data implemented in that country prior to submission of IDB data.

In addition to the checks performed by the IDB-NDA of a member state prior to submission, once IDB data has been submitted each variable uploaded will be analysed to determine the percentage of the data that is missing, contains non-specific codes, etc. A number of quality control procedures are in place to ensure IDB data are fit-for-purpose. These are summarised in points 1-3 below:

1. Controls on the entire file - Each file uploaded to the IDB is searched to find the number and percentage of duplicated records, records with a missing or non-valid value, records with invalid length, records not matching the year of attendance selected and excluded records.
2. Controls by variable - Within each file uploaded to the IDB all of the variables are checked to determine the percentage of records which have missing, unknown, other specified or non-valid codes.
3. Controls between variables - Within each file uploaded to the IDB several variables are cross-checked. This includes searching for cases of error; in chronology if dates are given; a date of discharge is given and treatment not = hospitalised; a date of attendance is later than a date of discharge; activity = sport and code sport not given; activity not = sport and code sport given; number of days hospitalised given and treatment not = hospitalised; treatment = hospitalised and number of days hospitalised missing; and records with at least one logical error.

Timeliness and punctuality

There are inevitable delays between the collection of data in individual hospitals, the coding of such data, centralisation with quality checks and forwarding of data for inclusion within the EU-webgate.

Timeliness refers to how up to date the data are and punctuality to how near data provision is to the request for such data. It is intended to minimise these delays by automation. Data will be made available on the *EU-webgate* with a time lag of 12-18 months between reference period and up load. For the JAMIE project there is one release each two years.

Coherence and comparability

Standardisation of case definitions, methodologies for data capture and for defining incidence rates by country are provided in the IDB-JAMIE Manual. This will lead to greater coherence and increased validity for cross-country comparisons.

However, as mentioned before, access and health system differences play an important part in patterns of injury attendance. JAMIE provides some sub-indicators which are robust to these effects and can be used in combination with the overall indicators to help interpret comparability. As to the quality assurance check of the calculated incidence rates, there are essentially two components to this quality check:

- First, the accuracy of the extrapolation factor used in the incidence rate calculation needs to be assessed. One way to achieve this is to compare ED attendance rates and hospital admission rates for injuries that are almost always admitted to hospital. Recently, an analysis of indicators for hospital admissions has been published (Cryer, 2010). This looked at the proportion of ED cases which were hospitalised by ICD9/10 codes and found that very few conditions were always or nearly always hospitalised. Hip fractures, and to a lesser extent a group of serious head, cervical spine and organ injuries fell into this category. Whilst these indicators are not perfect there is a growing recognition that they provide a valuable aid to interpretation in injury trends and between country comparisons. Coherence of hip fracture numbers has been used in the validation of population estimates in the UK Burden of Injury study (Lyons et al, 2011). The 4071 hip fractures estimated from ED data from five hospital in Wales compared very well with the 4058 hip fractures recorded in the inpatient database for the whole country, thereby providing confidence in the accuracy of the extrapolation factor used to derive national incidence rates.

- Second, it is important to understand differences across counties in the incidence rates calculated due to variations in the severity of the injury sustained and variations in the thresholds for attending an ED and being admitted to hospital. As earlier pointed out, a way to measure the impact of such conditions is to compare attendance rates at EDs or admission rates to inpatient settings between countries for conditions which always lead to attendance or admission against all injury attendances or admissions. It may not be possible to entirely remove system differences between countries but the judicious and explicit use of sub-indicators when applied to measuring the incidence of hospital attended injuries should remove concerns about misinterpretation. It is proposed that these indicators will be used to assess the accuracy of extrapolation factors and provide insight into system differences within the JAMIE project.

Finally, the statistics are also being checked as to their coherence over a reasonable period of time and with statistics from the different surveys (e.g. EHIS) and sources (HDR):

- As to coherence over time: It is advised to use the same hospital sample over the years. Then the variation between years will be considerably less than the variation of the national estimate, because the variation is mainly between hospitals.
- Coherence with interview data: A study in Denmark linked survey data to hospital data. This can show the sensitivity and specificity of interview data in relation to register data (and vice versa). The conclusion is that compared to register data interview data overestimates the number of severe injuries because they are reported although the occurred a longer time ago, while minor injuries are underreported because they are forgotten (depending on whether they are reported for 3 months or for 12 months). And in particular injuries among elderly are under reported in surveys due to non-response.

Accessibility and clarity

The injury statistics (together with relevant 'national IDB file information' and quality assurance statement) are presented on the *EU-webgate* in a form that facilitates proper interpretation and meaningful comparisons.

During the JAMIE-project there is a facility for third parties to request special data analyses and reports, i.e. custom-designed analyses are provided when feasible and are made public. Access to micro data is only allowed for research purposes and subject to strict protocols.

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6 Methodology to support IDB-NDAs in calculation of national injury related DALYs and direct medical costs

Introduction

Assessing the burden of injury within a country represents an important means of determining the extent of the injury problem that exists, of raising the profile of injuries amongst the public and policy makers, of attracting funding to support intervention/prevention activities and so on. Amongst the ways of determining the burden of injury includes assessing the impact on morbidity and mortality through the calculation of the "Years Lived with Disability" (YLDs) and the "Years of Life Lost" (YLLs) measures respectively, which can be combined to allow the overall "Disability Adjusted Life Years" (DALYs) measure associated with the occurrence of injury to be calculated. Established by the World Bank and incorporated into the Global Burden of Disease and Injuries (GBDI) study (Murray and Lopez, 1996), DALYs are frequently used by the World Health Organisation (WHO) for international comparisons of the burden of disease and injury. DALYs allow the extent to which injury impacts on a given individual to be estimated, in terms of the severity of the disability incurred and the period of time over which this applies. Together with its impact on the health of the injured individual, the burden of injury can also be reported in terms of the magnitude of the direct medical costs that are generated during the post-injury period. Comprising of spending on ED and inpatient services, outpatient activities, ambulance transport, medical supplies and pharmaceuticals, calculation of direct medical costs allow the consequences of injury to be expressed in monetary terms that are often easier to understand than other burden of injury measures, thereby assisting in the complex decision making process with regards to the appropriate resourcing of research and interventions.

Given the range of data being collected as part of the MDS proposed in the JAMIE project, including information on the age/gender of the injured individual, the nature of the injury sustained, the mechanism of the injury and the activity/location/intent associated with the injury, the opportunity exists for the IDB-NDAs from each country participating in JAMIE to use this information to calculate the number of DALYs and the size of the direct medical costs applicable to their own country. Due to the complexities of these calculations this chapter provides instructions relating to how DALYs and direct medical costs can be measured, utilising the knowledge gained and findings resulting from the GBDI study (Murray and Lopez, 1996) and the UK Burden of Injury (UK BOI) study (Lyons et al, 2009), within which several JAMIE advisory group members participated.

YLDs, YLLs and DALYs

Methodologies used in GBDI and UK BOI studies to calculate YLLs, YLDs and DALYs

The GBDI study (Murray and Lopez, 1996) introduced the concept of using DALYs lost as a result of illness or injury as a burden of injury measure. DALYs were created by calculating YLLs and YLDs, which in turn were based on several parameters including the duration of life lost due to a death at each age; age weighting – whereby lives at different ages are given different values; discounting – whereby individual and societal preferences for present rather than future benefits are reflected; and comparing time lost due to premature death and time lived with a non-fatal health outcome. As part of this final parameter, disability weights (DWs) to be assigned to particular health states were created. A disability weight is a weight factor that reflects the severity of the disease/injury on a scale from 0 (perfect health) to 1 (equivalent to death). The way in which health state preferences within the GBDI study (Murray and Lopez, 1996) were valued varied, sometimes being based on empirical data but more often being based on theory and reasoned argument.

The GBDI study (Murray and Lopez, 1996) derived detailed formulae for the calculation of YLLs and YLDs which incorporate discount rates and age weighting.

The general formula for calculating YLLs is:

$$YLLs = \frac{KCe^{ra}}{(r+\beta)^2}[e^{-(r+\beta)(L+a)}[-(r+\beta)(L+a)-1]- e^{-(r+\beta)a}[-(r+\beta)a-1]] + \frac{1-K}{r}(1-e^{-rL})$$

Where r is the discount rate, β is the parameter from the age weighting function, K is the age-weighting modulation factor, C is a constant, a is the age at death and L is the standard expectation of life at age a. For standard *YYLs* used in the GBD, r is 0.03, β is 0.04, K is 1, and C is 0.1658.
Time lived with disability (YLDs) is also age-weighted and discounted in the same manner as YLLs. The formula for YLDs differs from the formula for YLLs because of the addition of a disability weight and slightly different interpretations of a and L. The general formula for YLDs from a single disabling event is:

$$YLDs = D\left\{\frac{KCe^{ra}}{(r+\beta)^2}[e^{-(r+\beta)(L+a)}[-(r+\beta)(L+a)-1]- e^{-(r+\beta)a}[-(r+\beta)a-1]] + \frac{1-K}{r}(1-e^{-rL})\right\}$$

where a is the age of onset of the disability, L is the duration of disability, r is the discount rate (r=0.03), is the age-weighting parameter (β=0.04), K is the age-weighting modulation factor (K=1), C is the adjustment constant necessary because of unequal age-weights (C=0.1658) and D is the disability weight. To calculate the number of YLDs lost due to a condition, the number of YLDs lost per incident case must be multiplied by the number of incident cases.
The UK BOI study (Lyons et al, 2009) was a prospective, longitudinal multi-centre study of 1,517 injury patients attending an Emergency Department (ED) or admitted to hospital in four UK areas: Swansea, Surrey, Bristol and Nottingham. Participants were required to complete a baseline questionnaire and were subsequently followed-up at 1, 4 and 12 months post-injury. Participants were questioned in relation to the impact of injury on their quality of life (QoL), expressed in terms of changes in EQ-5D scores, and their time to recovery, with these responses then used to inform the calculation of the DWs and duration lengths incorporated within the UK BOI study (Lyons et al, 2009). The DWs and duration lengths calculated varied according to the nature of the injury and the body part injured. Substituting these derived figures into the YLD formula defined above, and subsequently multiplying the final results by the incidence of UK injuries allowed UK estimated population level YLDs to be derived. Total YLDs comprise of YLDs associated with the first 12 months post-injury (short-term) and YLDs due to permanent disability that are considered to be of life-long in duration. Within the UK BOI study (Lyons et al, 2009) the proportion of cases to which this latter type of YLD applied was determined by identifying the number of participants in the longitudinal study who were still affected by their injury at the 12 month assessment stage. Annual UK population level YLLs within the UK BOI study (Lyons et al, 2009) were also calculated by multiplying the results from the above YLL formula derived as part of the GBDI study (Murray and Lopez, 1996) by the total number of injury attributed deaths in the UK. Combining the UK population level YLDs and YLLs together then made it possible for the number of UK population level DALYs to be estimated.

Choice of DWs - INTEGRIS

For ease of use and consistency across Europe the DWs and duration lengths applicable to the EUROCOST 39 (Lyons et al, 2006) (Table 6.1) injury groupings have been used as an example in this manual. Specifically, the EUROCOST DWs and duration lengths derived as part of the EU funded INTEGRIS project have been used. Alternative DWs and duration lengths can be used if desired. In Tables 6.2 and 6.3 DWs from the original GBDI (Murray and Lopez, 1996) and Haagsma et al (2008) studies are shown for reference.

Table 6.1 DWs, proportion lifelong injured and duration lengths applicable to the EUROCOST 39 injury groupings

Injury group	Disability weight acute phase		Proportion lifelong		Disability weight lifelong consequences
	ED	HDR	ED	HDR	
Concussion	0.015	0.100	4%	21%	0.151
Other skull-brain injury	0.090	0.241	13%	23%	0.323
Open wound head	0.013	0.209	-	-	-
Eye injury	0.002	0.256	0%	0%	-
Fracture facial bones	0.018	0.072	-	-	-
Open wound face	0.013	0.210	-	-	-
Fractures/dislocations/sprain/strain vertebrae/spine	0.133	0.258	-*	0%*	-
Whiplash/neck sprain/distorsion cervical spine	0.073 [§]	[§]	[§]	[§]	[§]
Spinal cord injury	[§]	0.676	[§]	100%	[§]
Internal organ injury	0.103	0.103	-	-	-
Fracture rib/sternum	0.075	0.225	-	-	-
Fracture of clavicula/scapula	0.066	0.222	2%	9%	0.121
Fracture of upper arm	0.115	0.230	17%	10%	0.147
Fracture of elbow/forearm	0.031	0.145	0%	8%	0.074
Fracture wrist	0.069	0.143	0%	18%	0.215
Fracture hand/fingers	0.016	0.067	0%	0%	0.022
Dislocation/sprain/strain shoulder/elbow	0.084	0.169	0%	18%	0.136
Dislocation/sprain/strain wrist/hand/fingers	0.027	0.029	0%	0%*	-
Injury of nerves of upper extremity	[§]	[§]	[§]	0%*	-
Complex soft tissue injury of upper extremity	0.081	0.190	3%	15%	0.166
Fracture of pelvis	0.168	0.247	30%	29%	0.182
Fracture of hip	0.136	0.423	14%	52%	0.172
Fracture of femur shaft	0.129	0.280	46%*	35%	0.169
Fracture of knee/lower leg	0.049	0.289	23%	34%	0.275
Fracture ankle	0.096	0.203	12%	35%	0.248
Fracture of foot/toes	0.014	0.174	8%	39%	0.259
Dislocation/sprain/strain knee	0.109	0.159	8%	0%*	0.103
Dislocation/sprain/strain ankle/foot	0.026	0.151	4%	26%	0.125
Dislocation/sprain/strain hip	0.072	0.309	23%	30%	0.128
Nerve injury lower extremity	[§]	[§]	0%	0%*	-
Complex soft tissue injury lower extremity	0.093	0.150	10%	13%	0.080
Superficial injury (incl. contusions)	0.006	0.150	-	-	-
Open wound	0.013	0.093	-	-	-
Burns	0.055	0.191	0%	0%	-
Poisoning	0.245	0.245	0%	0%	-
Multi trauma	[§]	[§]	[§]	[§]	[§]
Foreign body	0.044	0.060	-	-	-
No injury after examination	-	-	-	-	-
Other and unspecified injury	0.111	0.212	-	-	-

Disability weight: 0 = full health, 1 = worst possible health state.

[±] cases from Emergency Department (ED) based injury surveillance systems and Hospital Discharge Registers (HDR)

* based on small number of cases (n<10)

[§] For these injury categories, EQ-5D data was missing or very limited (n<10)

A number of injury categories do not cause lifelong disability, for instance open wound. This is indicated with –. 0% indicates that none of the cases fulfilled the criterion for lifelong injury. Please note that the injury group burns will

only include patients with relatively mild burn injuries. Patients with severe burn injuries will be treated at specialized burn units for which data are missing.

Table 6.2 DWs and duration lengths from the GBDI (Murray and Lopez, 1996) study

Code Nature of injury	Age Group	Disability weight	Duration (years)
		Treated	Treated
1a Fractured skull: short term (85% of incident cases)	0 - 4	0.431	0.107
	5-14	0.431	0.107
	15-44	0.431	0.107
	45-59	0.431	0.107
	60+	0.431	0.107
1b Fractured skull: life long (15% of incident cases)	0 - 4	0.350	LL
	5-14	0.350	LL
	15-44	0.350	LL
	45-59	0.350	LL
	60+	0.404	LL
2 Fractured face	0 - 4	0.223	0.118
	5-14	0.223	0.118
	15-44	0.223	0.118
	45-59	0.223	0.118
	60+	0.223	0.118
3 Fractured vertebral column: short term	0 - 4	0.226	0.140
	5-14	0.226	0.140
	15-44	0.226	0.140
	45-59	0.226	0.140
	60+	0.226	0.140
4 Inured spinal cord: life long	0 - 4	0.725	LL
	5-14	0.725	LL
	15-44	0.725	LL
	45-59	0.725	LL
	60+	0.725	LL
5 Fractured rib or sternum: short term	0 - 4	0.199	0.115
	5-14	0.199	0.115
	15-44	0.199	0.115
	45-59	0.199	0.115
	60+	0.199	0.115
6. Fractured pelvis: short term	0 - 4	0.247	0.126
	5-14	0.247	0.126
	15-44	0.247	0.126
	45-59	0.247	0.126
	60+	0.247	0.126
7 Fractured clavicle, scapula, or humerus: short term	0 - 4	0.153	0.112
	5-14	0.153	0.112
	15-44	0.136	0.112
	45-59	0.136	0.112
	60+	0.136	0.112
8 Fractured radius or ulna: short term	0 - 4	0.180	0.112
	5-14	0.180	0.112
	15-44	0.180	0.112
	45-59	0.180	0.112
	60+	0.180	0.112

Code Nature of injury	Age Group	Disability weight	Duration (years)
		Treated	Treated
9 Fractured hand bones	0 - 4	0.100	0.070
	5-14	0.100	0.070
	15-44	0.100	0.070
	45-59	0.100	0.070
	60+	0.100	0.070
10a Fractured femur:	0 - 4	0.372	0.139
short term	5-14	0.372	0.139
(95% of treated)	15-44	0.372	0.139
	45-59	0.372	0.139
	60+	0.372	0.139
10b Fractured femur:	0 - 4	0.272	LL
life long	5-14	0.272	LL
(5% of treated)	15-44	0.272	LL
(50% untreated)	45-59	0.272	LL
	60+	0.272	LL
11 Fractured patella, tibia	0 - 4	0.271	0.090
or fibula:	5-14	0.271	0.090
short term	15-44	0.271	0.090
	45-59	0.271	0.090
	60+	0.271	0.090
12 Fractured ankle: short term	0 - 4	0.196	0.096
	5-14	0.196	0.096
	15-44	0.196	0.096
	45-59	0.196	0.096
	60+	0.196	0.096
13 Fractured bones in foot:	0 - 4	0.077	0.073
short term	5-14	0.077	0.073
	15-44	0.077	0.073
	45-59	0.077	0.073
	60+	0.077	0.073
14 Other dislocation	0 - 4	0.000	
	5-14	0.000	
	15-44	0.000	
	45-59	0.000	
	60+	0.000	
15 Dislocated shoulder,	0 - 4	0.074	0.035
elbow or hip:	5-14	0.074	0.035
short term	15-44	0.074	0.035
	45-59	0.074	0.035
	60+	0.074	0.035
16 Sprains	0 - 4	0.064	0.038
	5-14	0.064	0.038
	15-44	0.064	0.038
	45-59	0.064	0.038
	60+	0.064	0.038
17a Intracranial injury:	0 - 4	0.359	0.067
short term	5-14	0.359	0.067
	15-44	0.359	0.067
	45-59	0.359	0.067
	60+	0.359	0.067

Code Nature of injury	Age Group	Disability weight	Duration (years)
		Treated	Treated
17b Intracranial injury: life long (5% of incident cases)	0 - 4	0.350	LL
	5-14	0.350	LL
	15-44	0.350	LL
	45-59	0.350	LL
	60+	0.404	LL
18 Internal injuries: short term	0 - 4	0.208	0.042
	5-14	0.208	0.042
	15-44	0.208	0.042
	45-59	0.208	0.042
	60+	0.208	0.042
19 Open wound	0 - 4	0.108	0.024
	5-14	0.108	0.024
	15-44	0.108	0.024
	45-59	0.108	0.024
	60+	0.108	0.024
20 Injury to eyes: life long	0 - 4	0.301	LL
	5-14	0.300	LL
	15-44	0.298	LL
	45-59	0.298	LL
	60+	0.298	LL
21 Amputated thumb: life long	0 - 4	0.165	LL
	5-14	0.165	LL
	15-44	0.165	LL
	45-59	0.165	LL
	60+	0.165	LL
22 Amputated finger: life long	0 - 4	0.102	LL
	5-14	0.102	LL
	15-44	0.102	LL
	45-59	0.102	LL
	60+	0.102	LL
23 Amputated arm: life long	0 - 4	0.257	LL
	5-14	0.257	LL
	15-44	0.257	LL
	45-59	0.257	LL
	60+	0.257	LL
24. Amputated toe: life long	0 - 4	0.102	LL
	5-14	0.102	LL
	15-44	0.102	LL
	45-59	0.102	LL
	60+	0.102	LL
25 Amputated foot: life long	0 - 4	0.300	LL
	5-14	0.300	LL
	15-44	0.300	LL
	45-59	0.300	LL
	60+	0.300	LL
26 Amputated leg: life long	0 - 4	0.300	LL
	5-14	0.300	LL
	15-44	0.300	LL
	45-59	0.300	LL
	60+	0.300	LL

Code Nature of injury	Age Group	Disability weight	Duration (years)
		Treated	Treated
27 Crushing:	0 - 4	0.218	0.094
Short term	5-14	0.218	0.094
	15-44	0.218	0.094
	45-59	0.218	0.094
	60+	0.218	0.094
28a Burns <20%:	0 - 4	0.158	0.083
Short term	5-14	0.158	0.083
	15-44	0.158	0.083
	45-59	0.158	0.083
	60+	0.158	0.083
28b Burns <20%:	0 - 4	0.001	LL
Life long	5-14	0.001	LL
(100% incident cases)	15-44	0.001	LL
	45-59	0.001	LL
	60+	0.001	LL
29a Burns >20% and <60%:	0 - 4	0.441	0.279
Short term	5-14	0.441	0.279
	15-44	0.441	0.279
	45-59	0.441	0.279
	60+	0.441	0.279
29b Burns >20% and <60%:	0 - 4	0.255	LL
Life long	5-14	0.255	LL
(100% incident cases)	15-44	0.255	LL
	45-59	0.255	LL
	60+	0.255	LL
30a Burns >60% :	0 - 4	0.441	0.279
Short term	5-14	0.441	0.279
	15-44	0.441	0.279
	45-59	0.441	0.279
	60+	0.441	0.279
30b Burns >60%:	0 - 4	0.255	LL
Life long	5-14	0.255	LL
(100% incident cases)	15-44	0.255	LL
	45-59	0.255	LL
	60+	0.255	LL
31 Injured nerves:	0 - 4	0.064	LL
Life long	5-14	0.064	LL
(100% incident cases)	15-44	0.064	LL
	45-59	0.064	LL
	60+	0.064	LL
32 Poisoning	0 - 4	0.611	0.008
Short term	5-14	0.611	0.008
	15-44	0.608	0.008
	45-59	0.608	0.008
	60+	0.608	0.008

* LL: Life long. Duration depends on age, sex and region. In some cases individuals have a heightened average risk of death, which has been included in the calculation of average duration used in the final calculation of Years Lived and disability from these conditions.

Note: In many cases, the duration and severity of disability from a nature of injury category is the same for treated and untreated individuals that survive, although in those cases, the initial case-fatality rate may be different. [Note: all burns are assumed to have both short and long term consequences]

Table 6.3 DWs from the Haagsma et al (2008) study, including visual analogue scale (VAS) and time trade-off (TTO) values

Injury states	Number	VAS		TTO		DW
		Mean	Median	Mean	Median	
Head injury						
Concussion	142	0.20	0.20	0.01	0.01	0.020
Moderate brain injury	43	0.55	0.55	0.27	0.15	0.193
Severe brain injury, acute	46	0.80	0.85	0.33	0.25	0.540
Severe brain injury, stable	44	0.74	0.75	0.35	0.29	0.429
Corneal abrasion	44	0.07	0.05	<0.01	0	0.004
Fracture of nose	43	0.13	0.10	0.01	<0.01	0.009
Fracture of jaw	46	0.27	0.26	0.03	0.02	0.038
Back injury						
Fracture of vertebrae	43	0.54	0.53	0.21	0.13	0.186
Back sprain	46	0.27	0.25	0.04	0.01	0.039
Whiplash	44	0.33	0.32	0.07	0.04	0.056
Paraplegia, acute	142	0.82	0.82	0.50	0.44	0.563
Paraplegia, stable	43	0.86	0.86	0.63	0.54	0.656
Quadriplegia, acute	46	0.89	0.90	0.51	0.50	0.713
Quadriplegia, stable	44	0.89	0.90	0.64	0.75	0.719
Injury of thorax						
Fracture of rib	43	0.29	0.27	0.04	0.04	0.045
Injury of upper extremity						
Fracture of clavicle	142	0.28	0.28	0.05	0.03	0.041
Fracture of upper arm	44	0.27	0.30	0.06	0.04	0.039
Fracture of forearm	47	0.25	0.25	0.03	0.05	0.062
Fracture of wrist	43	0.30	0.29	0.05	0.03	0.049
Fracture of finger	142	0.16	0.15	0.03	0.01	0.014
Dislocation of shoulder	46	0.29	0.27	0.04	0.02	0.043
Sprain of wrist	45	0.23	0.24	0.02	0.01	0.026
Traumatic amputation finger	46	0.41	0.45	0.10	0.05	0.048
Traumatic amputation thumb	43	0.47	0.50	0.20	0.12	0.135
Injury of pelvis						
Fracture of pelvis	43	0.50	0.51	0.15	0.12	0.155
Injury of lower extremity						
Fracture of hip	142	0.46	0.45	0.11	0.08	0.124
Fracture of lower leg	46	0.34	0.32	0.05	0.02	0.063
Fracture of ankle	46	0.34	0.32	0.03	0.02	0.061
Fracture of toe	43	0.18	0.19	0.01	0.01	0.017
Sprain of ankle	43	0.19	0.23	0.03	0.01	0.018
Dislocation of hip	44	0.39	0.40	0.07	0.05	0.083
Traumatic amputation toe	46	0.44	0.44	0.07	0.04	0.111

Injury states	Number	VAS		TTO		DW
		Mean	Median	Mean	Median	
External injury						
Superficial injury	142	0.09	0.06	0.01	0	0.005
Open wound	46	0.14	0.10	0.01	<0.01	0.011
Small burn	44	0.12	0.10	0.01	0.01	0.008
Large burn, acute	43	0.69	0.71	0.42	0.36	0.357
Large burn, stable	44	0.60	0.60	0.46	0.46	0.248
Large burn, incl. face, acute	46	0.73	0.75	0.39	0.13	0.420
Large burn, incl. face, stable	43	0.77	0.77	0.51	0.46	0.479
Polytrauma						
Multiple injury, excl. brain, acute	46	0.65	0.69	0.27	0.15	0.304
Multiple injury, excl. brain, stable	44	0.49	0.45	0.23	0.12	0.145
Multiple injury, incl. brain, acute	43	0.78	0.80	0.47	0.40	0.487
Multiple injury, incl. brain, stable	45	0.76	0.80	0.29	0.23	0.461

Table 6.4 Time-weighted annualised DWs from the UK BOI study for the 13-injury group classification by hospitalisation status

Type of injury	Hospitalised	Not hospitalised
Skull, brain injury	0.10	0.007a
Facial fracture, eye injury	0.10	0.007a
Spine, vertebrae injury	0.34	0.08
Internal organ injury	0.10	—
Upper extremity fracture	0.12	0.07
Upper extremity, other injury	0.16	0.04
Hip fracture	0.24	—
Lower extremity fracture	0.24	0.11
Lower extremity, other injury	0.08	0.05
Superficial injury, open wounds	0.07	0.007a
Burns	0.04	0.007a
Poisoning	—	—
Other injuries	0.14	.007a

A common average disability weight was applied to these groups as the weights were all very low and similar and in some cases the numbers very small. No disability weight was calculated for the one case of poisoning.

Instructions for calculating YLDs, YLLs and DALYs

Although DALYs represent a well established measure of the burden of injury that have frequently been used by the WHO for international comparisons relating to the impact of injury within a given country the knowledge and skills necessary to allow DALYs to be calculated is often not available in many countries. Spread sheet templates have been provided in accordance with this report as a means to assist countries in measuring the *YLDs, # 12 on the list* and *YLLs, # 13 on the list*.

The spread sheets provided have the YLD and YLL formulae already incorporated, plus most of the parameter values have already been filled in. This means only a few simple steps need to be completed in order for population level YLDs, YLLs and DALYs to be calculated. These instruction steps are listed in the ReadMe worksheet within each of the templates.

Direct medical costs

Methodology used in UK BOI study to calculate direct medical costs

Within the UK BOI study only the direct medical costs of injury borne by the healthcare sector providing treatment were calculated. Consequently, other types of direct non-medical costs, such as spending on home adaptations and vocational/educational rehabilitation were not accounted for. Neither were medical/non-medical costs incurred specifically by the injured individual, or the losses to society arising from reduced productivity, for example. The UK BOI study adopted the incidence approach to calculating costs, utilising routine injury incident data to focus on the resource implications specific to the ED, inpatient and outpatient sectors in England and Wales. Extrapolation methods were then used to arrive at cost estimates applicable to the whole of the UK.

Instructions for calculating direct medical costs

Direct medical costs are relatively simple to calculate but require access to unit cost data at an individual country level. Direct medical costs can be calculated separately for the ED, inpatient and outpatient sectors.

ED direct medical costs

Direct medical costs within the ED sector can be calculated by multiplying the number of ED attendances observed in the hospitals/time period of interest by the average unit cost of an ED attendance in that country. For example, if 2,400 ED attendances are observed at an average unit ED attendance cost of £100 then the direct medical ED costs would be 2,400 x £100 = £240,000.
When the average unit ED attendance cost is not readily available this can be derived by dividing the total ED expenditure in a country by the total number of ED attendances in that country. For example, if the total ED expenditure in a country is £900,000 and the total number of ED attendances is 9000 then the average unit ED attendance cost would be £900,000 / 9000 = £100.

Inpatient direct medical costs

There are two possible ways of calculating direct medical costs within the inpatient sector:

- Method 1

Method 1 simply involves multiplying the number of inpatient bed-days observed in the hospitals/time period of interest by the average unit cost of an inpatient bed-day in that country. For example, if 30,000 bed-days are observed at an average unit bed-day cost of £50 then the direct medical inpatient costs would be 30,000 x £50 = £1,500,000.

When the average unit bed-day cost is not readily available this can be derived by dividing the total inpatient expenditure in a country by the total number of inpatient bed-days in that country. For example, if the total inpatient expenditure in a country is £5,600,000 and the total number of inpatient bed-days is 112,000 then the average unit bed-day cost would be £5,600,000 / 112,000 = £50.

- Method 2:

Method 2 is a more complicated process and requires access to average unit bed-day costs at a specialty level. In this instance the numbers of inpatient bed-days observed in the hospitals/time period of interest are separated into groups based on the main specialty of treatment associated with those days as an inpatient. Each group of bed-days can then be multiplied by the average unit bed-day cost applicable to that specialty. For example, assume the 30,000 bed-days that are observed in total can be separated into 20,000 bed-days treated under a “trauma and orthopaedic” specialty and 10,000 bed-days treated under a “plastic surgery” specialty. Based on an average “trauma and orthopaedic” unit bed-day cost of £40 and an average “plastic surgery” unit bed-day cost of £75 then the direct medical inpatient cost associated with treatment assigned a “trauma and orthopaedics” specialty would be 20,000 x £40 = £800,000, whilst the direct medical inpatient cost associated with treatment assigned a

“plastic surgery” specialty would be 10,000 x £75 = £750,000. Altogether therefore the total direct medical inpatient cost would be £800,000 + £750,000 = £1,550,000.

When the average unit bed-day cost per specialty is not readily available this can be derived by dividing the total inpatient expenditure in a country related to a particular specialty by the total number of inpatient bed-days in that country relating to that specialty. For example, if the total inpatient expenditure in a country associated with a “trauma and orthopaedics” specialty is £4,000,000 and the total number of inpatient bed-days associated with a “trauma and orthopaedics” specialty is 100,000 then the average unit bed-day cost would be £4,000,000 / 100,000 = £40.

It is apparent from the above examples that Methods 1 and 2 result in different direct medical inpatient costs. This is because Method 2 allows for varying average unit bed-day costs across different specialties of treatment. Consequently, since the average unit bed-day cost associated with the “plastic surgery” specialty of £75 is much higher than the average unit bed-day cost of £50, which is derived across all types of specialty, the total direct medical inpatient cost that results following adoption of Method 2 is higher than that applicable to Method 1. Hence, Method 2 allows for greater accuracy in the cost estimates but is more difficult to implement given it relies on knowing the unit bed-day cost associated with different inpatient specialties of treatment.

Outpatient direct medical costs
There are two possible ways of calculating direct medical costs within the outpatient sector:

- Method 1:
Method 1 simply involves multiplying the number of outpatient contacts observed in the hospitals/time period of interest by the average unit cost of an outpatient contact in that country. For example, if 16,000 outpatient contacts are observed at an average outpatient contact cost of £30 then the direct medical outpatient costs would be 16,000 x £30 = £480,000.
When the average unit outpatient contact cost is not readily available this can be derived by dividing the total outpatient expenditure in a country by the total number of outpatient contacts in that country. For example, if the total outpatient expenditure in a country is £3,000,000 and the total number of outpatient contacts is 100,000 then the average unit outpatient contact cost would be £3,000,000 / 100,000 = £30.

- Method 2:
Method 2 is a more complicated process and requires access to average outpatient contact costs at a specialty level. In this instance the numbers of outpatient contacts observed in the hospitals/time period of interest are separated into groups based on the main specialty of treatment associated with that outpatient contact. Each group of outpatient contacts can then be multiplied by the average unit outpatient contact cost applicable to that specialty. For example, assume the 16,000 outpatient contacts that are observed in total can be separated into 10,000 outpatient contacts treated under a “trauma and orthopaedic” specialty and 6,000 outpatient contacts treated under a “plastic surgery” specialty. Based on an average “trauma and orthopaedic” unit outpatient contact cost of £25 and an average “plastic surgery” unit outpatient contact cost of £60 then the direct medical outpatient cost associated with treatment assigned a “trauma and orthopaedics” specialty would be 10,000 x £25 = £250,000, whilst the direct medical outpatient cost associated with treatment assigned a “plastic surgery” specialty would be 6,000 x £60 = £360,000. Altogether therefore the total direct medical outpatient cost would be £250,000 + £360,000 = £610,000.

When the average unit outpatient contact cost per specialty is not readily available this can be derived by dividing the total outpatient expenditure in a country related to a particular specialty by the total number of outpatient contacts in that country relating to that specialty. For example, if the total outpatient expenditure in a country associated with a “trauma and orthopaedics” specialty is £2,500,000 and the total number of outpatient contacts associated with a “trauma and orthopaedics” specialty is 100,000 then the average outpatient contact cost would be £2,500,000 / 100,000 = £25.

It is apparent from the above examples that Methods 1 and 2 result in different direct medical outpatient costs. This is because Method 2 allows for varying average unit outpatient contact costs across different specialties of treatment. Consequently, since the average unit outpatient contact cost associated with the “plastic surgery” specialty of £60 is much higher than the average outpatient contact cost of £30, which is derived across all types of specialty, the total direct medical outpatient cost that results following adoption of Method 2 is higher than that applicable to Method 1. Hence, Method 2 allows for greater accuracy in the cost estimates but is more difficult to implement given it relies on knowing the unit outpatient contact cost associated with different outpatient specialties of treatment.

Chapter 6 references

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7 Dataset comparability and conversion tables

The IDB All Injury dataset, renamed in the JAMIE project as the IDB Full Data Set, is based on two sources. ICECI, the WHO classification for external causes on injuries, is the first source. ICECI in turn is related to the external cause chapter of WHO ICD-10. IDB is a derivative of the ICECI. The second source is the Home and Leisure Accidents V2000 coding manual, related to the NOMESCO classification. So the IDB-FDS classification, and therefore also the IDB-MDS classification, is related to ICD-10, ICECI and NOMESCO.

Although all classifications mentioned have common data elements and codes, there are also many differences between the classifications: differences in data elements, differences in the level of detail of various data elements and differences in codes. This means that exact mapping between datasets is impossible to achieve. However, by using conversion tables it is possible to make the datasets comparable to a very large degree. Conversion tables usually consist of conversions from more detailed classifications into less detailed classifications. It is easy to combine several detailed categories into one broader category; it is impossible to divide one broad category into several detailed categories without any additional information.
This Chapter provides conversion tables between the IDB Full Data Set and the IDB Minimum Data Set and between ICD-10 and IDB-MDS.

Conversion needs

During the development of the IDB European countries started to participate and to deliver IDB data, but not all countries changed their original injury surveillance system in order to do so. In some countries e.g. the Netherlands and Denmark, injury surveillance systems existed before the IDB started. These countries did not change their system and classification used, but they are able to convert their data into IDB-FDS data. Denmark uses a NOMESCO-classification and converts the national dataset into IDB-FDS. The Netherlands uses a national classification related to ICD-10 and ICECI and also converts their national dataset into IDB-FDS. France only collects home and leisure accident data. So France can only partly convert their national dataset into the IDB-FDS. Other countries, e.g. Latvia, use ICD-10 for their injury surveillance system. These countries also have to convert their national data set into the IDB-FDS. This shows the need for conversion tables between the various classifications in order to get comparable IDB-FDS and IDB-MDS.

Countries that are starting to set up an injury data collection system will be encouraged to use the IDB-FDS Data Dictionaryl and to ensure that their national dataset is in full compliance with the IDB-FDS. During the JAMIE project countries also have to start collecting data for the IDB Minimum Data Set. Some of the countries with a good quality IDB system do not need to collect separate IDB-MDS data, if their sample is large enough for making reliable national estimates. If needed, their IDB-FDS can be converted into an IDB-MDS. Other countries will collect both IDB-MDS data and IDB-FDS data. So there will be different scenarios in place in different reporting countries for collecting data and creating the IDB FDS and MDS.

It is beyond the scope of the JAMIE project to provide each country with a country specific conversion table. However, conversion tables from ICECI to IDB, ICD-10 to IDB and NOMESCO to IDB would help countries improve the comparability between the different IDB datasets.

Table 7.1 Different scenario's of data collection for creating IDB-FDS and IDB-MDS

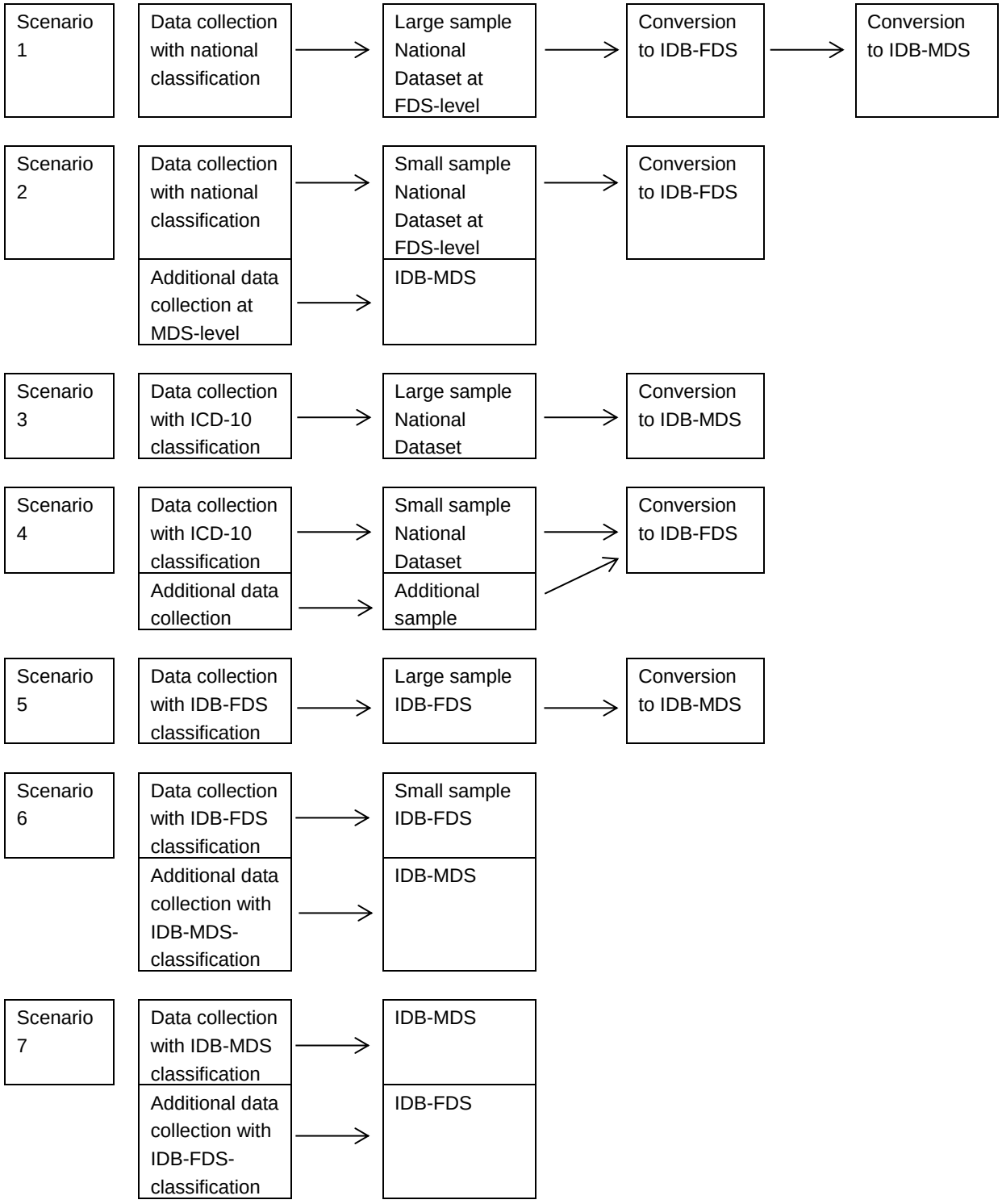


Table 7.1 shows a schematic representation of some of the different approaches. It also shows that conversion from IDB-FDS to IDB-MDS and conversion from ICD-10 to IDB-MDS are two of the most important conversions. In this chapter we provide the tables for these conversions. Separate from this IDB-JAMIE Manual an example of a conversion table from *NOMESCO version 4 to the IDB-FDS* classification.

In order to support the IDB-NDAs a software tool has been also developed for converting *IDB-FDS data into MDS-data*. This tool is based on the conversion tables presented in this Chapter.

IDB FDS-MDS conversion tables

User guide

Converting IDB data from FDS to MDS is quite easy. IDB-FDS consists of 29 data elements, almost all with considerable detailed codes. IDB-MDS consists of 16 data elements with only a few codes each. The detailed codes of the IDB-FDS can be combined into the more aggregated IDB-MDS categories. The conversion tables for each data element show the most detailed level of codes needed. Sometimes a range of codes is included in the table. E.g. code 01.x for data element “selected activities” means all codes ranging from 01.1 to 01.9 and code 01.xx for data element “location” means all codes ranging from 01.10 to 01.99.
For each data element the FDS into MDS conversion Table is shown.

In general it is not possible to convert MDS data into FDS data, because the MDS data does not include enough information. However, the conversion tables from MDS into FDS are included in this chapter in order to show the meaning of the MDS codes as they provide a short overview of the inclusions of the MDS-codes. So for each data element the FDS-MDS conversion table is followed by a table showing the theoretical conversion from MDS into FDS.

1. External cause data elements (aetiology)

1.1 Intent

FDS		**MDS**	
1	Unintentional	1	Accidental (unintentional) injury
2	Intentional self-harm	2	Deliberate (intentional) self-harm
3	Assault	3	Assault related injury
4	Unknown intent	3	Assault related injury
5	Undetermined intent	9	Unknown intent
8	Other specified intent	9	Unknown intent
9	Unspecified intent	9	Unknown intent

MDS		**FDS**	
1	Accidental (unintentional) injury	1	Unintentional
2	Deliberate (intentional) self-harm	2	Intentional self-harm
3	Assault related injury	3	Assault
9	Unknown intent	4	Other violence
		5	Undetermined intent
		8	Other specified intent
		9	Unspecified intent

1.2 Location (setting)

FDS		**MDS**	
01.xx	Home	3	Home
02.xx	Residential institution	8	Other
03.xx	Medical service area	8	Other
04.xx	School, education area	2	Education establishment and area
05.xx	Sports and athletics area	8	Other
06.xx	Transport area: public highway, street or road	1	Road
07.xx	Transport area: other	8	Other
08.xx	Industrial or construction area	8	Other
09.xx	Farm or other place of primary production	8	Other
10.xx	Recreational area, cultural area or public building	8	Other
11.xx	Commercial area (non-recreational)	8	Other
12.xx	Countryside	8	Other
98.98	Other specified place of occurrence	8	Other
99.99	Unspecified place of occurrence	9	Unknown

MDS		**FDS**	
1	Road	06.xx	Transport area: public highway, street or road
2	Educational establishment and area	04.xx	School, educational area
3	Home	01.xx	Home
8	Other	02.xx	Residential institution
		03.xx	Medical service area
		05.xx	Sports and athletics area
		07.xx	Transport area: other
		08.xx	Industrial or construction area
		09.xx	Farm or other place of primary production
		10.xx	Recreational area, cultural area, or public building
		11.xx	Commercial area (non-recreational)
		12.xx	Countryside
		98.98	Other specified place of occurrence
9	Unknown	99.99	Unspecified place of occurrence

1.3 Selected mechanisms

FDS			**MDS**	
Transport injury event=yes **and** Place=Public highway, street, road **and** Object=Land transport vehicle	**Mechanism**		**Selected mechanism**	
	01.2x-99.xx		1	Road traffic injuries
Transport injury event ≠ yes and/or Place ≠ Public highway, street, road and/or Object ≠ Land vehicle	01.2x	Contact with object or animal	8	Other
	01.3x	Contact with person	8	Other
	01.4x	Crushing	8	Other
	01.5x	Falling, stumbling, jumping, pushed	2	Fall
	01.6	Abrading, rubbing	8	Other
	01.8	Other specified contact with blunt force	8	Other
	01.9	Unspecified contact with blunt force	8	Other
	02.xx	Piercing/penetrating force	3	Cut/pierce
	03.x	Other mechanical force	8	Other
	04.11, 04.12, 04.13, 04.14	Contact with hot liquid, hot steam, other gas, hot object or solid substance, fire or flames	5	Burn/scald
	04.15-04.19	Heating other	8	Other
	04.2x	Cooling	8	Other
	04.8	Other specified thermal mechanism	8	Other
	04.9	Unspecified thermal mechanism	8	Other
	05.xx	Threat to breathing	8	Other
	06.1x	Poisoning by chemical or other substance	4	Poisoning
	06.2x	Corrosion by chemical or other substance	5	Burn/scald
	06.8	Other specified effect of exposure to chemical or other substance	8	Other
	06.9	Unspecified effect of exposure to chemical or other substance	8	Other
	07.x	Physical over-exertion	8	Other
	08x	Exposure to (effect of) weather, natural disaster or other force of nature	8	Other
	98.xx	Other specified mechanism of injury	8	Other
	99.xx	Unspecified mechanism of injury	9	Unknown

MDS		FDS	
Selected mechanism		**Mechanism**	
1	Road traffic injuries	Transport injury event on the public highway with land transport vehicle resulting in injury Transport injury event=yes and Place=Public highway, street, road and Object=Land transport vehicle	
2	Fall	01.5x	Falling, stumbling, jumping, pushed
3	Cut/pierce	02.1x	Scratching, cutting, tearing, severing
		02.2x	Puncturing, stabbing
		02.3x	Biting, stinging, invenomating
		02.98	Other specified piercing/penetrating force
		02.99	Unspecified piercing/penetrating force
4	Poisoning	06.1x	Poisoning by chemical or other substance
5	Burn/scald	04.11- 04.14	Contact with hot liquid, hot steam, other gas, hot object or solid substance, fire or flames
		06.2x	Corrosion by chemical or other substance
8	Other	01.2x	Contact with object or animal
		01.3x	Contact with person
		01.4x	Crushing
		01.6x	Abrading, rubbing
		01.98	Other specified contact with blunt force
		01.99	Unspecified contact with blunt force
		03.1x	Struck by explosive blast
		03.2x	Contact with machinery
		03.98	Other specified mechanical force
		03.99	Unspecified mechanical force
		04.15-04.19	Heating other
		04.2x	Cooling
		04.98	Other specified thermal mechanism
		04.99	Unspecified thermal mechanism
		05.1x	Mechanical threat to breathing
		05.2x	Drowning/near drowning
		05.3x	Confinement in oxygen-deficient place
		05.98	Other specified threat to breathing
		05.99	Unspecified threat to breathing
		06.98	Other specified effect of exposure to chemical or other substance
		06.99	Unspecified effect of exposure to chemical or other substance

MDS		FDS	
		07.1x	Acute over-exertion, over-extension
		07.98	Other specified physical over-exertion
		07.99	Unspecified physical over-exertion
		08.1x	Exposure to (effect of) precipitation
		08.2x	Exposure to (effect of) wind
		08.3x	Exposure to (effect of) earth movement or ocean movement
		08.4x	Exposure to (effect of) eruption
		08.98	Exposure to (effect of) other specified weather, natural disaster or other force of nature
		08.99	Exposure to (effect of) unspecified weather, natural disaster or other force of nature
		98.1x	Contact with foreign body
		98.2x	Exposure to electricity, radiation
		98.3x	Exposure to sound, vibration
		98.4x	Exposure to air pressure
		98.50	Exposure to low gravity
		98.6x	Neglect, abandonment, or lack of necessities of life
		98.98	Other specified mechanism of injury
9	Unknown	99.99	Unspecified mechanism of injury

1.4 Selected Activities

FDS		MDS	
01.x	Paid work	1	Paid Work
02.x	Unpaid work	8	Other
03.1	Physical education class, school sports	2	Sports
03.8	Other specified education	8	Other
03.9	Unspecified education	8	Other
04.x	Sports and exercise during leisure time	2	Sports
05.x	Leisure or play	8	Other
06.x	Vital activity	8	Other
07.x	Being taken care of	8	Other
08.x	Travelling not elsewhere classified	8	Other
98.x	Other specified activity	8	Other
99.9	Unspecified activity	9	Unknown

MDS		FDS	
1	Paid work	01.x	Paid Work
2	Sports	03.1	Physical education class, school sports
		04.x	Sports and exercise during leisure time
8	Other	02.x	Unpaid work
		03.8	Other specified education
		03.9	Unspecified education
		05.x	Leisure or play
		06.x	Vital activity
		07.x	Being taken care of
		08.x	Travelling not elsewhere classified
		98.x	Other specified activity
9	Unknown	99.9	Unspecified activity

2. Additional MDS/FDS-data elements

2.1 Age category of patient

FDS	MDS	
000	01	< 1
001-004	02	1-4
005-009	03	5-9
010-014	04	10-14
etc.	05	15-19
080-084	18	80-84
≥085	19	85+
999	99	Unknown

MDS		FDS
01	< 1	000
02	1-4	001-004
03	5-9	005-009
04	10-14	010-014
05	15-19	etc.
18	80-84	080-084

19	85+	≥085
99	Unknown	999

2.2 Gender:

FDS=MDS

2.3 Month of attendance

FDS	**MDS**	
nnnn01nn	01	January
nnnn02nn	02	February
nnnn03nn	03	March
nnnn04nn	04	April
nnnn05nn	05	May
nnnn06nn	06	June
nnnn07nn	07	July
nnnn08nn	08	August
nnnn09nn	09	September
nnnn10nn	10	October
nnnn11nn	11	November
nnnn12nn	12	December
nnnn99nn	99	Unknown

2.4 Year of attendance

FDS	**MDS**
Xxxxnnnn	xxxx
9999nnnn	9999

2.5 Country of permanent residence:

FDS: Recording country = Country of permanent residence; MDS: Country of permanent residence=1
FDS: Recording country ≠ Country of permanent residence; MDS: Country of permanent residence=2
FDS: Recording country = 99; MDS: Country of permanent residence=9
FDS: Country of permanent residence = 99; MDS: Country of permanent residence=9

MDS: Country of permanent residence=1; FDS: Recording country = Country of permanent residence
MDS: Country of permanent residence=2; FDS: Recording country ≠ Country of permanent residence
MDS: Country of permanent residence=9; FDS: Recording country = 99 and/or
FDS: Country of permanent residence = 99

NB. This is not a mandatory code and if not collected should be coded as 9, unknown

2.6 Recording country:

FDS=MDS

2.7 Hospital code:

FDS=MDS

2.8 Unique national record number:

FDS=MDS with leading 0

2.9 Hospital admittance

FDS		**MDS**	
01	Examined and sent home without treatment	2	Not admitted to hospital
02	Sent home after treatment	2	Not admitted to hospital
03	Treated and referred to general practitioner for further treatment	2	Not admitted to hospital
04	Treated and referred for further treatment as an outpatient	2	Not admitted to hospital
05	Treated and admitted to this hospital	1	Admitted to this or another hospital
06	Transferred to another hospital	2	Admitted to this or another hospital
07	Deceased before arrival/deceased at Emergency Department	2	Not admitted to hospital
08	Deceased during hospitalisation	1	Admitted to this or another hospital
98	Other	2	Not admitted to hospital
99	Unknown	9	Unknown

MDS		**FDS**	
1	Admitted to this or another hospital	05	Treated and admitted to this hospital
		06	Transferred to another hospital
		08	Deceased during hospitalisation
2	Not admitted to hospital	01	Examined and sent home without treatment
		02	Sent home after treatment
		03	Treated and referred to general practitioner for further treatment
		04	Treated and referred for further treatment as an outpatient
		07	Deceased before arrival/deceased at Emergency Department
		98	Other
9	Unknown	99	Unknown

2.10 Nature of injury 1,2

FDS		**MDS**	
01	No injury diagnosed	Not a case in IDB-MDS	
02	Contusion, bruise	01	Contusion, bruise
03	Abrasion	02	Open wound and abrasion
04	Open wound	02	Open wound and abrasion
05	Fracture	03	Fracture
06	Luxation, dislocation	04	Dislocation and subluxation
07	Distorsion, sprain	05	Sprain and strain
08	Crushing injury	98	Other
09	Traumatic amputation	98	Other
10	Concussion	06	Concussion/brain injury
11	Other specified brain injury	06	Concussion/brain injury
12	Consequences of foreign body entering through natural orifice	07	Foreign body
13	Suffocation (asphyxia)	98	Other
14	Burns, scalds	08	Burns, scalds
15	Corrosion (chemical)	08	Burns, scalds
16	Electrocution	98	Other
17	Radiation (sunlight, X-rays)	98	Other
18	Frostbite	98	Other
19	Injury to nerves and spinal cord	09	Injury to muscle and tendon, blood vessels and nerves
20	Injury to blood vessels	09	Injury to muscle and tendon, blood vessels and nerves
21	Injury to muscle and tendon	09	Injury to muscle and tendon, blood vessels and nerves
22	Injury to internal organs	10	Injury to internal organs
23	Poisoning	11	Poisoning
97	Multiple injuries	12	Multiple injuries
98	Other specified type of injury	98	Other
99	Unspecified type of injury	99	Unknown

MDS		FDS	
01	Contusion, bruise	02	Contusion, bruise
02	Open wound and abrasion	03	Abrasion
		04	Open wound
03	Fracture	05	Fracture
04	Dislocation and subluxation	06	Luxation, dislocation
05	Sprain and strain	07	Distorsion, sprain
06	Concussion/brain injury	10	Concussion
		11	Other specified brain injury
07	Foreign body	12	Consequences of foreign body entering through natural orifice
08	Burns, scalds	14	Burns, scalds
		15	Corrosion (chemical)
09	Injury to muscle and tendon, blood vessels and nerves	19	Injury to nerves and spinal cord
10	Injury to internal organs	22	Injury to internal organs
11	Poisoning	23	Poisoning
12	Multiple injuries	97	Multiple injuries
98	Other	08	Crushing injury
		09	Traumatic amputation
		13	Suffocation (asphyxia)
		16	Electrocution
		17	Radiation (sunlight, X-rays)
		18	Frostbite
		98	Other specified type of injury
99	Unknown	99	Unspecified type of injury

2.11 Part of the body injured 1,2

FDS		MDS	
1.10	Eye area	03	Eye
1.2x	Face, other and unknown part	02	Face (excl. eye)
1.30	Brain	01	Head/skull
1.40	Skull	01	Head/skull
1.98	Other specified part of the head	01	Head/skull
1.99	Unspecified part of the head	01	Head/skull
2.xx	Neck, throat	04	Neck
3.10	Thoracic spine	05	Thoracic/lumbar spine

3.2x	Organs trunk	08	Internal organs
3.3x	Thorax	06	Chest wall
3.40	Abdomen, lower back, lumbar spine and pelvis	07	Abdominal wall
3.41	Abdomen, external	07	Abdominal wall
3.42	Lower spine (lumbar and sacral)	05	Thoracic/lumbar spine
3.43	Lower back, buttocks	07	Abdominal wall
3.44	Pelvis	09	Pelvis
3.48	Abdomen, other specified	07	Abdominal wall
3.49	Abdomen, unspecified	07	Abdominal wall
3.98	Trunk, other specified	98	Other
3.99	Trunk, unspecified	98	Other
4.10	Collar bone	10	Upper arm/shoulder
4.20	Shoulder	10	Upper arm/shoulder
4.30	Upper arm, humerus	10	Upper arm/shoulder
4.40	Elbow	11	Elbow
4.50	Forearm, lower arm	12	Lower arm
4.60	Wrist	13	Wrist
4.70	Hand, fingers	14	Hand
4.71	Hand	14	Hand
4.72	Fingers	15	Fingers
4.98	Upper extremities, other specified	98	Other
4.99	Upper extremities, unspecified	98	Other
5.10	Hip	16	Hip
5.20	Upper leg, thigh	17	Upper leg
5.30	Knee	18	Knee
5.40	Lower leg	19	Lower leg
5.50	Ankle	20	Ankle
5.60	Foot and toes	21	Foot
5.61	Foot	21	Foot
5.62	Toes	22	Toes
5.98	Lower extremities, other specified	98	Other
5.99	Lower extremities, unspecified	98	Other
7.10	Multiple body parts affected	23	Multiple body parts
7.20	Whole body affected	23	Multiple body parts
9.10	Organs, level not specified	98	Other

9.98	Body part, other specified	98	Other
9.99	Body part, unspecified	99	Unknown

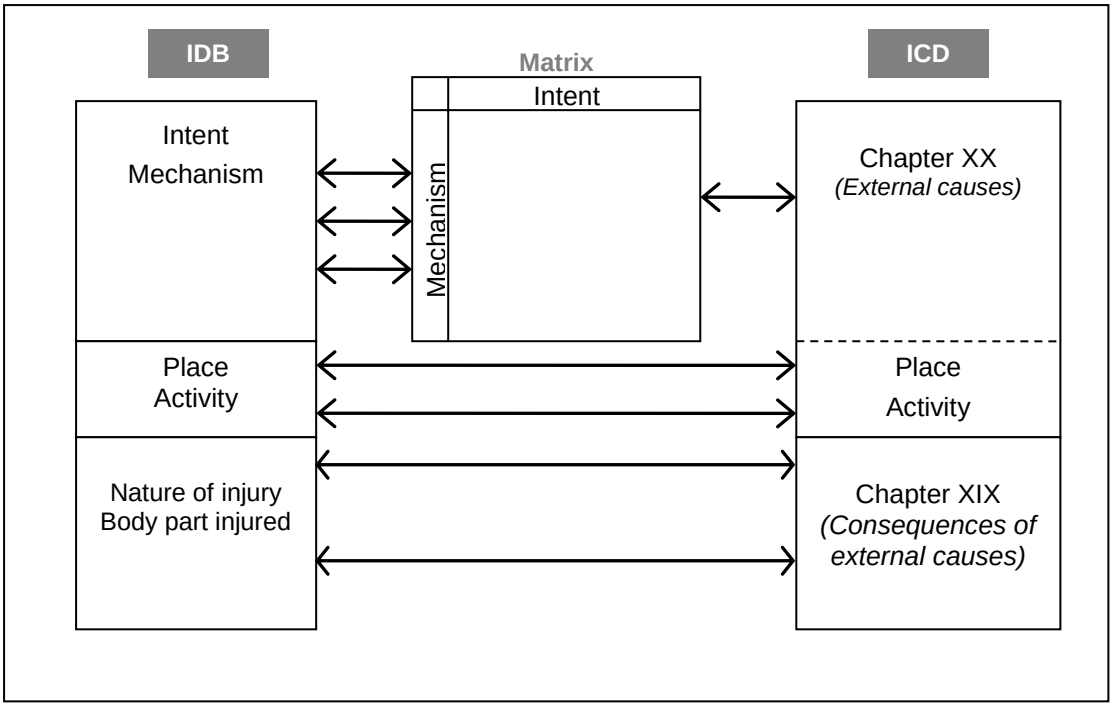
MDS		**FDS**	
01	Head/skull	1.30	Brain
		1.40	Skull
		1.98	Other specified part of the head
		1.99	Unspecified part of the head
02	Face (excl. eye)	1.2x	Face, other and unknown part
03	Eye	1.10	Eye area
04	Neck	2.10	Cervical spine
		2.20	Organs throat
		2.98	Neck, throat, other specified
		2.99	Neck, throat, unspecified
05	Thoracic/lumbar spine	3.10	Thoracic spine
		3.42	Lower spine (lumbar and sacral)
06	Chest wall	3.3x	Thorax
07	Abdominal wall	3.40	Abdomen, lower back, lumbar spine and pelvis
		3.41	Abdomen, external
		3.43	Lower back, buttocks
		3.48	Abdomen, other specified
		3.49	Abdomen, unspecified
08	Internal organs	3.2x	Organs trunk
09	Pelvis	3.44	Pelvis
10	Upper arm/shoulder	4.10	Collar bone
		4.20	Shoulder
		4.30	Upper arm, humerus
11	Elbow	4.40	Elbow
12	Lower arm	4.50	Forearm, lower arm
13	Wrist	4.60	Wrist
14	Hand	4.70	Hand, fingers
		4.71	Hand
15	Fingers	4.72	Fingers
16	Hip	5.10	Hip

MDS		FDS	
17	Upper leg	5.20	Upper leg, thigh
18	Knee	5.30	Knee
19	Lower leg	5.40	Lower leg
20	Ankle	5.50	Ankle
21	Foot	5.60	Foot and toes
		5.60	Foot
22	Toes	5.62	Toes
23	Multiple body parts	7.10	Multiple body parts affected
		7.20	Whole body affected
98	Other	3.98	Trunk, other specified
		3.99	Trunk, unspecified
		4.98	Upper extremities, other specified
		4.99	Upper extremities, unspecified
		5.98	Lower extremities, other specified
		5.99	Lower extremities, unspecified
		9.10	Organs, level not specified
		9.98	Body part, other specified
99	Unknown	9.99	Body part, unspecified

ICD-10 and IDB-MDS conversion tables

ICD, including its external cause classification, is the reference classification for international reporting of mortality. ICECI, as described in chapter 2, is designed to have a role complementary to the ICD-10 external cause classification. Making ICECI comparable with ICD-10 external cause has been difficult: ICD-10 combines information about intent, mechanism, object, place and activity in one data element. ICECI is a multi-axial classification system with different data elements for each of these distinct aspects of information on the external cause. Despite these difficulties, some comparability between both classifications was highly desirable. Because IDB is a derivative of the ICECI, it was decided to use the so-called “injury matrix”, the recommended framework for injury mortality data (McLoughlin et al, 1997; *http://www.cdc.gov/nchs/injury/ice/matrix10.htm*) for bridging between ICD-10 and IDB, as shown schematically in Figure 7.1.

Figure 7.1 Schematic diagram of relationship between IDB and ICD



Users guide

The conversion tables for each data element show the most detailed level of codes needed. Sometimes a range of codes is included in the table. E.G. V01 has a fourth-character subdivision. 0, 1 and 9. V01 in the table includes all subdivisions: V01.0, V01.1 and V01.9. V01 (1, 9) in the table includes only the mentioned subdivisions: V01.1 and V01.9.
For each data element that provides information for the IDB-MDS *the ICD-10 into IDB-MDS* conversion tables are shown.

In ICD-10 a special fourth-character subdivision is available with categories W00-Y34 (except Y06 and Y07) to identify the place of occurrence of the external cause where relevant. There is also a supplementary character position available in ICD-10 with categories V01-Y34 to indicate the activity of the injured person at the time the event occurred.

- Intent (MDS-1.1)

ICD-10		**IDB-MDS**	
V01-X59, Y85, Y86	Unintentional	1	Accidental (unintentional) injury
X60-X84, Y87 (0)	Suicide	2	Deliberate (intentional) self-harm
X85-Y09, Y87 (1)	Homicide	3	Assault related injury
Y35, Y36, Y89 (0,1)	Legal intervention/ war	3	Assault related injury
Y10-Y34, Y87 (2) Y89 (9)	Undetermined	9	Unknown

- Location or setting (MDS-1.2)

ICD-10		**IDB-MDS**	
.4	Street and highway	1	Road
.2*	School, other institution and public administrative area	2 *	Educational establishment and area
.0	Home	3	Home
.1	Residential institution	8	Other
.3**	Sports and athletics area	8 **	Other
.5	Trade and service area	8	Other
.6	Industrial and construction area	8	Other
.7	Farm	8	Other
.8	Other specified places	8	Other
.9	Unspecified place	9	Unknown

*: ICD-10 including Other institution and public administrative area and excluding Sports and athletics area at school;
IDB-MDS excluding Other institution and public administrative area and including Sports and athletics area at school
**: ICD-10 including Sports and athletics area at school; IDB-MDS excluding Sports and athletics area at school

- Selected mechanisms (MDS-1.3)

ICD-10		**IDB-MDS**	
V01-V06 (1, 9), V09 (2,3), V10-V18 (3-9), V19 (4-9), V20-V28 (3-9), V29 (4-9), V30-V39 (4-9) V40-V49 (4-9),V50-V59 (4-9) V60-V69 (4-9), V70-V79 (4-9), V80 (0-8), V81 (1), V82 (1-9), V83-V86 (0-3), V87 (0-9), V89 (2, 3), X82, Y03, Y32	Traffic accidents, assault/intentional self harm/ undetermined intent by crashing motor vehicle,	1	Road traffic injuries
V81 (5-6), W00-W19, X80, Y01, Y30	Fall	2	Fall
W25-W29, W32-W34, W45, W46, X72-X74, X78, X93-X95, X99, Y22-Y24, Y28, Y35.0, Y35.4 *	Cut/pierce	3*	Cut/pierce
X40-X49, X60-X69*, X85, X87-X90*, Y10-Y19**, Y35.2	Poisoning	4**	Poisoning
X00-X19**, X76**, X77, X86, X97**, X98, Y26***, Y27, Y36.3	Fire/Burn	5***	Burn/Scald
W24, W30-W31	Machinery	8	Other
W65-W74, X71, X92, Y21	Drowning/submersion	8	Other
V01-V06 (0), V09 (0,1), V10-V18 (0-2), V19 (0-3), V20-V28 (0-2), V29 (0-3), V30-V39 (0-3), V40-V49 (0-3), V50-V59 (0-3), V60-V69 (0-3), V70-V79 (0-3), V80 (9), V81 (0, 2-4, 7-9), V82 (0), V83-V86 (4-9), V88, V89 (0,1, 9), V90-V99, Y36 (1)	Non-traffic accidents, war operations involving destruction of aircraft.	8	Other
W42, W43, W53-W64, W92-W99, X20-X39****, X51-X57	Natural/environmental	8****	Other
X50	Overexertion	8	Other
W20-W22, W50-W52, X79, Y00, Y04, Y29, Y35 (3)	Struck by, against	8	Other
W75-W84, X70, X91, Y20	Suffocation	8	Other

ICD-10		IDB-MDS	
W23, W35-W41, W44, W49, W85-W91, X58, X75, X81, X83, X96, Y02, Y05-Y08, Y25, Y31, Y33, Y35 (1,5,6), Y36 (0-2, 4-8), Y85,Y86, Y87, Y89 (0,1)	Other specified	8	Other
X59, X84, Y09, Y34, Y35 (7), Y36(9), Y89.9	Unspecified	9	Unknown
Y40-Y84, Y88	Adverse effects	No case	No case

* ICD-10 excluding contact with venomous animal; IDB-MDS including bitten by venomous animal
** ICD-10 including corrosive substances; IDB-MDS excluding corrosive substances
*** ICD-10 including exposure to smoke and excluding corrosive substances; IDB-MDS excluding exposure to smoke and including corrosive substances
**** ICD-10 including contact with venomous animal; IDB-MDS excluding bitten by venomous animal, including exposure to smoke.

Selected activities (MDS-1.4)

ICD-10		IDB-MDS	
2	While working for income	1	Paid work
0	While engaged in sports activity	2	Sports
1	While engaged in leisure activity	8	Other
3	While engaged in other types of work	8	Other
4	While resting, sleeping, eating or engaging in other vital activities	8	Other
8	While engaged in other specified activities	8	Other
9	During unspecified activity	9	Unknown

Nature of injury and body part injured (MDS 2.10-2.11)
The ICECI classification is an external cause classification. However IDB and ICD-10 both contain variables with respect to injury diagnosis.
ICD-10 chapter XIX provides a classification of injuries, poisonings and certain other consequences of external causes (S00-T98). The codes form a combination of nature of injury and body part injured, two variables included separately in IDB-FDS and MDS.
A conversion table is available for converting *ICD-10 Chapter XIX codes, # 6 on the list*, into nature of injury codes and codes for body part injured at IDB-MDS level. This table also includes information for converting ICD-10 into IDB-FDS nature of injury and body part injured.

Chapter 7 References

Vimpani G, Hartley P. National injury surveillance and prevention project: final report. Canberra: Australian Government Publishing Service, 1991.

McLoughlin E, Annest JL, Fingerhut L A et al (1997). Recommended framework for presenting injury mortality data. *MMWR Centers for Disease Control and Prevention*. 46 (no. RR-14): 1N32.

8 IDB exchange and access at EU-level

This Chapter describes the organisation behind the exchange of IDB-data at EU level, the requirements as to the characteristics and quality of data to be delivered by the national partners and the procedures for uploading the data at the European Commission's web site and for accessing the data.

Data flow

The functioning of the European injury data exchange relies currently on the voluntary contributions of partner organisations and networks at national and EU-level, i.e.:

- Selected hospitals, the so-called IDB reference hospitals, which are collecting injury data in their emergency departments in accordance with the IDB-JAMIE standards; alternatively: institution(s) which handle data from hospitals and extract data in accordance with the IDB-JAMIE standards.
- "IDB-National Data Administrator"-organisations (IDB-NDAs) who are coordinating the data collection in a selection of hospitals, or though relevant institutions, and who represent the country in the European IDB network.
- The "IDB Network" which is the European network of IDB data suppliers, i.e. the IDB-NDAs, which supervise data exchange and reporting at EU-level. EuroSafe serves under the JAMIE-contract as coordinating body for the IDB-network, till 31 July 2014.
- The European Commission who hosts the IDB database, i.e. the compilation of national datasets, and who provides access to the data through the *IDB web-gate*.

Table 8.1 presents a model of the flow of data from hospitals to the IDB database, under the assumption that reference hospitals deliver directly to the IDB-NDA, as it is the usual case for FDS-data. If the collection of MDS data is implemented on a legal basis, the data flow might be different, e.g. when hospitals delivering data first to another institution such as the central health insurance fund which than supplies data to the IDB-NDA.

The hospitals participating in the data exchange (actually their patients) remain the principle owner of the data they collect and provide. However in the contracts concluded with the IDB-NDAs the data suppliers have to grant user rights to the IDB-NDAs for the purpose of public health research and analysis and for injury prevention planning and actions, at national as well as European level. In these contracts, the obligations and rights of both sides (hospitals and national data administrator) need to be clarified as well as data quality aspects, the rights for using the data, data protection issues and possible compensation for data delivery. An example of such a contract between the national organisation responsible for IDB-data administration and individual hospitals can be obtained at the EuroSafe secretariat.

All partners - i.e. the selected hospitals, IDB-NDAs and the Commission services - are expected to bear the costs for their tasks from own resources. As a matter of principle, there is no EU funding for routine collection of data at national level. The JAMIE-budget solely contributes to the development of harmonised procedures and quality criteria, common software tools and joint training seminars as well for data clearing at central level. In addition, it provides small seed-money for the start-up in new countries and for IDB-reporting countries to adapt their procedures to the newly developed standards.

The aim is to upload national IDB data by early September in the year following the actual data collection. The timeline of completing the respective data flow steps in table 8.1 has proven to realistic if IDB-NDAs deal directly with a number of reference hospitals.

Table 8.1 Schematic data flow

1. Data collection within hospitals

- Patients in Emergency Department and other relevant departments (e.g. children, dental, burn clinics) are being interviewed on the circumstances of injury event by nurses, receptionist or designated IDB staff: data recorded on paper/pencil or in PC.

Result: *Incomplete, personalized data sets*

⬇

- Diagnoses and data on further treatment (e.g. admission, transfer) are added from medical records by doctor, nurse or medical records clerk.

Result: *Complete, personalized data sets*

⬇

- If paper forms: transfer into electronic files. First check for completeness, content related errors, coding errors, duplication of cases. Personal identifier (birth date etc.) are removed by designated IDB staff.

Result: *Complete, anonymised data sets*

⬇

- Regularly (daily or weekly) transfer of the latest records to National Data Administrator.

Result: *All data of a complete year available in the NDA's office by the end of March in the year following the first patient contact.*

2. Data processing at national level

- Second check for completeness, formal errors, systematic coding errors, biases of hospital samples – for all data sets from all hospitals.

Result: *Complete, cleared national data file for previous year for use at national level by end of April of the year following data collection.*

⬇

- Preparation of data transfer to the EU database: Complete the "National IDB File Information Forms" for MDS and/or FDS (including simple analyses of data in order to establish basic parameters of the sample (percentage of admissions in the sample, percentage of "unknown") and producing the reference population data file (cases by age and gender) for the calculation of injury rates.

Result: *Complete "National IDB File Information Forms", reference population data file, list of FDS reference hospitals*

⬇

- Transfer of data sets, National IDB File Information Forms, Reference Population Data, and list of FDS reference hospitals to IDB Network coordinator

Result: *Complete cleared files uploaded in the test environment of the Network coordinator by the end of May of the year following data collection*

3. Data check by IDB Network coordinator and transfer to DG SANCO

- In the course of June/July third check for completeness, formal errors, systematic coding errors, wrong data format, invalid codes – of all data sets, file information forms, reference population data from all participating countries. Correction of data and information delivered by NDAs finalised by end of July

Result: *By the end of July, the complete cleared file sets for all participating countries, ready for upload (by the EC service in the course of August of the year following data collection), consolidated set of file information forms ("Upload Report"), consolidated list of EU-IDB reference hospitals (FDS-data)*

- Transfer to DG SANCO, A4

Result: *Complete cleared files uploaded in the test environment of DG SANCO (by early August of the year following data collection), compiled file information forms ("Upload Report") and consolidated list of FDS reference hospitals*

4. Check and uploading by DG SANCO A4

- Fourth check of data: Check of format and completeness only (no duplication of checks on contents and quality).

Result: *Complete cleared file sets for all participating countries ready for publication by early September of the year following data collection.*

- Upload to the EU-web gate/ IDB

Result: *From early September onwards, data from the participating countries will be available for public and restricted access on the SANCO web site, including the national file information, the upload report and the list of FDS reference hospitals.*

Key partners in the data flow process

IDB-National Data Administrators (NDAs)

The IDB-NDAs are designated by their competent authority, i.e. the national or regional Ministry of Health. The general responsibility of an IDB-NDA is to manage the IDB monitoring system at national level and to:

- Select and maintain the sample of hospitals in accordance with the requirements for representativeness and to ensure continued commitment from hospitals to collect the required data.
- Ensure that data in hospitals are being collected fully in line with the IDB-JAMIE standards, e.g. by providing training of the concerned hospital staff and resolving coding and processing issues.
- Liaise with relevant national stakeholders, e.g. ministry of health, public health institute, ministry of consumer affairs, national statistical bureau, national agencies for injury prevention, with a view to enhance data use and reporting.

- Collect, check, and – if needed – correct the data delivered by the hospitals for upload in the national database, ensuring data quality and compliance with IDB standards.
- Provide the IDB data timely to the network coordinator for upload into the joint EU injury Data Base IDB.
- Participate actively in the European data exchange and represent the country in the IDB-network.

IDB-JAMIE network

IDB-data exchange at European level is organized through the network of IDB-NDAs which decides on issues such as revision of standards and conditions for the use of data. The rules for such a decision making process are laid down in the "*House rules*" of the network. These house rules define the mission and organization of the Network, conditions for membership, rights and responsibilities of members, and the duties of elected functionaries. The core purpose of the network is to create a joint data pool, to publish aggregated data and to grant each other the use of individual data for analysis and research.

Currently (till July 2014), the European Association for Injury Prevention (EuroSafe) coordinates the network in the framework of the JAMIE-project with the assistance of the IDB-JAMIE Advisory Board. The coordinating body:

- Functions as secretariat of the network and representative towards the Commission services;
- Assists IDB-NDAs in implementing and maintaining comparable national systems;
- Collects and checks data for upload at European level;
- Develops and maintains standards and tools of the system, e.g. the IDB-JAMIE Manual, the Data Dictionaries and software support tools;
- Organises network meetings and training events;
- Promotes the use of the database at European level.

The Advisory Board is currently composed by experts from the Austrian Road Safety Board, Brandenburg's Ministry for Health and Environment, Danish Institute of Public Health, Dutch Consumer Safety Institute, Hungarian Institute for Health Planning, Swansea University, and EuroSafe.

Commission services

The Commission DG SANCO, unit A4 -information systems, is hosting the IDB-JAMIE database and making it publicly accessible through the EU-web gate which publishes also the European Community Health Indicators (ECHI). This service is delivered in the framework of the EU responsibility for public health in general and initiatives "aiming at the establishment of guidelines and indicators, the organisation and exchange of good practice, and the preparation of the necessary elements for periodic monitoring and evaluation" (Lisbon Treaty, Article 168, paragraph 2).

Data collection principles

Inclusion/exclusion criteria

In the framework of the EU-IDB exchange, countries are expected to report accidents/injuries that is *collected at Emergency Departments (EDs)* with around the clock/ seven days a week service within a selection of hospitals. Specialised departments within the selected hospitals, such as paediatric departments, dental departments, ophthalmologic departments and burn units, must be included in the system in order to make sure that all injury patients entering the hospital are covered within the selected hospitals.

As general principle applies that all hospital or emergency department visits shall be included if the reason for attendance is related to an injury and if this is the first treatment in a hospital. A case shall

be registered when the reason is an injury, a suspected injury or the consequence of an injury (e.g. infection of injury related wound), but diseases and complications of medical/surgical care shall be excluded. A case shall be registered, when the patient seeks treatment for the first time in a hospital (ED); therefore a next visit for follow up treatments shall not be recorded as a new case. For inclusion / exclusion of cases see also Chapter 3 and the Data Dictionaries.

Sampling of hospitals

In most countries such data is collected in a sample of EDs, respectively hospitals. For the appropriate sampling procedure see Chapter 4. Generally speaking, the sample size shall not be less than three hospitals for smaller countries and be up to nine for the larger countries (chapter 4; table 4.1). The larger number of hospitals in bigger countries is necessary in order to ensure representativeness of the sample and to compensate for greater diversity of patient populations in larger countries, due to geographical, economic and cultural diversity within countries as well as intra-country diversity in medical consumption and services.

As a general principle, the sample of hospitals needs to be balanced in order to ensure sufficient representativeness, taking into account the most prevalent sources of variation. The sample has to:

- Cover large, middle-size, and small hospitals, e.g. defined by number of beds and/or ED visits;
- Include urban and rural areas and includes residents as well as non-residents (e.g. tourists, migrant workers),
- Include hospitals that cover all relevant disciplines (e.g. ophthalmology, burn unit, dental clinic, paediatric ward), and accessible for all age groups (e.g. hospitals solely specialised in children should be excluded unless balanced by other sources of data).
- Be sufficiently large for deriving incidence rates for important segments of the universe of injuries: inpatients vs. ambulatory treatments, major age groups, major settings (home, school, sport, and other leisure activities, work, road traffic), or accidents vs. violence.

In countries that are organised in a de-centralized structure, health policies and health monitoring duties are often devolved to the regional level, e.g. to the autonomous regions in Spain or the federal states in Germany. For such countries it is hard to create a national system, unless the majority of the regions have taken on board their own regional system for injury monitoring. Therefore, it is accepted that the national IDB is being started up in one or two regions within the federal structure, under the condition that there are clear perspective for a successful roll out to other regions. While the incidence rates generated are actually only valid for the region(s) involved, such rates could be taken as “best guess” for the entire country, as long as no wider geographical coverage is achieved.

Methods of data capture

There is no one single procedure for data capture in hospitals/ EDs, as the most appropriate procedure highly depends on the actual setting and processes within the concerned hospitals or emergency departments. Neither there are detailed rules for how interviews with patients should be conducted or how the provided information gets transferred into electronic data sets,

Usually a two-step procedure is being applied:

- The first step consists of recording the patient’s report on causation and circumstances.
- The diagnoses and follow-up treatment, i.e. the medical report, are often added at a later stage.

Less severe cases can be interviewed in the waiting room, while severely injured patients can be interviewed only at a later stage or by proxy interviews. The data can be recorded by paper & pencil or with the help of a special data entry software, e.g. with drop-down menus on hand-held PCs. There are software tools available for combining injury monitoring with routine hospital administration IT (*INTEGRIS*).

In some cases, when the patient wants to avoid embarrassment, keep away further investigations or by-pass prosecution for suspected gross negligence, the information provided by the patient may be incorrect. In that case, the interviewer should express doubts about the plausibility of the story and ask further questions, but ultimately has to take the report by patient/ proxy at face value.

Confidentiality

As a matter of principle, the patient shall be informed about the purpose of being interviewed and be assured that all information given about the circumstances of the event will be only used in an anonymized form and only for the purposes of public health (social medicine, prevention). Of course, this principle does not overrule eventual legal duties to report cases to the authorities, as in case of suspected abuse, acts of crime, or significant risks for health and safety. Personal identifiers which are necessary for providing medical care (name, birthday, address, social security number) will be removed before data records 'leave the hospital' and are delivered to the IDB-NDA organization. If the IDB-NDA organization is a governmental body and legally entitled to deal with personal health data, it may be exempt from the former rule, but it will only deliver anonymized data to the European data exchange mechanism.

Data formats

Data collected in hospitals need to be coded according to the valid data dictionary. The EU IDB system is able to process the different data formats presented in Table 8.2.

Table 8.2 Which Data Dictionary for which data set and year?

<table>
<tr><td></td><td colspan="7">Data Dictionary to be used</td></tr>
<tr><td>Data set formats</td><td>2008</td><td>2009</td><td>2010</td><td>2011</td><td>2012</td><td>2013</td><td>2014</td></tr>
<tr><td>ISS-HLA (home & leisure accidents</td><td colspan="5">V2000 (August 2002)</td><td colspan="2">Shall be replaced by IDB 1.3 from at least 01.01.2014 onward</td></tr>
<tr><td>IDB-AI-(all injuries / full data set)</td><td colspan="4">IDB-AI 1.1 (June 2005)</td><td colspan="3">IDB-FDS 1.3 (2013)</td></tr>
<tr><td>IDB-AI-MDS (all injuries / minimum data set)</td><td colspan="2">Will not be applied retrospectively before 2010 at EU level</td><td colspan="5">JAMIE 1.1 (2012)</td></tr>
</table>

The ISS-HLA format is the oldest one and has been standardized in 2002 for the former EU injury surveillance system EHLASS, the European Home and Leisure Accident Surveillance System (National Public Health Institute for Denmark & PSYTEL 2002). The EHLAS System was established at the beginning of the Nineties of the past century with a focus on unintentional injuries related to consumer products and services, i.e. home and leisure accidents (HLA). In some countries this monitoring system is still operating in its restricted scope of HLAs, but most countries that collect data in EDs have expanded the scope towards "all injuries" including for instance work related injuries and road traffic injuries.

In the framework of the JAMIE-project it is envisaged to have at least by the year 2014 all countries collecting data according to the current standards in the IDB-Data Dictionaries, i.e. on all injuries and all age groups. Nevertheless, for 2012 and 2013 the ISS-HLA format is still an accepted format, as this format at least allows for the calculation of the ECHI 29b (register based incidence rate of home, leisure and school accidents). There is transcoding specification available (Kuratorium für Verkehrssicherheit & PSYTEL 2010) in order to transcribe ISS-HLA into IDB-FDS. This transcoding is implemented in the DG SANCO IDB database, in order to make the entire existing data universe accessible through the one data retrieval tool.

The IDB-AI format has been standardized in 2005, when the former EHLASS has been streamlined with the International Classification of External Causes of Injuries (ICECI) and expanded to all injuries,

i.e. including all accidental injuries, interpersonal violence and self-harm. A few inconsistencies of the first version V1.1 of the Data Dictionary (Consumer Safety Institute, 2005) has been eliminated in 2013, which led to the current version V1.3 of the IDB Full Data Set (FDS) – Data Dictionary, which shall be implemented in all participating countries from 2014 onwards. Purpose and content of IDB-FDS is also described into detail in Chapter 3.

The Minimum Data Set (see Annex : IDB Minimum Data Set - Data Dictionary) has been introduced in 2012 in order facilitate the collection of large samples for the calculation of incidence rates, in particular ECHI 29b. It is recommended to the EU-MSs to implement the collection of IDB-MDS as a matter of routine in all accident and emergency departments for ambulatory treatments as well as for inpatients. The IDB-MDS can be derived from IDB-FDS, by using the trans-coding specification in chapter 7 and the *Conversion software IDB-FDS to MDS* on the EuroSafe/ Injury data website page. It can be also derived, at least to a large extent, from existing data which are coded according to ICD-10, ICECI, or NOMESCO, under the condition that modules on external causes have been applied. For the respective transcoding specifications see also Chapter 7.

Training and coaching ED staff

It is expected that the hospital staffers who capture the data in hospitals (the "coders") are well trained. The IDB-NDA organization and the hospitals bear the joint responsibility for sufficient qualification of staff and sufficient quality of data. The heavy work load in accident and emergency departments and the limited time for/ interest in administrative work, puts severe pressure on the quality of reporting and completeness of information. Therefore continuous awareness raising and training of medical, nursing and administrative staff in EDs is essential.

The IDB-NDA shall offer regular training events for the involved hospital staff, and explain the importance of proper coding, the coding principles, by performing practical exercises, and explaining the "gold standards". In particular the coding of FDS data, involved products/substances, and the level of product involvement sometimes pose difficulties. For example, see the box "What mean the different levels of product involvement in the FDS".

What mean the different levels of product involvement in the FDS?

Injuries are often the result of a sequence of events. Three types of products/objects/substances may be involved in the injury event:

- Underlying object/substance — the object/substance involved at the start of the injury event
- Direct object/substance — the object/substance producing the actual physical harm
- Intermediate objects/substances — other objects/substances involved in the injury event

The direct and underlying objects/substances may be the same. For example, if a person cuts his or her finger with a knife while preparing food, the knife is involved at the start of the injury event, and it is the object that produces the actual physical harm. Coding object/substance data in these situations is straightforward.

Other situations are more complex. For example, if a woman trips over an appliance cord and hits her head on a counter, the appliance cord is the underlying object, and the counter is the direct object. Some situations are further complicated by several objects producing injuries. In the case of a car crash, there may be an underlying object — for example, the tree that was hit by the car in a collision — and several direct objects, such as the steering wheel, the dashboard, and the windshield. Each of the direct objects may cause different injuries.

In some cases another object/substance plays an intermediate role, i.e. its involvement contributes a crucial amount of risk - for example when the injured person has consumed alcohol or used a mobile phone while driving.

The series of events that occur in the process of an accident do not always happen a clear sequence neither involve objects/substances in clear succession. Proper coding requires a solid instruction and supervision of hospital staff responsible for the coding. And in some cases arbitrary decisions have to be made by the coding team.

The IDB-NDA supervises the data collection and ensures the full coverage of the envisaged scope within hospitals: all age groups, all attendees (inpatients as well as ambulatory treatments, all activities, accidents as well as acts of violence, all days of the week, 24 hours a day). The IDB-NDA shall also check the quality of coding and take corrective actions accordingly.

The hospital coders shall consult the IDB-NDA if there are doubts how to code particular cases. Even for highly experienced coders unusual events may occur, for which the appropriate coding is not self evident. Also the revised FDS-Data Dictionary 1.3 can include inconsistences or shortcomings, which need to be clarified and corrected at a later stage. In addition to this, new high risk products and/ or life styles may pop-up and require new codes. In the long run even the use/meaning of terminology can change.

For solving coding issues and questions, the following procedure has been agreed by the IDB-NDA-Network:

- If a local hospital coder has a question regarding the appropriate coding of specific cases, the coder shall put these questions forward to their IDB-NDA. The IDB-NDA is expected to be trained and familiar with the coding system and will answer as good as possible. If IDB-NDA is not in the position to answer a question or if an inadequacy of the data dictionary is at stake, the IDB-NDA has to put the question forward to the IDB-Coordinator (as "Coding Helpdesk").
- If a problem, raised by a IDB-NDA, can be solved by consulting the IDB Data Dictionaries and the IDB Coding Guide, the Coordinator will answer within one week. If he/she is also not in the position to decide, the Coordinator will consult the IDB Board. Board Members will send their proposed solutions back within two weeks. In the case of contradictory recommendations, the Coordinator will seek consensus.
- When consensus has been reached, the coordinator will notify all IDB-NDAs on the final decision.
- All queries to the Coordinator are being recorded in order to be used as training material in the IDB-NDA training events and or for the revision of the Data Dictionaries.

Data quality checks at record level

There are a number of quality control checks to be performed at hospital level as well as in the process of compiling the national data set:

- First of all, the data records have to be checked and cleared for any duplication of cases, cases which do not belong to the reported year or violate the inclusion criteria (only cases of injury shall be registered).
- Secondly, the percentages of missing and/or unspecified data elements in the data set are an important indicator for the level of accuracy in coding. The indicator "percentage of missing and/or unspecified data elements" shall take into account only the compulsory data elements (and leave out the following: hospital code, second nature of injury, second part of body injured, object/product causing the injury).
- Thirdly the frequency of not valid codes use or inconsistencies between logically dependent values of data elements provides an indication as to the level of accuracy of reporting.
- Finally, checks shall be done on a consistent use of blanks (= not existing, e.g. no product involved, OR not applicable, e.g. for second injury, or no narrative available) and the code 9, 99, or 999 (=missing, not recorded, unspecified, unknown). Zeros are allowed only as digit or *left-hand* 'leading?' zeros (e.g. 000XXX).

How to deal with missing information items

- Records shall contain only valid values according to the actual data dictionary (e.g. Data Dictionary for the Minimum Data Set MDS or the Coding Guide for the Full Data Set FDS)

- If an item is not specified, because no information could be captured for this specific case ("not answered" or "unknown"): insert always 9,99,999,…

- Leave an item blank only, if:
  - it is not mandatory and therefore not specified, i.e. the hospital code or the narrative, or if
  - it is not specified, because it is not applicable in a specific case (e.g. if there is "no product involved" or "no second injury", or "no second part of body injured" or no further modules).

- Add leading zeros to the left, if the actual valid code according to the Data Dictionary is shorter than the field length, e.g. if there is a one-digit code, but the foreseen field length is two-digits: e.g. if the actual FDS code is 2.12, and the field length is nn.nn (Mechanism), insert 02.12; or if the code is 6.0220, and the field length is nn.nnnn (Product/Substance), insert 06.0220.

Detected abnormalities are to be clarified in direct contact with the responsible persons in the hospitals. Inconsistent cases may lead to correction or the elimination of these cases. Systematic deviations from the guidelines shall lead to correction actions of organizational nature, but do not necessarily prevent data from being further processed. It is expected that the IDB-NDA delivers only data which are in line with the current standards.

The minimum requirement of formal quality checks on MDS- and/or FDS-data files are presented in Table 8.3. These checks will be also carried out by the IDB-NDA Network coordinator, who is in charge of controlling all data for a smooth upload at the joint *EU-webgate* . Swansea University, which fulfils this function in the course of the JAMIE project (till 31 July 2014), provides an *IDB data validation tool* . After receiving user-name and password from staff at the Swansea University (S.M.Macey@swansea.ac.uk), a NDA can upload the data and the data validator will then check the files and, if there are any errors, will present a list of these. If there are no errors then the data file will be passed and will be automatically secured and delivered to Swansea University. This tool works for MDS as well as for FDS data.

Table 8.3 Mandatory data quality control checks for IDB-FDSs and IDB-MDSs

	FDS	MDS
A. Essential checks at file level – if not fulfilled, the whole file will be rejected:		
1. Valid file structure (e.g. no delimiters between cases)	**y**	**y**
2. All records with the valid record length	**1-230**	**1-35**
3. Only digits or blanks in fields x-y (e.g. no tabs or letters)	**3-85**	**3-35**
4. Reporting country must exist and be identical for all records	**1-2**	**1-2**
5. Every record has an unique record number (no duplication)	**3-8**	**6-12**

	FDS	MDS
B. Checks at record level – if not fulfilled, the record needs to be corrected or rejected:		
1. All variables have valid values or blank (see data dictionary for each variable)	**y**	**y**
2. Every record has the same valid year of attendance (no missing or unspecified)	**25-28**	**19-22**
3. Every record has a valid hospital code (no missing or unspecified) IF NOT USED: blanks	**229-230**	**3-5**
4. Every record has a valid code for type of injury 1 or for body part 1	**74-75 vs. 78-81**	**24-25 vs. 28-29**
C. Consistency checks at record level – if not fulfilled, the record needs to be corrected or rejected:		
1. Date of injury <= date of attendance	**15-22 <= 25-32**	**n.a.**
2. If Type of injury1=01, body part1 left blank	**74-75 vs. 78-81**	**n.a.**
D. Checks for completeness of variables – percentage of incomplete records (missing and/or unknown) shall checked in order to guide interviewers at hospitals		
1. Age	**9-11**	**13-14**
2. Sex	**12**	**15**
3. Country of residence	**13-14**	**16**
4. Date of injury	**15-22**	**n.a.**
5. Time of injury	**23-24**	**n.a.**
6. Date of attendance	**25-32**	**17-18**
7. Time of attendance	**33-34**	**n.a.**
8. Treatment and follow-up	**35-36**	**23**
9. Intent	**37**	**31**
10. Transport injury event	**38**	**n.a.**
11. Place (location) of occurrence	**39-43**	**33**
12. Mechanism of injury	**44-48**	**34**
13. Activity when injured	**49-52**	**35**
14. Underlying object	**53-59**	**n.a.**
15. Object producing injury	**60-66**	**n.a.**
16. Type of injury 1	**74-75**	**24-25**
17. Type of injury 2	**76-77**	**25-27**
18. Part of body injured 1	**78-81**	**28-29**
19. Part of body injured 2	**82-85**	**30-31**
20. Narrative	**86-205**	**n.a.**
E. Checks for completeness of modules - percentage of incomplete records (missing modules) shall checked in order to guide interviewer at hospitals:		
1. Treatment=05 or 08, but no admission module	**35-36 vs. 206-208**	**n.a.**
2. Intent=3 or 4, but no violence module	**37 vs. 209-212**	**n.a.**
3. Intent=2, but no self-harm module	**37 vs. 213-214**	**n.a.**
4. Transport injury event = 1, but no transport module	**38 vs. 215-223**	**n.a.**
5. Activity=03.1,04.1, 04.8, or 04.9, but no sport module	**49-52 vs. 224-228**	**n.a.**

	FDS	MDS
F. Corrections to be made automatically:		
1. All blank values are set to missing (9, 99, 999) – except for type of injury 2 and part of body2, object/substance, narrative	**y**	**y**
2. Variables with 2+ digits are padded with left-hand leading zeros if needed, e.g. record number “ 123” -> “000123” or month “7_” or ”_7” -> “07”	**y**	**y**
3. If type of injury 1 is missing, but part of body 1 exists, type of injury 1 is set to missing (99)	**74-75 vs.78-81**	**23-24 vs.27-28**
4. If part of body1 is missing, but type of injury1 exists, part of body1 is set to missing (9.99)	**74-75 vs.78-81**	**23-24 vs.27-28**
5. If type of injury 2 is missing, but part of body2 exists, type of injury1 is set to missing (99)	**76-77 vs.82-85**	**25-26 vs. 29-30**
6. If part of body2 is missing, but type of injury2 exists, part of body2 is set to missing (9.99)	**76-77 vs.82-85**	**25-26 vs. 29-30**

Data upload

Annual call for data

Data upload to the EU IDB-database takes place once a year. As long as IDB-JAMIE is not part of the European Statistical System, the Commission services (DG SANCO A4) hosts the EU IDB-database with the assistance of the IDB-NDA Network coordinator for administering the data control and upload. A “Call for data” is sent out usually in the second quarter of the year that follows the year that the data has been actually collected, e.g. in April 2014 for the data of 2013, with a view to publish the data by early September of the following year at the IDB web-gate.

Although many IDB-NDAs would be in the position to deliver the data itself much earlier, it is hardly possible for them to produce incidence rates as in most countries the calculation of incidence rates is based on national health statistics such as the national hospital discharge statistics which have reporting delays of 6-9 months. For some countries it will not be possible to provide their data within that time frame due to administrative reasons, e.g. when hospital data are firstly processed by intermediate institution. Their data will be uploaded as soon as received after the deadline.

The call for data requests the delivery of up to six data files or documents for each year that data is being delivered:

1. File for the Minimum Data Sets, consisting of all cases for one year and one country. These sets are recorded directly in the IDB-MDS format and/or extracted from other registers (e.g. ICD-10) or the sample of FDS. These data are used for the calculation of national estimates.
2. File for the Full Data Sets, consisting of all cases for one year and one country, which are recorded in the format of IDB-FDS. These data are used for detailed analyses of external causes, e.g. involved consumer products, at EU level.
3. The National ‘IDB file information form’ for the MDS-file.
4. The National ‘IDB file information form’ for the FDS-file
5. The national/ reference population data
6. The list of national FDS reference hospitals

If only FDS data have been collected, only the FDS data file and the related FDS file information form have to be provided; if only MDS data have been collected, only the MDS data file and the related

MDS file information form have to be submitted. If FDS as well as MDS data have been collected, both data files and accompanying forms are necessary.

Data sets MDS and FDS

The main purpose of MDS is to provide the basis for estimating incidence rates, therefore the sample of MDS shall be as large as possible. MDS-data may be also derived from other data sets, e.g. from general hospital statistics (e.g. ICD-10 or NOMESCO coded) or the IDB-FDS sample. The data provided needs to be representative for the country (or region within a given country). Preferably the collection of MDS is implemented as a matter of routine in (almost) all hospitals, and FDS are collected on top of this in a sample of IDB reference hospitals.

If MDS information is missing but FDS is collected in a large enough sample of hospitals, all existing FDS-data can be used for extracting the MDS-sample. If the sample of FDS is biased, it is the duty of the NDA to ensure that the sample providing the MDS-data file is representative. The number of MDS cases will always be equal or bigger than the no. of FDS cases. For the illustration of the different scenarios of implementation see table 7.1 in chapter 7.

The data sets shall be provided as txt-files (ASCII) without delimiters between the variables, according to the following data formats (table 8.4 and 8.5).

Table 8.4: Standard IDB data format - Minimum Data Set (IDB-MDS)

Field	Nb char.	Position start	Position end	Format	Type
Recording country *	**2**	1	2	**nn**	Numeric
Provider (hospital) code (optional)	**3**	3	5	**nn**	Numeric
Unique national record number	**7**	6	12	**nnnnnnn**	Numeric
Age category of patient	**2**	13	14	**nn**	Numeric
Sex of patient	**1**	15	15	**n**	Numeric
Permanent country of residence (optional)	**1**	16	16	**n**	Numeric
Month of attendance	**2**	17	18	**nn**	Numeric
Year of attendance	**4**	19	22	**nnnn**	Numeric
Treatment and follow-up	**1**	23	23	**n**	Numeric
Nature of injury 1 (primary injury)	**2**	24	25	**nn**	Numeric
Nature of injury 2 (secondary injury)	**2**	26	27	**nn**	Numeric
Part of the body injured 1 (primary injury)	**2**	28	29	**nn**	Numeric
Part of the body injured 2 (secondary injury)	**2**	30	31	**nn**	Numeric
Intent	**1**	32	32	**n**	Numeric
Location (setting) of occurrence	**1**	33	33	**n**	Numeric
Mechanism of injury	**1**	34	34	**n**	Numeric
Activity when injured	**1**	35	35	**n**	Numeric
Narrative (optional)	**120**	36	155	**120n**	Alphanumeric
Total record length	***155***				

Table 8.5: Standard IDB data format - Full Data Set (IDB-FDS)

Field	Nb char.	Position start	Position end	Format	Type
Recording country	**2**	1	2	**nn**	Numeric
Unique national record number	**6**	3	8	**nnnnnn**	Numeric
Age of patient	**3**	9	11	**nnn**	Numeric
Sex of patient	**1**	12	12	**n**	Numeric
Country of permanent residence	**2**	13	14	**nn**	Numeric
Date of injury	**8**	15	22	**yyyymmdd**	Date
Time of Injury	**2**	23	24	**nn**	Numeric
Date of attendance	**8**	25	32	**yyyymmdd**	Date
Time of attendance	**2**	33	34	**nn**	Numeric
Treatment and follow-up	**2**	35	36	**nn**	Numeric
Intent	**1**	37	37	**n**	Numeric
Transport injury event	**1**	38	38	**n**	Numeric
Place of occurrence	**5**	39	43	**nn.nn**	Numeric
Mechanism of injury	**5**	44	48	**nn.nn**	Numeric
Activity when injured	**4**	49	52	**nn.n**	Numeric
Underlying object/substance producing injury	**7**	53	59	**nn.nnnn**	Numeric
Direct object/substance producing injury	**7**	60	66	**nn.nnnn**	Numeric
Intermediate object/substance producing injury	**7**	67	73	**nn.nnnn**	Numeric
Type 1 of injury	**2**	74	75	**nn**	Numeric
Type 2 of injury	**2**	76	77	**nn**	Numeric
Part 1 of the body injured	**4**	78	81	**n.nn**	Numeric
Part 2 of the body Injured	**4**	82	85	**n.nn**	Numeric
Narrative (optional)	**120**	86	205	**120n**	Alphanumeric
Admission module					
Number of days in hospital	**3**	206	208	**nnn**	Numeric
Violence module					
Relation victim/perpetrator	**1**	209	209	**n**	Numeric
Sex of perpetrator	**1**	210	210	**n**	Numeric
Age of perpetrator	**1**	211	211	**n**	Numeric
Context of assault	**1**	212	212	**n**	Numeric
Intentional self-harm module					
Proximal risk factor	**1**	213	213	**n**	Numeric
Previous intentional self-harm	**1**	214	214	**n**	Numeric
Transport module					

Mode of transport	**4**	215	218	**nn.n**	Numeric
Role of injured person	**1**	219	219	**n**	Numeric
Counterpart	**4**	220	223	**nn.n**	Numeric
Sport module					
Type of sport/exercise activity	**5**	224	228	**nn.nn**	Numeric
Provider (hospital) code (optional)	**2**	229	230	**nn**	Numeric
Total record length	***230***				

National File information forms

Each NDA shall describe into detail the method of hospital sampling and implementation, and provide evidence as to the accuracy of the data provided for upload. Therefore, each data file (= set of all valid cases from one country for one year) needs to be accompanied by metadata, the co-called 'National IDB file information form'. This national IDB file information form contains basic information for the NDA-network coordinator and end users of the data as to the origin, content and quality of the data. The metadata answer the most important questions regarding the data quality according to the principles of the European Statistical System (ESS) and the specifications of this manual. The Tables 8.6 and 8.7 provide the forms for the Minimum Data Set as well as for the Full Data Set.

All national File information forms will be published jointly in the form of an annual "IDB Upload-Report" on the *EU-webgate* . The information in the national file information sheets is also the basis for the IDB Network coordinator to complete the *EuroStat Metadata Structure-document*, which is a EuroStat standardised document providing information required for assessing the quality and the production process of the delivered statistics.

Table 8.6: National IDB File Information Form for delivered MDS data

National IDB File Information - Minimum Data Set			
General information			
1	Country	Max. 25 characters	
2	Year	yyyy	
3	National Register Name	Max. 100 characters	Official name of the register (& eventual abbreviation)
4	Purpose of the register	Max. 250 characters	Describe briefly the purpose of this register and eventual legal background
5	Scope of the register	Max. 250 characters	Max. 250 characters: Describe any systematic deviation from "all injuries, all age groups, all hospital treatments" as e.g. regarding intent (e.g. only accidents), setting (e.g. only home and leisure), age-group (e.g. only children), treatment (e.g. only inpatients)
6	Data file name (MDS)	Max. 100 characters	Exact name of submitted data file for IDB minimum data sets
7	Date of creation of MDS file	yyyymmdd	
8	Range of data of attendance	yyyymmdd – yyyymmdd	Earliest and latest day of attendances (in general, only full years acceptable)
9	Original coding dictionary	Max. 100 characters	Title, version no., year of issue of IDB-MDS data dictionary (e.g. September 2012), translation in national language from…

National IDB File Information - Minimum Data Set			
10	Dictionary modifications	Max. 250 characters	Describe eventual national modifications to the dictionary. Make sure that data is delivered in accordance with the required data dictionary.
11	Bridge coding applied	Max. 250 characters	Exact name of bridge coding table applied in order to produce the IDB data file (e.g. FDS > MDS, ICD10 > MDS, NOMESCO>MDS). If possible, refer to publications
Representativeness of sample			
12	No. of records in the data file	nnnnnnn	
13	No. of MDS reference hospitals	nnn	Number of hospitals (emergency departments) which delivered data for this file
14	Geographic scope	Max. 100 characters	Area, for which the sample is representative: the entire reporting country (preferred option) or selected (e.g. federal) province
15	Hospital characteristics used for a representative sample of hospitals	Max. 250 characters	Describe how hospitals have been selected. List characteristics, which have been considered for the selection, e.g. size of hospitals, particularities of the hospitals, geographic location, etc. Report known biases. If possible, refer to a publication.
16	Sampling of cases within hospitals	Max. 250 characters	If not all cases within hospitals are covered: Describe how representativeness of hospital samples has been ensured; report known biases. If possible, refer to a publication.
17	Percentage of admissions in data file	nn.n%	For the given sample: Ratio of no. of admissions/discharges (in accordance with national definition of 'admission') to all treatments due to injury (inpatients and ambulatory treatments) x 100
18	Relative sample size (admissions)	nn.n%	Ratio of no. of admissions/discharges in the sample to total no. of admissions/discharges due to injuries in the country (or reference area) (if a national hospital discharge statistic is available) x 100
19	Relative sample size (ambulatory treatments)	nn.n%	Ratio of no. of ambulatory treatments to total no. of ambulatory treatments due to injury in reference area (if a national statistic of ED treatments is available) x 100
Formal quality			
20	Minimum Quality Control Checks	y/n	Yes, if the Minimum Quality Control Checks for MDS (according to chapter 8 of the JAMIE-Manual) have been carried out
21	Average percentage of "unknown""	nn.n%	Average ratio of no. of codes 9, 99, 999, etc. in the 16 compulsory data elements "recording county" – "mechanism of injury" (except the not compulsory elements "nature of injury 2", "part of body injured 2")
Incidence rates			
22	Method for extrapolation from sample to national incidence	Max. 250 characters	Three methods are acceptable: 1) Based on national figures of injury cases of hospital admissions (if hospital discharge statistic is available); or 2) Based on national figures of injury cases of ambulatory treatments (if statistic of treatments in emergency department is available); or 3) Based on figures on catchment areas (if neither 1) nor 2) are applicable. If possible, refer to a publication.
23	Reference population data provided	y/n	Reference population data shall be provided in the requested format in order to allow for the calculation of crude incidence rates
Data supplier			
24	(Eventual) additional comments (for the user):	Max. 250 characters	Inform about eventual other particularities with are relevant for data use and interpretation
25	Responsible data administrator (organization)	Max. 250 characters	Name of the organization & department, which is responsible for data delivery (in national language and English); Homepage
26	Contact: Responsible person	Max. 250 characters	Name of the responsible officer Address, telephone eMail address

National IDB File Information - Minimum Data Set			
27	Signature		
28	Date of completion of this file	yyyymmdd	

Table 8.7: National IDB file information form for delivered FDS data

National IDB File Information - IDB Full Data Set			
General information			
1	Country	Max. 25 characters	
2	Year	yyyy	
3	National Register Name	Max. 100 characters	Official name of the register (& eventual abbreviation)
4	Purpose of the register	Max. 250 characters	Describe briefly the purpose of this register and eventual legal background
5	Scope of the register	Max. 250 characters	Describe any systematic deviation from “all injuries, all age groups, all hospital treatments” as e.g. regarding intent (e.g. only accidents), setting (e.g. only home and leisure), age-group (e.g. only children), treatment (e.g. only inpatients)
6	Data file name (FDS)	Max. 100 characters	Exact name of submitted data file for IDB full data sets
7	Date of creation of FDS file	yyyymmdd	
8	Range of data of attendance	yyyymmdd – yyyymmdd	Earliest and latest day of attendances (in general, only full years acceptable)
9	Original coding dictionary	Max. 100 characters	Exact title of the data dictionary used for data entry: e.g. The Injury Database (IDB) Data Dictionary version 1.3 – September 2012 (German version) or Data Dictionary V2000 for Home and Leisure – August 2002 (French Version)
10	Dictionary modifications	Max. 250 characters	Describe eventual national modifications to the dictionary. Make sure that data is delivered in accordance with the required data dictionary.
11	(Eventual) Bridge coding applied	Max. 250 characters	Exact name of any bridge coding table applied in order to produce the IDB data file (e.g. NOMESCO > IDB). If possible, refer to publication.
Quality of the sample			
12	No. of records in the data file	nnnnnnn	
13	No. of FDS reference hospitals	nnn	Number of hospitals (emergency departments) which delivered data for this file
14	Geographic scope	Max. 100 characters	Name of the area, for which the sample should be representative: entire country or specific (federal) province
15	Sampling of hospitals	Max. 250 characters	Describe how sampling of FDS has been done (method of sampling, types of hospital involved etc.); report known biases. If possible, refer to a publication.
16	Sampling of cases within hospitals	Max. 250 characters	If not all cases within hospitals are covered: Describe how sampling within hospitals has been done; report known biases.
17	Data entry method	Max. 250 characters	e.g. “Questionnaire filled out by patients, completed in face to face interviews by nurses, recorded on paper and later copied into electronic form, diagnoses supplemented from hospital records”. If possible, refer to a publication.
18	Percentage of	nn.n%	Ratio of no. of records of inpatients (stay of at least one night) due

National IDB File Information - IDB Full Data Set			
	admissions in data file		to injury to all records of treatments due to injury (inpatients and ambulatory treatments) x 100
19	Minimum Quality Control Checks	y/n	Yes, if the Minimum Quality Control Checks for FDS (according to chapter 8 of the JAMIE-Manual) have been carried out
20	Average percentage of “unknown”	nn.n%	Average ratio of no. of 9, 99, 999 in the compulsory data elements (optional: provider code, nature of injury 2, part of body injured 2, narrative)
Data supplier			
21	(Eventual) additional comments (for the user):	Max. 250 characters	Inform about eventual other particularities with are relevant for data use and interpretation
22	Responsible data administrator (organization)	Max. 250 characters	Name of the organization & department, which is responsible for data delivery (in national language and English); Homepage
23	Contact: Responsible person	Max. 250 characters	Name of the responsible officer Address, telephone Email address
24	Signature		
25	Date of completion of this file	yyyymmdd	

Reference population data for the calculation of incidence rates

The IDB database allows for retrieving data in three ways: in absolute numbers, in crude incidents rates per 100.000 persons of the resident population (adjusted for age and gender) and accordingly projected absolute numbers at national level. The calculation basis for rates and national estimates is the reference population data file, which is provided by the NDAs. The purpose of the reference population data file is to make the calculation of crude incidence rates, corrected for gender and age, possible. The IDB web-gate’s public access application allows for the automatic estimation of incidence rates for various data segments, however selected (e.g. specific age groups, specific activities or location). This application uses only the reference population data, provided by the NDAs and the population statistic as published by EuroStat (“demo_pjan”). The correctness of these estimates therefore is the sole responsibility of the NDAs.

-How to establish the reference population file?-

The calculation of the reference population data is described by the following steps. For details see Minicuci et al. (2008). All steps below need to be carried out for both sexes and for each year of age (2x100 cells).

Step 1. Get IDB counts by gender and age

Extract from the MDS data set (genuine MDS data and converted FDS data) which is considered as a representive national (or regional) sample for all injuries the number of cases for females and males and each year of age, for all cases (admissions and ambulatory treatments).

Step 2. Get IDB counts for admissions

Extract from your entire sample of IDB cases (MDS and FDS; no double counts!) the number of admissions (by age and gender). If the number of admissions is low (eventually even with zeros in some cells), the entire calculation shall be carried out by larger age-groups (e.g. for five years).

Step 3. Get national resident population by gender and age

Extract from the national population statistics the resident population, for which your IDB sample is representative. If your IDB sample covers the entire country, the reference population is equivalent to

the entire national resident population. Preferably use the data published by Eurostat (Population on 1 January by age and sex “demo_pjan”). If your IDB sample is representative only for a certain region or federal province, the population of this region or province is your reference population. Use the best available estimate for the concerned year of your IDB sample. If the population statistics provides only larger age-groups (e.g. of five years), the cells for single years shall be filled in by the accordingly estimated numbers (e.g. fifths).

Step 4. Get national numbers for injury inpatients (or outpatients) by gender and age
Currently, there is no country in the EU with a solid statistic on all injury patients. In most countries there are only statistics for inpatients (admissions or discharges). In this case, extract the numbers of admissions related to injury and poisoning (ICD-10 codes S00-T98). If in your country a statistic on outpatients (ambulatory treatments) exists, extract the numbers from this statistic. In many countries, the hospital statistics get available only with a delay of up to two years. If IDB data shall be published earlier, the NDA may use the average of the three most recent hospital statistics as estimate for the number of inpatients.

Step 5. Establish the estimated sample ratio
Put your IDB counts for admissions into relation to the national numbers of admissions and establish the percentages (sample ratio) for both sexes and each year of age. Take these percentages as best available estimates for all injuries. If in your country a statistic on outpatients (ambulatory treatments) exists, use the percentages for outpatients as best estimates.

Step 6. Establish the extrapolation factor
The extrapolation factor is the multiplier to be applied in order to extrapolate the estimated number of cases in your country (extrapolation factor=1/sample ratio).

Step 7. Establish national estimates for all injury patients
By multiplying the IDB counts by the corresponding extrapolation factor, you get projections for the total number of injury patients (inpatients as well outpatients).

Step 8. Establish estimated crude incidence rates
The crude incidence rates, adjusted for gender and age, are equivalent to the national estimates x 1000, dived by the according national population.

Step 9. Establish the reference population data file
The reference population, adjusted for gender and age, is equivalent to the IDB counts x 1000, dived by the crude incidence rate.

Table 8.8 illustrates the procedure and its intermediate stages. There is a spread-sheet available for the purpose of calculating your own reference population data, which has been kindly provided by the National Institute of Public Health and which can be downloaded from the EuroSafe-homepage: support tool number 8 on project page.

Table 8.8 Extrapolation of the reference population data by age-groups of five years and gender (fictive data)

Age group (90+)	STEP 1			STEP 2			STEP 3			STEP 4			STEP 5			STEP 6			STEP 7			STEP 8			STEP 9		
	IDB cases			Admissions from IDB data			National Population			National injury inpatients			Estimated Sample ratio			Extrapolation factor			National estimates for all injury patients			Estimated crude incidence rates			Reference population		
	Males	Female	Total	Males	Female	Total	Males	Female	Total	Males	Female	Total	Males	Female	Total	Males	Female	Total	Males	Female	Total	Males	Female	Total	Males	Female	Total
0-4	121	118	239	9	10	19	25022	23859	48881	265	176	441	0,03	0,06	0,04	29,45	17,61	23,22	3563,799	2078	5641	142,43	87,08	115,41	850	1355	2205
5-9	182	97	279	11	14	25	23186	21811	44997	194	63	257	0,06	0,22	0,10	17,64	4,50	10,28	3211	437	3647	138,48	20,02	81,06	1314	4845	6159
10-14	183	186	369	12	19	31	24683	23675	48358	159	62	221	0,08	0,31	0,14	13,25	3,26	7,13	2425	607	3033	98,26	25,65	62,71	1862	7253	9115
15-19	1014	435	1449	53	23	76	31808	30383	62191	333	115	448	0,16	0,20	0,17	6,28	5,00	5,90	6373	2176	8549	200,35	71,61	137,46	5061	6074	11135
20-24	1155	604	1759	44	25	69	36471	35362	71833	356	135	491	0,12	0,19	0,14	8,09	5,40	7,12	9348	3263	12611	256,30	92,27	175,55	4506	6546	11052
25-29	1256	483	1739	75	26	101	36847	38312	75159	317	131	448	0,24	0,20	0,23	4,23	5,04	4,44	5310	2434	7745	144,12	63,54	103,04	8715	7601	16316
30-34	907	292	1199	36	17	53	32916	36728	69644	236	95	331	0,15	0,18	0,16	6,56	5,59	6,25	5948	1632	7580	180,69	44,45	108,84	5020	6570	11590
35-39	698	201	899	28	28	56	28228	34008	62236	184	108	292	0,15	0,26	0,19	6,57	3,86	5,22	4588	776	5364	162,54	22,81	86,18	4294	8814	13108
40-44	469	250	719	29	17	46	26656	31440	58096	181	107	288	0,16	0,16	0,16	6,24	6,30	6,26	2928	1574	4502	109,85	50,07	77,50	4270	4933	9263
45-49	370	249	619	17	19	36	27669	30219	57888	152	107	259	0,11	0,18	0,14	8,94	5,63	7,20	3309	1403	4712	119,60	46,42	81,40	3094	5364	8458
50-54	531	178	709	28	28	56	27767	28873	56640	169	150	319	0,17	0,19	0,18	6,04	5,36	5,70	3206	954	4160	115,46	33,04	73,44	4599	5388	9987
55-59	192	297	489	35	37	72	24244	24689	48933	177	133	310	0,20	0,28	0,23	5,06	3,60	4,31	971	1068	2039	40,06	43,26	41,67	4793	6866	11658
60-64	223	146	369	26	26	52	22952	23762	46714	142	147	289	0,18	0,18	0,18	5,46	5,66	5,56	1218	826	2044	53,08	34,75	43,76	4201	4201	8403
65-69	174	145	319	15	25	40	16974	18187	35161	128	162	290	0,12	0,15	0,14	8,54	6,48	7,25	1495	940	2435	87,50	51,68	68,97	1909	2896	4794
70-74	115	134	249	14	54	68	13985	15349	29334	130	203	333	0,11	0,27	0,20	9,29	3,76	4,90	1068	504	1572	76,38	32,83	53,59	1506	4081	5587
75-79	86	83	169	13	13	26	9443	11740	21183	102	223	325	0,13	0,06	0,08	7,85	17,16	12,50	675	1424	2099	71,48	121,32	99,10	1203	684	1887
80-84	137	82	219	22	32	54	5930	8274	14204	112	262	374	0,20	0,12	0,14	5,09	8,19	6,93	698	672	1369	117,65	81,17	96,40	1164	1010	2175
85-89	78	101	179	9	31	40	2955	4448	7403	102	207	309	0,09	0,15	0,13	11,34	6,68	7,73	804	675	1559	299,24	151,68	210,58	261	666	927
90+	39	50	89	10	11	21	1257	1899	3156	49	83	132	0,20	0,13	0,16	4,90	7,55	6,29	191	377	569	152,07	198,74	180,15	256	252	508
Total	7930	4131	12061	406	455	941	418993	443018	862011	3489	2670	6159	0,14	0,17	0,15	7,18	5,87	6,55	56930	24241	81171	136	55	94	58958	85368	144327

Please note that table 8.8 shows for reasons of simplicity only age-groups of five years, but the requested standard format of the reference population data file is in steps of single years. The population file consists of one line for each year of age (e.g. 01-100) with a field length of 16 digits, according to Table 8.9.

Table 8.9 Standard format for the reference population data file (codes for sex and country: see valid Data Dictionary)

Field	Number of positions	Type of data
Country Code	2	Numeric
Sex	1	Numeric
Age (in 1-year age groups)	3	Numeric
Number of persons of reference population	10	Numeric

List of FDS reference hospitals

The collection of FDS data requires well trained and dedicated hospital staff. The participation of hospitals in this data collection imposes a certain specific burden, and in most countries the participation is voluntary and takes place with a view to facilitate effective prevention. Therefore, participation of these hospitals deserves particular appreciation. Names and location (cities) of these European reference hospitals are published on the EU-IDB web gate.

Rules for presenting national estimates and grouping injury settings

National estimates

An important feature is the provision of national estimates and incidence rates. Major shortcomings of the provided data, which limit substantially the comparability of incidence rates will be highlighted when selecting certain countries and years**.** For example for the year 2010, the data-sets for the countries shown in Table 8.10 will be provided with “warning flags” in order to avoid misunderstandings and over-interpretation of differences of rates and/or their accuracy.

Table 8.10: “Warning flags” on crucial limitations of national incidence rates (examples for 2010)

Cyprus	2010	Sample size is below recommended minimum number; estimates can be inaccurate.
Czech Republic	2010	Sample contains only admissions of children (0-18a); estimates are only comparable for admissions of children and adolescents (0-18a).
Germany	2010	Sample is representative only for federal state of Brandenburg; estimates are only valid for the federal state of Brandenburg. Sample size is below recommended minimum number; estimates can be inaccurate.
Italy	2010	Sample contains only home accidents; estimates are only comparable for home accidents.
Latvia	2010	Sample biased toward admissions: estimates are only comparable for admissions.
Malta	2010	Sample size is below recommended minimum number; estimates can be inaccurate.
Portugal	2010	Sample contains only home & leisure accidents; estimates are only comparable for home & leisure accidents.
Slovenia	2010	Sample contains almost only admissions; estimates are comparable for admissions only.

Grouping injury settings

Frequently a distinction is made between major “settings of injuries” in order to roughly quantify the burden of injury for which certain policy sectors bear the responsibility (“domains of injury prevention”): e.g. road traffic accidents “belonging” mainly to the transport sector, work place accidents to the labour sector, interpersonal violence to justice and crime prevention, school accidents to education, sport injuries to sport, and other injuries (as child, home, & leisure accidents) as well as self-harm to the public health sector.

Often accidents (unintentional injuries) are divided into road traffic injuries (RTI), work place accidents and the rest – “home, leisure, sport, and school accidents”. This approach is also reflected also in the series of ECHI indicators: ECHI 29 “Home, leisure and school accidents” (HLA), ECHI 30 “Traffic accidents”, and ECHI 31 “Workplace Accidents”.

- **HLA, RTI et cetera**

In reports, such as the series of IDB-reports “Injuries in the EU”, and other data presentations the following “subtractive” definitions are being applied in order to distinguish the seven sectors road traffic, work, assault, suicide/self-harm, school, sport, home and leisure:

I. For on non-fatal injuries based on JAMIE-MDS data the following selection filters apply:

1. Total: All valid cases
2. Road traffic: Intent = 1 (accident) & Mechanism = 1 (road traffic injury)
3. Work place: Intent = 1 (accident) & Activity = 1 (paid work)
4. Assault: Intent = 3 (assault)
5. Self-harm: Intent = 2 (deliberate self-harm)
6. School: Intent = 1 (accident) & Location = 2 (educational establishment)
7. Sport: Intent = 1 (accident) & Activity = 2 (sports)
8. Home & leisure: Total (1) minus cases of the categories 2-7, minus cases of unspecified location (location = 9) or unspecified activity (Activity = 9)

II. For non-fatal injuries based on IDB-FDS data:

1. Total: All valid cases
2. Road traffic: Intent = 1 (unintentional) &Transport event = 1 (cases requiring the transport module) & Place = 6 (public road) & Object/Substance = 1.xx (land transport vehicle)
3. Work place: Intent = 1 (unintentional) & Activity = 1 (paid work)
4. Assault: Intent = 3 (assault) or 4 (other violence; cases requiring the violence module)
5. Self-harm: Intent = 2 (cases requiring the intentional self-harm module)
6. School: Intent = 1 (unintentional) & Activity = 3 (education)
7. Sport: Intent = 1 (unintentional) & Activity = 4 (sport during leisure time) or 3.1 (school sport)
8. Home & leisure: Total minus cases of the categories 2-7, minus cases of unspecified activity (Activity = 99)

It is advised, to consider this policy driven approach also at national level, when reporting on injuries.

- **ECHI 29b**

As mentioned, the provision of ECHI indicator 29b (home, leisure and school accidents) is one important objective of the IDB. For more information on the ECHI-project (European Community Health indicators) see the ECHI web-site and the specification of the indicator 29b at the ECHIM-web-site. Accordingly, ECHI indicator 29b (accidental injuries in home, at school, and during leisure activities) will be selected by:

- Intent = 1 (accident) and
- Location = 2 (educational establishment) or 3 (home) or 8 (other) and
- Activity = 2 (sports) or 8 (other)

This selection excludes cases of violence and self-harm, as well as road accidents and work place accidents. There is a specific selection option at the “public access” to select ECHI 29b.

Data access

Access to data is provided through a “public access” (MDS data only), and through the option of “restricted access” application (MDS and FDS data).

Public Access

The public access to MDS data at *EU-web-gate* is open for everyone and provides aggregated results on various queries, e.g. regarding countries, years, age groups, place and activities, according to the data elements of the Minimum Data Set. Through the data tool, users can view and download indicators, selecting their geographical coverage, timeline and graphical presentation as map, graph, or table. The web-gate users are also able to create "my reports" by selecting tables and graphs from the web-gate into a single document that can be saved or printed as a PDF or html file. The application analyses the millions of individual cases in store, but do not allow for reading any individual case, as the IDB-MDS data do not contain any information which is so specific that the identification of an individual case is possible or that sensitive information about a case can be extracted.

Restricted Access

All data sets, which are transmitted from IDB-NDAs to the Network Coordinator and the Commission services, are anonymized, i.e. all personal identifiers like name, date of birth, address, or social security number have to be removed.

However, FDS-level data are still considered as subject of the data protection directive, EU Directive 95/46/EC on the processin of personal data and free movement of such data, and its national legal implementations. The purpose of Directive 95/46/EC is that personal data can be used efficiently for legitimate purposes like public health planning, prevention or research while ensuring a high level of protection of privacy. In order to comply with Directive 95/46/EC of 1995, the Network of data suppliers has issued a *data access policy*, which regulates the access to single case ("micro") data. Through that policy, access is granted to:

- IDB data suppliers (as long as they provide data according to the common quality criteria);
- The head of the Health Programme Management Unit at the European Commission (as long as EC/DG SANCO hosts the database);
- The head of the Product and Service Safety Unit at the European Commission (as long as EC/DG SANCO hosts the database);
- Service providers linked to the European Commission by contract to fulfil specific (e.g. technical) tasks related to the IDB (access is temporary and will be suppressed at the end of the contract).

Access can be granted to researchers and injury prevention professionals upon request. Such an access permission is temporary and will be suppressed at the end of their analysis. As a precondition, all data users (including the data suppliers, the IDB-NDAs) have to agree (in writing) with the "*Terms of Use*:

- Single-record data is to be used for internal purposes only. The user will not give access to single-record data to a third party;
- Single-record data will not be published or disseminated to the public, neither to a third party;
- The user will not link IDB data to other information in order to identify natural persons;
- The user may use the data only for the general purpose of research or analyses with the goal of deriving general findings to enhance safety and prevent injuries (...);
- Whenever publishing any results of such research or analyses, the user will indicate the source ("Source: EU Injury Database – The IDB Network & the EU Commission, DG SANCO") in texts, tables, figures, and list of literature;
- Data suppliers, network-coordinator, or data controller cannot be hold responsible for any outcome or conclusions of research and analyses; (...)
- The user will use data only during the agreed period of time. Any internal copies of data will be deleted immediately after the termination of the user account.

Researchers, who are not IDB-NDAs, have to apply through the EU-web gate *'restricted access'* page, and to explain the purpose of their research and why they need access to the personal data. Actually, each single request for disclosure needs the consent of each data supplier. The appointed Board-Member handles such requests.

Currently, the Austrian Road Safety Board is appointed for this task, and requests can be directed to: *injurydata@kfv.at*. Each single request for access will put forward to all data suppliers, and the data controller at DG SANCO will disclose only those data sets, for which the data suppliers have given their consent. As mentioned, access is granted temporary and will be closed after termination of the agreed time period.

Chapter 8 references

EU- regulation 45/2001 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data, 18 December 2000

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Thelot B, Nachbaur C, Mouquet MC, Boyer S (2003) Estimates of annual incidence rates of home and leisure injuries in France. Saint Maurice, France: Institute de Veille sanitaire.
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Annex IDB-JAMIE Minimum Data Set (MDS)

IDB-JAMIE Minimum Data Set (MDS)

Background

This Data Dictionary for the new Minimum Data Set for the EU Injury Data Base (IDB-MDS) is meant to support the recording of information at emergency departments within the European Union. It covers basic information on all injuries and is derived from the Full Data Set for the EU Injury Data Base (IDB-FDS) (1).

The International Statistical Classification of Diseases and Related Health Problems (ICD) is the basic classification within health care, but does not provide enough detail for injury prevention (2, 3). The International Classification of External Causes of Injuries (ICECI) is related to the External Causes chapter of the ICD and accepted by the World Health Organization (WHO) as a member of the WHO Family of International Classifications (4). Therefore, ICECI (version 1.2) was the major guideline for developing the IDB-FDS. Other important sources are: the Home and Leisure Accidents V2000 coding manual (5), used for recording home and leisure accident data for the former European Home and Leisure Accident Surveillance System (EHLASS) and the Minimum Data Sets on Injuries (MDS-Is), developed under the auspices of the European Commission and meant to record information on accidents/injuries in less resourced (as far as information or money is concerned) settings (6).

This document provides some background information and the actual MDS-Data Dictionary. For each MDS data element information is available on the required field length, the definition and a list of codes. Where relevant, a guide for use and in- and exclusion criteria can be found. Each National Data Administrator (NDA) should translate the categories in the MDS into their home language given certain wordings mean different things in different countries.

The rationale and technical details of the entire IDB-system are laid down comprehensively in the JAMIE-IDB Manual (7).

Scope

Data should be collected on all injury related attendances, not just home or leisure or unintentional injuries. However, in some circumstances data may only be collected on subgroups of injury (such as unintentional home and leisure) and valid comparisons can still be undertaken on sub-groups across countries. Where this occurs it should be clearly documented with the dataset.

In order to calculate national incidence rates it is necessary to distinguish injuries among residents of the host country from visitors. Normal place of residence should be used for this purpose. Given that calculation of residence based rates across many countries will underestimate the overall European rate, by excluding cross-border flows, it would be helpful (but optional) to include all injuries (irrespective of residence) and include a yes/no residency indicator to the dataset.

A free text is also a very important (but optional) element useful in more detailed analysis of the injury event and gain insight in the sequence of events leading to the injury.

Selection of injury events by “domains of prevention”

For injury prevention it is important to be able to distinguish between groups of risks, for which distinct policy sectors bear the main responsibility for prevention. Injuries related to the major “domains of prevention” can be selected e.g. as follows:

- Intentional self-harm: Intent = 2 (Deliberate self-harm)
- Violence: Intent = 3 (Assault related injury)
- Road traffic injury: Mechanism of injury=1
- Occupational injury: Activity when injured= 1 (Paid work)

- Sports injury: Activity when injured=2 (Sports)
- Home and leisure injury: Intent = 1 (Accidental) excluding Road traffic, Occupational and Sports injuries
- Educational injury: Location (setting) of injury=2 (Educational establishment).
- The ECHI indicator 29b (home, leisure, sport and school injuries): Intent = 1 (Accidental) excluding Road traffic and Occupational injury

Of course there might be overlap between two or even three types of injury events.

Case definition

Only ED attendances associated with an injury are to be included within the MDS. An injury is defined as: a bodily lesion resulting from acute overexposure to energy (this can be mechanical, thermal, electrical, chemical or radiant) interacting with the body in amounts or rates that exceed the threshold of physiological tolerance. In some case an injury results from an insufficiency of vital elements, such as oxygen.

All cases should be included that are being reported at Emergency Departments for diagnosis, investigation or treatment of acute physical injuries which fall into the nature of injury categories listed in the dataset. It should relate to both patients that are admitted to hospital for further observation and treatment and those that are sent home after diagnosis and treatment (ambulant care).

An outpatient is being defined as a patient who is admitted to a hospital or clinic for treatment that does not require an overnight stay. In case there are national variations in defining in-/ outpatients, these national rules shall be applied.

Inclusions:

- All acute physical injuries attending emergency department for diagnosis, investigation or treatment, which fall into the nature of injury categories listed in the dataset.
- Acute poisonings and toxic effects, including overdoses of substances and wrong substances given or taken in error.
- Early complications and late effects of trauma and injury (e.g. infected wound due to dog bite).

Exclusions:

- Adverse effects and complications of therapeutic, surgical and medical care.
- Psychological harm.
- Psychological consequences of injury.
- ED attendances associated with non-injury related health conditions
- Acute physical injuries attending emergency department for follow-up treatment, routine check or other return visit to ED.
- All cases with ICD10 code External Cause Chapter XX:Y40-Y84 (Complications of medical and surgical care), Y88 (sequelae with surgical and medical care as external cause).
- All cases with ICD10 code Injury Diagnosis Chapter XIX:T78 (adverse effects, not elsewhere classified), T80–T88 (complications of surgical and medical, not elsewhere classified), T98.3 (sequelae of complications of surgical and medical, not elsewhere classified).

Tools

In order to extract MDS from existing data, bridging tables have been developed, e.g. from IDB-FDS to IDB-MDS Also a software programme for converting *IDB-FDS to IDB-MDS* is available. Some countries use mainly ICD-10 for coding injuries treated in hospitals. Therefore also a bridging table between ICD 10 and IDB-MDS is available and also a *software tool*). For details see the JAMIE-IDB Manual, chapter 7 (7).

Missing information items

How to deal with missing information items:

- Records shall contain only valid values according to this data dictionary
- If an item is not specified, because no information could be captured for this specific case ("not answered" or "unknown"): insert always 9,99,999,…;
- Leave an item only blank, if it is not mandatory and therefore not specified (i.e. the hospital code or the narrative) orif it is not specified because not applicable in a specific case (e.g. "no product involved" in the FDS, or "no second injury", or "no second part of body injured").

Update of information

The IDB-MDS Data Dictionary will be made available on the websites of the EU IDB (8) and of EuroSafe (9).

References

1. EuroSafe, European Association for Injury Prevention and Safety Promotion: IDB-JAMIE Full Data Set (IDB-FDS) Data Dictionary. Amsterdam: EuroSafe, November 2013.

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3. WHO, World Health Organization. International Statistical Classification of Diseases and Related Health Problems: Tenth Revision: Volume 1, tabular list (ICD-10). Geneva: World Health Organization; 1992.Bloemhoff A, Hoyinck S, Dekker R, Mulder S. Data Dictionary for Minimum Data Sets on Injuries: Developed within the Injury Prevention Programme of the European Commission. Amsterdam: Consumer Safety Institute; 2001.

4. ICECI Coordination and Maintenance Group. International Classification of External Causes of Injuries (ICECI): version 1.2. Amsterdam: Consumer Safety Institute 2004 and Adelaide: AIHW National Injury Surveillance Unit. http://www.who.int/classifications/icd/adaptations/iceci/en/

5. National Institute for Public Health, Denmark & PSYTEL, France. Coding Manual for Home and Leisure Accidents, including product related accidents (HLA V2000). ISS Database version 2002.

6. Bloemhoff A, Hoyinck S, Dekker R, Mulder S. Data Dictionary for Minimum Data Sets on Injuries: Developed within the Injury Prevention Programme of the European Commission. Amsterdam: Consumer Safety Institute; 2001.

7. EuroSafe, European Association for Injury Prevention and Safety Promotion: IDB-JAMIE Manual. Amsterdam: EuroSafe, 2013.

8. The European Injury Data Base (IDB) web-gate: http://ec.europa.eu/health/data_collection/databases/idb/index_en.htm

9. European Association for Injury Prevention and Safety Promotion (Eurosafe) http://www.eurosafe.eu.com/.

Data Dictionary

List of data elements and required format

Field	Nb char.	Position start	Position end	Format	Type
Recording country *	**2**	1	2	**nn**	Numeric
Provider (hospital) code (optional)	**3**	3	5	**nn**	Numeric
Unique national record number	**7**	6	12	**nnnnnnn**	Numeric
Age category of patient	**2**	13	14	**nn**	Numeric
Sex of patient	**1**	15	15	**n**	Numeric
Permanent country of residence (optional)	**1**	16	16	**n**	Numeric
Month of attendance	**2**	17	18	**nn**	Numeric
Year of attendance	**4**	19	22	**nnnn**	Numeric
Treatment and follow-up	**1**	23	23	**n**	Numeric
Nature of injury 1 (primary injury)	**2**	24	25	**nn**	Numeric
Nature of injury 2 (secondary injury)	**2**	26	27	**nn**	Numeric
Part of the body injured 1 (primary injury)	**2**	28	29	**nn**	Numeric
Part of the body injured 2 (secondary injury)	**2**	30	31	**nn**	Numeric
Intent	**1**	32	32	**n**	Numeric
Location (setting) of occurrence	**1**	33	33	**n**	Numeric
Mechanism of injury	**1**	34	34	**n**	Numeric
Activity when injured	**1**	35	35	**n**	Numeric
Narrative (optional)	**120**	36	155	**120n**	Alphanumeric
Total record length	***155***				

Recording country

Required field length: nn (alphanumerical)
Definition: Country that provides the data
Codes:

03	Austria
05	Belgium
06	Bulgaria
07	Switzerland
08	Cyprus
09	Czech Republic
10	Germany
11	Denmark
12	Estonia
13	Spain
14	Finland
15	France
16	Greece
17	Croatia
18	Hungary
19	Ireland
20	Iceland
21	Italy
22	Liechtenstein
23	Lithuania
24	Luxembourg
25	Latvia
27	Montenegro
28	Macedonia
29	Malta
30	Netherlands
31	Norway
32	Poland
33	Portugal
34	Romania
35	Sweden
36	Slovenia
37	Slovakia
38	Turkey
39	United Kingdom
99	Unspecified reporting country

Hospital code (optional)

Required field length: nnn

Definition: Hospital that provides the data

Guide for use: This field can be used together with the Recording country field to make it possible to identify the hospital provider within each country.

Example: If Austria has 3 hospitals submitting data to the MDS then the codes used following combination of the Recording country field with the Hospital code field would be AT001, AT002 and AT003. If the United Kingdom had 2 hospitals submitting data to the MDS then the codes used would be UK001 and UK002.

Unique national record number

Required field length: nnnnnnn

Definition: Number of the Emergency Department case or record

Guide for use: The coding form has 7 spaces for coding the unique national record number. If your setting uses fewer spaces for its case numbers, fill the extra spaces with leading zeros.

Example: Case number 1234 should be coded as 0001234

Age category of patient

Required field length: nn

Definition: Person's age category at the time of the injury

Example: 52 years is in the 50-54 age category and so should be coded as 12
12 years is in the 10-14 age category and so should be coded as 04

Codes:

01	< 1
02	1-4
03	5-9
04	10-14
05	15-19
06	20-24
07	25-29
08	30-34
09	35-39
10	40-44
11	45-49
12	50-54
13	55-59
14	60-64
15	65-69
16	70-74
17	75-79
18	80-84
19	85+
99	Unknown

Sex of patient

Required field length: n

Definition: Person's sex at the time of injury

Codes:

1	Male
2	Female
9	Unknown

Permanent country of residence

Required field length: n

Definition: Persons permanent country of residence (one year of more) at the time of the injury

Codes:

1	Country of residence is the same as recording country
2	Country of residence is not the same as recording country
9	Unknown

NB. This is not a mandatory code and if not collected should be coded as 9, unknown

Month of attendance

Required field length: nn

Definition: The month the injured person attended the Emergency Department

Codes:

01	January
02	February
03	March
04	April
05	May
06	June
07	July
08	August
09	September
10	October
11	November
12	December
99	Unknown

Year of attendance

Required field length: nnnn

Definition: The year the injured person attended the Emergency Department

Guide for use: Use 4 digits to represent all numbers of the given year, e.g. for 2010 code 2010. If year unknown code 9999.

Treatment and follow-up

Required field length: n

Definition: Status of treatment after attendance at the Emergency Department

Codes:

1	Admitted to this or another hospital or deceased during hospital admittance Includes: - Treated and admitted at this hospital - Transferred to another hospital - Deceased during hospitalisation
2	Not admitted to hospital Includes: - Examined and sent home without treatment - Sent home after treatment - Treated and referred to general practitioner for further treatment - Treated and referred for further treatment as an outpatient - Deceased before arrival/deceased at Emergency Department
9	Unknown

Note: Within the FDS the 'Transferred to another hospital' category within the 'Treatment and Follow-up' data item should be assumed to mean that the patient has been admitted.

Nature of injury (type of injury) 1

Required field length: nn

Definition: Nature of primary injury sustained

Guide for use: If necessary, you may code two different natures of injury. If so, be careful to code the corresponding body parts with the nature of injury coded. The first coded injury refers to the first coded body part and the second injury (if any) refers to the second coded body part.
If more than one diagnosis appears on the Emergency Department record (and it is not a multi trauma patient), code the one that seems to be the most severe first.
If it is a multi trauma patient, code Multiple injuries (code 12).
If no confirmed injury diagnosed then the case should not be included in the MDS.

Codes:

01	Contusion, bruise
02	Open wound and abrasion
03	Fracture
04	Dislocation and subluxation
05	Sprain and strain
06	Concussion/brain injury
07	Foreign body
08	Burns and scalds
09	Injury to muscle and tendon, blood vessels and nerves
10	Injury to internal organs
11	Poisoning
12	Multiple injuries
98	Other
99	Unknown

Nature of injury 2

Required field length: nn

Definition: Nature of secondary injury sustained

Guide for use: If there is no secondary injury code as 00. Also code as 00 if it is a multi-trauma patient and nature of injury 1 is coded as 12 (multiple injuries).

Codes:

00	No second injury, multi-trauma patient (nature of injury 1 coded as 12)
01	Contusion, bruise
02	Open wound and abrasion
03	Fracture
04	Dislocation and subluxation
05	Sprain and strain
06	Concussion/brain injury
07	Foreign body
08	Burns and scalds
09	Injury to muscle and tendon, blood vessels and nerves
10	Injury to internal organs
11	Poisoning
12	Multiple injuries
98	Other
99	Unknown

Part of the body injured 1

Required field length: nn

Definition: Region or part of the body where the primary injury is located

Guide for use: If necessary, you may code two different injured body parts. If so, you must always be careful to code the corresponding body parts with the type of injury coded. The first coded injury refers to the first coded body part and the second injury (if any) refers to the second coded body part. You should always code the most severe injury first.

If it is a multi trauma patient code Multiple body parts affected (code 23).

Codes:

01	Head/skull
02	Face (excl. eye)
03	Eye
04	Neck
05	Thoracic/lumbar spine
06	Chest wall
07	Abdominal wall
08	Internal organs
09	Pelvis
10	Upper arm/shoulder
11	Elbow
12	Lower arm
13	Wrist
14	Hand
15	Fingers
16	Hip
17	Upper leg
18	Knee
19	Lower leg

20	Ankle
21	Foot
22	Toes
23	Multiple body parts
98	Other
99	Unknown

Part of the body injured 2

Required field length: nn

Definition: Region or part of the body where the secondary injury is located

Guide for use: If there is no secondary injury code as 00. Also code as 00 if it is a multi-trauma patient and part of body injured 1 is coded as Multiple body parts affected (code 23).

Codes:

Codes:

01	Head/skull
02	Face (excl. eye)
03	Eye
04	Neck
05	Thoracic/lumbar spine
06	Chest wall
07	Abdominal wall
08	Internal organs
09	Pelvis
10	Upper arm/shoulder
11	Elbow
12	Lower arm
13	Wrist
14	Hand
15	Fingers
16	Hip
17	Upper leg
18	Knee
19	Lower leg
20	Ankle
21	Foot
22	Toes
23	Multiple body parts
98	Other
99	Unknown

Intent

Required field length: n

Definition: The role of human purpose in the injury event

Guide for use: In general, intent is primarily determined by the incident and not by the resulting injury.

To code intent:

- during the ED attendance of the patient it is important to find out the intent of the event, although this may be difficult.
- select the code that best describes the intent of the injury event.

- code injuries sustained by a bystander to a violent incident, or by a non-combatant in a conflict, as assault.
- code injuries resulting from animal attacks as unintentional, unless the animal was used as a weapon by a person intent on inflicting injury. Code this as assault related injury.
- consider injuries to children under age five years who harm themselves to be unintentional, except in the case of an individual who bangs his or her head in anger or frustration.
- consider injuries caused by children under age five years who harm others to be unintentional.
- code as deliberate self-harm if there is some indication for deliberate self-harm from the patient. If there is no indication at all for self-harm (or assault) then intent is accidental. If there is no information about the incident at all, then intent is unknown.

Codes:

1 **Accidental (unintentional) injury**

2 **Deliberate (intentional) self-harm**

Includes:

- - suicide
- - para-suicide (incomplete suicide attempt)
- - self-mutilation
- - intentional intoxication by alcohol or drug

3 **Assault related injury**

Includes:

- - injury inflicted by law enforcement agent during legal action
- - injury inflicted by state agency during attempts to enforce the law
- - execution or injury performed at the behest of judiciary or ruling authority
- - operations of war or civil conflict
- - sexual assaults

9 **Unknown intent**

Includes:

- - undetermined intent
- - injury resulting from unknown incident
- - euthanasia

Location (setting) of injury

Required field length: n

Definition: Where the injured person was when the injury event started.

Guide for use: The codes represent where the injured person was when the injury event began, not when the injury event ended.

To code Location (setting) of injury:
- select the place where things started to go wrong.
- choose a category referring to the whole entity (i.e., a structure or space owned or operated as a whole) within which an injury occurred, rather than a category referring to only a part of such an entity.

Codes:

1 **Road (incl. pavement)**

Includes:
- highway, street or road specified as public
- highway, street or road not specified as public
- roadway (incl. free way, motorway, street parking)
- sidewalk (incl. designated walkway, footpath next to road, home driveway beyond property boundary, line pavement; excl. home driveway within property boundary line or home driveway nos, pedestrian mall)

- cycleway (incl. cycle path next to road)
- inside vehicle that is located on road
- railway/rail track that forms a part of the public highway, e.g. railway operated by a streetcar or tram

Excludes:
- highway, street or road specified as private (e.g. home driveway, 3)
- parking area, public transport area, pedestrian mall, railway line operated by a train (8)

2 **Educational establishment (and surrounding grounds)**

NOTE: Refers to building and adjacent grounds under 'school authority'

Includes:
- school, university (incl. college, institute for higher education, military school, private/public/state school, school yard campus)
- day care, kindergarten (incl. day nursery, crèche, after school care, place where young people are cared for (usually while their parents are at work), pre-school)
- sports and athletics area at school, educational area
- playground at school, educational area

Excludes:
- school dormitory (8)
- reform school (8)
- building under construction (8)

3 **Home (incl. garden)**

NOTE: Refers to building and adjacent grounds

Includes:
- house, apartment
- farmhouse
- weekend cottage
- residential caravan (trailer), tent, hut, lean-to
- boarding house
- garage
- home garden or yard
- home driveway, within property boundary line or home driveway nos
- home playground
- swimming pool in/around home
- transport vehicle used as residence (incl. Houseboat, motorhome, mobile home)
- common area of multi-residence building (incl. elevator, lobby, corridor, stairwell)
- occupied house under construction/renovation
- residence of foster children in home environment
- parts of home used for home office
- cottage industry
- any place where plants and/or animals are grown primarily for personal use by a farmer/rancher and his or her family
- kitchen
- living room, bedroom (incl. hall, lobby, dining room, lounge, study)
- bathroom, toilet (incl. bath, shower, sauna, laundry room, scullery)
- stairs, indoors (incl. landing)
- residence indoors, other (incl. basement, cellar, loft, porch, passage)
- residence outdoors, other (incl. balcony, frontage, roof, outdoor staircase, landing)

8 **Other**

Includes:

- residential institution (incl. home for the elderly, nursing home, prison, shelter for battered women, military institution, children's home, orphanage, dormitory, reform school, hospice)
- medical service area (incl. hospital, outpatient clinic/health centre, health professional's office (consultation room/examination room)
- sports and athletics area (indoor, outdoor)
- transport area: other (incl. parking area, public transport area/facility, pedestrian mall, railway line))
- industrial or construction area (incl. building under construction, demolition site, factory plant, mine and quarry, oil or gas extraction facility, shipyard, power station)
- farm or other place of primary production (incl. area for growing crops, market gardening, horticulture, area for raising or care of animals)
- recreational area, cultural area, or public building (incl. public playground, amusement park/theme park. public park, public building/non-cultural, holiday park/campground, public religious place)
- commercial area (non-recreational, incl. shop/store, commercial garage, office building, cafe/hotel/restaurant)
- countryside (incl. area of still water, stream of water, large area of water, marsh/swamp, beach/shore/bank of a body of water, forest, desert)
- other specified location (setting) of injury (incl. harbour used as a non-commercial area/harbour nos, sewer system)

9 **Unknown**

Includes:

- unspecified location (setting) of injury

Mechanism of injury

Required filed length: n

Definition: The way in which the injury was sustained (i.e. how the person was hurt).

Guide for use: Injuries are often the result of a sequence of events. Different types of mechanisms are usually involved in the injury:

- Underlying mechanisms – those involved at the start of the injury event; the kind of uncontrolled energy that has triggered the incident.
- Direct mechanisms – those producing the actual physical harm.
- Intermediate mechanisms – other mechanisms involved in the injury event.

The direct and underlying mechanisms may be the same. For example, if a person cuts his or her finger with a knife while preparing food, the cutting of the finger is both the direct and underlying mechanism. Coding mechanism of injury in these situations is straightforward. Other situations are more complex. For example, if a woman trips over an appliance cord and hits her head on a counter, the tripping over the cord is the underlying mechanism (the action that starts the injury event), and the contact with the counter is the direct mechanism (the action that causes the actual physical harm).

To code Mechanism of injury:

- code only the underlying mechanism.
- if it is not possible to distinguish between types of mechanism, code the first mechanism in the sequence they appear in the case information.

Codes:

1 **Road traffic injuries**

Includes:

- transport injury event on public road with land transport vehicle crash and other injurious event occurring in the course of transportation on public road with land transport vehicle
- fall in or from a land transport vehicle not involved in a derailment, collision, or crash on public road
- a land transport vehicle must be involved; the injured person may be: a pedestrian, including user of a pedestrian conveyance (e.g., baby carriage or stroller, In-line skates, wheelchair), a user of a land transport vehicle, or a bystander (e.g. a person at a sidewalk café who was hit by a car that went out of control
- poisoning from exhaust gas generated by a land transport vehicle in motion on a public road
- injury from being thrown against some part of, or object in, a land transport vehicle in motion on a public road
- injury from a moving part of a land transport vehicle in motion on a public road (e.g., catching one's hand or neck in a moving car window)

Excludes:
- transport injury event with train
- transport injury event on specified private road with land transport vehicle (e.g. car on private home driveway)
- transport injury event specified not on public road with land transport vehicle (e.g. motor on racetrack)
- transport injury event with watercraft or aircraft (including injuries to parachutists)
- event in which pedestrian, or person using pedestrian conveyance, is injured but there is no involvement of a transport device. None of the following would be included: a pedestrian who fell on a sidewalk, an in-line skater who collided with a utility pole, a person in a wheelchair who collided with a pedestrian
- Events due to cataclysm (earthquake, volcanic eruption, avalanche, landslide or other earth movement, cataclysmic storm, flood). Neither of the following would be included: injury due to a vehicle being caught in an avalanche or landslide, injury to a motorcyclist swept off the road by a sudden flood
- events unrelated to the movement or operation of a transport device. Neither of the following events would be included: a child putting a bean in her ear while riding in a car, being stung by a bee while riding in a car (as long as it did not result in loss of control and a collision or crash)
- events involving a land transport device not in use for transport at the time (e.g., injury due to a vehicle under repair in a garage or driveway falling on the person repairing it)

2 **Fall**

Includes:
- being pushed by a person
- falling while being carried (i.e. being dropped)
- tripping
- slipping
- falling/stumbling /jumping/pushed on the same level
- falling/stumbling /jumping/pushed from a height less than 1 meter
- falling/stumbling /jumping/pushed from a height 1 meter or more
- falling/stumbling /jumping/pushed on stairs/steps
- falling from bumping against an object
- striking or hitting an object when jumping or diving
- falling from a pedal cycle

- falling from a horse
- falling from a building or structure

Excludes:
- spraining ankle when walking and not falling (i.e. over-exertion, 8)
- being pushed by an animal (8)
- being crushed or pushed by a crowd or stampede (8)
- collapse of a non-burning building or structure (8)

3 Cut/pierce

Includes:
- scratching, cutting, tearing, severing
- puncturing, stabbing
- being shot by a firearm or other weapon
- cases where the skin was cut and where there was deep penetration of underlying tissue
- stabbed with a knife, sword or other sharp-edged instrument
- penetration of the skin by foreign body (splinter, chip of metal, projectile, wood, etc.)
- biting, stinging, invenomating (bitten by person, bitten/stung by animal)
- anaphylactic shock following a bee sting, etc.

Excludes:
- cutting or puncturing due to explosion (3)
- having a body part ripped/torn by machinery (8)
- tearing a ligament due to tripping/slipping (2), or over-exertion (8)
- non-shooting injury by a firearm (e.g. struck by gun, 8)
- a bite/sting that has become infected (not an injury)

4 Poisoning

Includes:
- poisoning by chemical or other substance
- accidental drug overdose
- intentional poisoning, e.g. intentional alcohol or drug intoxication
- poisoning of unspecified intent

5 Thermal mechanism (Burn/Scald)

Includes:
- contact with hot liquid, hot steam, other gas, hot object or solid substance, fire or flames
- corrosion by chemical or other substance (solid, liquid, gaseous substance)
- tissue damage due to chemical effects of a strong acid, alkali, etc.

Excludes:
- contact with molten lava, volcanic fires (8)
- whole body heating (8)
- inhalation of smoke from burning object/substance (8)
-cooling (8)
- rubbing, chafing, abrading (8)

8 Other

Includes:
- contact with object or animal
- contact with person
- crushing
- abrading, rubbing
- other specified/unspecified contact with blunt force
- struck by explosive blast
- contact with machinery
- other specified/unspecified mechanical force

- whole body heating
- inhalation of smoke from burning object/substance
- cooling
- other specified/unspecified thermal mechanism
- mechanical threat to breathing
- drowning/near drowning
- confinement in oxygen-deficient place
- other specified/unspecified threat to breathing
- other specified/unspecified effect of exposure to chemical or other substance
- acute over-exertion, over-extension
- other specified/unspecified physical over-exertion
- exposure to (effect of) precipitation
- exposure to (effect of) wind
- exposure to (effect of) earth movement or ocean movement
- exposure to (effect of) eruption
- exposure to (effect of) other specified weather, natural disaster or other force of nature
- exposure to (effect of) unspecified weather, natural disaster or other force of nature
- contact with foreign body
- exposure to electricity, radiation
- exposure to sound, vibration
- exposure to air pressure
- exposure to low gravity
- neglect, abandonment, or lack of necessities of life
- other specified mechanism of injury

9 **Unknown**

Includes:
- unspecified mechanism of injury

Activity when injured

Required field length: n

Definition: The type of activity the injured person was engaged in when the injury occurred.

Guide for use: Select the category that best describes the activity the injured person was engaged in when the injury occurred.

Codes:

1 **Paid work**

Includes:
- voluntary work under some form of (liability insurance benefit) contract
- travelling to/from paid work
- travelling in the course of paid work
- other specified paid work (incl. begging, military service, paid self-employment, professional sports activity, professional teaching or tutoring, prostitution, sports activity under auspices of employer)

Excludes:
- unpaid work (8)

2 **Sports**

Note:

Includes:
- physical education class, school sports (Refers to organised physical activities that form part of a formal educational course or program of instruction provided by a school, college, or university).

- sports and exercise during leisure time (Organised and not organised; refers to physical activities with a described functional purpose (e.g., competition, practising for competition, improving physical health) performed during leisure time.)

Excludes:
- sports activity under auspices of employer (1)
- professional sports activity (1)
- leisure and play (8)
- playing draughts, checkers, chess (8)

8 Other

Includes:
- unpaid work (incl. travelling to/from unpaid work, travelling in the course of unpaid work, cooking/cleaning, shopping, caring for children and relatives, do-it-yourself projects, maintenance of own home or garden)
- other specified/unspecified education (Refers to activities that form part of a formal educational course or program of instruction provided by a school, college, university, adult education institution, etc.)
- leisure or play (Refers to play, hobbies, and other activities undertaken mainly for pleasure, relaxation, or leisure. May be passive (watching TV) or active (dancing at a party), undertaken alone (reading) or with other people (children playing “hide and seek”), commercial (attending a “fun park”) or not (family picnic at a public park), and formally organised (day-trip) or not (a child “just playing”)
- vital activity (incl. eating/drinking, sleeping/resting, personal hygiene)
- being taken care of (Refers to undergoing activities conducted by or at the direction of a health care professional. These may occur in a health care facility or elsewhere.)
- travelling not elsewhere classified
- other specified activity (incl. general walking around, sitting, standing, known but nothing in particular, religious/spiritual activities, activities during violence/aggression/deliberate self harm)

Excludes:
- travelling to/from paid work
- travelling in the course of paid work

9 Unknown

Includes:
- unspecified activity

Narrative (optional)

Required field length: 120 spaces free text

Definition: Description of the event leading to the injury.

Guide for use: The free text is a very important element useful in more detailed analysis of the injury event. The free text is a description of the injury event in plain language, concentrating on describing “what went wrong?”. Give a description of the process of the injury event as detailed as possible.

It should capture at least the following information:
- What was the person doing?
- Where was the person doing it?
- What went wrong?
- How was the person hurt?
- Which objects/substances/products were involved?
- What was the injury?