Application of the ICECI Classification of External Cause of Injury to the WHO Health Behavior in School-Aged Children Survey

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Introduction

The World Health Organization released a draft version of a new guideline for the classification of external causes of injury in May, 1998. This classification system, the *International Classification of External Causes of Injury* (or ICECI),[1] was developed to provide a standard coding system for these external causes. It was designed to be compatible with the 10th revision of the *International Classification of Diseases*,[2] and was meant for use in a variety of injury coding situations. Goals of the new system included (1) providing more precise definitions of injuries under study, (2) addressing the multi-axial injury components of where injuries occurred, how, under what circumstances, involving which products, and (3) providing more detailed descriptions of specific categories of injuries such as sports injuries. The latter goal was expected to be achieved by subsequent addition of topical modules.

At the meeting of the International Collaborative Effort on Injury in that May, a call was made to members of the international injury control community to test this classification system with existing data. The hope was that practical feedback could be provided to the WHO-Working Group on Injury Surveillance Methodology Surveillance that was responsible for the development of ICECI. This would in turn assist in the refinement of the ICECI, in order that it become a practical system with more universal applicability.

We applied the 1998 draft version of the ICECI while coding injury data collected as an optional part of the *Health Behaviour in School-Aged Children* (HBSC) Study.[3] The latter is a periodic school-based health survey, currently conducted in about 30 countries, under the auspices of the World Health Organization. The injury questions of the HBSC were developed to address the same multi-axial components incorporated in the ICECI, making this coding approach feasible. Five countries used the ICECI guidelines to assign codes from a combination of pre-coded and open-ended injury questions. This paper focuses specifically on coding experience from data collected in Canada and the United States during the 1997-98 HBSC surveys.

The objectives of this paper are:

- to demonstrate the applicability of the ICECI coding system to structurally compatible survey data in the 1997-98 versions of the HBSC used in Canada and the United States;

- to identify salient coding issues that arose during our application of the ICECI to these HBSC injury data;

- to document common activities that were associated with the occurrence of youth injury in Canada and the United States, thus providing a supplemental module for use with the ICECI. Sports injuries, the predominate activity producing injury in adolescence, are further classified by the common underlying form of play for each activity. The common form, describing individual, paired, or team attributes of the game, may be predictive of the extent of contact in a sport that may be a factor in injury occurrence and severity.

The *Health Behaviour in School-Aged Children* Survey

The Health Behaviour of School-Aged Children (HBSC) Study is a collaborative cross-national research project involving countries in Northern Europe, the Middle East, Canada and the United States. Representative samples of youth with average ages of 11.5, 13.5, and 15.5 years are identified in school-based settings in each of the countries.

The goal of the HBSC is to use the information collected to improve the quality of health promotion programs for youth in these countries. International comparisons of these data also assist in understanding disparities in health indicators on a more global basis. The research emphasis of the HBSC provides an opportunity to understand contextual relationships of youth attitudes, behavior and health outcomes. Figure 1 identifies the countries that participated in the 1997-98 HBSC. Twelve countries collected injury data, with open-ended questions coded according to ICECI guidelines in five of these (USA, Canada, Republic of Ireland, Israel, and Switzerland). England used the open-ended questions but coded them according the ICD-9 guidelines.

Injury Items Used in the HBSC

Questions pertaining to injury were first introduced to the HBSC in 1993 based on experience from earlier U.S. survey data.[5,6,7] In the 1993/94 survey, a series of close-ended questions were available for use by participating countries.[4] Students were asked to report those injuries that happened during the 12 months prior to survey that resulted in treatment by a doctor or nurse. For

the one "most serious" of these injuries, additional questions were asked in order to describe the injury and its consequences. Questions were asked about the nature of the injury, type of treatment and number of days lost from school or other normal activities. Besides these questions used to address severity, the respondents were asked to name the place where the injury occurred, what they were doing when the injury occurred, and the month and year of occurrence.

During the planning stage for the 1997/98 version of the HBSC, it was determined that it would be helpful to have additional information about the circumstances and external causes of the reported injuries. An optional group of questions were developed for this purpose. Researchers charged with developing these items had to work within the limits of the HBSC. These included the need to: (1) be compatible with the earlier version of the survey so that temporal trends could be documented; (2) keep the number of questions to a minimum to improve questionnaire completion rates; and (3) use wording of questions that would be understandable to youth from ages 11-15, yet yield the desired information.

For these reasons, a very simple, open-ended question was developed for activity and mechanism of injury. This involved asking respondents to provide two sentences in answer to the questions: *at the time of the injury (a) what were you doing, and (b) how did it happen?* Three examples were provided in order to demonstrate how the information was to be recorded.
With minor modifications to the previous 1993/94 close-ended questions, a question was added on whether or not the injury happened while participating in organized sports or recreational activities to address injury prevention issues. Besides the questions on nature, severity, and treatment of the injuries, the 1997/98 HBSC injury questions used for coding within the ICECI multi-axial matrix are described below. Students were asked to mark the one best answer to describe their most serious injury:

1) Where were you when this injury happened?
   - at home (yours or someone else's)
   - at school (including school grounds)
   - at a sports facility or field (not at school)
   - in the street or road
   - other location: write it here _____

2) What were you doing when this injury happened?
   - biking
   - skating (including roller blades, skateboards, ice skating)
   - playing or training for sports (not biking or skating)
   - riding in a care or other motor vehicle
   - walking/running (not for sports or exercise)
   - fighting
   - other: write it here _____

3) Did this injury happen while participating in sports or other recreational activities?
   - No
   - Yes – organized activity on a team, league or club
   - Yes – informal/unorganized sport or recreational activity

Note: Canada did not use question No. 2 but used the open-ended questions to back-code activities into the categories used by the other countries that did not have access to open-ended questions.

The *International Classification of External Causes of Injury (ICECI)*

The ICECI is a "multi-axial code set" developed under the auspices of the World Health Organization.[1] The draft version of the ICECI released in 1998 provided a standardized, coding system for different aspects of injury circumstances, including place of occurrence, mechanism, objects involved, activity, intent of injury, and victim-perpetrator relationship.

The ICECI was viewed as a companion guide to the standard International Classification of Disease coding systems. It provides opportunity for more detailed data capture in a variety of settings, including in-hospital events, emergency departments, ad hoc studies, and health surveys. Many of the principles that appear in the coding system are consistent with those used in the more standard international classifications of injury, including ICD-10.[4] An additional feature of the ICECI is its adaptability, in that it takes into account the limitations of most data collection settings and allows for data capture and coding at various levels of specificity.

Approach to Coding

An abbreviated version of the ICECI was developed for use with the HBSC data. The latter was based upon the first level of codes available within the ICECI coding hierarchy. The abbreviated coding version, along with corresponding codes to be used by the six HBSC countries, appears in Appendix A. Each country also referred to the full ICECI draft instruction for guidance if questions occurred. Finally, unclear coding determinations were discussed through consultation among countries during the coding process.

Based on the open-ended questions, and on the close-ended questions about place of occurrence and organized league/activity, it was suggested that participating countries provide ICECI codes on 1) intent, 2) mechanism, 3) objects involved, 4) place of occurrence, and 5) activity, associated with each injury. In addition, because the activity codes provided by the ICECI system were quite non-specific, a list of more detailed activity codes were developed by the Canadian participants in the HBSC. Participating countries were also asked to apply these codes to their respective data. Additional codes were added by other countries, as needed. Codes shown in Table 1 include activities found primarily in Canadian and U.S. data although additional codes mentioned during consultation with other countries may also be present.

Table 1. Potential Codes for Sports and Recreational Activity Module in the ICECI, based upon Youth Injury Data Collected During the 1997-98 WHO-HBSC

Primarily Individual Activities	Primarily Paired/Small Group Activities	Primarily Team Activities
Aerobics	Badminton	Baseball
Archery	Boxing	Basketball
Ballet	Dance	Broomball
Billiards/Pool	Dodgeball	Curling
Bowling	Fencing	Cricket
Climbing	Frisbee	Football – American
Crafts	Hackeysack	Football – European (see soccer)
Cycling	Handball	Football – Flag/touch
Darts	Hide and seek	Football – Tackle
Diving from board	Martial Arts	Handball
Diving - other	Play fighting	Handball – European
Exercising	Playing catch	Hockey – Field
Fishing	Playing keep-away	Hockey – Ice
Golf	Racquetball	Hockey – Inline
Gymnastics/Trampoline	Squash	Hockey – Road/Street
Hiking	Table Tennis	Hurling
Horseback Riding	Tag	Lacrosse
Hunting	Tennis	Lacrosse – box
Jetskiing	Wrestling/wrestling for fun	Lacrosse – field
Jogging		Ringette
Playing/Playing around/Horsing around		Rugby/rugger
Running		Skating – Precision
Skateboarding		Soccer
Skating - Figure		Softball
Skating - Inline		Volleyball
Skating - Recreational		
Skating - Speed		
Skating - Not specified		
Ski Jumping		
Skiing – Alpine/downhill		
Skiing – Nordic/cross-country		
Skiing - Water		
Skiing - Not specified		
Snowboarding		
Snowmobiling		
Swimming/waterslide		
Tobogganing		
Track - Jumping events		
Track - Running events		
Track - Throwing events		
Water-skiing		
Weightlifting/Bodybuilding		

¶ Originally developed from the Canadian HBSC data by MA King of the Social Program Evaluation Group, Queen's University, Canada. Expanded with U.S. HBSC data and subsequently modified by CW Burt, National Center for Health Statistics, USA, based on open-ended text review of reasons for emergency department visits at all ages. Activities are organized according to the most common form of participation for a specific sport or recreation: individual, paired or small groups, or team sport. These activities are not intended to be mutually exclusive.

Coding of open-ended items was done within the individual countries. Each coder was supplied with the ICECI coding manual,[1] as well as a set of instructions and the abbreviated ICECI coding scheme provided by the Canadian and U.S. research groups. Canada used one coder for ICECI coding with additional help to verify coding decisions and apply supplemental activity codes. The United States employed three coders who each assigned both the ICECI system categories and the activity codes. Each coder was asked to maintain a log of all coding issues that arose during the course of their work. Coding differences were resolved through regular e-mail exchange. Major coding issues that suggested possible deficiencies in the ICECI were flagged for further discussion.

At the time of this presentation, the abbreviated version of the ICECI had been applied to approximately 11,000 HBSC injury records within Canada (n=4144) and the United States (n=7197). Based on this experience, we offer the following as major coding issues for consideration of the international working group that is refining the ICECI.

Coding Issues

1. Coding of Intent with Uncertain Information

The coding of intent is often problematic in any injury data setting, due to a lack of knowledge or inconsistent detail provided about the intent of the perpetrator and/or the victim. This was true in the HBSC coding situation, and is almost certainly true in emergency department settings where coding is based on medical records. Intent is traditionally assigned only in fatality data based on coroner or medical examiner determination or after legal proceedings.

The major problem that we encountered in the HBSC situation was how best to code the intent of injuries with insufficient descriptions. Traditional approaches to the resolution of this issue include coding the intent of injuries as unintentional, unless otherwise specified in the injury description. Alternatively, the ICECI allows one to code uncertain cases as having an undetermined intent. We recommend that the ICECI provide better and more specific instructions for use with nonfatal data, with examples, to ensure that consistent decisions can be made in situations where there is a dearth of information provided about intent.

The precoded questions used by most of the HBSC countries specifically asked about fighting; however, this question was not used in Canada. For the HBSC, the U.S. assigned an 'intentional' code only when the student indicated in either the pre-coded or open-ended questions that they were fighting when the injury occurred. However, these questions indicate only that interpersonal violence was involved without any knowledge of intent. Canada also included cases where it was clear in the open-ended questions that the injury was caused by an intentional act. (In either case, fights in the context of sports were excluded from this definition.) The two countries still reported very similar rates of injury that resulted from intentional acts.

2. Coding of Objects

The objects involved in injury events frequently raised questions at different levels. Some were simple but others involved complex issues for the purposes of prevention. One common question concerned knives. The ICECI includes knives in two categories: weapons or utensils. Most often,

the context of their use determines which category was appropriate. Unless they are used in the context of violence, we made the assumption that they should be coded as a utensil. (When is a kitchen knife a weapon or a utensil?) Frequently, information about objects at that level is missing.

3. Coding of Object in Self-induced Injuries

Many injuries reported by youth, both intentional and unintentional, are self-induced injuries. An example of this type of injury might include an overexertion injury caused when a person stretches to reach an object or person during the playing of sports. The ICECI provides no directions as to how to code this situation. We recommend that the ICECI provide better instructions, with an example, to ensure that this coding situation can be resolved easily. This may involve insertion of a code for "self" within the list of codes available to describe objects.

2.2 Coding of Contributing Objects in Addition to Primary Injury Vectors

The draft ICECI coding instructions indicates that more than one object can be coded for individual injury events. However, it also suggests that there may be situations where data collectors may only be concerned with coding one object. Our experience with the ICECI suggests that the latter practice should be discouraged. The rules surrounding the use of object codes suggest that the object that is most immediate to the occurrence of an injury should be coded first. For example, if a person falls down a set of stairs and lands on the ground, the primary object to be coded should be the ground and not the stairs as a contributing factor in the injury event. Second, if a cyclist collides with another vehicle and strikes a tree, then the ICECI rules suggest that the tree should be coded as the primary object. We recommend that, in the interests of prevention, at least two codes should be recorded for object in these types of injury circumstances and their order should follow the temporal logic proposed by the ICECI. Instructions should be provided by the ICECI to address this need.

4. Coding of Place of Occurrence

The most common ICECI questions about place of occurrence of injury for students are related to school premises. The order of preference is to code the first location mentioned if exact location (e.g., classroom, playground, or sports field) is not known. The *only* code available for injuries occurring at school specifies the educational area. No option is given for sports and athletic areas on school grounds in the coding. Neither is a gymnasium or auditorium mentioned even though these areas are frequently used for physical education classes. The next category listed is "Sports and athletic area" without a separate breakout to specify designation of school grounds. Further down on the list is "recreational or cultural area or public building". Playground areas of schools are specifically excluded from this latter category. If the coder picks the latter categories for sports related injuries, the school location is missed altogether. It would be better if the school areas were broken into multiple choices, with a minimum specification of inside or outside the school building and a separate category for sports fields on school property.

Since one goal is to identify responsible authorities, the opportunity to identify injuries on school premises that are part of school sponsored physical events are missed with the existing options. However difficult, the ability to discriminate between school sponsorship of events on school property and sponsorship of organized sporting events by other community entities is needed to

enable assignment or understanding of authority relationships. Equally important, the use of a question on the HBSC about whether sports injuries occurred during organized or unorganized activities allowed further discrimination of whether the individuals were playing on their own or during sponsored events with the potential for safety management by the sponsoring entity.

5. Coding of Activity:

Tables 1 and 2 describe the specific activities according to the ICECI categories for which injuries were reports for the adolescents ages 11-15 years. Table 1 is proposed as a starting basis for a sports and recreational activity module for the ICECI. The majority of injuries to adolescents occurred during these events. Table 2 lists the other activities during which an adolescent was injured. The work activities were not broken out in this presentation although the multi-axial matrix of the ICECI will allow better specification of occupational injury among youth than many other sources.

Table 2: Other Activity Codes from the WHO-HBSC

Transport Related activities	**Other Activities**
Passenger in car/truck/van	Household/daily activities
Driver of water transport other than jet ski	Laundry
Passenger on water transport other than jet ski	Food Preparation
Driver of three or four wheel ATV	Cooking
Passenger on a three or four wheel ATV	Cleaning
Driver of motorbike	Moving household objects
Passenger on motorbike	
Driver of farm vehicle	Personal activities
Passenger on farm vehicle	Eating or drinking
Passenger in bus	Washing/showering/bathing
Passenger in train	Sleeping/sitting/standing/resting
Passenger in airplane	Dressing/brushing hair
Passenger in subway	Sexual activity
Walking (for transport, not sport)	
Running/jogging (for transport, not sport)	Maintenance
	Gardening
	Do it yourself (carpentry, electrical, etc.)
	Do it yourself (vehicle maintenance)
	Intentional Injuries
	Assaulted/bullied/attacked
	Fight (not in context of sport)
	Intended self harm
	Sexual Assault
	Miscellaneous
	Encounter with animal
	Encounter with insect
	At work/working
	Body piercing/tattooing complications
	Other
	Unspecified/undecipherable/insufficient detail

4.1 Sports vs. Education vs. Leisure Activities

The coding of activity is very difficult in situations where youth are involved in injuries. This is mainly because many different activity codes might apply to these situations. For example, an injury that occurred while playing soccer during a school recess could arbitrarily be placed in any of the three categories. In uncertain situations, the ICECI recommends the coding of the first response that appears on the list, and the order that these appear are: 1) sports, 2) leisure and, finally, 3) education. The soccer example would therefore be coded as a sports activity. The problem with this practice is that, for prevention purposes, it would be advisable to code activity in manner consistent with the authority that has the responsibility to intervene. In our example, this would be an educational authority. Second, the ICECI provides no discussion about the basis upon which the order of the codes was arrived at, and we have observed that this order does not reflect patterns observed in our population-based study of youth injury. We therefore recommend that better instructions be provided in the ICECI about the importance of coding activities according to the responsible authority. Second we suggest that the practice of coding uncertain cases to the activity that comes first on the ICECI list be re-examined for youth injury contexts. Third, we suggest that a more precise set of examples be provided to illustrate those situations that should be considered education, sports, and leisure by the ICECI working group.

4.2 Sports activities and place of occurrence

There is an inconsistency in the ordering of activity and place of occurrence. For the latter, educational areas are placed ahead of sports and athletic areas in the coding. This is a reversal of the order used in the activity codes.

4.3 Coding of sports and recreational activities (definitional issues)

In the ICECI, sports injuries are defined as those that result from participation in sport with one or more of the following consequences: a) a reduction in the amount or level of sport activity, b) a need for advice or treatment, c) adverse social or economic effects. This definition includes both acute and overuse injuries, does not limit treatment to medical care, and covers factors such as loss for the team of an injured player (social effects) or absences from work or study (economic effects).[10] Finch defines sport or recreation related injuries as any type of injury associated with increased voluntary activity that is not occupational related.[11]

The ICECI goes on to distinguish between organized sports injuries (undertaken under the auspices of a sports federation, club or similar organization), and unorganized sports (activities similar to organized sports, but not under the auspices of an organization).
Recreational injuries are included in several ICECI activity codes (leisure, education, sports), but generally are most consistent with those classified as leisure. This includes activities undertaken mainly for pleasure, relaxation or leisure.

In practical terms, in the absence of information obtained by structured interviews it is often impossible to know the true context associated with these injuries. This makes the classification of activities associated with injury as "sport" or "recreational" difficult. Basketball injuries, for example, clearly could fall into either category depending upon whether the injury occurred during an organized game, or occurred in a less structured environment. For this reason, the classification

provided in Table 1 has been entitled "Sports and Recreational Activities", and we have made no attempt to distinguish between the latter activities in this classification. Activities that have traditionally been classified as sports may well be recreational injuries, and vise versa.

Table 1 is also organized according to the most common form of participation for a specific sport or recreation: individual, paired or small groups, or team sport. This enhances research capability to address underlying hypotheses related to extent of bodily contact allowed under the rules of the sport to be addressed. The nature and severity of injury trauma usually differs by the force and direction of energy transferred at the instant of contact with the object inflicting the trauma. The force and direction of energy transfer in paired and team sports are expected to differ from that occurring when an individual acts alone. The emphasis of the ICECI on determining the responsible authority to focus prevention efforts is enhanced by determination of the form of play (individual, paired or small group or team) when combined with information on the organizational structure of the activity. Structured questions in the HBSC ask the students whether the injury occurred during organized or unorganized play with teams. Combining the form of play with the organizational component increases the potential for prevention through education of responsible authorities and enforcement of rules of play.

4.4 Coding of Activity: Need for Further Detail

In evaluating the ICECI coding system, it is important to remember that its main purpose is to provide data that have utility for prevention. For youth and injury, the activity codes that are suggested by the ICECI provide insufficient detail to develop focused prevention initiatives. This is particularly true for sports and recreation injuries. There are only two codes provided for the classification of sports injuries: sports (organized) or sports (unorganized).

In order to address this lack of specificity, investigators at the *Social Program Evaluation Group* at Queen's University developed the supplementary list in Table 1 to more completely describe the activities reported during the HBSC. The latter was based upon observations made during the Canadian coding of the HBSC injury data, using both the NOMESCO[8] and CHIRPP[9] coding systems.

Table 1 provides this list of activities for sports and recreational injuries. It is our hope that this list could form the genesis for an ICECI sports injury module, to be developed in concert with the ICECI working group.

6. Other coding issues.

Since five countries in the HBSC coded extensive records with open-ended text responses on injuries according to the draft ICECI guidelines, a number of coding questions arose requiring consistent decisions that would be applicable across the international study. The examples and coding guidelines for these decisions are available from the first two authors of this paper upon request.

Originally developed from the Canadian HBSC data by MA King of the Social Program Evaluation Group, Queen's University, Canada. Expanded with U.S. HBSC data and subsequently modified by CW Burt, National Center for Health Statistics, USA, based on open-ended text

review of reasons for emergency department visits at all ages. Activities are organized according to the most common form of participation for a specific sport or recreation: individual, paired or small groups, or team sport. These activities are not intended to be mutually exclusive.

General Comments

There were a number of issues and concerns that emerged during our efforts to apply an abbreviated version of the ICECI to the injury data collected as part of the ICECI. Despite this, the systematic ICECI approach to multi-axial coding offers an opportunity to provide more depth on injury circumstances with a focus on prevention. Prior to the ICECI, the injury field lacked a universally accepted system for the coding of the external cause of injury, and in this respect the ICECI has the potential to become an important advance.

We found the coding system to be adaptable to our data coding needs. First, we were able to use a simple coding structure based on the first level of the ICECI hierarchy. In fact, we consider it unlikely that there will be many situations where the more detailed levels of coding can be applied in a consistent fashion. Second, the ICECI is adaptable in an analytical sense, in that it allows the cross-tabulation of many different factors that contribute to external causes of injury (e.g. mechanism by place of occurrence, activity by object). This should be of considerable use to the design and targeting of focused, prevention initiatives.

We do suggest that the ICECI working group address provision of adequate instructions for coders with limited available information when they make revisions to the current document. It is our understanding that this priority will be addressed based on work completed at the meeting at the ICE on Injury in June, 1999.

Finally, although the ICECI was developed with emergency department data collection systems in mind, it is applicable to written survey situations. The HBSC now has a simple protocol to follow in collecting this information from school-aged children. The latter could be applied in other survey and data collection contexts.

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Appendix A: Coding Specifications for use of the May 1998 draft of the ICECI with HBSC data

Suggested standard coding schemes

1. International Classification for External Causes of Injury (ICECI)
2. Canadian codes for activity and cause of injury (developed by SPEG; Queen's University)

Standard Data Elements

1. Full written description of activity (from HBSC questionnaire)
2. Full written description of how injury occurred (from HBSC questionnaire)
3. Intent (abbreviated version of ICECI; attached)
4. Mechanism (abbreviated version of ICECI; attached)
5. Primary Object (abbreviated version of ICECI; attached)
6. Contributing Object 1 (abbreviated version of ICECI; attached)
7. Contributing Object 2 (abbreviated version of ICECI; attached)
8. Place of Occurrence (abbreviated version of ICECI; attached)
9. Activity (abbreviated version of ICECI; attached)
10. Activity (Detailed Canadian list developed by SPEG; attached)
11. Optional: Cause of Injury (Canadian list developed by SPEG; attached)

Some general rules for Coding, using this modified version of the ICECI

We have created a coding system, based on a simplified version of the International Classification for External Causes of Injury (ICECI). The code sheets that follow provide suggested HBSC codes for five elements of each injury: intent, mechanism, object/substance (primary and up to 2 contributing), location and activity. On the right hand side of the coding sheets are the corresponding ICECI Codes (for reference purposes only).

In order to use this classification system, you will need to understand some basic rules. These are as follows:

Coding of Intent

1. Select the category that best describes the way the person was injured.
2. If 2 or more categories are judged to be equally appropriate, select the one that comes first on the code list.

Coding of Mechanism

1. Select the category that best describes the way the person was injured.
2. If 2 or more categories are judged to be equally appropriate (i.e. the mechanism can be described in 2 or more ways), select the one that comes first on the code list.
3. If more than one mechanism is involved in the occurrence of the injury, select the one that is most immediately and directly responsible for the trauma.

Coding of Object

1. Code the primary object first. This is the object that was most immediately and directly responsible for the trauma.
2. Code up to 2 contributing objects. These do not have to be coded in any particular order. Most of the time, there will not be more than one contributing object. Some of the time, there will be no contributing object, other than the primary object.
3. Do not code an individual type of object more than once for any particular injury.
4. If a person (self) is the sole object involved in the injury (e.g. some over-exertion injuries), the person (self) should be coded as the primary object.
5. A person can be a contributing object. If the description of the injury event implies that another person contributed to the injury, code this person as a contributing object.

Coding of Location

1. Select the category that best describes the location where the person was injured.
2. If 2 or more categories are judged to be equally appropriate, select the one that comes first on the code list.

Coding of Activity

1. Select the category that best describes the type of activity the person was involved in when injured.
2. If 2 or more categories are judged to be equally appropriate, select the one that comes first on the code list.
3. For sports injuries that occur in school environments, code these as sports: organized or unorganized.

Abbreviated Coding Schemes (Modification of the ICECI)

Intent

HBSC Code	Intent (pages 18-20; ICECI)	Corresponding ICECI Code (for reference purposes)
1	Unintentional	
2	Interpersonal (e.g. assault)	21-29
3	Intentional Self-harm	31-39
4	Legal intervention	4
5	Operations of war or civil insurrections	51-59
8	Undetermined	7
9	Other	6, any others

Mechanism

HBSC Code	Mechanism (pages 21-29; ICECI)	Corresponding ICECI Code (for reference purposes)
	Blunt Force	
1	Contact with blunt object	A1.1-A1.6
2	Application of bodily force	A2.1-A2.9
3	Crushing	A3.1-A3.9
4	Falling, stumbling, jumping	A4.1-A4.9
5	Blunt force: unspecified contact	A8-A9
6	Penetrating force	C1-C9
7	Other mechanical force	E1-E9
8	Thermal and Radiant Mechanisms	G1.1-G3.9
	Threats to Breathing	
9	Strangulation; asphyxiation	J1.1-J1.3
10	Drowning/Near Drowning	J2.1-J2.3
11	Confinement in oxygen deficient place	J3
12	Other specified threats to breathing	J8
13	Unspecified threats to breathing	J9
14	Therapeutic, surgical and medical care	L1.1-L9
15	Poisoning by, exposure to chemical substances	N1-N9
16	Physical over-exertion	P1-P9
17	Other and unspecified mechanisms	U1-U9

Object/Substance - use for coding primary and contributing objects

HBSC Code	Object/Substance Producing Injury (pages 30-49 ICECI)	Corresponding ICECI Code (for reference purposes)
1	Infant's or child's product	A01-A99
2	Furnishing	B01-B99
3	Household appliance	C01-C99
4	Utensil or container	D09-D99
5	Pedestrian	E01
6	Pedal cycle (bicycle)	E19
7	Animal, while used in transport	E05,E07
8	Other land vehicle used in transport	E21-E99
9	Special purpose vehicles, mobile machinery	F09-F99
10	Water craft and means of transport	G09-G99
11	Air craft and means of transport	H09-H99
12	Sporting Equipment	I01-I99
13	Tool, machine, apparatus	J01-J99
14	Animal	K29-K69,K95,K96
15	Plant	K07-K19
16	Person (self); only coded in instances when "self" is the sole object involved. Do not use this code in the contributing code categories	na
17	Person (other person(s))	K71,K75
18	Ground surface and conformations	L23-L99
19	Weather, natural disasters	M19-M99
20	Food, drink	N01-N99
21	Personal use item	O21-O99
22	Drugs, pharmaceutical substances	P01-P99
23	Chemical substance, non-pharmaceutical	Q09-Q99
24	Building, building component or fitting	R01-R99
25	Material	S09-S99
26	Weapon	T08-T99
27	Medical/surgical devices and procedures	U07-U99
28	Fire, flame, smoke	V09-V99
29	Miscellaneous object, substance	Z19-Z98
30	Unspecified object, substance	Z99

Location

HBSC Code	Place of Occurrence (pages 50-57; ICECI)	Corresponding ICECI Code (for reference purposes)
1	Home	1
2	Institutional area	21-29
3	Medical service area	31-39
4	School, educational area	41-49
5	Sports and athletics area	51-59
6	Transport area: street and highway	61-69
7	Transport area: other	71-72
8	Industrial and construction area	81-89
9	Farm	91-99
10	Recreational or cultural area or public building	101-109
11	Commercial area	111-119
12	Countryside	121-129
13	Other/Unspecified	13,14

Activity

HBSC Code	Activity When Injured (pages 58-61; ICECI)	Corresponding ICECI Code (for reference purposes)
1	Paid or unpaid work	1,2
2	Travelling	3
3	Sports: organized or unorganized	4,5
4	Leisure	6
5	Education	7
6	Health care	8
7	Vital activity	9
8	Being taken care of	10
9	Other/Unspecified	11-12

Decision Rules for Difficult Coding Issues – HBSC Survey

Variable	The Issue	Decision Rule
Intent	Coding of Sports Injuries	Sports injuries to be coded as unintentional, according to standard practice used in the various versions of the ICD coding of external cause. UNLESS: If there is a clearly stated indication that the injury was sustained as a result of an intentional act (i.e. there was an intent to injure), then code these sports injuries as intentional.
Mechanism	a) When multiple mechanisms are present, and the coder cannot decide which is most appropriate	a) Pick the mechanism that is most immediate to the injury event, e.g., if a fall from a tractor and then crushed by a tractor wheel, then code for the "crushing" rather than the "falling, stumbling, jumping"
	b) Physical overexertion, versus: falling, stumbling, jumping.	b) Physical overexertion is when the victim is exerting themselves beyond their capability (e.g., a soccer goalies is stretching for the ball, and pulls a muscle). However, we suggest that sports injuries where someone has explicitly stated that they have sprained or strained their ankle (or another body part) due to a trip or fall be coded as "falling, stumbling, jumping" injuries. All others – over-exertion.
	c) Application of bodily force versus contact with a blunt object, when humans are involved.	c) Application of bodily force is when the victim is assaulted or struck in some way by another person, or they strike or assault another person. All injuries that are consistent with these statements should be coded as "application of bodily force", and not "contact with a blunt object".
Object	When multiple objects contribute to the injury.	a) Code all injuries to the Canadian codes describing causes of injury. b) Code the object that directly causes the injury as the primary object (i.e. the object that is most immediately and directly responsible for the trauma, e.g.. a child is playing on the monkey bars and falls; the object producing injury is the ground.) c) Code up to two additional objects contributing to the injury (contributing objects), for cases when more than one object are involved in the injury

Example when "self" is the only object involved:

I was practicing for cross-country running, and stretched my groin.

Object involved: self

Primary Object: 11c Person (self)
No contributing objects

Example of three objects involved:

A child is playing in a tree-house, is pushed by another child, and falls to the ground.

Objects involved: ground, other person, tree-house

Primary Object:
12 Ground surface and conformations
Contributing Object 1:
11d Person (other person)
Contributing Object 2:
1 Infant's or child's product

(order of contributing objects 1 and 2 has no meaning)

Example of three objects, two from same category:

I was playing ice hockey, and was hit in the head by a shot.

Objects involved: puck, hockey stick, other person

Primary Object:
9 Sporting equipment
Contributing Object 1:
11d Person (other person)
Contributing Object 2:
None

(Don't count "sporting equipment" twice, so there is not double counting of any object).

If the descriptions imply that another person was involved in the injury event, code that person as a contributing object. This may involve some logical assumptions in some coding situations.

e.g., *I was playing baseball, and was hit by a ball.*

Primary object:
9 Sporting equipment
Contributing object 1:
11d Person (other person)

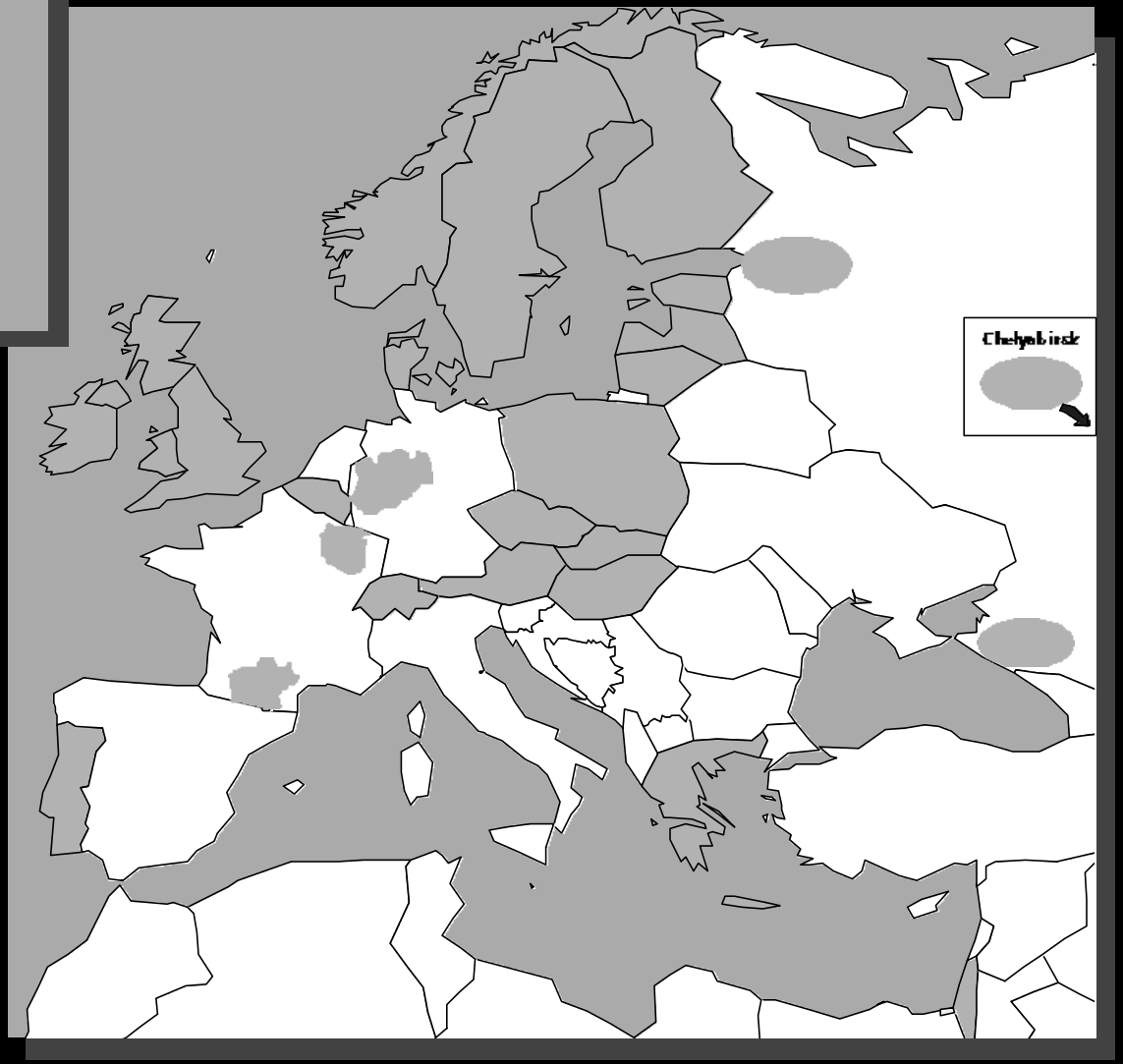
(Although the other person was not explicitly referred to in the description, common sense dictates that, in the vast majority of cases, the ball would have come from another person.)

Activity	Education versus organized sport	When an organized sport injury occurs at school, as denoted by the location code, it is to be coded as "sports: organized or unorganized" for the activity field.

Figure 1. Countries involved in the 1997-98 HBSC Survey, reproduced (with permission)

Health Behaviour in School-Aged Children

A WHO Cross-National Study 1997/98



Austria
Belgium Flemish
Belgium French
Canada
Czech Republic
Denmark
England
Estonia
Finland
* France (Nancy and Toulouse)
* Germany (Nordrhein-Westfalen)
Greece
Greenland
Hungary
Israel
Latvia
Lithuania
Northern Ireland
Norway
Poland
Portugal
Republic of Ireland
* Russia (St.Petersburg and district, Krasnodar, Chelyabinsk)
Scotland
Slovak Republic
Sweden
Switzerland
United States
Wales