

## **Appendix 6 – Changes in Cause of Death coding**

### **Change from ICD-9 to ICD-10**

The Tenth Revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) was approved by the World Health Organization in 1989 and has been available for implementation since 1989. The General Register Office for Northern Ireland introduced ICD-10 to replace ICD-9 for classifying deaths from 1 January 2001.

The International Classification of Diseases (ICD) is used to code and classify mortality data from death certificates. The ICD-10 is copyrighted by the World Health Organization (WHO), which owns and publishes the classification.

ICD-10 was developed following a thorough evaluation by a Technical Advisory Panel and extensive additional consultation with physician groups, clinical coders, and others to assure clinical accuracy and utility.

### **How does ICD-10 compare to ICD-9?**

The primary intent of developing new revisions is to incorporate advances in medical knowledge. Each successive revision has a similar core to the previous revision. Compared with ICD-9, ICD-10 has:

- used alphanumeric codes instead of numeric codes (e.g., code for diabetes mellitus was 250 in ICD-9 and is E10-E14 in ICD-10);
- moved some conditions around the classification (e.g., hemorrhage has been moved from the circulatory chapter in ICD-9 to the symptoms and signs chapter in ICD-10);
- expanded details of many conditions (e.g., viral hepatitis has been expanded from ICD-9 070, a single 3-digit category, to ICD-10 B15-B19, five 3-digit categories);
- modified coding rules (e.g., the ICD-9 "Old pneumonia, influenza, and maternal conditions" and "Error and accidents in medical care" coding rules have been eliminated)

In total ICD-10 has 21 chapters with alphanumeric categories and subcategories compared with 17 chapters in ICD-9. ICD-10 has an expanded scope, compared to ICD-9 including conditions and situations which are not diseases but represent risk factors to health, such as occupational and environmental factors, lifestyle and psycho-social circumstances.

## The structure of the ICD10 code

The ICD10 code uses a 3 or 4-character alphanumeric code. For example 'malignant neoplasm of stomach' has changed from 151 in ICD9 to C16 in ICD10. As previously, a fourth digit may be used for sub-categories. The introduction of an alphabetic first character greatly increases the potential number of codes available. In fact ICD10 uses a total of some 8,000 unique codes, over 3,000 more than ICD9. Nevertheless there is still scope within the coding framework for future expansion of the classification for new diseases and more specific diagnoses. It should be noted that the first character of the code, the letter, does not always relate to an individual chapter.

## Extra chapters and chapter renumbering

A second obvious change is that the number of chapters increased and the order of chapters rearranged. See the tables below:

### ICD-9

Chapter	Code range	Description for ICD-9
I	001–139	Infectious and parasitic diseases
II	140–239	Neoplasms
III	240–279	Endocrine, nutritional and metabolic diseases and immunity disorders
IV	280–289	Diseases of blood and blood-forming organs
V	290–319	Mental disorders
VI	320–389	Diseases of the nervous system and sense organs
VII	390–459	Diseases of the circulatory system
VIII	460–519	Diseases of the respiratory system
IX	520–579	Diseases of the digestive system
X	580–629	Diseases of the genitourinary system
XI	630–676	Complications of pregnancy, childbirth and the puerperium
XII	680–709	Diseases of the skin and subcutaneous tissue
XIII	710–739	Diseases of the musculoskeletal system and connective tissue
XIV	740–759	Congenital anomalies
XV	760–779	Certain conditions originating in the perinatal period
XVI	780–799	Symptoms, signs and ill-defined conditions
XVII	800–999	Injury and poisoning
E	E800–E999	Supplementary classification of external causes of injury and poisoning

## ICD-10

Chapter	Code range	Description for ICD10
I	A00-B99	Certain Infectious and parasitic diseases
II	C00-D48	Neoplasms
III	D50 - D89	Diseases of the blood and blood forming organs and certain disorders involving the immune mechanism
IV	E00 - E90	Endocrine, nutritional and metabolic diseases
V	F00 - F99	Mental and behavioural disorders
VI	G00 - G99	Diseases of the nervous system
VII	H00 - H59	Diseases of the eye and adnexa
VIII	H60 - H95	Diseases of the ear and mastoid process
IX	I00 - I99	Diseases of the circulatory system
X	J00 - J99	Diseases of the respiratory system
XI	K00 - K93	Diseases of the digestive system
XII	L00 - L99	Diseases of the skin and subcutaneous tissue
XIII	M00 - M99	Diseases of the musculoskeletal system and connective system
XIV	N00 - N99	Diseases of the genitourinary system
XV	O00 - O99	Pregnancy, childbirth and the puerperium
XVI	P00 - P96	Certain conditions originating in the perinatal period
XVII	Q00 - Q99	Congenital malformations, deformations and chromosomal abnormalities
XVIII	R00 - R99	Symptoms, signs and abnormal clinical and laboratory findings, n.e.c.
XIX	S00-T88	Injury, poisoning and certain other consequences of external causes
XX	V01 - Y98	External causes of mortality
XXI	Z00-Z99	Factors influencing health status and contact with health services

Note: The 'Nature of injury' chapter (XVII in ICD9 and XIX and XXI in ICD10) is not used to classify underlying cause of death. For example the terms 'multiple injuries' or 'skull fracture' would never be used as an underlying cause, but the relevant external cause would.

### Title changes, regroupings and restructuring

Throughout the classification there have been numerous title changes and regroupings. Examples of title changes are 'chronic obstructive pulmonary diseases and allied conditions' in ICD-9 which becomes 'chronic lower respiratory diseases' in ICD10. Another example is the change from ICD-9 'suicide and self-inflicted injury' which becomes 'intentional self-harm' in ICD-10.

Notable regroupings include 'transient cerebral ischaemic attacks' which has moved from Diseases of the Circulatory System (ICD9, Chapter VIII, code 435) to Diseases of the Nervous System (ICD10, Chapter VI, codes G45.8 and G45.9), and 'myelodysplastic syndromes' which has moved from Diseases of Blood and Blood Forming Organs (ICD9, Chapter IV, code 298.8) to Neoplasms of Uncertain Behaviour (ICD10, Chapter II, code D46).

Transport accidents serve as an example of restructuring. In ICD9 the main axis of the classification was by type of vehicle involved whereas in ICD10 they have been grouped by the characteristics of the person injured (pedestrian, cyclist, car occupant, etc.).

### **New areas covered**

New areas covered include recently identified conditions such as AIDS/HIV and many chromosomal abnormalities. Additionally, there is much greater detail for certain important conditions, for example acute myocardial infarction. There is also a substantial increase in the number of codes covering perinatal conditions.

### **Selection and modification rules**

The selection and modification rules have been changed significantly for ICD10. The most important change is to selection Rule 3, which covers the circumstances where particular conditions can be assumed to be a direct consequence of another condition, reported on the death certificate. In ICD10 the wording of Rule 3 is similar to that in ICD9. However, there are further explanatory notes in ICD10 that substantially widen its scope. Of most significance is a note referring to pneumonia and bronchopneumonia. Another important change to the application of the rules concerns the way in which the primary site of malignant neoplasms is selected, and in particular the creation of a new code (C97) covering 'malignant neoplasms of independent (primary) multiple sites'.

### **Bridge-coding exercise**

Following the introduction of ICD-10 in 2001, the General Register Office currently plan to bridge code for one year only (2000). Results from this exercise are expected to be published in the 2002 Registrar General Report. However, the results of a mapping from ICD-9 to ICD-10 carried out in Australia showed that, of a total of 13,600 ICD-10 codes, 50.8% were more specific than the ICD-9 codes, 31.5% were as specific, and only 11.5% either were less specific or could not be compared. This increased specificity contributes to more relevant data for epidemiological research and decision-support purposes. Gains in the level of specificity also increase the sensitivity of the classification when making refinements in applications, such as grouping methods.

## **Ongoing Maintenance and Updating**

Adaptability, maintenance and updating are critical if a classification system is to be dynamic enough to be used in our rapidly changing world. Unlike previous revisions, ICD-10 allows for enhancements to accommodate newly discovered diseases, such as AIDS. WHO has established an ongoing maintenance and updating process that ensures input from member states as well as from interested professional bodies. In addition, there are plans to share updates internationally by means of the latest technology. This enhances the long-term viability of the classification system.

## **Consequences of ICD-10 for Registrar General's Annual Report**

The Registrar General's Annual Report currently includes tables with backdated information on deaths by cause for a number of years. In the 2001 report these tables are:

- 6.1 - Deaths by cause, 1992 to 2001
- 6.5 - Deaths by frequency of cause, percentages, 1980 to 2001
- 6.6 - Death rates from malignant neoplasms of trachea, bronchus and lung, by sex and age, 1960 to 2001
- 6.7 - Death rates from malignant neoplasms, by sex, age and selected sites, 1960 to 2001
- 6.8 - Death rates from heart disease and ischaemic heart disease, by sex and age, 1960 to 2001
- 6.9 - Deaths from road transport accidents, by sex and age, 1981 to 2001

Future mortality statistics will be in ICD-10 only. However, at certain aggregate levels, comparable summary statistics can be produced to aid the analysis of trends, this has been done for the above-mentioned tables. NISRA are conducting a bridging exercise by coding deaths in 2000 using both ICD9 and ICD 10. This will aid the interpretation of trend data that spans the introduction of ICD 10.

Care should be taken when comparing statistics up to and including 2000 with statistics from 2001 onwards because of the possible effects on the introduction of automatic coding, which is explained below.

Scotland introduced ICD-10 for all deaths coded from the 1<sup>st</sup> January 2000 onwards and they found that many death certificates, particularly for the elderly, record pneumonia or bronchopneumonia in Part I with other major chronic and degenerative diseases given in Part II. The wider scope of Rule 3 therefore, even as amended, leads to an increase in the number of deaths classified to strokes, neurological diseases and a wide range of chronic conditions and a consequent reduction in the numbers classified to the pneumonia category. To a lesser extent similar changes are observed for other terminal causes such as pulmonary embolism.

## **Classifying cause of death**

Traditionally, tabulations of mortality statistics have presented information based on a single cause for each death and the early international classifications were devised to categorise the single cause normally reported on death certificates. However, as the medical profession began to report more than one condition on certificates, it became necessary to develop rules to select a principal or 'underlying' cause.

International Classification of Disease defines the underlying cause as

- a. The disease or injury which initiated the train of morbid events leading directly to death, or
- b. The circumstances of the accident or violence, which produced the fatal injury.

There are also a number of modification rules, which apply to particular conditions, combinations or circumstances even when the certificate has been completed properly. For example two or more mentioned conditions may be linked to derive a composite underlying cause, or a trivial condition unlikely to cause death may be rejected in favour of a more serious condition. Changes to the selection and modification rules can have significant effects on the underlying causes chosen.

## **ICD-10 and Automatic Death Coding**

This year in addition to the change to ICD-10 the General Register Office, also changed to the use of Automatic Coding Software. Over 30 years ago, the National Center for Health Statistics (NCHS) in the United States began to develop software that would assign ICD codes to the causes reported on death certificates and consistently apply the rules for choosing the underlying cause. The aim of automated coding is the correct and consistent application of the complex coding rules set out in the ICD. The system uses a set of detailed decision tables developed by coding, classification and medical experts. Although automated coding works well, trained coders are still required to check and edit the input data and to resolve uncertainties and ambiguities.

The suite of programs developed by NCHS is now used by an increasing number of countries around the world including Northern Ireland, where it was introduced for 2001 registered deaths.