# Action guide on implementing automated coding (Iris)

This *CRVS action guide* is edited from the module 'Coding causes of death to statistical categories' from Topic 4 of the CRVS Learning Centre available at https://crvsgateway.info/learningcentre

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## How can automated coding improve mortality statistics?

Reliable knowledge on the mortality and causes of death in a population are critical for policy making. Ideally, analyses are based on the **underlying cause of death,**[1] which is recorded on the medical certificate of cause of death. However, it is estimated that 140 countries with 80% of the world's population do not have reliable cause of death data.

Mortality coding is a complex process by which all diseases and conditions recorded on a death certificate are transformed from text to alpha-numeric codes, following strict procedures as set out by the International Classification of Diseases 10th Revision (ICD-10).[2] To be able to do this correctly **mortality coders have to be well trained in ICD-10 rules and regulations.**

### What are ICD-10 codes?

The International Statistical Classification of Diseases and Related Health Problems, 10th Revision, or ICD-10, is a statistical classification that groups similar diseases into mutually exclusive categories by translating text (cause of death) into alphanumeric codes. Coding is done for the purposes of storage, retrieval and analysis of COD data.

Using coding software to automate the coding process can improve the quality and consistency of data by applying standard coding rules. And, because of the instantaneous nature of automated coding, it makes data dissemination timelier.

Many countries use Iris, an automatic system for coding multiple causes of death and for selecting the underlying cause of death.[3]

Iris is based on the International Form of Medical Certificate of Cause of Death provided by the World Health Organization (WHO) in Volume 2 of ICD-10. The aim of Iris is to improve the quality and comparability of mortality statistics by coding causes of death according to the ICD-10 rules.[4]

### What is Iris?

Iris is an automated coding software that allows death certificates to be coded according to ICD-10 rules and standards. Iris has been installed in a number of European Union countries, as well as by the Office for National Statistics in the United Kingdom and by Statistics Canada. In the Asia-Pacific region it is used by the Australian Bureau of Statistics and the Fijian Statistical Office. The Philippines is the first country in Asia to implement Iris: another BD4H initiative.

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1   The underlying cause of death is 'the disease or injury which initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury' (WHO 1994).

2   World Health Organization. International statistical classification of diseases and related health problems. 10th revision, 10th edition. Geneva, Switzerland: WHO; 2016.

3   Prieto JC, García MRG. Iris: International automatic coding system of causes of death. Its use in the Spanish mortality statistics. *Boletin de Estadistica e Investigacion Operativa* 2016; 32:130-147.

4   Iris Automated Coding System for Causes of Death: User's Reference Manual (Iris version V5.4.0S1). Cologne: IRIS Institute, German Institute of Medical Documentation and Information; 2017.

# Action guide – key tasks and challenges



## Step 1: Information gathering

Prior to doing a process map (see Step 2), it is important that countries gather all the relevant background information on current certification and coding practices. Types of information to gather include:

- The government departments responsible for producing vital statistics and coding of death certificates.

- If data on certification is entered into a database or spreadsheet, and where this can be accessed.

- If coding of death certificates is performed, and if so, where (ie national, regional, local hospitals).

- Training that is available to coders.

- The classification in use for coding, how ICD updates are applied, and where coded data is stored.

- Any quality assessments on coding that have been performed, and if there are pathways for coders to query certifiers in case of coding problems.

As part of the Bloomberg Philanthropies Data for Health (BD4H) Initiative, a checklist of basic requirements that should be in place before implementing Iris has been developed (**Box 1**).

### Box 1: Basic requirements for Iris implementation

- Use of the WHO International Form of Medical Certificate of Cause of Death.
- Use of the ICD-10 for mortality coding.
- Enough trained mortality coders (with access to ongoing training).
- A local language dictionary is available or can be developed.
- Local information technology (IT) support is available for implementation, maintenance, and development of interfacing computer programs.



## Step 2: Process mapping

A process map (**Box 2**) should be undertaken to determine:

- how the death certificates will be inputted into Iris (code entry or text entry mode),

- how and when the Iris batch processing software will be run,

- how to notify Iris which data dictionary to use (adults, fetal or neonatal),

- if the software should perform other calculations such as the date of death of the decedent, and what other information is needed to do so,

- how rejected records will be handled or resolved, and

- how the coded files from Iris will be imported back into the national civil registration and vital statistics (CRVS) system. Generally, an interface software program is designed in advance to perform these tasks, but it must be tested until the system flow is smooth and complete.

### Box 2: What is process mapping?

Process mapping is one of the tools used in enterprise architecture to describe and analyse the business architecture of a system. It is a systematic and standardised approach that CRVS stakeholders can use to understand, analyse and optimise processes within complex systems, to achieve intended system goals. A process map is a visual snapshot of the end-to-end activities, stakeholders and requirements of a CRVS system.[5]

Improving death certification and mortality coding

**1** ─── **2** ─── **3** ─── **4** ─── **5**

## Step 3: Data dictionary

A country-specific data dictionary needs to be created that assigns the corresponding ICD-10 code to the text-based cause of death - written in the country's official language.

English, French, German and Swedish versions of the dictionary have been developed and may be used freely. However, if these dictionaries are adopted, a country would still need to adjust its dictionary to take care of differences in epidemiological profiles and local terms used (text expressions) to describe causes of death, which will likely vary between the two countries. For example, the standard Spanish dictionary for Iris would need to be modified for certain Spanish speaking countries that have their own local version of Spanish, such as Peru. Also, the use of different dialects by large groups of the population would also require modifications to the data dictionary.

It is strongly recommended that countries use and adapt Iris dictionaries that have already been developed by other countries that use the same language. Iris has an iteration process whereby each rejection of an individual death record informs the development of the local dictionary so that once rectified, the dictionary can be expanded and tailored to the local context.

**1** ─── **2** ─── **3** ─── **4** ─── **5**

## Step 4: Rejected records

As part of the implementation, testing and improvement of Iris, it is common for many individual death certificates to be rejected in the beginning. What is important is that countries address the underlying problem causing rejection, and have a system in place to manage such records. Common reasons for rejected death records include:

- Non-standard expressions for causes of death, including abbreviations and data entry errors when the record was created.

- Non-standard sequence of events. Physicians do not always put the series of causes or events that led to the death in the correct order on the death certificate, or they are not listed on separate lines of the death certificate.

- Interval reasons. When several diseases are reported on the death certificate, but the duration of each disease is not stated, or the duration for one or more diseases is missing, or it is unclear to which diseases the duration listed applies to.

- Main injury missing in countries that require it. For example, if the death was due to a skull fracture from a road traffic accident, the underlying cause of death would be the road traffic accident. If the skull fracture is not also listed on the medical certificate as the main injury, the record will be rejected by Iris.

- Missing cause of death. If the dictionary is adapted from another country, but is not updated to local epidemiological circumstances, the cause of death listed will not be in the data dictionary.

- Incorrect type of death certificate. If an adult death certificate is used for perinatal deaths, the record will be rejected by Iris.

Although some of the reasons Iris rejects individual death records will be resolved by updating the country data dictionary, there are other rejected records that will require experienced manual coders to review them. It is therefore crucial to keep a minimum number of experienced manual coders to handle Iris-rejected individual death records.

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## Step 5: Training

Once Iris is being used, it is still important to retain a cadre of trained coders to assess rejected records and perform periodic quality controls to ensure the data is being input and coded correctly.

It is also important that local IT staff are trained in the installation and use of Iris, as they will be responsible for developing interfacing computer programs (such as those to transfer data on death certificates into Iris, and to then transfer the coded data from Iris to local mortality databases).

Improving death certification and mortality coding

## Summary

Mortality coding can be a complex, time-consuming, and costly process.  To address this, many countries are using automated software to generate more reliable and timely cause of death data.  One such software is Iris, which allows users to either enter ICD-10 codes, or to enter the causes in free text to then be assigned codes and an underlying cause of death.

However, there are a number of steps countries should take before implementing Iris. A complete system mapping and design process should be completed, along with the development of a country-specific data dictionary that maps causes of death in the language the local death certificates are completed in, to their corresponding ICD-10 codes.  Additionally, countries will need to formulate a plan for dealing with rejected individual death records, and to correct some of the system processes that are causing them.

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