Author's response to reviews

Title: A review of injury epidemiology in the UK and Europe. Some methodological considerations in constructing rates

Authors:

Roxana Alexandrescu (Roxana.Alexandrescu@postgrad.manchester.ac.uk)
Sarah J O'Brien (Sarah.O'brien@manchester.ac.uk)
Fiona E Lecky (Fiona.Lecky@manchester.ac.uk)

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Author's response to reviews: see over
Dear Editors,

We would like to thank you for giving us the opportunity to respond to the reviewers’ comments and to thank the reviewers for the useful suggestions and references that definitely improved the paper. Please receive the revised manuscript and the cover letter that includes the comments against each point raised by the reviewers below.

Roxana Alexandrescu  
Corresponding author
Reviewer: Emmanuelle Amoros

Reviewer's report:

General

The paper seems to have two objectives, as mentioned in the title: firstly, to provide incidences and characteristics of injuries in UK and Europe, and secondly, to discuss methodology for constructing incidence rates.

Maybe there should be two papers: one on methodology (about constructing incidence rates) and one on injury epidemiology results; within UK only? or within Europe? and each one should be more thorough.

You should clarify whether you deal only with studies dealing with injuries covering all types of causes, or studies dealing with injuries from any type of cause (road, home and leisure, occupational….)

Major compulsory revisions

About methodology:

It lacks of presentation of different measures of injury severity: at least those based on AIS: ISS indeed, but also NISS, and MAIS, and please provide at least some references about the pros and cons of each.

‘The AIS allows computation of several measures of injury severity that have been used in trauma research. These measures include Injury Severity Score (ISS) calculated by summing the squares of the highest AIS-scores in three body areas (22), Maximum Injury Severity Score (MAIS) which is the highest single AIS score (23,24) or the New Injury Severity Score (NISS) developed by Osler et al. in 1997 based on the three most severe lesions regardless of the body region (25). Moreover, in the middle of the 1990s, Osler introduced the ICD-9 based ISS (ICISS) that allows severity to be classified based on the ICD-9 classification of injuries (26). Injury Severity Score ICD-9 is a product of survival risk ratio from each injury sustained, based on the values of the survival rates of prior patients with similar diagnoses as classified by ICD-9. Hospital databases do contain ICD diagnoses and as a result there is opportunity to derive AIS severity scores ICISS for the estimation of injury severity (27). Apart from the measures based on AIS, it should be mentioned in this context…’
the Paediatric Trauma Score (PTS) – an injury scoring method specifically designed for children (28,29). It relies on a six point score calculated from weight, blood pressure, ability to maintain on airway, level of consciousness and presence of fracture/wound.

Several issues have been raised with regard to the use of any of these specific measures of injury severity. Injury Severity Score, for example, is ‘congenitally attached’ to the AIS score for calculation (30), add to this it does not take into account age or chronic preconditions and it is limited to one injury per body region (31,32). Injury Severity Score, MAIS and PTS only apply to physical injury and are not suitable for other events, such as drowning. Moreover, ISS and MAIS are derived from adult norms and consequently are not ‘child friendly’ (33). Although developed to correct some of the limitations related to ISS, NISS seems to be a measure ‘that tends to overstate severity for lesser injuries’ (31). With regard to ICISS, there is limited evidence on the validation and performance of this scoring method with ICD10 classification of injuries (33,34,35).

The issue of matching numerator with denominator needs more development. For instance, do the registries have an inclusion criteria based on the place of residence or the place of occurrence of the injury?

Page 13
‘This is the case of data provided by national registries (e.g., 21) that relies on a selection of hospital reporting on a voluntary basis; regional registries using patient inclusion criteria based on place of residence (93) or place of injury occurrence (83,90,91) or hospital discharge databases.’

And what about numerator estimation and denominator estimation? including the issue of registry completeness? And record-linkage with other sources? And methods such as capture-recapture to overcome incomplete registration?

Page 13-14
‘Another issue in the context of defining numerators and denominators for further calculation of population based rates is related to data quality. Although completeness and accuracy of the records fields within trauma registries have rarely been reported in the literature, there is evidence that validated trauma registries are a reliable data source for population based epidemiology (108,109). Apart from the validity, an other component of registry data quality is the completeness of case ascertainment defined as the proportion of all cases in the target population that appear in the data base (110). Case ascertainment rates of 90% of all major trauma (injuries ISS>15) for Victoria State trauma registry (111) or 87% of serious injuries (NISS9+) for French Rhone road trauma registry (90) have been shown in the literature. Use of methods such as capture-recapture through record linkage between several data sources (police records-trauma registry (112), police records-hospitalisation records (113) and hospitalisation records-police records, deaths certificates (114)) can overcome incomplete registration of injuries and provide extensive scientific data for population based epidemiologic research.’

In addition, what about some references of papers dealing with denominator estimation? (for instance Schlaud, Brenner et al, 1998, approaches to the denominator in practice-based epidemiology: a critical overview)

Thank you for the reference, it has been added.

Page 13
‘The definition of appropriate numerators and denominators is crucial for calculating population-based rates. This issue applies not only to injury research but also to the larger area of population based epidemiology. A number of approaches to determine the denominator or ‘population at risk’
have been described within the literature presenting data from the general practice (104,105) or from sentinel practice networks (106,107). Whereas use of the number of consultations (i.e., yearly or weekly contact group) has proved to be the step forward to determine the population practice, the ideal denominator seems to be the total population within a clearly defined geographic area, i.e., the practice catchment area (107).

About estimated incidences and characteristics of injury epidemiology:
There should be more comparison and interpretation.
I am afraid the literature review is not exhaustive for Europe. Only a few European countries are covered; is that really so? If you choose to keep a review of European studies, you should enlarge your bibliography: please mention/present at least IDB (Injury Database) that has been set up within European projects, as an enlargement to EHLASS programs (which you do mention).

The epidemiological profile, within the results and discussion sections, has been extended. The bibliography has been enlarged with English language research papers from Belgium (75), Romania (76), Poland (77), Spain (86), Sweden and Baltic States (87) and Germany (88). The European Injury Database has been presented in the background:

Page 3
‘In this context it is noteworthy the European Injury Database established in 1999, under the European Prevention Programme, as an enlargement to European Home and Leisure Accident Surveillance System. The purpose of this database is to provide access to national injury data collected from Emergency departments of Member States hospitals for the development of evidence-based injury prevention strategies (13).’

If you cover studies of any type of cause of injuries, then you should add a number (?) of European studies (for instance for road traffic injuries: Harris S, 1990, the real number of road traffic accident casualties in the Netherlands, a year-long survey, Accident Analysis and Prevention, …)
The review presents epidemiological studies covering injuries all types of causes.

Similarly, not all trauma registries across Europe are alike those you mention. When you discuss their limitations on page 8, this may only apply to UK registries (For instance, the French Rhone road trauma registry does include immediate (on-the-scene) deaths (ref= Laumon et al, a French road accident trauma registry: first results, 41St annual conference of AAAM, 1997)).
Thank you for the reference, it has been added.

Page 9-10
‘Moreover, there are trauma registries that include deaths on the scene, for example the French Rhone Road trauma registry covering injuries from road crashes in the Rhone county (90) or The PaEdiatric Network around TraumA registry that provides population-based data of injury in children and youngsters for the Flemish region (75).’

As mentioned above, you should clarify whether you include only with studies dealing with injuries covering all types of causes, or all studies dealing with injuries from any type of cause.
It has been clarified.

**Minor essential revisions**

You should clarify the end point of your literature search: 2008? (since one referenced study has been published in 2008)

Page2

‘The review summarizes research papers on the subject of population based injury epidemiology published from 1970 to 2008.’

Page5

‘Medline, EMBASE, and Cochrane Library electronic databases have been examined for English language European injury papers published from 1970 to 2008.’

Page 8 “decline in walking and cycling activities”: this should be documented; at least give the corresponding time frame, since very recently, in some European cities, cycling has developed again, in conjunction with large implementation of self-help bike rental

Page10

‘(declines in walking and cycling activities - based on national data, England and Wales, 1985-1995 (40,41)).’

Page 9: last paragraph: English mistakes.

The mistakes have been corrected.

Page11

‘Whereas no consistent results for children age groups at higher risk, a well-recognised pattern of higher fatal and serious injury rates in males up to 65y old then in females ≥ 65 years, has been shown in the papers reviewed (59,67,82,84).’

Please explicit RTC the 1st time you mention it.

Page3 ‘Road Traffic Collisions (RTC)’

Tables:

If there is a restriction on the cause of injuries, it would better be mentioned before the last column. Maybe in the type of study or in the “epidemiological observation” (for instance: school injuries, traffic injuries, assault injuries)

*No restriction of injuries related to causes or location of injuries.*

*The research studies that presented injuries of selected causes (traffic injuries Coupland et al (37), assault injuries (Sivarajasingam et al (57), Bellis et al (58)) as well as the article presenting school injuries (Scherer et al (65)) have been removed.*

(Page5

‘We excluded studies covering selected injury categories, for example sport related injuries, work related injuries (by location of injury), traffic accidents, assaults (by injury cause) or head injuries (by body region), as it was out of the scope of this paper to provide the epidemiological profile within a selected group of injuries.’)

Please add the type of data source, in the type of study or in additional column?

(sometimes you do somewhat: for instance “TARN”)

5
Please add the population size in the column “population”; it will tell us the size of the sample.

*When available, the population size has been added in the third column – denominator.*

Please be homogenous in the rate unit (per 100000; the population size will tell us on how many subjects the estimation is actually based)

*Done.*

**Discretionary revisions**

the alphabetical order may not be the most relevant: by region first? By Country within Europe.

*The articles have been tabulated (children and teenagers/general population) by region and country in UK and Ireland (Table 2,3) and by country in Europe (Table 4,5).*

Please provide age range of children or adolescents for each study rather than in the title and for some studies when different

*Done.*

Page 8: please explain “secondary data”

*Page 10*

‘(data collected by people other than the researcher in question, for example, public vital statistics records)’

Page 3: Please explain “finished consultant period”

*Page 3*

‘(i.e. a completed period of care a patient using a NHS hospital bed, under one consultant within one health care provider)’

Page 5 explicit Uk social class V and I

*Page 6-7*

‘Of note, the five basic social classes recognised by Office of Population Censuses and Surveys are described as follows: I Professional occupations; II Managerial and technical occupations; III Skilled occupations; IV Partly - skilled occupations and V Unskilled occupations (49).’

Page 6, 1st paragraph: incidence instead of occurrence?

*Yes, incidence changed instead of occurrence (page7).*

Tables: please be homogeneous in the words use.

For instance page 26 “body parts” whereas “body region” elsewhere

*Body parts changed to body region.*

“proportion by demographics” I assume it means gender and age? (which you have used previously)

*Yes, demographics changed to age, gender.*

Conditions of injury? Do you mean circumstances?
Yes, conditions changed to circumstances.

“event timing”=?
Page33
'(injury in relation to the interview date)'

“Ws”=?
Page 28
*Ws provides a measure of excess survivors or deaths per 100 patients treated at each site (hospital)*

MTOS=?
Page27
‘Major Trauma Outcome Study’

“regression” is too vague ; please specify what is the event of interest that is being modeled
Done.

Process of care? - the procedures carried out in the emergency department, hospital, their timing and seniority of doctors, brief details of operations etc
The tables include examples of process of care as used within the corresponding study, for example at page 28 ‘prehospital timing’ (62), ‘seniority of doctors’(63)

outcome? - used generally in terms of survival or deaths based on assessment at hospital discharge
The tables include examples of outcome as used within the corresponding study, for example at page 28/29 ‘died/alive’ (64)/ ‘death, persistent vegetative state, severe/ moderate disability, good recovery’ (65)

origin=? Is it “Cause type” that you have used elsewhere?
Yes, origin changed to type.

Table 2:
What do you mean by “article comments” in epidemiological shortcomings column?
Some of the article’s responses (“article comments”) have underlined study limitations. However, the article by Coupland et al (37) has been removed for the reason that presented data on traffic injuries only and not on all types of causes.

What does NSSEC class mean? 8 and 1? (for non–UK readers)
Page26
* National Statistics Socio-Economic Classification (NSSEC) is a new, occupational based classification that replaced starting with 2001 the social classes. The analytic eight class version is described as follows: 1 higher managerial and professional occupations, 2 lower managerial and professional occupations, 3 intermediate occupations, 4 small employers and own account workers, 5 lower supervisory and technical occupations, 6 semi-routine occupations, 7 routine occupations, 8 never worked, long term unemployed (48)*

What do you mean by “53% pick-up rate”?
Page27
*53% questionnaire response rate*
Reviewer: Kirsten McKenzie

Reviewer’s report:

**Minor essential revisions:**

**LIT REVIEW**

1. There is a growing body of work describing the use of ICD for injury severity assessment (ICISS) and the literature review should provide more detail regarding this approach to injury severity (given the focus on hospitalisation data as a source of injury surveillance data).

   *Injury Severity Score based on ICD-9 has been presented in the background section.*

   Page 4-5

   ‘Moreover, in the middle of the 1990s, Osler introduced the ICD-9 based ISS (ICISS) that allows severity to be classified based on the ICD-9 classification of injuries (26). Injury Severity Score ICD-9 is a product of survival risk ratio from each injury sustained, based on the values of the survival rates of prior patients with similar diagnoses as classified by ICD-9. Hospital databases do contain ICD diagnoses and as a result there is opportunity to derive AIS severity scores ICISS for the estimation of injury severity (27)... With regard to ICISS, there is limited evidence on the validation and performance of this scoring method with ICD10 classification of injuries (33,34,35).’

**METHODS**

2. The methods need to describe in more detail the process for including/excluding articles (detailed specifications regarding what was in scope and out of scope) and the number of articles that were identified prior to the review process.

   *The methods section has been changed to present inclusion/exclusion criteria for the literature review.*

   Page 5

   ‘Medline, EMBASE, and Cochrane Library electronic databases have been examined for English language European injury papers published from 1970 to 2008. Search terms used included: “descriptive epidemiology injury/ trauma”, “injury population based study”, “injury morbidity/mortality”, “injury incidence/deaths” and “injury surveillance”. The review presents epidemiological studies covering injuries all types of causes. Since the primary aim was to identify comprehensively the literature focusing on the epidemiology of all injury (fatal and/or non-fatal) in UK, the papers identified from the search located in England, Wales, Scotland or Northern Ireland were cross-referenced and further reviewed. Studies from Europe were included if they present the epidemiological profile of all causes of injuries. We included papers that present data in the general population as well as within specific age groups (e.g., children, adolescents). We excluded studies covering selected injury categories, for example sport related injuries, work related injuries (by location of injury), traffic accidents, assaults (by injury cause) or head injuries (by body region), as it was out of the scope of this paper to provide the epidemiological profile within a selected group of injuries.’
The electronic search of databases yielded 154 papers, 122 provided by Medline, 32 from EMBASE and no relevant article from the Cochrane library. A further selection of the articles based on abstract shows that 71 were relevant to the subject of this literature review, excluding duplicates this gave a total of 48 papers.

3. There needs to be a general summary at the beginning of the results outlining the number of papers reviewed, the overall number that focused on national level data vs local data, and the overall number using each data source (i.e mortality, hospitalisation, A&E).

Forty-eight articles have been reviewed: 18 focused on national level data and 30 focused on local level data; 29 papers had used mortality data, 30 papers - hospitalization data and 19 papers - A&E data. Two or more data sources have been used by 21 papers.