

# Strengthening Civil Registration and Vital Statistics (CRVS) Systems

GUIDE 3



## Implementing **ICD Mortality Coding** in the CRVS System



# Preface

## About the Strengthening CRVS Systems Guides

The Strengthening CRVS Systems Guides provide best-practice guidance for specific aspects of a civil registration and vital statistics (CRVS) system. Drawn from international standards and concepts, the guides provide users with practical and operational advice and strategic planning support for targeted CRVS system improvements.

## International Classification of Diseases (ICD) Mortality Coding

CRVS systems are concerned with the legal registration of vital events, and the collection and statistical analysis of data related to these vital events in the population. A well-functioning CRVS system, among other tasks, registers all births and deaths, issues birth and death certificates, and compiles and disseminates birth and death statistics, including cause of death information, for policymaking.

To allow for accurate cause of death data analysis, interpretation, and use, for deaths occurring in the presence of a physician, data collected on the international standard medical certificate of cause of death should be mortality coded according to the standard of the ICD. This guide provides operational best-practices for the improvement and maintenance of an ICD mortality coding system within the CRVS system. The efforts described in this guide will help to strengthen the quality and completeness of cause of death.

## Structure of the Guides

This guide begins with an infographic that locates the specific topic of the guide within the context of the overall CRVS system with key principles highlighted. Following this, an implementation framework presents success factors. These factors are broken down into implementation tasks which are grouped into the following main intervention areas: a) Governance & Processes; b) System & Workforce Capabilities; c) Quality Assurance; and d) Data Analysis, Interpretation & Use. For each task the reader can find references to published key resources for further learning and application.



### GUIDES

The Strengthening CRVS Systems Guides have been developed for the following topics:

- 1 Civil Registration of Births and Deaths
- 2 Medical Certification of Cause of Death
- 3 **International Classification of Diseases Mortality Coding**
- 4 Verbal Autopsy

## Target Audience

The target audience of the guides includes, but is not limited to, decision-makers, planners, and other managers at the Civil Registration Office, the Ministry of Health, and the National Statistics Organization in countries aiming to improve their CRVS system and/or to maintain a high quality system. The guides further aim to support members of high-level interagency CRVS coordination committees or other decision-making bodies concerned with the governance of the CRVS system.

The guides assume the reader has a good understanding of CRVS systems. For readers who would like more introductory and background information about CRVS systems please see:

- Principles and Recommendations for a Vital Statistics System published by the UN Statistics Division ([unstats.un.org/unsd/demographic/standmeth/principles/mi19rev3en.pdf](https://unstats.un.org/unsd/demographic/standmeth/principles/mi19rev3en.pdf)).
- WHO Resource Kit “Strengthening civil registration and vital statistics for births, deaths and causes of death” ([apps.who.int/iris/handle/10665/78917](https://apps.who.int/iris/handle/10665/78917)).
- CRVS Knowledge Gateway of the Bloomberg Philanthropies Data for Health Initiative ([crvsgateway.info/](https://crvsgateway.info/)).
- Training Course on Civil Registration and Vital Statistics Systems of the National Center for Health Statistics of the US CDC ([cdc.gov/nchs/isp/isp\\_fetp.htm](https://cdc.gov/nchs/isp/isp_fetp.htm)).
- eLearning Course on Civil Registration and Vital Statistics (CRVS) Systems of the World Bank Group ([olcstage.worldbank.org/content/civil-registration-and-vital-statistics-systems-advanced-level-facilitated-1](https://olcstage.worldbank.org/content/civil-registration-and-vital-statistics-systems-advanced-level-facilitated-1)).

## Acknowledgements

These guides have been made possible through financial support provided by the Bloomberg Philanthropies Data for Health Initiative. This work is available under the Creative Commons Attribution-ShareAlike 4.0 International (CC BY-SA 4.0) license (<https://creativecommons.org/licenses/by-sa/4.0/>).

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INTERNATIONAL CLASSIFICATION  
OF DISEASES (ICD) MORTALITY CODING IN THE

# Civil Registration & Vital Statistics System

## CRVS Systems must be:

- Continuous
- Compulsory
- Universal
- Permanent
- Confidential

## Key functions of CRVS systems:

- Provide proof of legal identity
- Produce vital statistics

## Types of Vital Events

### Vital Events Proper

Live Births, Fetal Deaths,  
Deaths with  
**Cause of Death**

### Dual Events

Annulments, Divorces,  
Marriages, Judicial  
Separations

### Vertical Events

Adoption,  
Recognition,  
Legitimation

## GUIDE 1



Civil  
Registration  
of Births  
& Deaths

## Place of Occurrence of the Death

Death in Presence  
of Physician



Death in Absence  
of Physician



## GUIDE 2



Medical  
Certification of  
Cause of Death  
(MCCD)

## GUIDE 4



Verbal  
Autopsy  
(VA)

## GUIDE 3

YOU ARE HERE



## International Classification of Diseases (ICD) Mortality Coding

ICD mortality coding is the process by which diseases, morbid conditions, and injuries reported on medical certificates of cause of death (MCCD) forms are converted into standard alphanumeric codes. Through the application of ICD mortality coding rules, the underlying cause of death is then determined by an automated system or by manual ICD mortality coding. ICD mortality codes enable the systematic analysis and interpretation of cause of death statistics for public health policymaking.

## GUIDE 3

# International Classification of Diseases (ICD) Mortality Coding

A system of ICD mortality coding for all deaths with a MCCD form will produce high-quality cause of death information that should be used to inform evidence-based decisions on population health policies.

## KEY PRINCIPLES

### Make death registration universal

All death should be registered with the civil registry. Facility based or other health care workers can help to identify deaths and act as informants to the civil registrar. Through close collaboration between the health sector and civil registration system, the burden on families to register deaths can be reduced.

### Implement the WHO standard MCCD form

The standard international MCCD form should be adopted and used uniformly and consistently for all deaths attended by a physician in order to maintain structured reporting of causes of death.

### Ensure confidentiality

The process of MCCD and ICD mortality coding should ensure confidentiality of medical information.

### Establish governance structures in the CRVS system

Necessary governance structures should be fully operational and ensure coordination in the CRVS system; these structures should also oversee activities related to cause of death information.

### Provide routine training on ICD mortality coding

The skills of designated ICD mortality coders should be strengthened through institutionalized training.

### Centralize ICD mortality coding

ICD mortality coding should be centralized in line with the organizational structure of the CRVS system to ensure efficiency and uniformity of practice.

### Automate ICD mortality coding

Automated ICD mortality coding software can be used to increase efficiency and standardization; expert ICD mortality coders will be required to support the use of the automated system.

### Establish a system for quality assurance and data use

A quality assurance and improvement system should continuously monitor the quality of the ICD mortality coded cause of death data, and that data should be analyzed and interpreted for use in the health and other sectors.

# Implementation Framework for ICD Mortality Coding in the CRVS System

## Intervention Area A



### Governance & Processes

8

#### SUCCESS FACTOR PAGE

A1	Appropriate Governance Structures	9
A2	Strong CRVS Legal and Regulatory Framework	11
A3	Strategy for ICD Mortality Coding	12
A4	Integrated ICD Mortality Coding Management and Processes	15

## Intervention Area B



### System & Workforce Capabilities

18

#### SUCCESS FACTOR PAGE

B1	Adequately Funded ICD Mortality Coding System	19
B2	ICD Mortality Coding System Standard Operating Procedures and Manuals	19
B3	Human Resources for ICD Mortality Coding	20
B4	Infrastructure and Other System Resources for ICD Mortality Coding System	21

## Intervention Area C



### Quality Assurance

22

#### SUCCESS FACTOR PAGE

C1	Supportive Supervision System for ICD Mortality Coding	23
C2	Routine Quality Assurance System for ICD Mortality Coding	24
C3	Periodic ICD Mortality Coding Audits for Manual ICD Mortality Coding	26

## Intervention Area D

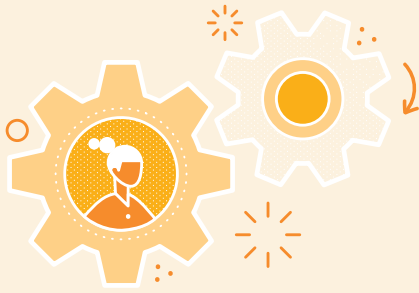


### Data Analysis, Interpretation & Use

27

#### SUCCESS FACTOR PAGE

D1	Analysis, Interpretation, Dissemination and Use of ICD Mortality Coded Cause of Death Data	28
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## Intervention Area A:

# Governance & Processes

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Governance structures coordinate stakeholders to support ICD mortality coding of cause of death data. Relevant processes are optimized and integrated into the CRVS system to produce high-quality cause of death data for decision-making.



## SUCCESS FACTOR A1

# Appropriate Governance Structures

### PURPOSE

To ensure functional structures, system coordination and management of mortality and cause of death processes and data in the CRVS system.

### OUTPUT

Terms of reference for applicable governance committees specifying roles and responsibilities, constitution, and frequency of meetings, among other points.

Governance committees meet and function as intended.

### REFERENCES

- 1 Vital Strategies. 2020. Guidance for Civil Registration and Vital Statistics Coordination Mechanisms. <https://www.vitalstrategies.org/resources/guidance-for-civil-registration-and-vital-statistics-governance-mechanisms/>
- 2 University of Melbourne (2018). CRVS coordinating committee. CRVS Gateway. <https://crvsgateway.info/CRVS-coordinating-committee~330>.
- 3 Vital Strategies – Bloomberg Philanthropies Data for Health Initiative. 2021. Strengthening CRVS Systems Guide for Medical Certification of Cause of Death.
- 4 Vital Strategies – Bloomberg Philanthropies Data for Health Initiative. 2021. Strengthening CRVS Systems Guide for Verbal Autopsy.

## IMPLEMENTATION TASKS



### Ensure functioning of a High-Level Interagency CRVS Coordination Committee with responsibility for high-quality cause of death data

- In line with its core functions, responsibilities, reporting, and composition (1,2), this committee should provide policy level oversight, approval and evaluation of activities related to the collection of high-quality cause of death data for deaths in the CRVS system. This should include considerations for MCCD (3), ICD mortality coding (3), and, as applicable, the use of verbal autopsy (4).
- As applicable, the committee should endorse and support proposed system improvements.



### Ensure functioning of a CRVS Technical Coordination Committee

- In line with its core functions and responsibilities (1), the technical coordination committee should include in its mandate, the provision of strategic guidance and oversight for the implementation of interventions that maintain, improve and promote the production and use of high-quality ICD mortality coded data for public health decision-making.
- The technical coordination committee should be the primary sponsor of ICD mortality improvement activities and commission work as needed. The input of a mortality and cause of death technical working group should be sought, and the technical coordination committee should receive regular updates on progress and results of ICD mortality coding improvement efforts.



**SUCCESS FACTOR A1 (CONT'D)****Ensure functioning of Subject Specific Technical Working Group, where needed**

- The working group should be responsible for developing detailed work plans, including ensuring adequate ICD mortality coding capacity and developing quality assurance mechanisms. The work plans should include targeted activities, responsibilities and timelines.
- The working group should coordinate with other subject matter experts such as a Collaborating Center of the WHO Family of International Classification (WHO-FIC) which is responsible for the maintenance of the ICD.
- The technical working group should closely monitor MCCD and practices ICD mortality coding quality, and develop, as well as monitor, the implementation of corrective measures.
- In addition to a national level group, hospital-based groups or subnational groups may be needed (or the corresponding responsibilities should be included into the terms of reference of any such groups currently existing).



## SUCCESS FACTOR A2

# Strong CRVS Legal and Regulatory Framework

### PURPOSE

To ensure that the CRVS legal framework mandates a system and processes for ICD mortality coding.

### OUTPUT

Best-practice CRVS legal framework that mandates ICD mortality coding of all MCCD data.

## IMPLEMENTATION TASKS



### Review and revise the CRVS legal and regulatory framework and ensure it mandates ICD mortality coding

- The legal and regulatory framework should ensure the civil registration of all deaths independent of the availability of cause of death data, i.e. a cause of death should not be required to register a death with the civil registry.
- The legal and regulatory framework should mandate MCCD and ICD mortality coding for all deaths that are attended by a physician or other authorized medical provider (i.e. certifier of cause of death (5, 6)).
- Rules and regulations related to cause of death and ICD mortality coding should be aligned with international best practices (7, 8).
- Where no legal and regulatory framework exists, the technical working group should propose and define approaches to mandate ICD mortality coding. This should be done in concert with legal experts, CRVS governance structures, and other stakeholders. CRVS governance structures should also work towards the development of a CRVS legal and regulatory framework.

## REFERENCES

- 5 Department of Economic and Social Affairs of the United Nations, Statistics Division (2014). Principles and recommendations for a vital statistics system, revision 3. [https://unstats.un.org/unsd/demographic-social/Standards-and-Methods/files/Principles\\_and\\_Recommendations/CRVS/M19Rev3-E.pdf](https://unstats.un.org/unsd/demographic-social/Standards-and-Methods/files/Principles_and_Recommendations/CRVS/M19Rev3-E.pdf).
- 6 Vital Strategies – Bloomberg Philanthropies Data for Health Initiative. 2021. Strengthening CRVS Systems Guide for Birth and Death Registration.
- 7 Schwid, A., Frederes, A., Bronson, G., Abouzahr, C., de Savigny, D., Schwartz, S., Chanley, J., Bratschi, M., Setel, P. (2017). Civil registration and vital statistics (CRVS) legal and regulatory review tools and methodology. Bloomberg Philanthropies Data for Health Initiative, Vital Strategies, GHAI, Centre of Excellence. <https://advocacyincubator.org/ghai-advocacy-tools/legal-and-regulatory-review-toolkit-for-crvsid/>.
- 8 United Nations Statistics Division and Vital Strategies (2019). Guidelines on the legislative framework for civil registration, vital statistics and identity management [draft]. [https://unstats.un.org/unsd/demographic-social/Standards-and-Methods/files/Handbooks/crvs/CRVS\\_GOLF\\_Final\\_Draft-E.pdf](https://unstats.un.org/unsd/demographic-social/Standards-and-Methods/files/Handbooks/crvs/CRVS_GOLF_Final_Draft-E.pdf)



### SUCCESS FACTOR A3

## Strategy for ICD Mortality Coding

#### PURPOSE

To establish a locally appropriate ICD mortality coding strategy.

#### OUTPUT

Locally appropriate ICD mortality coding strategy implemented.

#### REFERENCES

- 9 World Health Organization (2016). International statistical classification of diseases and related health problems 10th revision Volume 2 Instruction manual Fifth edition. Annex 7.1 International form of medical certificate cause of death, [https://icd.who.int/browse10/Content/statichtml/ICD10Volume2\\_en\\_2016.pdf?ua=1&ua=1](https://icd.who.int/browse10/Content/statichtml/ICD10Volume2_en_2016.pdf?ua=1&ua=1).

### IMPLEMENTATION TASKS



#### Implement international standard MCCD form

- Regardless of the ICD version used, countries should use the WHO standard international MCCD form (9) for all deaths attended by a physician (3).
- The standard international MCCD form is designated to facilitate structured reporting of the sequence of diseases or conditions leading to death, which designated and trained ICD mortality coders can use to determine the underlying cause of death for all deaths attended. The use of this form allows for comparability of data between parts of a country, over time, and internationally.
- Countries may adapt the administrative section of the MCCD form and translate the form as needed for local use. Frames A and B should not be modified as they contain the information for ICD mortality coding. The process of local adaptation of the standard international MCCD form, should include the relevant authority responsible for the MCCD form.



## SUCCESS FACTOR A3 (CONT'D)

### Implement international standard ICD mortality coding

- ICD mortality coding should be implemented according to WHO standards (10).
- It should be noted that ICD mortality coding is distinctively different from ICD morbidity coding.
- Countries should strive to use the most recent version of ICD mortality coding. WHO provides guidance on transitioning between versions of ICD mortality coding and the differences between versions (11).
- Countries without a process for ICD mortality coding should prepare a strategy and plan to improve cause of death statistics in accordance with ICD.
- Countries transitioning from one ICD version to another should set a strategy to facilitate training roll-out and to assess how the distribution and quality of cause of death data changes throughout the transition. Stakeholders should be presented with cause of death quality assessments throughout the process of the transition to ensure that there is a complete understanding of potential changes in cause of death statistics based on the new coding version.
- If coding to 3–digit or 4–digit ICD code is not possible, WHO recommends that countries consider implementing the Start-up Mortality List (ICD-10 SMoL) based on the ICD-10. SMoL involves a simplified set of coding rules (12, 13).
- WHO developed a DHIS2 program (14) to support ICD-10 SMoL implementation, which automates the process of converting information captured in Part I of the MCCD form into alphanumeric codes using a medical dictionary. In the default ICD-10-SMoL DHIS2 program, the final underlying cause of death is selected at the point of data entry. This requires all relevant data entry staff to be skilled in the application of the SMoL rules (13). Depending on the location of data entry, this may however mean that coding is decentralized and this may result in a high number of ICD mortality coders needing to be trained and requiring maintenance and supervision of skills. If there are concerns about the capacity to apply SMoL rules, the DHIS2 program can be modified to not require selection of the underlying cause of death at data entry and that task can be centralized.

### REFERENCES

- 10 World Health Organization. [no date]. Classification of Diseases (ICD). <https://www.who.int/classifications/icd/en>
- 11 World Health Organization. 2019. ICD-11 Implementation or Transition Guide. [https://icd.who.int/docs/ICD-11%20Implementation%20or%20Transition%20Guide\\_v105.pdf](https://icd.who.int/docs/ICD-11%20Implementation%20or%20Transition%20Guide_v105.pdf).
- 12 World Health Organization. [no date]. Startup Mortality List (ICD-10-SMoL). [https://www.who.int/healthinfo/civil\\_registration/smol/en](https://www.who.int/healthinfo/civil_registration/smol/en)
- 13 World Health Organization. 2018. WHO Application of ICD-10 for low-resource settings initial cause of death collection The Startup Mortality List (ICD-10-SMoL) V2.1. [https://www.who.int/healthinfo/civil\\_registration/ICD\\_10\\_SMoL.pdf?ua=1](https://www.who.int/healthinfo/civil_registration/ICD_10_SMoL.pdf?ua=1)
- 14 World Health Organization. [no date]. WHO Configuration Packages for DHIS2 – Cause of Death. <https://who.dhis2.org/documentation/#cause-of-death>



## SUCCESS FACTOR A3 (CONT'D)

### Implement automated ICD mortality coding

- The Iris automated ICD mortality coding software (15) should, where feasible, be implemented to ensure standardized and timely ICD mortality coding (16).
- Planning for automated ICD mortality coding should begin with a comprehensive assessment of existing processes for ICD mortality coding of cause of death data as well as an assessment of system readiness for automated ICD mortality coding.
- The team implementing the automated ICD mortality coding system should include information technology experts, ICD mortality coders, physicians to assist with the development of the locally adapted dictionary of medical terms and corresponding ICD codes for use by the automated coding system, and public health officials with a strong understanding of the country's mortality pattern and burden of disease.
- Iris can be implemented in full-text or code-only mode. In the full-text mode, the MCCD form is entered into the Iris software exactly as written by the certifier of cause of death. Iris uses its dictionary of medical terms and corresponding ICD codes to convert that free text into an ICD code applying ICD rules and principles. Iris then determines the underlying cause of death from the information provided. This standardizes the conversion of medical terms to ICD codes and the application of the ICD coding rules. In code-only mode, text on the MCCD form is manually or through another system (e.g. using the DHIS2 program for ICD-10-SMoL) converted to ICD codes. These codes are entered into Iris, and the software determines the underlying cause of death by applying ICD rules and principles. This approach will harmonize the 1 application of the ICD rules to determine the underlying cause of death. Both modes have the potential to improve the efficiency (cost and timeliness) of ICD mortality coding.
- Iris should only be considered once a team of coders with advanced ICD mortality coding expertise are in place. This is important since Iris will not be able to code all MCCD forms. Complicated cases will require manual coding by highly skilled ICD mortality coders. In addition to the requirement of skilled ICD mortality coders, substantial IT support is required to implement and maintain an ICD mortality coding system.
- Local translation and/or adaptation of the dictionary used by the automated ICD mortality coding system to convert the text captured on the MCCD form into alphanumeric ICD codes may be required depending on the language used on the MCCD forms and if the system is to be used in full-text or code-only mode. In countries committed to implementing Iris in full-text mode, a team consisting of a programmer, ICD mortality coder, and physician will be needed to support the local translation and adaption of the dictionary and standardization tables.
- Countries implementing the Iris automated ICD mortality coding software should connect to the developers of the system and participate in the Iris user community.

#### REFERENCES

15 German Institute of Medical Documentation and Information. 2020. Iris Institute. <https://www.dimdi.de/dynamic/en/classifications/iris-institute/index.html>.

16 University of Melbourne (2018). Action guide on implementing automated coding (Iris). <https://crvsgateway.info/file/17045/82>.



### SUCCESS FACTOR A3

## Integrated ICD Mortality Coding Management and Processes

#### PURPOSE

To ensure efficient ICD mortality coding practices are in place and that data are processed, analyzed, interpreted, and used.

#### OUTPUT

System in place for centralized and automated ICD mortality coding in the CRVS system.

#### REFERENCES

17 Economic Commission for Africa. 2021. CRVS Systems Improvement Framework. <https://www.vitalstrategies.org/resources/crvs-systems-improvement-framework/>

### IMPLEMENTATION TASKS



#### Establish efficient processes for ICD mortality coding

- The ICD mortality coding process should have clearly defined goals, objectives and standard operating procedures, and it should be fully institutionalized.
- The process for ICD mortality coding should clearly outline roles and responsibilities of the relevant stakeholder for receiving MCCD forms after they have been filled, ICD mortality coding, data storage, and the onward transmission of data to the civil registration authorities, the national statistics organization, or other stakeholder in the CRVS system.
- Current processes for ICD mortality coding should be assessed and re-designed by the subject specific technical working group as needed (17).
- The process should ensure that MCCD forms are efficiently transported physically or transmitted electronically to the location where ICD mortality coding will take place.
- Once ICD mortality coding is complete, a process should be in place to ensure the cause of death statistics are shared with the relevant authorities in a timely manner for the eventual production of vital statistics.
- Agreements on roles, responsibilities, and business processes should be reflected in standard operating procedures, which can be used as a basis for training, monitoring and evaluation, and quality assurance.
- Established processes must include quality assurance measures.
- Timelines to maintain a routine within the data management process and ensure timeliness of data should be set. Specifically, a date for the last day to submit MCCD forms to the coding unit for their inclusion in the final death file, a date for the release of the final death file, and a date for the release of the annual data publication which is recommended to be no more than 18 months after the end of the calendar year, should be set. Such a timeline will help to maintain a routine, promote accountability, and serve as a quality assurance metric for system strengthening.
- Although most deaths are natural, those that are referred to the medical legal death investigation system may require additional testing that prolongs the process of determining the cause and manner of death. A time period after the final death file deadline during which information from amended MCCD forms can be included, should be established. Separate death files as needed, i.e.



## SUCCESS FACTOR A4 (CONT'D)

the original death file and a death file that includes amended data, can be maintained. It is preferable to avoid delaying the publication of annual data publications for the resolution of pending cases to ensure timely statistics on the majority of deaths are made available for policy and programming (7).

### Implement electronic data capture and transmission for ICD mortality coding

- Electronic data capture close to the source of the completed MCCD form (e.g. at the hospital level) will facilitate data entry and alleviate the burden on central data entry staff and the need for transport of physical forms. Such a set-up will also allow for clarifications with the MCCD certifier, if required.
- The electronic system used for data collection and transmission should have the necessary security measures in place to ensure the security and confidentiality of the data, in accordance with government policies.
- Data security and legal requirements for retention of paper forms and proper storage of completed MCCD forms must be considered when evaluating or improving the processes for ICD mortality coding.
- MCCD data should be digitized using a government information technology (IT) system, such as the health information system, and abide by government laws, regulations, and guidelines governing electronic data systems in the country.
- If clinicians can directly enter MCCD data into an electronic system, this can minimize data entry errors and provide feedback to the clinician at the point of data capture. If data entry happens later, adequately skilled and trained data entry staff will need to be available.
- Any IT platform used for ICD mortality coding should allow for the ICD mortality coders to see all parts of the MCCD, convert the relevant information into the alphanumeric codes of the ICD, and determine the final underlying cause of death. The need for coders to see identifiable personal information about the deceased other than sex and age should be evaluated and restricted as much as possible.
- Results from ICD mortality coding should have a unique identifier linked to the deceased's death registration record allowing for the ICD-coded cause of death to be amended with other information about the death. Linking of data will likely require data sharing and other agreements between the relevant agencies.

**SUCCESS FACTOR A4 (CONT'D)****Link MCCD and ICD mortality coding processes with civil registration processes**

- The health facility, coroner's or medical examiner's office that issue the MCCD form should be able to submit a declaration of the death to the civil registration authority as an informant in line with the local CRVS legal and regulatory framework, to ensure the death is registered. This will reduce the burden of death registration on the family.
- The MCCD data collection process should ensure that the MCCD form is transmitted for ICD mortality coding and the data used in vital statistics.
- The MCCD form can be embedded within or connected to a death notification form of the civil registrar, resulting in one form that collects two critical and related streams of information allowing for the collection of cause of death information and registration of the death with the civil registrar.
- The civil registrar does not need to see the cause of death reported on the MCCD form but must ensure collection of cause of death information and transmit the information to the national statistics office (before or after ICD mortality coding depending on the local system). Information may, for example, be passed to the national statistics organization encrypted or by another secure manner that limits access and protects confidentiality of the cause of death information.
- Rules and regulations regarding the exchange of data between the health sector and the civil registrar taking into account factors such as encryption and data safety—should be outlined in the CRVS legal and regulatory framework (7, 8).





**Intervention Area B:**

# System & Workforce Capabilities

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Human resources, Information Technology (IT), and other capabilities are in place to produce high-quality ICD mortality coded cause of death data.



### SUCCESS FACTOR B1

## Adequately Funded ICD Mortality Coding System

#### PURPOSE

To plan for and ensure availability of all necessary financial resources to implement the ICD mortality coding system.

#### OUTPUT

All necessary financial resources are available to maintain the ICD mortality coding system.

### IMPLEMENTATION TASKS



#### Develop budget and secure financial resources needed to maintain the ICD mortality coding system

- Plan and budget necessary financial resources to establish and maintain the ICD mortality coding system. This should consider aspects such as human resources, information technology systems and training needs.

### SUCCESS FACTOR B2

## ICD Mortality Coding System Standard Operating Procedures and Manuals

#### PURPOSE

To ensure that ICD mortality coding is carried out and supervised efficiently and that data is processed, managed, and analyzed in a standardized fashion.

#### OUTPUT

Standard operating procedures and manuals for all relevant staff are available and in use.

### IMPLEMENTATION TASKS



#### Develop standard operating procedures for ICD mortality coding processes from receiving the data to data analysis

- Standard operating procedures and manuals should be developed for all cadres of staff involved in ICD mortality coding related processes for data collection, transmission, analysis, management, quality assurance, supervision and dissemination.
- Manuals, guides and supporting materials should be developed based on the local country context.
- Manuals should include training materials and guides for ICD mortality coders, master trainers and supervisors, as well as job aids to facilitate application of ICD mortality coding best practices.
- Standard operating procedures and manuals should be made readily available to all relevant staff for use and reference.



### SUCCESS FACTOR B3

## Human Resources for ICD Mortality Coding System

#### PURPOSE

To ensure ICD mortality coders are trained and supported to ensure efficient ICD mortality coding practices.

#### OUTPUT

Trained human resources for ICD mortality coding.

#### REFERENCES

- 18 Centers for Disease Control (2007). Core curriculum for certifiers of underlying cause of death. <https://www.cdc.gov/nchs/data/icd/curriculumcertification03-08-078.pdf>

### IMPLEMENTATION TASKS



#### Maintain a cohort of trained ICD mortality coders

- ICD mortality coders are not required to have a medical background. However, they need to have basic knowledge of medical terminology, anatomy, and physiology. ICD mortality coders, should therefore receive intensive training, and as required re-training, on medical terminology.
- Before joining the mortality coding team, ICD mortality coders should have intensive training on ICD mortality coding, which includes multiple cause coding and underlying cause coding (18).
- ICD mortality coders should receive annual re-trainings with regular supportive supervision of their ICD mortality coding activities.
- Training can be provided by master trainers with extensive knowledge and experience in medical terminology and ICD mortality coding.
- ICD mortality coding master trainers or others with similarly extensive experience and knowledge should provide supportive supervision including continuous support to the team of ICD mortality coders, conducting audits, and providing on the job training of the ICD mortality coders. Typically, these master trainers are known as nosologists.



#### Maintain human and other required resources

- In addition to well-trained ICD mortality coders, other key personnel are also required for data entry of information collected using MCCD forms.
- For countries using the Start-up Mortality List (SMoL), data entry staff will need to be trained on the SMoL coding rules. Because these data entry staff also will be applying coding rules, countries adopting SMoL will need to ensure careful supervision.



#### Provide of job aids for ICD mortality coders

- ICD mortality coders and other relevant staff should have access to ICD manuals for mortality coding, and any supplemental WHO coding resources such as the decision tables.
- If ICD mortality coding is done manually, Iris in code only mode may be considered as a job aid for coders to practice coding or test certain cases where they have doubts.
- ICD mortality coders should be given a forum to discuss challenging cases and doubts.



#### SUCCESS FACTOR B4

## Infrastructure and Other System Resources for ICD Mortality Coding

### PURPOSE

To ensure that the necessary infrastructure for the ICD mortality coding system is available.

### OUTPUT

Infrastructure and other system resources are in place for ICD mortality coding.

#### IMPLEMENTATION TASKS



### Maintain IT infrastructure for ICD mortality coding

- Independent of the ICD mortality coding strategy used, some IT infrastructure will need to be established and maintained for ICD mortality coders to capture the output of the ICD mortality coding. Such infrastructure should promote efficiency of the coding work and facilitate access to the data by relevant individuals and agencies. Systems should allow for exchange with other IT systems to receive the entered MCCD data and transmit the ICD mortality coded cause of death data for use in the production of vital statistics.
- Coders should have access to the completed MCCD form (in paper or electronic format) so they can verify free text on the forms.
- The corresponding human resource capacity to maintain the IT system must also be in place.
- For the implementation of Iris or SMoL, additional IT infrastructure will be required; specifically, to run the Iris software (15) and DHIS2 for SMoL (14).
- Countries planning to implement automated coding are advised to ensure the interoperability of their IT infrastructure with the necessary software.
- The IT infrastructure must allow for the necessary quality control steps at the point of data entry of the MCCD data; during coding; and following coding.



## Intervention Area C:

# Quality Assurance

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A structured and routine quality assurance system ensures the highest possible quality of ICD mortality coded cause of death data.

**SUCCESS FACTOR C1**

## Supportive Supervision System for ICD Mortality Coding

**PURPOSE**

To ensure that the ICD mortality coding processes are followed and the quality of cause of death from physician-attended deaths is monitored and continuously improved.

**OUTPUT**

Supportive supervision system in place for ICD mortality coding.

**IMPLEMENTATION TASKS****Provide supportive supervision to ICD mortality coders**

- In addition to initial training and re-training, master trainers and supervisors should provide support to the ICD mortality coders for them to be able to carry out their work.
- Supervisory support should include assistance with the ICD mortality coding of difficult cases and the opportunity for exchange among the ICD mortality coders to share experiences and discuss cases. This exchange between ICD mortality coders will also provide opportunity for capacity building.
- The supervision system should also provide a channel for feedback from the governance structures to the ICD mortality coders and allow the ICD mortality coders to provide feedback to these structures.



## SUCCESS FACTOR C2

# Routine Quality Assurance System for ICD Mortality Coding

### PURPOSE

To ensure that the quality of cause of death data from physician-attended death is assured on a regular basis.

### OUTPUT

Quality assurance system for the assessment of death data from physician-attended deaths.

### REFERENCES

- 19 Vital Strategies. (2021). MCCD and ICD Mortality Coding Data Quality Control Manual. Forthcoming.
- 20 World Health Organization (2014). Analysing mortality levels and causes-of-death (ANACoD). <https://www.who.int/healthinfo/anacod/en>
- 21 Bloomberg Philanthropies University of Melbourne. ANACONDA. <https://crvsgateway.info/ANACONDA-Mortality-Data-Quality-Assessment-Tool-686>.

## IMPLEMENTATION TASKS



### Conduct routine quality checks of MCCD data before ICD mortality coding

- The quality of ICD mortality coded cause of death data can only be as good as the quality of MCCD practices. Therefore it is advisable to develop an automated protocol for the quality assessment and improvement of MCCD raw data before ICD mortality coding.
- Recommendations are available regarding the data quality checks to be carried out on the handwritten MCCD form (3, 19).
- Following data entry, these quality control checks should also assess the completeness of all the collected variables and, given its public health relevance, the completion of pregnancy variables, as applicable, should be checked.
- Depending on the system used, conversion of the free text MCCD data into alphanumeric ICD codes may be necessary before the checks can be done.
- If an automated coding system is used, this data quality check may be accomplished by the automated ICD mortality coding system or as module of that system.
- Errors detected should be logged and used for feedback to and training of professionals filling the MCCD form.



### Conduct routine assessment of the quality of the ICD mortality coded cause of death data

- The subject specific technical working group should establish and maintain a system should be established and maintained to assess the quality of ICD mortality coded cause of death data and statistics.
- The quality assessment should also be done on a routine basis and allow for the assessment of individual records to facilitate feedback and improve targeted training.
- The quality control checks applied to the cause of death data following ICD mortality coding, should assess the consistency of the cause of death information provided compared to other variables (e.g. age and sex) and closely examine the data for suspected or confirmed maternal deaths. Detailed recommendations about the checks are available (19).



### SUCCESS FACTOR C2 (CONT'D)

- The quality assessment should also identify, issues such as, MCCD data coded to ill-defined causes of death, MCCD forms that only contain an immediate (as opposed to underlying) cause of death, MCCD forms on which the location and nature of cancers and other tumors or local lesions are not specified, or MCCD forms on which the nature of an injury is not documented and is not differentiated between accidental and intentional. Detailed recommendations about the checks are available (19).



### Conduct routine assessment of the quality of the ICD mortality coded cause of death data

- In addition to the analysis of individual certificates, tools (20, 21) are available to analyze aggregated ICD mortality coded cause of death data to identify issues regarding quality in the data.
- Findings from the quality assurance of ICD mortality coded cause of death data should be well documented, if possible published, presented to the CRVS technical coordination committee, fed back to certifiers, and used to improve the certification training of certifiers.





### SUCCESS FACTOR C3

## Periodic ICD Mortality Coding Audits for Manual ICD Mortality Coding

#### PURPOSE

To develop a system to periodically assess the quality and accuracy of manual ICD mortality coding practices.

#### OUTPUT

System in place for routine audits of manual ICD mortality coding to ensure the highest possible quality.

#### REFERENCES

- 22 National Centre for Classification in Health (1998). *Australian coding benchmark audit (ACBA)*. National Centre for Classification in Health, Faculty of Health Sciences.

### IMPLEMENTATION TASKS



#### Conduct periodic ICD mortality coding audits if using manual ICD mortality coding

- Audits should be conducted regularly on a sub-set of MCCD forms (22).
- A senior mortality coder should be responsible for mortality coding audits and can also maintain the responsibility of daily team supervision and coding support for the ICD mortality coders.
- Evaluation of the quality of manual ICD mortality coding can be done using the coder/re-coder method in which an expert coder re-codes MCCD forms to determine if the underlying cause of death was correct as originally assigned.
- Errors identified in the audits should be logged. Feedback should be provided to individual ICD mortality coders as needed, and ICD mortality coder training updated accordingly. The subject specific technical working group should also be informed.
- A maximum acceptable coding error rate should be determined to retrain coders. Measures should be considered if the pre-determined rate is exceeded.
- As needed, an external audit of the ICD mortality coding practice may be considered to ensure that ICD mortality coding produces the highest possible quality of cause of death data (22).



## Intervention Area D:

# Data Analysis, Interpretation & Use

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A system is in place for the ICD mortality coded cause of death data to be analyzed, interpreted, and used by decision makers.



## SUCCESS FACTOR D1

# Analysis, Interpretation, Dissemination and Use of ICD Mortality Coded Cause of Death Data

### PURPOSE

To analyze, interpret, disseminate and use ICD mortality coded cause of death data in the form of vital statistics and for the purpose of policy making.

### OUTPUT

ICD mortality coded cause of death data available to policy-makers and included in vital statistics.

## IMPLEMENTATION TASKS



### Analyze and interpret ICD mortality coded cause of death data

- Analyze ICD mortality coded cause of death data and produce the appropriate disaggregated cause of death tabulations for inclusion in the vital statistics report (e.g. age, sex, geographic area) (23).
- Tools and recommendations (20, 21) for the analysis of ICD mortality coded cause of death data can be used to produce some of the recommended statistics.
- The analysis of cause of death data will likely require collaboration between the national statistics organization, with the ministry of health, and the subject specific technical working group. Academic and other partners may be included to support the analysis of ICD mortality coded cause of death data.
- Analysis of ICD mortality coded cause of death data should compare the data which is collected in the CRVS system to other local and global data sources.
- Public-use data files for analysis of mortality data by individuals outside government agencies should be made available and updated as pending cases are resolved and included in the amended final death file (24). Such data which is available outside of government, should include a data user agreement to ensure that analyses maintains confidentiality and privacy requirements (25). Public-use file promotes further analyses and review of data, furthering the discussion on policy development and prevention.

## REFERENCES

- 23 United Nations Economic Commission for Africa, United Nations Economic and Social Commission for Asia and the Pacific, Statistics Norway (2017). Guidelines and template for developing a vital statistics report. [http://www.getinthepicture.org/sites/default/files/resources/Guidelines%20and%20template\\_ENG.pdf](http://www.getinthepicture.org/sites/default/files/resources/Guidelines%20and%20template_ENG.pdf)
- 24 US Centers for Disease Control and prevention. (no date). Public-Use Data Files and Documentation. [https://www.cdc.gov/nchs/data\\_access/ftp\\_data.htm](https://www.cdc.gov/nchs/data_access/ftp_data.htm)
- 25 US Centers for Disease Control and prevention. (no date). Data User Agreement. [https://www.cdc.gov/nchs/data\\_access/restrictions.htm](https://www.cdc.gov/nchs/data_access/restrictions.htm)



## SUCCESS FACTOR D1 (CONT'D)



### **Make high-quality cause of death data available to inform decision making and policy-making**

- The national statistics office or ministry of health should present data for key mortality indicators such as maternal mortality and infant mortality, as well as data needed to measure progress on the Sustainable Development Goals.
- Findings from the mortality data should be published in vital statistics reports and using other modalities (e.g. in online dashboards) to make the data available to the public and other stakeholders in the CRVS system.
- Analysis of quality assessments ranging from MCCD data collection to ICD mortality coding should also be published.
- All analyses should result in the presentation of actionable information in a format appropriate for the target audiences, e.g. a full vital statistics report for government agencies, academic or other partners, or policy brief for senior decision-makers.

**Bloomberg Philanthropies**  
**Data for Health Initiative**

The Data for Health Initiative, supported by Bloomberg Philanthropies and the Government of Australia, is providing technical assistance to over 25 low- and middle-income countries worldwide to improve public health data systems. The CRVS Program, focusing on improving civil registration and vital statistics, is one of four Initiative components; the other three components focus on data use, developing new tools for noncommunicable disease risk factor surveillance, and strengthening cancer registries. Collaborating institutions in the Initiative are: Vital Strategies, U.S. Centers for Disease Control and Prevention, the Johns Hopkins Bloomberg School of Public Health, the World Health Organization, and the Global Health Advocacy Incubator.

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Thank you very much for your support.