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Title: **ICECI Technical Update: developments since the adoption of ICECI into WHO-FIC with alpha status in October 2002**

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Purpose: (for information, discussion or decision)

Abstract: (no more than 200 words)

The International Classification of External Causes of Injury version 1.1 (ICECI) was accepted into the alpha phase of the process for admission into the WHO Family of International Classifications at the October 2002 meeting (Brisbane).

Technical updates and developments of the ICECI system since that time are described in this paper. These are:

1. ICECI system update to version 1.1a.
2. Indexing: Proof-of-concept of flexible indexing method. Production of index.
3. ICD to ICECI bridge: updated to ICECI version 1.1a
4. ICECI System Repository: Concept and draft specifications produced.
5. ICECI User Training Application: Initial version developed and released for testing.

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## INTRODUCTION

Version 1.1 of the International Classification of External Causes of Injury (ICECI) was presented to the October 2002 (Brisbane) meeting of the Heads of WHO Collaborating Centres for Health Classification. The ICECI was accepted into the WHO Family of International Classifications with alpha status.

Developments since that meeting include arrangements for ICECI governance and administration, and technical developments. This paper provides a survey of the technical developments.

## TECHNICAL DEVELOPMENTS

### 1. ICECI SYSTEM UPDATE TO VERSION 1.1a

ICECI Version 1.1 was completed prior to the WHO-FIC meeting at Brisbane, in October 2002. Comments received during and after that meeting, particularly including comments from WHO officers, have been incorporated into the system. The resulting version has been designated ICECI 1.1a. The ICECI Coordination and Maintenance Group (CMG) approved this version at its meeting on 15 April 2003 for release via the ICECI website (ICECI Coordination and Development Group, 2003).

ICECI Version 1.1a has been produced in two formats:

- For printing: Adobe Acrobat format (.pdf)
- For uses in electronic form: Microsoft Excel format (.xls)

### 2. INDEXING

A conceptual model for flexible indexing of the ICECI was proposed at the CMG meeting in April 2003, and at the meeting of the International Collaborative Effort on Injury Statistics in the same month. The CMG agreed that this approach to indexing warranted exploration.

The flexible indexing model was prompted by recognition that some of the design characteristics central to the value of the ICECI would complicate a conventional approach to indexing. For example, ICECI is modular and hierarchical. It is designed in this way so that users with a particular application in mind can opt to use all, or only some, of the ICECI coding modules and items for a particular application. The user can also decide whether each ICECI item selected for an application will coded to Level 1, Level 2 or Level 3 of the hierarchical coding tree. (The number of levels currently available varies between items).

An index generated in a conventional way would be specific to a particular configuration of the ICECI (ie to a particular combination of modules, items and coding levels). An index generated for the whole ICECI system (ie all items in all modules, all at the finest available level) could, in principle, be used for implementations in which only part of the system are applied, but it would be inconvenient.

Efficiency of maintenance and updating was another consideration prompting adoption of a flexible-indexing model. The heart of a classification system such as the ICECI is the data dictionary. Indexes are one form of user aid, derived from the dictionary and specific to a particular version of it. While formal ICECI version updates will be released occasionally, the data dictionary will be in a more-or-less constant state of review and change, in preparation for revisions. It is desirable to adopt a method for index preparation which is rapid and which minimises the person-time required for updating and checking for consistency between index and underlying data dictionary.

It was recognised that indexes produced by an automatic or largely automatic method would be unlikely to be as easy and pleasing to use as a indexes produced by an expert human indexer. Hence, it was anticipated that a flexible indexing system should be able to produce basic indexes rapidly. While these would be sufficient for some purposes (eg during development work; for low-budget or brief uses of ICECI), some other purposes might warrant a more refined index (eg major release versions). In these instances, a human indexer would be engaged to refine the product of the automated system.

Consultation, design and testing undertaken by the AIHW National Injury Surveillance Unit have developed the approach to proof-of-concept stage. An indexing system has been produced which enables rapid, semi-automatic production of an index for any combination of ICECI modules, items and levels. An index can be specified and produced within a few minutes. Alterations to the underlying data dictionary (eg addition, alteration or removal of a category or synonym term) can be implemented in a revised index equally promptly. The design of the method integrates data dictionary and index production in a manner that ensures consistency between the two.

The indexes produced by this system are useable now. The addition or improvement of synonym entries and cross-references will achieve incremental improvement. It is envisaged that a refined version of the indexing system will form part of the planned ICECI System Repository (see point 4, below). A set of indexes will be part of the next formal release of ICECI (likely to be designated version 1.2). They will be a refined version of the indexes that have now been produced.

### 3. ICD to ICECI BRIDGE: Update to ICECI version 1.1a

The coding bridge between ICD-10 and ICECI has been updated from ICECI version 1.0 to ICECI version 1.1a.

### 4. ICECI SYSTEM REPOSITORY: concept and specifications

Indexing is one of a set of technical tasks for maintenance and development of the ICECI:

(A) Version development

(B) Version control (including translations)

(C) Indexing

(D) User access

(E) User training support

(F) Coordination of these tasks

Planning and developing the flexible indexing method for the ICECI (section 2, above) prompted recognition that an integrated approach to these tasks would simplify maintenance and development of the ICECI, and reduce the burden of doing so.

This project is now at the stage of a draft design brief, which is summarised below. Refinement of the model and proof-of-concept work is in progress. Further development will follow consultation within the ICECI Coordination and Maintenance Group. An outline of the draft design brief (version 0.2) follows.

## I Aim

To house the ICECI system in a soundly designed relational database which will facilitate maintenance, revision, version control (of updates and of language-specific equivalents of a version), indexing, access and dissemination.

## II Functional description

### (A) Version development

Provide a mechanism to coordinate, facilitate and document changes to the ICECI system. Changes include:

- Addition of new ICECI components (ie categories, items, modules)
- Changes or additions to the attributes of existing ICECI components (eg changes to content or status; addition of translated equivalents; addition of attributes)

Functional requirements for version development include:

- Receiving and recording proposed changes
- Facilitating decision-making concerning proposed changes
- Recording decisions concerning proposed changes
- Facilitating changes to ICECI which are required to implement decisions

### (B) Version control

Provide a mechanism to facilitate management of multiple versions of the ICECI system, and of components of the system. Versions include:

- Update versions: versions that succeed one another over time.
- Language equivalent versions: parallel versions, which have ICECI components in common. They differ in that labels and other human-readable elements are represented in a different language in each language-equivalent version. A language equivalent belongs to a particular Update version.

- Subset versions: Particular 'short-forms' of the ICECI system, in which a defined subset of ICECI components is used. A subset version belongs to a particular Update version.

Version control will operate at the level of individual ICECI components, and at the level of the system. A version of an ICECI component (eg a particular category) can be specified in terms of an internal ICECI component identifier (eg C.2.12.1.1), a status (meaning, for example 'draft', 'current', or 'superseded') and the dates during which this status applied, or applies. A version of the ICECI system (eg 'Version 1.2') can be defined as all ICECI components with a particular status (eg 'current') at a particular date. All previous versions of components should be retained within a reference repository. Among other things, this will enable previous versions of the ICECI system to be recreated, and will facilitate inter-version mapping.

**(C) Indexing**

Electronic look-up facilities can reduce dependence of users of systems like the ICECI on formal indexes. However, the ICECI is likely to continue to be used in paper-based implementations for the foreseeable future. Furthermore, indexes can provide guidance to coders and users of coded data going beyond that which is typically provided by look-up facilities (eg cross-references and management of synonymous terms).

It is desirable for indexes to be closely integrated with the ICECI system that they reflect. This is important for the reliability of indexes, and for the efficiency of their production.

Functional requirements for indexing ICECI include:

- a method for specifying index terms for ICECI components and for holding these (indexing terms are version-specific)
- a repository for index terms, linked to the ICECI components to which they refer
- a means to select ICECI version, modules, items and coding levels for inclusion in an index, and to produce a corresponding index quickly and easily.
- a means to format, export and save indexes in common file formats (eg .doc, .pdf).

**(D) User access**

For the foreseeable future, the main mode of access to ICECI for users and intending users is expected to be the World Wide Web. The ICECI System Repository will be designed to provide open access to certain functions and information via a Web interface:

- Select and down-load the whole ICECI system, or a subset of interest (ie some modules and items). Down-loads will be available formatted for printing (eg .doc or .pdf files), and for use in electronic systems (eg .xls or .csv files).

- Select and down-load indexes
- ICECI on-line search look-up facilities
- A way for users to lodge error reports and recommendations for development

**(E) User training support**

Stand-alone training support applications (such as the one described in item 5, below) have the limitation that they typically lose currency when the system to which they refer is updated. Also, it tends to be difficult to ensure that users benefit from enhancements and corrections which are implemented after the release date of the version of the application which they happen to have acquired. Finally, opportunities for users to share their knowledge and experience are limited with stand alone applications.

We envisage a version of an ICECI user training application that is linked to the ICECI system repository (mainly to ensure that it is up to date) and which has a web-interface. The interface would provide similar functions to the stand-alone version. In addition, it would be designed to receive input from users (eg additional example cases; comments on worked examples).

**(F) Coordination of these tasks**

Effective maintenance and support of the ICECI system requires that the functions described here are coordinated. Efficient coordination is essential if the task of maintenance and support is not to be burdensome. Efficient coordination can be achieved by integrating these tasks into a relational database structure.

The structure will be designed to support the functions described in sections (A) to (E). Implementation may be modular, starting with a core component, providing basic functions (eg repository and version control) to which other functions can be added later. Other desired qualities are a design that facilitates system expansion and evolution over a long period; good documentation; robustness and security; and placement in the public domain, with avoidance of dependence on proprietary software.

## 5. ICECI USER TRAINING APPLICATION

Some features of the ICECI, such as its multi-axial and hierarchical design, are not necessarily familiar to potential users. Similarly, the way in which it can be used to code cases is not easily inferred from its data dictionary.

An ICECI User Training Application has been developed, which is intended to provide a more intuitive and experiential way for initial familiarisation with the ICECI.

The application was written by Dr Raymond Cripps, of the AIHW National Injury Surveillance Unit, Adelaide, Australia. At the time of writing, the application incorporates the Core, Sport and Transport modules of ICECI

version 1.1a, and provides for coding these to hierarchical Level 1 or Level 2 (Level 3 will be added).

In its present form, the application includes a set of one hundred brief descriptions of hypothetical injury events. Users of the application can code these sample cases by means of cascading pick-and-choose lists of categories. At the end of the process, the application presents a summary of selected category codes and labels, along with the case description. Planned future developments include worked examples with feedback to users on the quality of their coding.

The application is presently available as an alpha version for comment and testing. We anticipate that it will be made available via the ICECI web-site.

## DISCUSSION

Technical development of the ICECI system during the period since October 2002 has delivered noteworthy products, and planned others.

Delivered products are:

- an updated version of the ICECI system (Version 1.1a);
- an index for this version
- proof-of-concept implementation of a method for flexible indexing
- an updated version of the ICD-ICECI coding bridge
- a draft version of a user training application

The main foreshadowed product is an electronic ICECI System Repository. Planning and consultation to date is embodied in the design brief. Several of the delivered products, listed above, implement functions planned for inclusion in the Repository system.

## REFERENCE

ICECI Coordination and Development Group (2003). International Classification of External Causes of Injuries (ICECI) version 1.1a. Consumer Safety Institute, Amsterdam and AIHW National Injury Surveillance Unit, Adelaide.