

**WHO Recommendations for conducting an
external inspection of a body and filling in the
Medical Certificate of Cause of Death**



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ABBREVIATIONS

AIDS	acquired immunodeficiency syndrome
CRVS	civil registration and vital statistics
FIC	Family of International Classification (Network)
HIV	human immunodeficiency virus
ICD	International Classification of Diseases
MCCD	Medical Certificate of Cause of Death
MLDI	medicolegal death investigation
TB	tuberculosis
UCOD	underlying cause of death
WHO	World Health Organization

EXECUTIVE SUMMARY

This document is directed mainly at certifying physicians.

Prompt and accurate certification of cause of death serves many critical functions. In addition to the well-established legal and administrative functions, information on the cause of death is used by governments to monitor the health of the population and to plan and evaluate public health interventions and services.

Furthermore, cause of death data are extensively used to support epidemiological research.

The aim of these WHO recommendations is to promote good practice in medical certification of cause of death. Medical certification of cause of death involves confirmation of death, external examination of the body and ascertainment of the circumstances and cause of death, and finally completion of the Medical Certificate of Cause of Death (MCCD).

These duties are usually carried out by a physician, often the person involved in the care of an individual before their death. In terms of documenting a cause of death, WHO's MCCD form serves as the international standard and has been agreed by all countries¹.

The MCCD form has been designed to standardize reporting of cause of death across countries, and is usually part of – or linked to – the death certificate that serves civil registration. The MCCD places particular emphasis on the accurate identification of the underlying cause of death (UCOD), the key statistic which supports intra- and inter-country comparisons of mortality data, as well as comparisons over time.

Use of WHO's international MCCD form is strongly recommended; physicians and practitioners are also encouraged to adopt a standard approach to the investigation of the circumstances surrounding a death and the external inspection of a body, as set out in these recommendations.

These recommendations focus on the medical certification of the cause of unsuspected, natural deaths (i.e. deaths due to disease) and do not include medicolegal death investigation or other legal procedures required by national legislation.

The main content is divided into two parts. The first part covers the initial steps in the medical certification of cause of death process, including the confirmation of a death, the investigation of the circumstances surrounding the death and its causes, and the external examination of the body. The second part guides certifying physicians through the process of properly completing the MCCD form.

While this document is directed mainly at certifying physicians it may also be of interest to others involved in the investigation and certification of causes of death. It is designed to serve both as a quick reference guide for certifying physicians and to support the training of health professionals in cause of death certification.

¹<https://www.who.int/publications/m/item/elevanth-revision-of-the-international-classification-of-diseases-adoption-wha72>

Studies from across world have demonstrated that the quality and accuracy of cause of death reporting and mortality data is improved through training. Ideally such training should start during medical education and be continued in regular in-service education programmes.

However, in many countries and settings, physicians do not routinely receive any formal training in cause of death certification. It is for this reason that these recommendations are supplemented by some additional resources which may be used as training materials for physicians.

These supplemental resources include a one-page medical certification of cause of death checklist and a series of worked examples of completed MCCD forms, designed to illustrate the application of these recommendations.

This document was formulated by an international board of experts, comprising practicing physicians and medicolegal professionals, as well as users of mortality statistics and data analysts, and representing all WHO regions and both high- and low-income country perspectives.

These recommendations were subsequently tested in the field in the following countries: Argentina; Bolivia, Plurinational State of; Brazil; Colombia; Ghana; India; Mexico; South Africa; Spain; Sri Lanka and the United Kingdom and were also reviewed by the Mortality Reference Group of WHO Family of International Classification (WHO-FIC) Network.

GLOSSARY

- **Authorization:** In the context of these recommendations, authorization means giving legal permission to look at information relating to the death of an individual. Medical staff, coroners and cause-of-death coders are all examples of people who are authorized to view sensitive information relating to a death by law.
- **Cause of death:** ICD describes cause of death as all those diseases, morbid conditions or injuries which either resulted in or contributed to death and the circumstances of the accident or violence which produced any such injuries. It does not include symptoms or modes of dying such as cardiac arrest.
- **Cause of death coding:** The process of coding causes of death, also referred to as mortality coding, consists of first converting each of the conditions mentioned on the Medical Certificate of Cause of Death into an International Classification of Diseases (ICD) code and second, confirming which of the conditions is the underlying cause of death. See also *Underlying cause of death*.
- **Confidentiality:** Confidentiality refers to the obligation of professionals and other health workers not to disclose information (also called data) about people to third parties. This duty was codified in the Hippocratic Oath in the 4th century BC, and remains one of the core principles of medical ethics to this day.
The need for confidentiality usually arises within a relationship (e.g. between a data manager or physician and a patient) in which it is necessary to share information with someone who would otherwise not have been informed.
Any information that is person-identifiable, meaning any information that might allow the identification of a specific person, should only be viewed by people who are authorized to do so. See also *Authorization*.
- **Contributory causes of death:** Contributory causes of death are other significant conditions which contribute to a death, but which are not part of the sequence of events causing death. Contributory causes of death should be reported in Part 2 of Frame A of the Medical Certificate of Cause of Death.
- **Manner of death:** For the purposes of the medical certification of cause of death, “manner of death” refers to the determination of the way in which the death occurred or the nature of the death as classified on the international Medical Certificate of Cause of Death (e.g. disease, accident, intentional self-harm, assault, legal intervention, war, could not be determined, pending investigation, unknown). Depending on national law, the determination of manner of death for medical certification of cause of death may be made by a physician, coroner or another medicolegal authority. Manner of death for medical certification of cause of death is a separate determination from that made in a court of law. Note that manner of death is different from “mode of death”. See also *Mode of death*.
- **Medical certification of cause of death:** Medical certification of cause of death describes the process of accurately identifying the sequence of events that lead to

death. It includes also recording of causes that contributed to death but were not part of the sequence that led to death.

Cause of death certification is mandated by international regulations that are usually reflected in national law.

Medical certification of cause of death requires physicians² to complete a Medical Certificate of Cause of Death (MCCD), an internationally adopted standard form for reporting deaths.

Terminal, intermediate and underlying causes of death are reported in Part 1 of the MCCD, and any contributory causes of death in Part 2; causes of death are subsequently coded to statistical categories in accordance with the rules of the International Classification of Diseases (ICD). See also *Cause-of-death coding*.

- **Mode of death:** ICD describes, as “mode of death” the terminal event, or more specifically, the immediate physiologic derangement that leads to death. Also called “mechanism of death” or “mode of dying”.

Common modes of death include cardiac arrest, respiratory failure and respiratory arrest.

Recording the mode of death is not recommended because it does not inform future treatment or prevention of the events leading to death. The mode of dying should not be recorded as the terminal cause of death.

Note that mode of death is different from “manner of death”. See also *Manner of death, Sequence and Underlying cause of death*.

- **Privacy:** Privacy relates to the requirement to protect an individual's right to exert control over what personal information and decisions can be shared with others. For instance, when a physician examines or speaks with a patient it is usually done in a non-public area so that the information given to the physician by the patient cannot be heard by anyone else.

It also enables the physician to give a patient their diagnosis in private. Likewise, medical data should only be forwarded or shared with consent from the patient.

It is important to note that different cultures and communities will have different concepts of what an individual's right to privacy means and entails, and what levels of confidentiality patients can expect.

Certifying physicians should be aware of local and national rules and regulations regarding issues relating to patient confidentiality and privacy. See also *Confidentiality*.

- **Sequence:** In the context of these recommendations, “sequence” refers to the chain or series of medical events which result in death.

The Medical Certificate of Cause of Death (MCCD) is structured so as to allow certifying physicians to document the sequence of events leading to death, such that in Part 1 each listed disease/condition is a complication of, or is caused by, the cause listed on the line below.

- **Terminal cause of death:** The terminal cause of death is defined as the final disease, injury or complication which directly preceded or led to death.

² In exceptional situations, also other appropriately trained health staff may be asked to fill in the MCCD form

The terminal cause of death is the first condition entered on the first used line of Part 1 of the Medical Certificate of Cause of Death (MCCD). It is also, more correctly, called the immediate or direct cause of death.

- **Underlying cause of death (UCOD):** The underlying cause of death is formally defined 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.
The underlying cause of death is selected for routine single-cause tabulation of mortality statistics and is used as the basis for comparative mortality statistics worldwide.

INTRODUCTION

Value of mortality statistics

Prompt and accurate certification of cause of death serves a number of critical functions. In addition to the well-established legal and administrative functions, information on cause of death is used by governments to monitor the health of the population and to plan and evaluate public health interventions and services. Furthermore, cause of death data are extensively used to support epidemiological research.

Mortality statistics are so fundamental for health service policy-making and planning that most countries have put in place legislative frameworks for civil registration, vital statistics systems and collection of cause of death data (1).

Systems which require cause of death to be ascertained by a physician and reported using the international Medical Certificate of Cause of Death (MCCD) form and subsequently classified using WHO's International Statistical Classification of Diseases and Related Health Problems (ICD) coding system are widely perceived to be the gold standard for reporting cause of death data (1).

WHO's International Classification of Diseases³ provides a structured translation of each medical condition into an alphanumeric code. Use of this classification to report cause of death data allows for the harmonization and comparison of mortality statistics across time and place, within and between countries (2,3).

Since 1948, the cause of death information reported to WHO has been collated by country, year, age and sex in the WHO Mortality Database (4), the world's most comprehensive collection of internationally comparable cause of death data.

ICD coding of causes of death presupposes the correct use of the international Medical Certificate of Cause of Death (MCCD) form. This form was revised as recently as 2016 to improve the quality of cause of death reporting (*see Annex 2*).

The MCCD form should not be confused with the death certificate, which is the legal document that families of the decedent receive once a death has been registered in the civil registration system.

Medical training in pathophysiology and differential diagnosis equips physicians with an understanding of the processes that result in a patient's death and means that physicians already have the necessary skills and knowledge to certify a death and complete a MCCD form.

However, it has been demonstrated that further training in medical certification of cause of death, for instance through workshops and interactive in-service training delivered by clinical colleagues, improves the completion and accuracy of cause of death reporting and information.

³ As of 1 January 2022, the 11th revision (ICD-11) came into effect.

Despite this, in many countries and settings, physicians do not routinely receive any formal training in medical certification of cause of death. This lack of training has been linked to poor quality cause of death data and in some settings, both significant underreporting and overreporting of certain causes of death (5).

Moreover, where it exists, MCCD training has tended to focus on the reporting task. Newer evidence suggests that taking a broader view of the certifying physician's task, and also adopting a standard approach to the examination of a deceased person and investigation of the circumstances of death as advocated in these recommendations, offers a further opportunity to improve the quality of cause-of-death data.

Purpose and scope of the recommendations

The aim of these recommendations is to promote good practice in the confirmation of death, external examination of the body and ascertainment of the immediate circumstances of death, and completion of the Medical Certificate of Cause of Death (MCCD) form. These are duties which are usually carried out by a certifying physician, often the person who has been involved in the care of an individual prior to their death, although national law and practice may permit exceptions⁴. The content is divided into two parts. The first part covers the initial steps in the medical certification process, including the confirmation of a death and the investigation of the circumstances surrounding a death and its causes. The second part guides certifying physicians through the process of properly completing the Medical Certificate of Cause of Death (MCCD).

This document is therefore directed mainly at certifying physicians but may also be of interest to others involved in the investigation and medical certification of cause of death, as well as those involved in the related legal and administrative processes surrounding the death of an individual, such as mortality coders. It is designed to serve both as a reference guide for certifying physicians and to support the training of health professionals in medical certification cause of death (alongside relevant national guidance). In order to fulfil this latter objective, these recommendations are accompanied by a series of additional resources, including a checklist which is intended to guide physicians through the process of medical certification of cause of death (see *Table 2*) and some further training materials, including a number of worked examples of completed MCCD forms (*Annex 1* see A1.5).

These recommendations focus on the medical certification of the cause of unsuspected, natural deaths (i.e. deaths due to disease) that do not require investigation through a country's medicolegal death investigation system. Complex clinical issues such as the confirmation of brain death are not covered, and national guidance in such matters should be followed.

Table 1 sets out the scope of these recommendations in more detail, but it should be noted that this list of inclusions and exclusions is not exhaustive and is intended to serve as a rough guide to what types and manner of death fall under the remit of the recommendations.

It should also be noted that these recommendations should be read as subject to national law and practice, which take precedence in the case of contradiction or doubt. It is essential that the certifying physician complies with national law and the guidance

⁴ For example, an emergency paramedic might be permitted to confirm death; in the case of a stillbirth, certification of death might be carried out by a midwife.

provided by professional authorities in all respects, in order to avoid errors which might invalidate medical certification of cause of death or expose them to criminal or civil liability. In case of a death which is not due to natural causes, certifying physicians must ensure that their examination of the body and surrounding circumstances does not interfere with any investigation by the police or other authorities. The physician has a duty to inform the police, coroner or other relevant authorities of any suspicious circumstances or clinical findings, and to support the medicolegal investigation by accurately documenting all relevant facts.

Responsibility for ensuring proper examination and medical certification of cause of death varies between countries and care settings. In a hospital setting for instance, the formal responsibility often lies with the institution head, department head or the physician overseeing a ward but the actual examination and certification is usually carried out by more junior staff. In some countries, there may be a designated official (e.g. a “medical examiner”) whose role it is to routinely scrutinize medical certification of cause of death and to advise the certifying physician when necessary. Regardless of local institutional practices, it is important that all personnel involved in medical certification of cause of death have the relevant professional qualifications and are fully aware of the legal and administrative processes and requirements surrounding death certification in the specific country or jurisdiction in which they are working.

Table 1: Scope of the present recommendations

Included	Excluded
Confirmation of a natural death where there are no unusual clinical or medicolegal considerations	Confirmation of brain death and management of special clinical circumstances (e.g. persistent vegetative state)
External examination of the body and its surroundings and collection of readily available information from healthcare records and family members	Conduct of an autopsy , analysis of tissue samples and other specialist forensic investigations which may be required in suspicious cases
Medical certification of cause of death from natural causes (i.e. disease), usually with supporting information from healthcare records	Certification of deaths requiring medicolegal investigation , including the non-routine attendance of police authorities
Medical certification of cause of death in circumstances where a certifying physician or other qualified person is available to carry out the duties described in the normal way	Certification of a death in special circumstances, such as low-resource settings and remote areas, where special arrangements may be needed
	Deaths during wars and disasters

Routine attendance of the police does not in itself raise the suspicion that a death is unnatural; for example, national law may require the presence of a police officer at any time a body remains outside authorized premises.

PART 1: INITIAL STEPS PRIOR TO MEDICAL CERTIFICATION OF CAUSE OF DEATH

As mentioned in the introduction, this document is divided into two parts.

This first part focuses on the initial steps in the medical certification of cause of death process, steps which should be undertaken prior to filling in the Medical Certificate of Cause of Death (MCCD).

These include confirming the death, addressing the information needs and conducting an external examination of the body to determine the manner and cause of death. Structured guidance for carrying out these functions is provided below (sections 1.2 to 1.4).

This is preceded by a number of recommendations of a more general nature which are intended to assist the certifying physician approach the task of medical certification of cause of death in a more systematic fashion and so reduce the risk of procedural errors (section 1.1).

The importance of adopting a respectful approach when dealing with a death, and of maintaining patient confidentiality throughout the certification process, is highlighted in **Box 1**. By way of a summary, and as a tool to guide physicians through the process of medical certification of cause of death, a checklist is provided as **Table 2**. For convenience and ease of replication, this checklist is also at the last page of this document.

1.1 General principles

1.1.1 Recognition of the importance of cause of death data

When carrying out an investigation and a medical certification of cause of death, the certifying physician should be aware of the wider context and importance of their work. Mortality data and cause of death information reported by physicians are widely used by epidemiologists and health researchers to support improvements in medical treatment and healthcare provision.

More broadly, statistical information on deaths by underlying cause is important for monitoring the health of the population and for planning health services. Certifying physicians also need to be aware that cause of death information is a cornerstone of civil registration and identity management systems, with the Medical Certificate of Cause of Death (MCCD) in most countries being part of the basis for the legal recognition of a death (1).

1.1.2 Immediate arrangements for the disposition of the body

In the event of a death, the certifying physician should ensure that they obtain and record all the information needed for immediate purposes, that is to say, information that is necessary for the release of the body for burial or cremation. This may include identifying the presence of medical devices such as a pacemaker or an artificial joint.

1.1.3 Addressing the information needs of medical certification and registration of a death

Medical certification of cause of death requires a physician to state, based on their clinical judgement and following thorough investigation, what in their best medical opinion were the events and medical conditions that led to a person's death.

Alongside reporting cause of death, the certifying physician should be aware of, and aim to meet, the wider administrative, epidemiological and other information needs associated with the medical certification of a death.

In addition to recording the cause of death, the MCCD serves as a permanent legal record of the death and as such may impact on non-medical issues such as inheritance and insurance, historical studies and genealogy.

This means that the information provided must be accurate, comprehensive and clearly expressed. Any doubt about the identity of the deceased, their date of birth, place of residence or other characteristics should be resolved in accordance with national law.

When medically certifying a death, a physician is required to document the chain or sequence of events and medical conditions that ultimately resulted in death.

The physician should thus make every effort, using the information available and based on their best medical opinion, to ensure that the certified cause of death is as complete, accurate and precise and definite as possible.

Any uncertainty should be resolved before the medical certification, either by autopsy or other investigations, or by referral to medicolegal authorities (see also Box 1 and section 1.1.4).

Although civil registration systems may allow for amendments to be made if required, the physician should aim to conduct a thorough investigation to avoid the need for changes once the MCCD form has been submitted to the civil registration or vital statistics authorities. However, national law may allow exceptions to this general principle in at least two ways:

- The physician may be required to provide a provisional medical certification of cause of death, for example, to allow prompt disposal of the body, before the medicolegal investigation is completed.
- The physician may be expected to update the medical certification of cause of death at a later date after receipt of laboratory results or other additional evidence.

Box 1: Integrity, ethics and confidentiality

Professional integrity and respect for the law: Physicians should conduct their duties in a thorough and impartial manner, strictly observing national law and avoiding any improper influence (actual or perceived) on the extent of their investigation of the circumstances of death or their medical conclusions. Any attempt at improper influence should be reported to the appropriate authorities. Physicians should not medically certify a death as due to natural causes (disease) in the presence of any reasonable suspicion to the contrary and must ensure that every death which is unnatural or of unknown cause receives proper investigation according to national law (1).

Ethical behaviour and respect for religious and cultural practices: The examination is a medical task that requires the same care, accuracy and professional conduct as the diagnosis of disease and prescription of treatment for a living patient. Physicians should conduct their examination in a way which is considerate of the religion of the deceased (if known) and the feelings and religious beliefs of the bereaved (1). They should comply with religious and cultural preferences for handling of the body and burial unless there is a serious and unavoidable need to make an exception for legal or public health reasons. When discussing the deceased, physicians should avoid terms that might be seen as offensive or pejorative, for example “alcoholic”, except as required for accurate medical description of the cause of death.

Maintaining confidentiality after death: In many cultures, respect for the deceased’s privacy and desire for confidentiality extends beyond death. However, there are usually special, sometimes statutory, procedures that must be followed after a person has died, including recording information on medical certificate of cause of death and transferring the deceased’s medical file to storage. It is important to be particularly respectful when dealing with confidential information relating to deceased persons. Physicians and other personnel involved in medical certification of cause of death should always think carefully before sharing confidential information and must be sure to have proper authorization before disclosing information. WHO’s ICD-10 e-Training Tool includes a module which deals with matters relating to confidentiality and ethics; it is recommended that users of this document consult this resource for additional guidance in these matters (6).

1.1.4 Determining the manner of death

In many countries the distinction between natural and unnatural deaths is fundamental to the process of medical certification of cause of death. Generally speaking, a *natural death* is the result of an evident disease process. In many cases, a *natural death* will follow a recorded diagnosis of a potentially fatal health condition, or at least a record of symptoms, clinical findings or test results which support the apparent cause of death.

An *unnatural death* mostly results from external causes, such as an accident or interpersonal violence; in most countries a death that is deemed unnatural requires further review by a coroner, the police or some other legal authority in accordance with national law.

Some countries recognize a third category, namely an *undetermined* (or *unknown*) manner of death, while in others a death from unknown causes is automatically considered unnatural and therefore subject to medicolegal investigation.

Physicians are required to make a determination of manner of death for purposes of medical certification of cause of death when this is within their responsibility according to national law. In this case, determination of manner of death for purposes of medical certification of cause of death is one of the key tasks to be completed by a physician during their investigation of the death and findings should be recorded on the MCCD along with the causes of death.

Manner of death is reported in Frame B of the MCCD form, to note that the sequence of events leading to death, is always initiated by a specific disease, or cause of an injury that should always be reported in frame A.

When the manner of death is unnatural, for example, is caused by an injury but the cause of the lethal injury is omitted in frame A, this can trigger questions about the mode of death which may in turn either trigger a correction to frame A (to include the specific external cause of the injury), or serve to add a generic external cause when tabulating the cause of death information, where only the injury is mentioned in frame A.

An entry of “disease” as the manner of death corresponds to a natural death, whereas “accident”, “intentional self-harm”, “assault”, “legal intervention” or “war” would denote an unnatural death.

Many countries have established medicolegal death investigation (MLDI) systems to support the process of investigating certain types of deaths, mostly unnatural (or suspected unnatural) deaths and deaths with unknown causes. Sometimes deaths of public health importance or deaths which have occurred due to other special circumstances are also subject to further investigation.

Which types of deaths that require further review by the country’s MLDI system are generally specified as part of the legislative framework. Examples of national laws and regulations which specify which types of deaths (or circumstances surrounding the death) should be referred for investigation by a coroner, the police or other legal authority are provided as part of *Annex 1* (see A1.1).

Given the differences between countries in terms of the legislation governing which cases require referral, certifying physicians should familiarize themselves with all categories of reportable cases required for the country and/or jurisdiction in which they are working.

It is important to note that a death should be treated as requiring investigation even if there is only reasonable suspicion that the cause was not natural. In addition, certifying physicians should be aware that some categories of deaths which can be “natural” in themselves may nevertheless require referral to the MLDI system under national law, for example, because of a connection with important occupational exposures.

Underreporting of cases to the MLDI system may result in a miscarriage of justice and the underreporting of unnatural deaths in vital statistics (7, 8).

While in the first instance the initiative usually lies with the certifying physician to identify that a death should be referred to the MLDI system, once the referral has been made, the responsibility for determining the manner of death often transfers to the police or judicial authorities.

Manner of death for medical certification of cause of death is then a separate determination from that made in a court of law. However, national practice may require that the physician provide a MCCD to the legal authorities or other parties, or instead they may be asked to provide medical evidence which then enables the legal authorities to reach a conclusion. A flowchart summarizing the typical process of deciding whether a death is natural or requires medicolegal investigation is provided as part of *Annex 1* (see A1.2).

1.2 Confirmation that death has occurred

The diagnosis and confirmation of death is required for all deceased persons. Death is usually diagnosed when a registered medical practitioner, or other appropriately trained and qualified individual, confirms the irreversible cessation of neurological, cardiac and/or respiratory activity.

Broadly speaking, the process of confirming the death of an apparently deceased patient should only commence in one of the following circumstances:

- the patient has made an advance decision to refuse life-saving treatment;
- treatment aimed at sustaining life has been withdrawn because it has been decided to be of no further benefit to the patient and not in their best interests to continue;
- the patient meets local criteria for not attempting cardiopulmonary resuscitation; or
- attempts at cardiopulmonary resuscitation have failed.

In addition, full and extensive attempts at reversal of any contributing cause to cardiorespiratory arrest should have been made before death is confirmed. These causes may include, but are not limited to:

- depressant drugs or drug overdose;
- hypothermia (body temperature < 35°C);
- drowning; and
- reversible metabolic or endocrine causes (e.g. hyponatremia, hyperglycaemia, thyroid storm, Addisonian crisis).

The methods by which death is confirmed include the following:

- The presence of certain signs of death: livor mortis, rigor mortis, putrefaction or the presence of physical trauma that is incompatible with life (e.g. decapitation).
- Confirmation of the persistent and prolonged absence of cardiac and respiratory activity (“cardiorespiratory death”): the absence of a central pulse on palpation, the absence of respiratory effort on observation, or the absence of heart or breath sounds on auscultation.
- The presence of asystole (zero voltage) on an ECG recording.
- Confirmation of the absence of neurological activity, ranging from the absence of pupillary responses to light, corneal reflexes and motor responses to a central painful stimulus (e.g. supra-orbital pressure or trapezius squeeze), to the identification of whole brain or brain stem death by neurological testing.

From a practical standpoint, the way death is formally diagnosed and confirmed varies between countries. Certifying physicians are therefore urged to make themselves aware of local requirements or guidelines, where they exist, regarding which method or methods is/are required to confirm that death has occurred under given circumstances.

They should also be familiar with the detailed requirements of that method, for example, how soon to carry out an examination and for how long (e.g. when assessing cardiorespiratory death).

1.3 Information gathering to support medical certification of cause of death

The investigation of a death is not limited to a physical examination of the body but includes a certain amount of information gathering to create a clearer picture of the deceased, the circumstances surrounding their death and their previous medical history.

This information gathering is a starting point for the process of medically certifying cause of death, irrespective of whether the physician attended to the deceased at any point in the past, or only after the death occurred. For convenience this section is divided into administrative data and medical information.

1.3.1 Administrative data

The deceased’s name, address and date of birth (age) and date of death are required for the top section of the MCCD. Given the importance of medical certification of cause of death, and its frequent link to death certification for civil registration these details should be checked against suitable identification documents or other evidence to ensure that they are correct.

1.3.2 Medical history review

From the point of view of medically certifying a cause of death, it is not essential to conduct a full review of the deceased’s medical history, and this is not generally advised.

This is because a full review is not only time-consuming, but in most cases, unnecessary. Although an individual may have an extensive medical history, the MCCD should include only the external events and medical conditions that ultimately resulted in death, along with any medical conditions that may have contributed to this causal sequence.

However, certain aspects of a person's previous medical history are more likely to be pertinent and should be considered as part of the information gathering process; these include:

- past medical problems with approximate dates of onset or diagnosis,
- past surgery with approximate date of surgery,
- recent hospitalizations,
- medications taken prior to death, and
- medical allergies.

The certifying physician should consider taking brief notes on key points of the deceased's medical history which relate to cause of death and to which they can refer during the external examination (see section 1.4).

However, it is worth noting that the information gathering process is not intended to focus the external examination on a specific body system but rather to provide a clearer picture of the individual's recent health status, an important perspective especially when the physician is tasked with certifying the cause of death of a person they have not attended prior to death.

In a deceased woman of child-bearing age, the possibility of pregnancy-related circumstances such as ectopic pregnancy or adverse consequences of unsafe delivery or abortion should be considered.

For deaths that occur during a hospitalization, the certifying physician will have access to recent hospital notes and records, which will provide valuable insight into the deceased's recent medical history, including any diagnoses, treatments and their responses to care.

In cases where the deceased is brought to a hospital or health facility where care has not previously been provided, the physician may be able to request recent medical records from other healthcare professionals who have been involved in the care of the deceased.

In settings where healthcare access and medical documentation systems are limited, it is less likely that a deceased person will have a well documented medical history; however, they may have a health booklet which may contain some relevant information, for example, details of clinical diagnoses, prescriptions and immunizations received.

Given the aim of the information gathering exercise is to obtain an as complete as possible picture of the circumstances leading to death, certifying physicians should consider consulting all potential sources of useful information pertaining to the death, including but not limited to discharge summaries, ambulance records, general practitioner records, pathology and imaging reports.

Non-health sources of information such as police reports should also be considered when relevant. The physician should use their clinical judgement to decide on the scope of information gathering needed in the individual circumstances.

It is important to converse with a member of the household, ideally an adult with close contact to the deceased, such as a spouse, parent or adult child, or caregiver.

If the deceased lived in a communal setting, such as a nursing home, staff of the establishment should also be approached.

This process of gathering information from “lay” informants is quite separate from the review of the recorded medical history and is likely to focus on more recent health problems and symptoms and the observed circumstances of death, rather than formal medical details.

Any concerns about the care the deceased received or suspicions about the circumstances should be sensitively elicited. *Annex 1* contains an outline of suggested topics to cover when consulting or interviewing relatives about a death of a family member (see A1.3).

The recorded medical history, the observations of “lay” informants and the physical examination should all point towards the same cause of death.

Any apparent contradiction between the sources of information must be carefully considered and, if it cannot be resolved, may lead to referral to the appropriate medicolegal authorities.

1.4 External examination of the body

A careful and respectful external examination of the deceased’s body is an important part of the medical certification process, being frequently essential for the determination of the cause and manner of death (9, 10).

While it is understood that external examination is not always routinely undertaken in all regions, an accurate determination of the cause and manner of death (which is vital for medicolegal and public health purposes) is nearly always impossible without it, although there are a few exceptional circumstances in which an external examination is not deemed essential (see below).

In addition to the findings on the body itself, observations of the surroundings can often provide useful cues, namely evidence of recent consumption of alcohol, drugs or medication, as well as signs of violence. In some cases, pertinent information about the manner and cause of death can be elicited from relatives, caregivers or other persons and should also be considered (11).

The extent of the external examination should be guided by clinical judgement and may vary depending on the circumstances and setting of the death. For example, a death which occurred in a healthcare institution may well demand a different approach to one that took place in the community where the person was found dead or was pronounced dead on arrival at the emergency department.

Regardless of the circumstances surrounding the death, the health and safety of the examining physician is a primary consideration, and local guidelines and advice on such matters should be observed to ensure the well-being of the examining physician.

Only in rare cases will it be possible to determine the cause of death by external examination alone. However, a careful external examination of the body is *always* important as it is an essential element of all death investigations.

Not only can the external examination exclude or identify signs of injury and violence, but it can also aid in the evaluation of the circumstances surrounding death. The examiner

must keep in mind that even a terminally ill person may have been the victim of a homicide (12).

During the examination, all necessary precautions should be taken so as to not destroy or contaminate evidence or to create artefacts during the examination. This is particularly important in deaths which are suspicious or concerning for inflicted injury, in which case the preservation and collection of evidence may need to take precedence over the certifying physician's own external examination.

In such cases, the detailed external examination can be done later as part of the complete autopsy examination. Photographic documentation may be indicated. In addition, care should be taken to perform the examination in a respectful and private fashion which preserves the dignity of the body and is consistent with the cultural and religious concerns of the deceased and their family (see also Box 1).

As a general rule, the external examination should be performed on the completely undressed body, with all clothing, bandages and dressings removed. This is helpful as it ensures that no injuries are overlooked because they are covered by clothing or other items and thereby hidden from view. However, in some regions, this may not be considered culturally acceptable.

If the body is clothed, the examiner should first observe the condition of the clothing prior to its removal. Potentially relevant observations which should be documented might include whether clothing is correctly positioned and fastened, and whether it is wet, soiled or torn. Care should be taken to ensure that any evidence is not lost in the process of undressing.

Any extraneous items on the body should also be noted, such as tourniquets, medical devices or therapeutics. In the case of a homicide or suspicious death, the body should not be undressed, as this could destroy evidence, and all necessary procedures will take place during the autopsy.

The physical examination should take place under conditions of adequate lighting. Before examining individual parts of the body, general features such as signs of neglect, nutritional condition or skin discolouration should be recorded. For example, icterus may indicate liver failure.

Both the front and back of the entire body should be examined, as well as the hair and all body orifices (i.e. oral cavity, nasal orifices, external auditory canals, anus, genital region). The presence of seminal discharges should be noted where appropriate. The location of the lividity can be observed, and may allow the examiner to determine if the body was moved from a previous position prior to the examination. Attention should be paid to signs of poisoning.

These may be subtle; for example, an unusual colour of livor mortis may be suggestive of carbon monoxide poisoning (livor is cherry-red instead of the usual blue-purple colour). Substance abuse may be indicated by signs of pill debris or powder on the face, hands or in the mouth, and/or by evidence of needle marks. An unusual odour may be another indication of intoxication.

For example, a garlic odour is typical of intoxication with E605 parathion and a bitter almond odour is typical of cyanide poisoning. Scars, evidence of old injuries and tattoo marks are all features that should be recorded as part of the physical examination.

In order not to miss any relevant findings, a systematic approach should be taken. Use of a checklist can often be helpful in this regard (see Table 2).

It is recommended that the front of the body be examined first, starting with the head, and progressing distally to examine the neck, trunk, arms, legs and back.

Examination of the genitals can be done prior to rolling the body on its side to examine the back, during which the examination of the anal region can be done. Make sure to examine both sides of the back, including the side which is downward when the body is rolled.

In each area examined, the general appearance should be noted, as appropriate for that area of the body, and attention should be directed to the identification and/or exclusion of any injuries.

The head should be palpated and the hairy scalp inspected in detail so as not to miss fractures and injuries. Examine the eyelids, sclerae and conjunctivae, including eversion of the upper and lower eyelids to examine the conjunctivae. Conjunctival petechial haemorrhages may indicate neck compression (e.g. ligature or manual strangulation), and should prompt further investigation.

Other common sites for petechial haemorrhages are the eyelid skin, oral mucosa, facial skin, and the skin behind the ears. Examine the eyes for eye colour (which may be useful in identification) and evidence of injury or manifestation of disease (e.g. cataracts, post-surgical changes).

Blood or cerebrospinal fluid leaks from the external auditory canals can indicate a skull base fracture. Laceration and haemorrhage of the labial mucosa (so-called dental contour marks) may have been caused by blows or kicks against the oral region. Laceration of the tongue or oral mucosa may have resulted from a seizure.

The oral cavity should be inspected for signs of blood, foreign matter and other evidence of injury to the teeth or other oral structures.

The neck should be thoroughly examined on all sides, as neck skin injuries can be relatively subtle and not always immediately obvious.

Skin abrasions or contusions (bruises) may be due to manual strangulation, and partial or complete ligature impressions or furrows suggest ligature strangulation or hanging. The combination of neck skin injuries and petechial haemorrhages is highly suggestive of neck compression.

The chest should be palpated for possible rib fractures. Subcutaneous crepitus suggests pneumothorax. Patterned injuries suggestive of bites on the breasts or other areas of the body may indicate a sexually-related assault.

Passive movement of the **limbs** at the joints allows identification of unnatural mobility caused by fracture, as well as assessment of rigor mortis.

Rigor mortis is the stiffening of the muscles after death and is often detected when joint mobility is evaluated.

Inspection of the hands should look for broken fingernails, electrical burns and injuries to the hands (e.g. bruises, abrasions, incisions) which may have occurred during an altercation, and may be indicative of “defence wounds”.

Contusions and/or abrasions on the forearms or wrists may result from restraints or ligatures (so called “bondage marks”). An inspection for injection punctures should include the vein areas in the crook of the arms, forearm, wrists and the backs of the hands, as well as the ankles and the dorsal feet.

If these needle punctures are not the result of medical procedures, they may be related to injection drug use and raise suspicion for drug-related death. Contusions (bruises) caused by forceful grip (so-called “grip marks”) may be found on the upper arms.

Contusions on the inner thighs may have been caused by forcible spreading of the legs during sexual assault. Bondage marks may be found on the ankles. The soles of the feet may show electrical burns or other injuries.

Abrasions and contusions of the skin of the back over prominent skeletal regions may be impact injuries resulting from forcible pushing of the victim to the ground during an altercation or assault, including sexual assault.

Any **injury of the genital or anal region**, including abrasions, lacerations, or contusions should raise concern for sexual assault. The appearance of any faecal material should be noted – tarry or bloody stool should raise concern for gastrointestinal haemorrhage, supported by skin/mucosal pallor and/or sparse livor mortis.

Table 2: Death certification checklist: a tool for certifying physicians

Information gathering	
Yes/No	Identity of deceased confirmed (name, gender, date of birth, address)?
Yes/No	Details of death confirmed – date, time, location of death (address), type of place (e.g. hospital, home etc.)?
Yes/No	Next of kin/non-family contact identified (name, age, sex, relationship to deceased or role [e.g. care home manager], address)?
Yes/No	Pre-mortem circumstances considered (carer, duration of illness, symptoms, allergies, medications, death expected/unexpected)?
Yes/No	Is the deceased pregnant or have they recently given birth?
Yes/No	Any recent unusual circumstances (travel, exposure to substances, behaviour change)?
Yes/No	Any witnesses to death (and what they saw) identified?
Yes/No	Any suggestion of injuries or poisoning ? Police involved?
Yes/No	Healthcare records available/examined (GP notes, hospital notes, recent admission)?
Yes/No	Any recent surgery , invasive investigations, changes to medications, other intervention?
Yes/No	Any recent or prior pathology reports to confirm/support circumstances/diagnosis?
Yes/No	Any other records available (e.g. ambulance service, social services, care home)?
External circumstances and examination of the body	
Yes/No	Environmental surroundings – any signs of alcohol, drugs, violence?
Yes/No	Have you undressed the body (NOT in suspected homicide or suspicious death)?
Yes/No	Clothing – correctly placed, fastened, wet, soiled or torn?
Yes/No	Any tourniquets, medical devices or dressings, sign of therapeutic intervention?
Yes/No	Does the body have an unusual smell/odour ?
Yes/No	Skin – any abnormal discolouration, jaundice, cyanosis?
Yes/No	Scalp – fractures or injuries?
Yes/No	Eyes – haemorrhages?
Yes/No	Ears – haemorrhages, blood or cerebrospinal fluid in the canal?
Yes/No	Mouth – lacerations, bruises, blood or foreign material, injuries to teeth/other structures?
Yes/No	Neck – abrasions, bruises, ligature marks, furrows?
Yes/No	Chest/abdomen – rib fractures, subcutaneous crepitus (pneumothorax), bite marks?
Yes/No	Genitals – abrasions, lacerations, contusions?
Yes/No	Arms – fractures (mobility), grip marks, injection marks, bondage marks, burns (especially finger-tips), broken nails, finger injuries?
Yes/No	Legs – contusions (especially inner thighs), bondage marks, burns on soles of feet?
Yes/No	Back – abrasions (especially over prominent bony structures), wounds?
Yes/No	Anal region – abrasions, lacerations, contusions, bloody or tar-like stool?
Completion of Medical Certificate of Cause of Death (MCCD)	
Yes/No	Have you prepared a draft with time intervals? Does the causal sequence make sense?
Yes/No	Are all demographic details complete?
Yes/No	Have you completed Frame A part 1 including time intervals with the correct causal sequence?
Yes/No	Does Frame A Part 1 include a valid underlying cause of death ?
Yes/No	Is Frame A part 2 complete including other significant conditions with time intervals (if available)?
Yes/No	Have you completed Frame B and any other remaining sections?
Yes/No	Submit MCCD to appropriate authorities within the required deadline.

Think: should this case be referred to the police or medicolegal authorities? Is a post-mortem required?

PART 2: MEDICAL CERTIFICATION OF CAUSE OF DEATH

Once the death has been declared (pronounced) and the necessary information about the deceased has been collected (from a document review and physical examination), the certifying physician can then make a clinical judgement as to the causal chain and contributory medical conditions that resulted in death and complete the Medical Certificate of Cause of Death (MCCD) form.

The medical certificate of cause of death form should be completed following the recommendations described in the WHO International Classification of Diseases (ICD), irrespective of the ICD revision the country is currently using (2, 3). The 2016 WHO international Medical Certificate of Cause of Death (MCCD) is reproduced in full in *Annex 2* and is the international standard upon which countries base their death certificates.

2.1 The WHO international Medical Certificate of Cause of Death form

2.1.1 Purpose and importance

The WHO international Medical Certificate of Cause of Death (MCCD) form has been designed to standardize reporting of causes of death across countries to facilitate intra- and inter-country comparisons of causes of death, including over time (2). Use of this standardized form is recommended to ensure the correct application of the ICD rules and principles for mortality coding and the resulting selection of the underlying cause of death by cause of death coders. The MCCD was developed to facilitate the reporting of multiple conditions in a standardized way: thus, the cause of death is reported in a logical, sequential fashion in Part 1 of Frame A, while Part 2 of Frame A is used to record other conditions which contributed to, but did not directly cause, the death (see *Annex 2*). Completion of Part 1 is required on all MCCD forms.

For MCCD purposes, causes of death were defined by the 20th World Health Assembly as: “... all those diseases, morbid conditions or injuries, which either resulted in or contributed to death and the circumstances of the accident or violence which produced any such injuries.”

This definition indicates that if the certifying physician believes that a condition present in the deceased did not cause or contribute to death, that condition does not have to be noted on the MCCD form. This definition also ensures that only relevant *causes* are recorded, rather than symptoms and modes of dying (13). The latter should instead be documented in the deceased’s medical record, along with other reports and relevant documentation regarding the deceased’s previous medical conditions. **The WHO MCCD form is limited to reporting only the causal sequence of the underlying cause of death and any contributory conditions that resulted in death.**

Although all events and medical conditions reported on the MCCD form are important for understanding the circumstances surrounding a death, accurate identification of the underlying cause of death (UCOD) is of critical importance. Accurate UCOD data lead to accurate mortality data and statistics, which in turn are used to inform health policy and design public health programmes aimed at reducing or eliminating premature and preventable deaths. The application of the WHO ICD coding rules and principles to the international MCCD form allows for the systematic identification of an UCOD and supports routine analysis of mortality. Because mortality data are based on the information recorded in MCCD forms, it is important that certifying physicians clearly

understand the concept of underlying cause of death and the importance of thoughtful completion of the MCCD (see also section 1.1).

Accurate determination of cause of death and completion of the MCCD form requires training that ideally should start during medical education and be continued in regular education programmes. Ongoing training is of particular relevance in settings where the MCCD form and reporting recommendations evolve in response to changes in mortality statistical needs and developments in coding standards. Physician inexperience and lack of appropriate training are commonly cited reasons for major errors in medical certification of cause of death. Moreover, error rates have been shown to decrease markedly when didactic training seminars or printed guidelines are provided. Educational programmes can emphasize the importance and direct relationship between the quality of medical certification of death and accurate mortality data, which are the basis for prioritization and allocation of health care and public health resources.

A mechanism should be in place for medical certificates of cause of death to be reviewed on a regular basis. This mechanism can be implemented at the level of the unit (i.e. the senior attending physician reviews MCCD forms completed by physicians on duty), the hospital (i.e. a mortality review committee reviews a sample of completed MCCD forms); or the individual (i.e. coders reach out to certifying physicians when they encounter challenges in understanding the information reported on the MCCD form). The reported causes of death that are subject to epidemiological surveillance must also be ratified or rectified, for example, through individual case review.

Finally, in countries that allow amendment of information reported on MCCD forms, a mechanism should exist to allow physicians to submit a final cause and/or manner of death when this information is confirmed at the conclusion of a thorough medical investigation (*see also* section 1.1.3). All efforts should be made to ensure mechanisms are in place to assess quality proximal to the point of medical certification to minimize delays from corrections and to ensure the timeliness in the analysis of a cause of death statistics.

2.1.2 Structure and content

Although the precise structure and content of the MCCD form varies between countries, reflecting country-specific data collection needs, the section devoted to the reporting of causes of death (Frame A) usually follows the 2016 WHO-recommended international MCCD form in most if not all countries (*Annex 2*).

Frame A is divided into Part 1 and Part 2. Part 1 consists of a causally related sequence of the diseases, injuries, complications and/or conditions that ultimately resulted in the death. The underlying cause of death (UCOD) is the condition which started the fatal causal sequence and should be reported on the *lowest* completed line in Part 1. The cause of death statement in Part 1 can consist of 1, 2, 3, or 4 lines, depending on the physician's judgement about the causal sequence. The phrase "due to" between the lines means that the condition listed above is due to the one listed below – both pathophysiologically and chronologically. If the form has been completed properly, the condition on the lowest completed line of Part 1 will have caused all the conditions on the lines above it.

A cause must always be entered on Line 1a of Part 1. If only one cause is listed in Part 1, that condition is considered to be the UCOD, and in accordance with ICD coding rules, will be selected as the underlying cause of death. If more than one cause is listed in the causal

sequence, the first cause (listed in line 1a) is called the immediate, direct, terminal or final cause of death. If 3 or 4 causes are listed in Part 1, those causes in lines 1b and 1c are termed “intermediate causes of death”, and the UCOD should be the last listed cause (in either line 1c or 1d).

Only one condition or event should be entered per line in Part 1, unless two or more complications or conditions occurred simultaneously.

A time interval must be recorded for the condition on each line listed in Frame A, indicating the elapsed time between the presentation of each condition (not the time of diagnosis) and the date of death. The listed time intervals can be estimates, using terms such as minutes, hours, days, weeks, months or years. Providing estimated time intervals allows more accurate understanding of the time course and sequence of the listed interrelated causes. The time intervals should either increase or stay stable in the causal sequence from Part 1a to Part 1d (or the lowest line used) but should not decrease.

Part 2 of Frame A is for listing one or more significant diseases, injuries, or conditions that contributed to death (contributory causes of death) but are not part of the causal sequence described in Part 1. Certifying physicians should use their best clinical judgement to decide whether a disease or condition was a part of the causal sequence (and therefore should be included in Part 1) or contributed otherwise to a person’s death (in which case it should be included in Part 2).

Frame B is designed to report detail that is relevant to a more complete understanding of the death and like Frame A is also very important. It complements the information in Frame A, in that it is used during the selection of the UCOD, assists with cause-of-death coding and supports additional epidemiological analyses. This section includes information on manner of death, as well as circumstantial data for non-natural or external causes of death. Additional data are also collected on maternal deaths, perinatal (fetal or infant) deaths, and deaths due to post-procedural conditions (Annex 2).

2.1.3 Specificity of cause of death and mode of death

Causes of death should be described using terms that are as diagnostically and etiologically specific as possible. For example, the term “Type 2 diabetes mellitus” should be used instead of “diabetes mellitus”; likewise, “end-stage renal failure” is more informative than the less specific “renal failure”.

Use of etiologically specific terminology is particularly important when describing the underlying cause of death. Although in a causal sequence, terminal or intermediate causes of death may be described in less specific terms, more specific information should always be provided as an etiologically specific UCOD. For example, rather than reporting an UCOD as “End-stage renal failure (months)”, certifying physicians should aim to provide a more diagnostically specific underlying cause of death such as: “End-stage renal failure (months) due to Diabetes mellitus, type 1 (years).” A list of diagnostic terms that are frequently cited as the underlying cause of death, but which are not sufficiently specific, and generally should only be used as either terminal or intermediate causes of death, is provided in Annex 1 (see Table A1.4.1).

Reporting only the terminal or intermediate causes without an etiologically specific UCOD is a common error in medical certification of cause of death. For example, heart failure can be caused by many different conditions, such as rheumatic heart disease,

ischaemic heart disease or cardiomyopathy, each of which has different prevention measures. The use of non-specific terms as underlying causes of death adversely impacts the usefulness of mortality data to identify health priorities and inform health policies.

Another common error in medical certification of cause of death is the use of a mode of death instead of an underlying cause of death. A mode of death is a final common pathway for many of causes of death and does not provide detailed information about the underlying cause. Common modes of death are cardiac arrest, heart failure or respiratory failure. It is sometimes difficult to separate modes of death from non-specific intermediate or terminal causes of death. However, what is important to note is that neither modes nor non-specific causes of death should be stated as an UCOD. If a physician chooses to record a mode of death to clarify a causal sequence, it is important to also record an associated UCOD – the event or condition which initiated the fatal chain of causal events.

In rare circumstances, it is possible to list the UCOD as "unknown cause". The use of this term is discouraged, but is not prohibited, because in some cases there is no information or confirmation of the cause of death, even after the autopsy. In such cases, it is preferable to write "Death due to undetermined or unknown cause" instead of "inventing" diagnoses.

2.2 Filling in the Medical Certificate of Cause of Death

The final section of these recommendations provides a number of important tips for correct completion of a MCCD form. This list of "Dos and Don'ts" (see Box 2), together with the checklist presented in Table 2 are intended to assist physicians approach in medical certification of cause of death in a systematic manner and to reduce the risk of errors.

A series of examples of completed MCCD forms are presented in Annex 1 (see A1.5); these examples have been chosen to reflect common errors in cause of death reporting, and to illustrate the application of the guidance provided by these recommendations. The examples focus on the proper completion of Frame A, Part 1.

BOX 2: Dos and Don'ts of MCCD completion

The DOs

- **Do** verify the name of the deceased person on the MCCD, and always make sure that you are completing the form for the correct deceased person.
- **Do** prepare a draft of the sequence of events and conditions, and time intervals, you plan to include in Frame A of the MCCD form, both in Part 1 (Causal sequence of events/conditions leading to death) and in Part 2 (Contributory causes).
Do include in your draft as much clarifying detail as is available to you for each medical condition and event you list. This allows for more diagnostic specificity and improves the quality of your information. For example, if the death was due to cancer, make a note of the type of malignancy, the site and if it was the result of an infection, the causative organism; if the deceased suffered heart failure, include the specific aetiology of the heart failure.
Do check your listed causes against the list provided in *Annex 1* (Table A1.4.1). If you have used a non-specific process or mode of death, use your best clinical judgement and the information available to you to clarify the terminology and provide the most etiologically specific UCOD.
Do make sure that the causal sequence you have written makes sense. A useful check is as follows:
 - Read the Part 1 Cause of Death statement from the highest to lowest line, inserting “due to” between the lines. Make sure it makes logical and chronological sense.
 - Then check the time interval column and make sure that the time intervals increase or stay stable from top to bottom.
 - For example: (1a) Immediate cause (hours), due to (1b) Intermediate cause (days), due to (1c) Intermediate cause (days), due to (1d) Underlying cause (months).
- **Do** Complete all parts of the form, including the pertinent sections in Frame B.
- If using a paper format, **do** write legibly and complete the form in pen using an acceptable colour (i.e. black).
- **Do** check for errors, and make sure your name and title are correctly listed, before signing in pen or electronically.

The DON'TS

- **Don't** leave Part 1 blank. In some cases, the findings of histopathological, toxicological or other studies may not be available at the time of completing the MCCD, especially if the death occurred due to external causes or was sudden. If a diagnosis is not confirmed by a procedure or test, but the clinical presentation provides sufficient confirmation, it is acceptable to report the medical condition as “probable” or “possible”.
- **Don't** make alterations or erasures, or use correction fluid, on a paper MCCD form.
- **Don't** use abbreviations. Some mortality coding offices may accept certain common abbreviations such as HIV and AIDS, but others may not. Use of abbreviations may result in incorrect interpretation of the information on a MCCD, and should be avoided.
- **Don't** report modes of death without an associated underlying cause of death. Likewise, do not use etiologically non-specific causes of death as an underlying cause of death, unless no other additional information is available.

REFERENCES

1. Guidelines on the legislative framework for civil registration, vital statistics and identity management. New York, NY: United Nations; 2019 (https://unstats.un.org/unsd/demographic-social/Standards-and-Methods/files/Handbooks/crvs/CRVS_GOLF_Final_Draft-E.pdf, accessed 20 March 2022).
2. International statistical classification of diseases and related health problems. 10th revision, Volume 2. Instruction manual. Fifth edition. Geneva: World Health Organization; 2016 (https://icd.who.int/browse10/Content/statichtml/ICD10Volume2_en_2016.pdf, accessed 20 March 2022).
3. ICD-11. International classification of diseases for mortality and morbidity statistics. Eleventh revision. Reference guide. Geneva: World Health Organization; 2022 (<https://icd.who.int/icd11refguide/en/index.html>, accessed 20 March 2022).
4. WHO Mortality Database [online database]. Geneva: World Health Organization; 2022 (<https://www.who.int/data/data-collection-tools/who-mortality-database>, accessed 20 March 2022).
5. Madsen A, Thihalolipavan S, Maduro G, Zimmerman R, Koppaka R, Li W et al. An Intervention to improve cause-of-death reporting in New York City hospitals, 2009–2010. *Prev Chronic Dis*. 2012;9:120071. doi:10.5888/pcd9.120071.
6. ICD-10 Training Guide. Version 2020 [e-training guide]. Geneva: World Health Organization; 2020 (<https://icd.who.int/training/icd10training/ICD-10%20training/Start/index.html>, accessed 20 March 2022).
7. Lu T, Shaw K, Hsu P, Chen L-H, Huang S-M. Non-referral of unnatural deaths to coroners and non-reporting of unnatural deaths on death certificates in Taiwan: implications of using mortality data to monitor quality and safety in healthcare. *Int J Qual Health Care*. 2008;20(3):200–5.
8. Charles A, Ranson D, Bohensky M, Ibrahim J. Under-reporting of deaths to the coroner by doctors: A retrospective review of deaths in two hospitals in Melbourne, Australia. *Int J Qual Health Care*. 2007;19(4):232–6.
9. Madea B, Argo A. Certification of death: External post-mortem examination. In: Madea B (ed). *Handbook of Forensic Medicine*. Chichester: Wiley; 2014: 57–74.
10. Schmeling A, Klein A, Bajanowski T. External post-mortem examination according to S1 guideline 2017 of the German Society of Legal Medicine [in German]. *Bundesgesundheitsbl*. 2019; 62(12):1452–7. doi: 10.1007/s00103-019-03043-4.
11. Cusack D, Ferrara SD, Keller E, Ludes B, Mangin P, Väli M et al. European Council of Legal Medicine (ECLM) Principles for on-site forensic and medico-legal scene and corpse investigation. *Int J Legal Med*. 2017;131:1119–22.
12. Brinkmann B, Banaschak S, Bratzke H, Cremer U, Drese G, Erfurt C, et al. Errors resulting from the external examination of corpses in Germany. Results of a multicentre study [in German]. *Arch Kriminol*. 1997;199: 2–12, 65–74.
13. International statistical classification of diseases and related health problems. 10th revision, Volume 2. Instruction manual. Second edition. Geneva: World Health Organization; 2004 (https://apps.who.int/iris/bitstream/handle/10665/42980/9241546530_eng.pdf, accessed 20 March 2022).

ANNEXES

Annex 1. Materials for use in the training of physicians

The following materials are intended to support the training of health professionals and practitioners involved in the medical certification of cause of death.

- A1.1 Specific examples of deaths requiring referral to coronial and non-coronial systems.
- A1.2 Flowchart illustrating a prototypical decision process for determining whether a death is natural or unnatural and/or requires medicolegal investigation.
- A1.3 Suggested topics to cover when interviewing household members of the deceased.
- A1.4 Guidance relating to the use of diagnostically and etiologically accurate terminology when filling in the MCCD form.
 - Table A1.4.1 List of frequently used medical conditions and clinical terms that should be used with additional etiological information for public health value.
 - Table A1.4.2 List of conditions which may be suggestive of complications of an injury or poisoning and may require referral to the medico legal system.
- A1.5 Completing the Medical Certificate of Cause of Death form: worked examples.

A1.1 Specific examples of deaths requiring referral to coronial and non-coronial systems

A selection of extracts from national or state regulations, as of January 2022, which specify the circumstances in which deaths should be referred for investigation by a coroner or the police, or other legal authority, are presented below. In each case, a short summary of the relevant legislation is provided, paraphrased where necessary for clarity.

This material is intended for training purposes only; the original texts of the regulations can be found by consulting the source material from which these summaries are derived and for which links and references are provided.

It is important to note that ultimately, healthcare professionals must make their own decisions on a case-by-case basis, using their clinical judgement, medical and legal responsibility and expertise, bearing in mind the legal requirements applicable in the country or jurisdiction in which they are working. While being part of training materials of this document, the material provided here does not precede any local regulations or laws. WHO disclaims all liability for the accuracy or completeness of the text of this annex, and disclaims all warranties, expressed or implied to its incorrect use.

Coronial systems

Australia (State of South Australia)

The Courts Administrative Authority of South Australia defines “reportable” deaths, i.e. deaths which must be reported to the state coroner, as deaths which have occurred (1):

1. unexpectedly, unusually or as a result of a violent, unnatural or unknown cause;
2. during a flight or voyage to the State of South Australia;
3. while the deceased was in custody;
4. during, as a result or within 24 hours of certain surgical or invasive medical procedures, including the giving of an anaesthetic for the purpose of performing the procedure;
5. within 24 hours of discharge from a hospital or attendance for treatment to an emergency department of a hospital;
6. while the deceased was a “protected” person;
7. while the deceased was subject to a custody or guardianship order under the Children and Young People (Safety) Act 2017;
8. while the deceased was a patient in an approved treatment centre under the Mental Health Act 2009;
9. while the deceased was a resident of a licensed supported residential facility under the Supported Residential Facilities Act 1992;
10. while the deceased was in a hospital or other facility for treatment for drug addiction;
11. during, as a result or within 24 hours of medical treatment to which consent had been given under Part 5 of the Guardianship and Administration Act 1993; or
12. when a cause of death was not certified by a physician.

In most circumstances, a police officer or a physician will notify the state coroner of any death that may be a reportable death.

Ghana

Ghana's Coroner's Act of 1960 (2) mandates that a coroner is to be notified:

1. When any dead body is found, or when a person has died a violent or other unnatural death or a death of which the cause is unknown, it shall be the duty of any person finding the body or becoming aware of the death to give forthwith notice thereof to the officer in charge of the nearest police station."
2. "The person in charge of any prison, lock-up, lunatic asylum or public institution other than a hospital shall forthwith give notice to the Coroner for the district of the death from any cause whatsoever of any person detained therein."
3. "The person in charge of any hospital in which a person has died an unnatural death shall forthwith give notice thereof to the Coroner for the district."

United Kingdom (England and Wales)

According to The Notification of Deaths Regulations 2019 (3), in England and Wales, a physician is required to report a death to the coroner in any of the following circumstances:

1. The physician suspects that the death was due to:
 - (i) poisoning, including by an otherwise benign substance;
 - (ii) exposure to or contact with a toxic substance;
 - (iii) the use of a medicinal product, controlled drug or psychoactive substance;
 - (iv) violence;
 - (v) trauma or injury;
 - (vi) self-harm;
 - (vii) neglect, including self-neglect;
 - (viii) the person undergoing a treatment or procedure of a medical or similar nature; or
 - (ix) an injury or disease attributable to any employment held by the person during the person's lifetime;
2. The physician suspects that the person's death was unnatural but does not fall within any of the circumstances listed under (1) above;
3. The cause of death is unknown, or there is any other suspicion that the death was unnatural;
4. The deceased died while in custody or otherwise in state detention;
5. The identity of the deceased is unknown; or
6. Certain other circumstances, such as lack of involvement of a physician within certain time limits before or after death.

United States of America (State of California)

The California State Government Code (4) stipulates that it is the duty of the coroner to inquire into and determine the circumstances, manner, and cause of:

1. all violent, sudden, or unusual deaths;
2. unattended deaths;
3. deaths where the deceased has not been attended by either a physician or a registered nurse, who is a member of a hospice care interdisciplinary team, in the 20 days before death;
4. deaths related to or following known or suspected self-induced or criminal abortion;
5. known or suspected homicide, suicide, or accidental poisoning;
6. deaths known or suspected as resulting in whole or in part from or related to accident or injury either old or recent;

7. deaths due to drowning, fire, hanging, gunshot, stabbing, cutting, exposure, starvation, acute alcoholism, drug addiction, strangulation, aspiration, or where the suspected cause of death is sudden infant death syndrome;
8. death in whole or in part occasioned by criminal means;
9. deaths associated with a known or alleged rape or crime against nature;
10. deaths in prison or while under sentence;
11. deaths known or suspected as due to contagious disease and constituting a public hazard;
12. deaths from occupational diseases or occupational hazards;
13. deaths of patients in state mental hospitals serving the mentally disabled and operated by the State Department of State Hospitals;
14. deaths of patients in state hospitals serving the developmentally disabled and operated by the State Department of Developmental Services;
15. deaths under such circumstances as to afford a reasonable ground to suspect that the death was caused by the criminal act of another;
16. and any deaths reported by physicians or other persons having knowledge of death for inquiry by coroner.

South Africa

According to South Africa's National Health Act No. 61 of 2003 (5), all "unnatural deaths" should undergo a medicolegal investigation and be referred to the Forensic Pathology Service.

The Inquests Act 1959 (Act No. 58 of 1959) deems the following as deaths due to unnatural causes, and are thus subject to medicolegal investigation of death:

1. any death due to physical or chemical influence, direct or indirect, or related complications;
2. any death, including those which would normally be considered to be due to natural causes, which may have been the result of an act of commission or omission which may be criminal in nature;
3. any death as contemplated in section 56 of the Health Professions Act, 1974 (Act No. 56 of 1974); and
4. any death which is sudden and unexpected, or unexplained, or where the cause of death is not apparent."

Non-coronial systems

India

According to India's Code of Criminal Procedure, 1973 (6) the police should be notified that a person:

1. has committed suicide, or
2. has been killed by another or by an animal or by machinery or by an accident, or
3. has died under circumstances raising a reasonable suspicion that some other person has committed an offence.

Mexico

In Mexico, when a death is confirmed or suspected of being caused by accident, homicide or suicide, or is of unknown cause, physicians are instructed to notify the public prosecutor (police). Under such circumstances, a forensic doctor performs the autopsy and certifies the death.

Often the causes noted are provisional, poorly defined or unknown and must be corrected days or months later as the investigation progresses or reaches a conclusion. Changes to the mortality statistics database are made once the mode and cause of death are confirmed (7).

When death occurs at home, the medical certificate of cause of death can either be filled in by a physician from the institution that was treating the deceased at the time of their death, or by a doctor appointed by the funeral home.

United States of America (District of Colombia)

Regulations established by the Mayor of the District of Colombia specify which types of deaths require medicolegal investigation by the Office of the Chief Medical Examiner. These include:

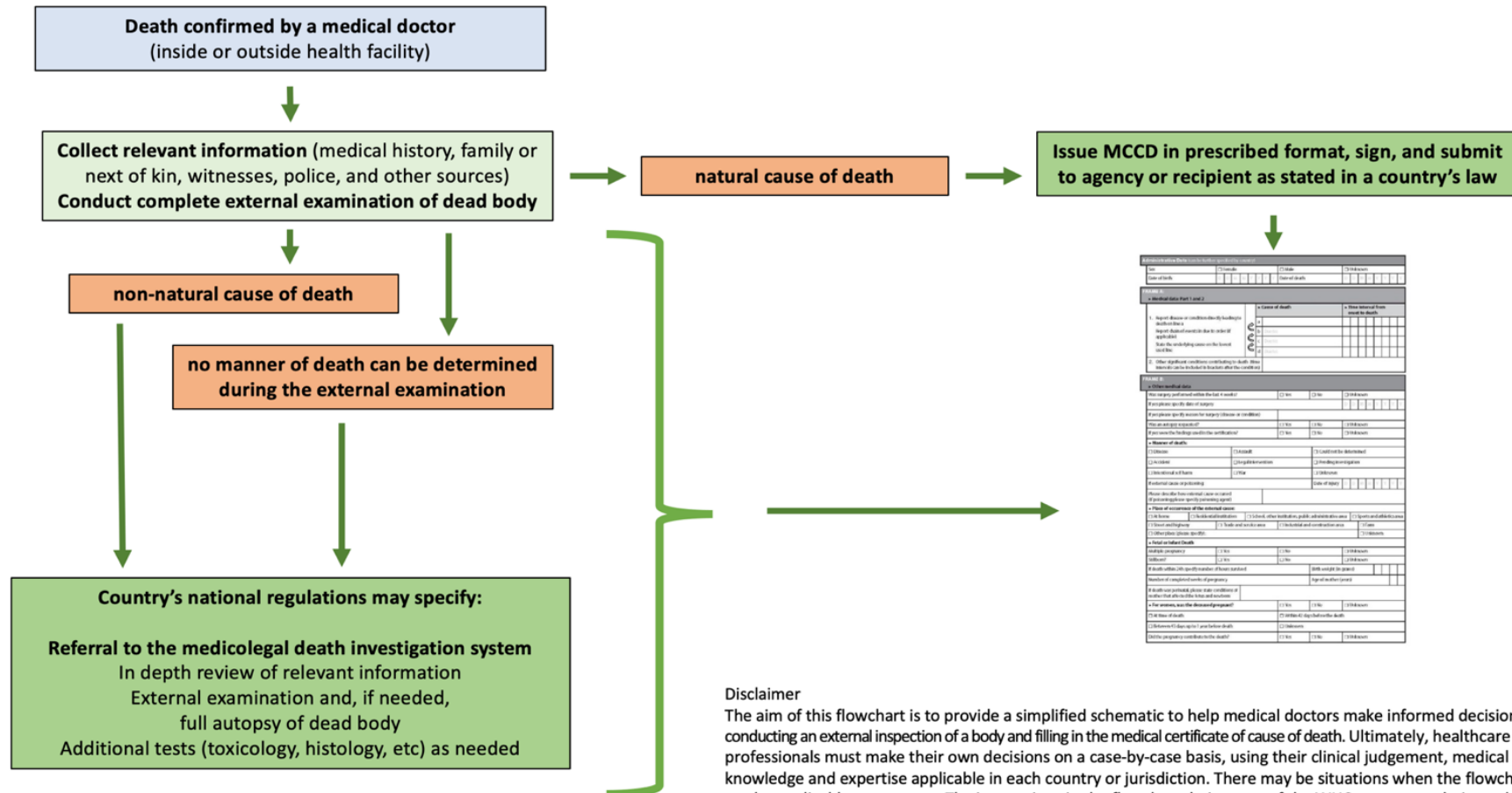
- violent deaths, whether apparently homicidal, suicidal or accidental including deaths due to thermal, chemical, electrical or radiation injury and deaths due to criminal abortion, whether apparently self-induced or not;
- sudden, unexpected or unexplained deaths not caused by readily recognizable disease, including sudden infant deaths or apparent sudden infant death syndrome (SIDS) for infants one year of age and younger;
- deaths under suspicious circumstances;
- deaths of persons whose bodies are to be cremated, dissected, buried at sea or otherwise disposed of so as to be thereafter unavailable for examination;
- deaths related to disease resulting from employment or on-the-job injury or illness;
- deaths related to disease which might constitute a threat to public health;
- deaths of persons who are wards of the District of Colombia government;
- deaths related to medical or surgical intervention, including operative, peri-operative, anesthesia, medication reactions or deaths associated with diagnostic or therapeutic procedures;
- deaths of persons while in legal custody of the District;
- fetal deaths related to maternal trauma including substance abuse, and extra-mural deliveries;
- deaths for which the Metropolitan Police Department, or other law enforcement agency, or the United States Attorney's Office requests, or a court orders investigation; and
- dead bodies brought within the District of Colombia without proper medical certification.

Moreover, all deaths occurring in the District of Colombia for which cremations are requested, regardless of where the cremation will occur, are subject to clearance from the Chief Medical Examiner.

References

1. Courts Administration Authority of South Australia: The Coronial Process (https://www.legislation.sa.gov.au/_/legislation/lz/c/a/coroners%20act%202003/current/2003.33.auth.pdf, accessed 05 May 2022).
2. Laws of Ghana. Coroners Act, 1960 Act 1 (<http://elibrary.jsg.gov.gh/fg/laws%20of%20ghana/2%20REP/CORONERS%20ACT.%201960%20ACT%2018.htm>, accessed 05 May 2022).
3. The Notification of deaths Regulations 2019: Statutory Instrument 2019 No. 1112 (<https://www.legislation.gov.uk/ukSI/2019/1112/made>, accessed 05 May 2022).
4. California Government Code: Sec. 27491 (https://california.public.law/codes/ca_gov't_code_section_27491, accessed 05 May 2022).
5. National Health Act, Act No 61 of 2003: Regulations regarding the rendering of forensic pathology service (Gazetted 20 July 2007 – No. R.636) (<https://www.gov.za/documents/national-health-act>, accessed 12 May 2022).
6. The Code of Criminal Procedure Act, 1973 (<https://legislative.gov.in/actsofparliamentfromtheyear/code-criminal-procedure-act-1973>, accessed 12 May 2022).
7. Lineamientos para la expedición del certificado de defunción (IV). Manual de Llenado del Certificado de Defunción y de Muerte Fetal. México City: Mexico; 2017 (http://www.slpsalud.gob.mx/transparenciaadmon/planeacion/estadistica/manual_cdcmf.pdf, accessed 12 May 2022).
8. Council of the District of Colombia. Deaths – determinations and investigations; cremations. D.C. Code § 5-1405 (<https://code.dccouncil.us/us/dc/council/code/sections/5-1405#>, accessed 12 May 2022)

A1.2 Flowchart illustrating a prototypical decision process for determining whether a death is natural or non-natural and/or requires medicolegal investigation



A1.3 Suggested topics to cover when interviewing household members of the deceased

In terms of guidance and recommendations for gathering information from family members in the event of a death, it is difficult to be overly prescriptive or too specific. The information gathering process will inevitably be unique to the circumstances in which the death occurred; also much will depend on the family or next of kin's familiarity with the deceased's medical history and death, and the family or next of kin's ability to communicate these details to the certifying physician.

As a general rule, however, it is recommended that a certifying physician approach this discussion in a similar way to taking a clinical history in connection with a patient visit, with the provision that in this case, the patient is dead and the information will be collected from a proxy.

The topics listed below are intended to assist physicians tasked with interviewing a deceased person's family or household with a view to gaining a better understanding of the deceased's medical history, the circumstances surrounding the death and the cause of death.

The interview

Consider starting the discussion with open-ended questions, such as:

- Could you tell me how [your father] died?
- Can you tell me about your [father's health] prior to [his] death? For example, did [he] have any health conditions, was [he] receiving care from a doctor or a nurse [or traditional healer], and do you know what treatment [he] was having or had been recommended to have?

Depending on the responses to the initial open-ended questions, it may be possible to pose a few follow up, more specific questions and arrive at a differential diagnosis. If, however, the open-ended questions do not produce sufficient information, consider asking questions about symptoms that the deceased may have had, taking the main body systems in turn, as follows:

- cardiorespiratory (e.g. chest pain, palpitations, ankle swelling, orthopnoea, nocturnal dyspnoea, shortness of breath, cough with or without sputum, blood in sputum when coughing);
- gastrointestinal (e.g. abdominal pain, chest pain after eating, difficulty swallowing, nausea, vomiting, degree of appetite, weight loss or gain, bowel patterns and any changes, blood in stool, jaundice);
- genitourinary (e.g. haematuria, nocturia, frequency, dysuria, menstrual irregularity (women), urethral discharge (men));
- locomotor (joint pain, change in mobility); and
- neurological (e.g. seizures, collapses, dizziness, eyesight, hearing, paresthesia, intermittent loss of vision, speech, or sight).

If the death was a result of an accident or another external cause (and has not already been referred to the police or appropriate medico-legal authorities), ask questions about the circumstances of the incident in order to obtain all the information pertinent to certifying cause of death:

- If the death was a result of a transport accident, ask about the type(s) of vehicles involved, the location of the accident, and role of the deceased (e.g. driver, passenger).
- If the death occurred because of some other form of accident, ask about the location and circumstances of the incident (e.g. did it take place at a workplace, at home or in a public place) and the nature of the physical injury that led to death (e.g. was death the result of a fall, a blow or a crushing injury).
- Ask about the part(s) of the body that sustained injuries and the observable effects on those parts (e.g. bleeding, bruising, pain, paralysis).

When asking follow-up questions about medications taken by the deceased, consider asking the family to share the medication bottles or blister packs to confirm the names and dosages of any prescribed medications. Also ask about any traditional medicines that the deceased may have been taking.

If the deceased has been hospitalized in the recent past, ask the family to share any discharge notes or other medical records they may have. These notes can be used to guide the information gathering discussion and also to cross-check information shared by the family.

It is often beneficial to ask questions about family history of illnesses and about the deceased employment and occupational history.

Questions about the deceased behaviours such as alcohol consumption, drug use and sexual activity are also often a necessary part of the information gathering process. This line of questioning, particularly when it concerns sexual health and substance use, may be uncomfortable for family members, and should be approached with appropriate sensitivity and be mindful of non-verbal cues.

Use vocabulary that can be comprehended by the family member or next of kin. For example, instead of using a term such as “nocturnal dyspnoea”, consider asking if the deceased awoke suddenly at night coughing, with shortness of breath, and even the need to sit up to breathe.

When asking for clarification about information provided by family members, use both lay language (e.g. dizziness and upset stomach) and medical terms (e.g. heart attack and stroke) to ensure you comprehend the condition that is being described.

Be alert for any suggestion that the family member believes there was a deficiency in the care of the deceased, either in the longer term or in the illness leading directly to death, or has suspicions that any misconduct was involved. If raised, such issues should be elicited sensitively and may require the involvement of the police or medico-legal authorities according to national laws and professional codes of conduct.

A1.4 Guidance relating to the use of diagnostically and etiologically accurate terminology when filling in the MCCD form.

Table A1.4.1 List of frequently reported medical conditions and clinical terms that should be used with additional etiological information for public health value.

Term	Comments
Abdominal haemorrhage	Specify the cause of haemorrhage
Abscess	Specify the cause and location of abscess
Accident	Specify the circumstances of the accident Specify intent Specify place of occurrence
Adhesions	Specify the cause and location of adhesions
Adult respiratory distress	Specify the cause
Alcohol, drugs	Specify long term or single use, addiction
Altered mental status	Specify the cause
Anaemia	Specify the type and cause of anaemia
Anoxia	Specify the cause
Arrhythmia	Specify the type and cause
Ascites	Specify the cause
Aspiration	Specify the cause and effect of aspiration
Atrial fibrillation	Specify the cause
Bacteraemia	Specify the location and cause of primary infection
Bedridden	Specify the cause/disease
Biliary obstruction	Specify the cause of obstruction
Bowel obstruction	Specify the cause of obstruction
Brain injury	Specify the cause, circumstances and intent
Brain stem herniation (when not otherwise specified)	Specify the cause
Carcinomatosis	Specify the type and location of the primary tumour
Cardiac arrest	Specify the cause
Cardiac dysrhythmia	Specify the kind of dysrhythmia and the cause
Cardiomyopathy	Specify the kind of cardiomyopathy and the cause
Cardiopulmonary arrest	Specify the cause (if known)
Cellulitis	Specify the cause
Cerebellar tonsillar herniation	Specify the cause
Cerebral oedema	Specify the cause
Cerebrovascular accident	Specify the cause
Chronic bedridden state	Specify the cause
Cirrhosis	Specify the cause
Coagulopathy	Specify the cause
Complication of surgery	Specify the disease that was the reason for surgery
Compression fracture	Specify the cause, location and intent (if applicable)
Convulsions	Specify the cause
Decubiti	Specify the cause and location
Dehydration	Specify the cause

Term	Comments
Dementia	Specify the kind of dementia
Diarrhoea	Specify the cause
Disseminated intravascular coagulopathy	Specify the cause
End-stage liver disease	Specify the cause
End-stage renal disease	Specify the cause
Epidural haematoma	Specify the cause
Exsanguination	Specify the cause
Failure to thrive	Specify the cause
Fracture	Specify the location and the cause
Gangrene	Specify the location and the cause
Gastrointestinal haemorrhage	Specify the cause
Heart failure	Specify the cause
Haemothorax	Specify the cause
Hepatic failure	Specify the cause
Hepatitis	Specify the whether acute or chronic, viral (specify type), or other aetiology
Hepatorenal syndrome	Specify the cause
Hyperglycaemia	Specify the cause
Hyperkalaemia	Specify the cause
Hyponatraemia	Specify the cause
Hypotension	Specify the cause
Hypovolemic shock	Specify the cause of hypovolemia
Immunosuppression	Specify the cause
Increased intracranial pressure	Specify the cause
Intracranial haemorrhage	Specify the cause
Infection	Specify the causative microorganism and localisation of the infection
Leukaemia	Specify type e.g. myeloid, monocytic, lymphoid, also whether acute or chronic
Malnutrition	Specify the cause and type (if known)
Metabolic encephalopathy	Specify the cause
Multi-organ failure	Specify the cause
Multi-system organ failure	Specify the cause
Myocardial infarction	Specify the cause
Necrotizing soft-tissue infection	Specify the location and cause
Open (or closed) head injury	Specify the cause, mechanism, intent (if applicable)
Pancytopenia	Specify the cause
Paralysis	Specify the cause of paralysis
Perforated gallbladder	Specify the cause of perforation
Peritonitis	Specify the cause
Pleural effusions	Specify the cause
Pneumonia	Specify the cause, e.g. aspiration, causative microorganism. If due to immobility: specify the cause of immobility
Pulmonary arrest	Specify the cause
Pulmonary oedema	Specify the cause

Term	Comments
Pulmonary embolism	Specify the cause of embolism. If postsurgical or due to immobility, indicate the disease that was a cause for surgery or immobility
Pulmonary insufficiency	Specify the cause
Renal failure	Specify the cause whether acute, chronic or terminal, underlying cause of insufficiency, such as arteriosclerosis or infection. If due to immobility: specify the cause of immobility
Respiratory arrest	Specify the cause
Seizures	Specify the type and the cause
Sepsis	Specify the cause (specific microorganism and the primary location of the infection)
Septic shock	Specify the cause of sepsis
Shock	Specify the type and the cause
Starvation	Specify the cause
Subarachnoid haemorrhage	Specify the cause
Subdural haematoma	Specify the cause
Sudden death	Specify the cause (if known)
Thrombocytopenia	Specify the cause
Thrombosis	Specify: arterial or venous. Specify: the blood vessel. If postsurgical or immobility: specify disease that was a cause for surgery or immobility
Tumour	Specify: behaviour (e.g. malignant, borderline, benign), location, whether metastases were present
Uncal herniation	Specify the cause
Urinary tract infection	Specify the site in the urinary tract, causative microorganism, underlying cause of infection. If due to immobility: specify the cause of immobility
Ventricular fibrillation	Specify the cause
Ventricular tachycardia	Specify the cause
Volume depletion	Specify the cause

Table A1.4.2 List of conditions which may be suggestive of complications of an injury or poisoning and which may require referral to the medicolegal system.

Asphyxia
Bolus
Choking
Drug or alcohol overdose/drug or alcohol abuse
Epidural haematoma
Exsanguination
Fall
Fracture
Hip fracture

Hyperthermia
Hypothermia
Open reduction of fracture
Pulmonary emboli
Seizure disorder
Sepsis
Subarachnoid haemorrhage
Subdural haematoma
Surgery
Thermal burns/chemical burns

A1.5 Completing the Medical Certificate of Cause of Death form: worked examples

Examples of completed Medical Certificate of Cause of Death (MCCD) forms are shown below; these examples have been chosen to reflect common errors in medical certification of cause of death, and to illustrate the application of the guidance provided in the main body of these recommendations. The examples focus on completion of Frame A, Part 1.

In examples 1 and 2, several options are shown, some correct and some incorrect. In these first two examples, the reasons why the completed MCCD form is considered to be correct or incorrect is explained. In the remaining examples, 3 to 7, the relevant MCCD extracts shown have been completed correctly for the following reasons:

- the listed medical conditions and events are described using accurate and specific medical terminology;
- the sequence of medical conditions and events is correct and the time interval from onset to death (i.e. duration) has been included for each listed condition in the sequence leading to death;
- the underlying cause of death is correctly specified in the lowest line of Part 1;
- no medical abbreviations have been used; and
- any contributing causes noted in Part 2 are reported with their respective duration, and were not part of the chain of events leading to death listed in Part 1.

Note also that only the information presented in the short case summaries are reflected in the completed sections of the MCCD forms shown.

Case example 1

Summary

A 36-year-old man with a three-year history of duodenal ulcers was admitted to hospital with peritonitis following a peptic ulcer perforation. Five years previously, he was involved in a road traffic crash, suffering a broken tibia and fibula that required surgery. Upon admission, he was febrile, complained of weight loss, and had a poor appetite.

An emergency exploratory laparotomy on his first day of admission showed a 2 cm diameter duodenal ulcer on the anterior wall of the first part of the duodenum. Despite antibiotic therapy, the patient became febrile five days post-op and a sub-phrenic abscess was found under the right diaphragm.

A revision exploratory laparotomy was scheduled for the following day, but his condition worsened over the course of the day. He had increased difficulty breathing, decreased urine output and low blood pressure, and was exhibiting signs of septic shock by that night. He had a sudden cardiac arrest and died within two hours of the onset of septic shock.

Physician examination of the deceased

The attending physician declared the death and initiated the death examination. In preparation for certifying the death, the attending physician reviewed the patient's medical file to refresh her memory of his medical history even though she had been caring for him and was familiar with his history.

Since the attending physician was able to obtain detailed information about the patient's current and past medical history from his medical file, it was not necessary in this case to consult with the next of kin or conduct a review of additional medical history documents.

The attending doctor then conducted a full external examination of the deceased to confirm her understanding of the medical conditions leading to his death and to avoid missing any relevant findings.

Upon completion of her systematic external examination, but before filling in the official hard copy of the MCCD form, the attending physician made her own list of the medical conditions that contributed to her patient's death, in order of occurrence and including the length of time from the onset of each to death.

Once she had confirmed her opinion regarding the correct sequence of the chain of events that led to death, the attending physician then completed the hard copy of the MCCD. In line with common practice, the completed MCCD form was added to the patient's medical history file, for subsequent submission to the appropriate authorities.

Completed Medical Certificate of Cause of Death form

Option 1

Frame A: Medical data: Part 1 and 2											
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death					Time interval from onset to death			
		a	Right sub-phrenic abscess					1 day			
		b	Due to: Perforated duodenal ulcer					5 days			
		c	Due to: Chronic duodenal ulcer					3 years			
		d	Due to:								
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)											
Frame B: Other medical data											
Was surgery performed within the last 4 weeks?						☒ Yes		☐ No		☐ Unknown	
If yes please specify date of surgery						D	D	M	M	Y	Y
If yes please specify reason for surgery (disease or condition)											
Was an autopsy requested?						☐ Yes		☐ No		☐ Unknown	
If yes were the findings used in the certification?						☐ Yes		☐ No		☐ Unknown	
Manner of death:											
☒ Disease				☐ Assault				☐ Could not be determined			
☐ Accident				☐ Legal intervention				☐ Pending investigation			
☐ Intentional self harm				☐ War				☐ Unknown			
If external cause or poisoning:						Date of injury		D	D	M	M
Please describe how external cause occurred (If poisoning please specify poisoning agent)											

Option 1 shown above is considered **correct** for the following reasons:

- The physician presents a plausible pathophysiological and chronological sequence, starting with the terminal cause of death (right sub-phrenic abscess with a time interval of 1 day), due to an intermediate cause of death (perforated duodenal ulcer with a time interval of 5 days), due to the tentative underlying cause of death (chronic duodenal ulcer with a time interval of 3 years) which is reported in the lowest line.
- The physician does not report signs and symptoms (i.e. fever, weight loss, poor appetite, difficulty breathing, decreased urine output, and lower blood pressure) but instead reports only medical conditions, using specific terminology.
- The physician does not include cardiac arrest in the chain of conditions or events leading to death, as in this case cardiac arrest is the mechanism of death.
- Time intervals were clearly specified in each line of Part 1.
- The physician wrote all medical conditions clearly using appropriate medical terminology, did not use any abbreviations and there are no crossings out.

Option 2

Frame A: Medical data: Part 1 and 2				
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line	  		Cause of death	Time interval from onset to death
		a	Septic shock	2 hours
		b	Due to: Right sub-phrenic abscess	1 day
		c	Due to: Perforated duodenal ulcer	5 days
		d	Due to: Chronic duodenal ulcer	3 years
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)				

Option 2 shown above is also considered **correct** for the following reason:

- This physician decided that septic shock was important to include as the terminal cause of death in the causal sequence. It is acceptable to include septic shock in the causal sequence when additional information on the aetiology can also be reported.

However, septic shock should never be reported alone on a MCCD. This is because septic shock in isolation does not provide any information about the root cause of the septic shock and which medical condition could have been prevented, and as such is of limited value from the point of view of policy-making and health planning.

A list of other similar terms that should not be used without additional information about the aetiology is provided in Annex 1 (Table A1.41).

Option 3

Frame A: Medical data: Part 1 and 2				
1	Report disease or condition directly leading to death on line a		Cause of death	Time interval from onset to death
		a	Shock	
	Report chain of events in due to order (if applicable)	b	Due to: Abscess	
		c	Due to: Ulcer perforation	
	State the underlying cause on the lowest used line	d	Due to:	
2	Other significant conditions contributing to death (time intervals can be included in brackets after the condition)	Road traffic accident		

Option 3 shows an incorrectly completed MCCD form; it is considered to be incorrect for the following reasons:

- The physician should not have included the road traffic accident in Part 2. This section of the MCCD is reserved for contributory causes of death. However, as indicated in the case summary above, the road traffic accident neither initiated nor contributed to the chain of events that led to the death of this patient and was only mentioned as an antecedent.
Remember the MCCD form is specifically for the events and medical conditions that triggered the sequence of events resulting in death and should be limited to this information. The medical history is the location for all details on the deceased.
- The terms used to describe the medical conditions listed in Part 1 and the injury in Part 2 are not sufficiently detailed. It is important to describe each medical condition using precise medical terms so that cause-of-death coders can identify the underlying cause of death from a completed MCCD and assign an appropriate ICD code.

In this example of a completed MCCD, which not only lacks sufficient medical precision but also incorrectly includes the road traffic accident in Part 2, a coder may be forgiven for making the assumption that there is a connection between the road traffic accident and the ulcer perforation.

This combination of poor recording may lead to an incorrect conclusion and erroneous coding of the underlying cause of death. Remember that policy and programmes are informed by the underlying causes of death reported on MCCD forms.

- Time intervals have not been included in either Part 1 or 2. The absence of such information makes it difficult for cause-of-death coders to confirm whether the causal sequence is correct. In this particular example, the lack of time interval information adds to the potential for error because coders have no way of knowing whether the road traffic accident is connected to the causal sequence or if it is an unrelated, prior event.
This example highlights the importance of reporting time intervals alongside all conditions listed in Part 1, even if the time interval is listed as “unknown” or described in only very broad terms, such as “hours”, “days” or “minutes”

Case example 2

Summary

A 34-year-old male was admitted to hospital in acute respiratory distress. He died before any emergency interventions could be initiated. The patient had been admitted to hospital with severe shortness of breath a month earlier.

During the previous admission it was noted that he had a nine-month history of unintentional weight loss, night sweats and diarrhoea. HIV tests were positive, with T-cell levels of less than 200 cells/ μ L, indicative of AIDS. A chest X-ray showed pulmonary cavitation suggestive of tuberculosis (TB). Tuberculosis was confirmed by a positive sputum smear. The patient did not respond to standard tuberculosis treatment.

Physician examination of the deceased

The examining physician was the attending doctor on duty at the hospital when the patient arrived in respiratory arrest. Since he died shortly after arrival, the certifying physician did not have any interaction with the patient before conducting the physical examination, nor had she been involved in his care during his recent admission.

In terms of information gathering, the certifying physician was thus reliant on the patient's medical passport that his family had brought to the hospital and the information she was able to obtain from speaking with the deceased's family (*see Annex A1.3 for guidance on interviewing household members using a structured question format*).

By reviewing the patient's medical passport, the physician was able to confirm the deceased's date of birth (and age) and found evidence of positive test results for TB and AIDS from the previous month and a prescription for TB treatment.

The family confirmed that the deceased took his prescribed TB medication "most days". She also learned that the deceased suffered a broken left arm and scarring on both arms five years ago as a result of a fall while doing repairs to his house.

Based on her review of the deceased medical history and the examination of the deceased's body, the certifying physician expected to find signs of AIDS and TB, and some scars on his arms. On examination of the deceased's unclothed body, she found that the patient was underweight with swollen lymph glands in his neck and armpits; he had oral thrush and anal ulcers. She also found old scarring on both arms.

Completed Medical Certificate of Cause of Death form

Option 1

Frame A: Medical data: Part 1 and 2				
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death	Time interval from onset to death
	  	a	Respiratory tuberculosis	1 month
		b	Due to: Acquired Immunodeficiency Syndrome (AIDS)	10 months
		c	Due to:	
	d	Due to:		
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)				
Frame B: Other medical data				
Was surgery performed within the last 4 weeks?			☐ Yes	☒ No
If yes please specify date of surgery			D	D
If yes please specify reason for surgery (disease or condition)				
Was an autopsy requested?			☐ Yes	☐ No
If yes were the findings used in the certification?			☐ Yes	☐ No
Manner of death:				
☒ Disease		☐ Assault		☐ Could not be determined
☐ Accident		☐ Legal intervention		☐ Pending investigation
☐ Intentional self harm		☐ War		☐ Unknown
If external cause or poisoning:			Date of injury	D D
Please describe how external cause occurred (If poisoning please specify poisoning agent)				

This completed MCCD form is considered correct for the following reasons:

- The direct cause of death, "respiratory tuberculosis" is correctly written in full; remember use of medical abbreviations in Part 1 and 2 of the MCCD should be avoided.
- The causal sequence is correct and time intervals have been provided. In this case, HIV infection led to AIDS and ultimately pulmonary tuberculosis (TB). Although the deceased did not have an HIV test 10 months prior to death, at this point in time he was showing signs of HIV infection (unintentional weight loss, night sweats and diarrhoea).

The certifying physician has decided that there is sufficient evidence to report HIV infection at 10 months on the MCCD form given that a diagnosis of AIDS was confirmed with a test one month prior to death. Note that this MCCD form does not mention the fall and broken arms since this event does not contribute to the causal sequence which led to death.

Option 2

Frame A: Medical data: Part 1 and 2				
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death	Time interval from onset to death
		a	Respiratory distress	
		b	Due to: TB	
		c	Due to:	
		d	Due to:	
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)				

This completed MCCD would be considered to be **incorrect** for the following reasons:

- Abbreviations have been used. Use of abbreviations for medical conditions should be avoided since they can result in confusion among cause-of-death coders who are not always medical doctors.
- This MCCD form does not include mention of HIV or AIDS despite evidence that the deceased had HIV/AIDS, and in this case was condition that led to TB and respiratory failure. Cause-of-death coders will use the medical conditions and events you report on MCCD forms to determine the underlying cause of death and assign mortality codes using ICD rules and principles.

Not reporting HIV or AIDS on the MCCD could lead to underreporting of the burden of this disease. This in turn will misinform policy-makers and could have a substantial impact on HIV prevention programmes and target populations, as well as on overall funding decisions.

- Time intervals are not included. Always report a time interval for events and conditions listed in Part 1 since it can be used by coders to verify the sequence of events and medical conditions listed. If you know the time interval for conditions listed in Part 2, include those also.

Option 3

Frame A: Medical data: Part 1 and 2				
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death	Time interval from onset to death
		a	TB	
		b	Due to: Broken arm	
		c	Due to:	
	d	Due to:		
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)				

This version of the completed MCCD is **incorrect** for the following reasons:

- Part 1 does not provide a causal sequence – a logical chain of events leading to death. A broken arm does not lead to TB. Remember, as noted above, the purpose of the MCCD is not to provide a medical history. It is a form for reporting the sequence of events or medical conditions that ultimately resulted in death.
 Of key interest to policy-makers is the underlying cause of death so that they understand who is dying and from what, and can develop policies and health services accordingly. In this case, a broken arm is not a part of the causal sequence or a significant condition that contributed to death and therefore should not be included in the MCCD.
- Abbreviations have been used. Use of abbreviations for medical conditions should be avoided.
- This MCCD does not mention that the deceased had HIV or AIDS. Cause-of-death coders will use the medical conditions and events you report on MCCD forms to determine the underlying cause of death and assign mortality codes using ICD rules and principles.
 Not reporting HIV or AIDS on the MCCD as the underlying cause of death could lead to underreporting of the burden of this disease, which in turn could impact on funding decisions and support for HIV prevention programmes.
- Time intervals are not included. Always report a time interval for events and conditions listed in Part 1 since it can be used by coders to verify the sequence of events and medical conditions listed. If you know the time interval for conditions listed in Part 2, include those also.

Option 4

Frame A: Medical data: Part 1 and 2				
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death	Time interval from onset to death
		a	Retroviral disease	
		b	Due to: Pulmonary tuberculosis	
		c	Due to:	
	d	Due to:		
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)				

This MCCD would also be considered **incorrect** for the following reasons:

- In this example, the patient's medical condition, HIV/AIDS, has not been described accurately. Instead, the certifying physician has written "retroviral disease". Other terms that are often used in place of AIDS because they are considered more discrete and/or easier for families to accept include "immunodeficiency", "immunocompromised" or "retroviral syndrome". It is important that medical conditions are reported accurately on a MCCD, and with sufficient detail.

Using a non-specific term like "retroviral disease" may confuse or mislead the cause-of-death coder who may not code this as a death caused by HIV/AIDS. As mentioned above, this can lead to an underestimate of the true burden of HIV/AIDS, and a poor basis for informed policy-making.

Policy-makers will only be in a position to make informed decisions about strategies to reduce deaths occurring in their communities and countries if they understand what people are dying of, and this understanding hinges on accurate and detailed reporting of the underlying cause of death in MCCD forms.

- The causal sequence is incorrect. In this case, the viral disease, AIDS, resulted in pulmonary tuberculosis, but this sequence is listed in the MCCD in the wrong order. The fact that time intervals have not been included either is also unhelpful; including this information can help coders to verify the correct sequence of events leading up to death. It is your role, as the certifying physician, to make every effort to identify the event or medical condition which you believe, using your best medical opinion, triggered the sequence that ultimately led to death and ensure that this is reported in the lowest line of Part 1. This may be difficult when the deceased has an extensive medical history and multiple comorbidities.

Case example 3

Summary

A 38-week gestational age male infant was born by emergency forceps delivery because of acute fetal distress. At birth, there was a tight double nuchal cord, severe asphyxia and evidence of meconium aspiration. He died 12 hours later; birth weight 3100 g. The mother was a healthy 25- year-old.

Completed MCCD form (Frame A and relevant section of Frame B)

Frame A: Medical data: Part 1 and 2											
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death				Time interval from onset to death				
		a	Severe asphyxia at birth (38 weeks gestation)				12 hours				
	↻	b	Due to: Meconium aspiration				12 hours				
	↻	c	Due to: Acute fetal distress				12 hours				
	↻	d	Due to: Tight double circular nuchal cord				12 hours				
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)											
Frame B: Other medical data											
Manner of death:											
☒ Disease			☐ Assault			☐ Could not be determined					
☐ Accident			☐ Legal intervention			☐ Pending investigation					
☐ Intentional self harm			☐ War			☐ Unknown					
If external cause or poisoning:					Date of injury		D		D		
Please describe how external cause occurred (If poisoning please specify poisoning agent)											
Fetal or infant Death											
Multiple pregnancy					☐ Yes		☒ No		☐ Unknown		
Stillborn?					☐ Yes		☒ No		☐ Unknown		
If death within 24h specify number of hours survived				1	2	Birth weight (in grams)		3	1	0	0
Number of completed weeks of pregnancy				3	8	Age of mother (years)		2	5		
If death was perinatal, please state conditions of mother that affected the fetus and newborn					None						

Case example 4

Summary

A 28-year-old woman in her third pregnancy with a pregnancy of 37 weeks had a history of previous caesarean section for foetopelvic disproportion. She presented at home with ruptured membranes, with onset of labour accompanied by severe abdominal pain and profuse vaginal bleeding. She was admitted to hospital in hypovolemic shock. She underwent an emergency caesarean section for uterine rupture at the level of the previous caesarean section scar, but she died during the intra-operative period.

Completed MCCD form (Frame A and relevant section of Frame B)

Frame A: Medical data: Part 1 and 2				
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death	Time interval from onset to death
		a	Haemorrhagic shock	Hours
		b	Due to: Uterine haemorrhage	Hours
		c	Due to: Pregnancy complicated with uterine rupture of previous caesarean scar	Hours
		d	Due to:	
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)				
Frame B: Other medical data				
Manner of death:				
☒ Disease		☐ Assault		☐ Could not be determined
☐ Accident		☐ Legal intervention		☐ Pending investigation
☐ Intentional self harm		☐ War		☐ Unknown
If external cause or poisoning:			Date of injury	D D
Please describe how external cause occurred (If poisoning please specify poisoning agent)				
For women, was the deceased pregnant?			☒ Yes ☐ No ☐ Unknown	
☒ At time of death			☐ Within 42 days before the death	
☐ Between 43 days up to 1 year before death			☐ Unknown	
Did the pregnancy contribute to the death?			☒ Yes ☐ No ☐ Unknown	

Case example 5

Summary

A 70-year-old man with a 20-year history of hypertension, a 15-year history of type 2 diabetes mellitus, a myocardial infarction eight years previously due to ischaemic heart disease, and a five-year history of congestive heart failure, was admitted to hospital with worsening shortness of breath, and a five-day history of leg swelling and cough productive of clear sputum. He was treated for an exacerbation of congestive heart failure, but progressed to decompensated heart failure with pulmonary oedema requiring inotropic support and died six days after admission.

Completed MCCD form (Frame A and relevant section of Frame B)

Frame A: Medical data: Part 1 and 2				
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death	Time interval from onset to death
		a	Pulmonary oedema	6 days
		b	Due to: Congestive cardiac failure	5 years
		c	Due to: Remote myocardial infarction	8 years
		d	Due to: Ischaemic heart disease	> 8 years
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)			Hypertension (20 years), Diabetes Mellitus type 2 (15 years)	
Frame B: Other medical data				
Manner of death:				
☒ Disease		☐ Assault		☐ Could not be determined
☐ Accident		☐ Legal intervention		☐ Pending investigation
☐ Intentional self harm		☐ War		☐ Unknown
If external cause or poisoning:			Date of injury	D D
Please describe how external cause occurred (If poisoning please specify poisoning agent)				

Case example 6

Summary

A 54-year-old man with a 10-year history of ischemic heart disease underwent colectomy on 10 February 2020 for sigmoid colon carcinoma diagnosed several months previously. Three days after surgery, he developed acute shortness of breath and hypotension and died shortly thereafter due to pulmonary embolism.

Completed MCCD form (Frame A and relevant section of Frame B)

Frame A: Medical data: Part 1 and 2															
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death					Time interval from onset to death							
		a	Pulmonary embolism					1 hour							
		b	Due to: Colectomy					3 days							
		c	Due to: Primary sigmoid colon carcinoma					Months							
		d	Due to:												
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)			Ischemic heart disease 10 years												
Frame B: Other medical data															
Was surgery performed within the last 4 weeks? ☒ Yes ☐ No ☐ Unknown															
If yes please specify date of surgery						0	2	1	0	2	0	2	0		
If yes please specify reason for surgery (disease or condition)						Colon carcinoma									
Was an autopsy requested?						☐ Yes ☒ No ☐ Unknown									
If yes were the findings used in the certification?						☐ Yes ☐ No ☐ Unknown									
Manner of death:															
☒ Disease			☐ Assault			☐ Could not be determined									
☐ Accident			☐ Legal intervention			☐ Pending investigation									
☐ Intentional self harm			☐ War			☐ Unknown									
If external cause or poisoning:						Date of injury		D	D	M	M	Y	Y	Y	Y
Please describe how external cause occurred (If poisoning please specify poisoning agent)															

Case example 7

Summary

A 45-year-old man was struck by an automobile while crossing a road on 25 September 2020. He was treated in hospital for multiple rib and sternal fractures and a cardiac contusion of the left ventricle and died two days later. He had been hospitalized for an acute myocardial infarct one year previously, and had a 20-year history of type 2 diabetes.

Completed MCCD form (Frame A and relevant sections of Frame B)

Frame A: Medical data: Part 1 and 2														
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line	  		Cause of death	Time interval from onset to death										
		a	Cardiac tamponade	2 days										
		b	Due to: Cardiac contusion	2 days										
		c	Due to: Chest trauma (blunt impact injury to chest)	2 days										
	d	Due to: Pedestrian struck by motor vehicle												
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)														
Frame B: Other medical data														
Manner of death:														
☐ Disease			☐ Assault			☐ Could not be determined								
☒ Accident			☐ Legal intervention			☐ Pending investigation								
☐ Intentional self harm			☐ War			☐ Unknown								
If external cause or poisoning:					Date of injury		0	9	2	5	2	0	2	0
Please describe how external cause occurred (If poisoning please specify poisoning agent)					When crossing the main avenue of the city, he was hit by a car.									
Place of occurrence of the external cause:														
☐ At home		☐ Residential institution		☐ School, other institution, public administrative area				☐ Sports and athletics area						
☒ Street and highway		☐ Trade and service area		☐ Industrial and construction area				☐ Farm						
☐ Other place (please specify):										☐ Unknown				

Sources of further information

1. USCDC. Instructions for completing the cause-of-death section of the Death Certificate. US Department of Health and Human Services, Centers for Disease Control and Prevention; 2004 (https://www.cdc.gov/nchs/data/dvs/blue_form.pdf, accessed 10 May 2022).
2. WHO. International statistical classification of diseases and related health problems. 10th revision, Volume 2. Instruction manual. Fifth edition. Geneva: World Health Organization; 2016 (https://icd.who.int/browse10/Content/statichtml/ICD10Volume2_en_2016.pdf, accessed 20 March 2022).

Annex 2. The WHO 2016 international Medical Certificate of Cause of Death form

Administrative Data (can be further specified by country)																			
Sex		☐ Female				☐ Male				☐ Unknown									
Date of birth		D	D	M	M	Y	Y	Y	Y	Date of death		D	D	M	M	Y	Y	Y	Y
Frame A: Medical data: Part 1 and 2																			
1 Report disease or condition directly leading to death on line a Report chain of events in due order (if applicable) State the underlying cause on the lowest used line		Cause of death												Time interval from onset to death					
		a																	
		b	Due to:																
		c	Due to:																
		d	Due to:																
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)																			
Frame B: Other medical data																			
Was surgery performed within the last 4 weeks?										☐ Yes		☐ No		☐ Unknown					
If yes please specify date of surgery										D	D	M	M	Y	Y	Y	Y		
If yes please specify reason for surgery (disease or condition)																			
Was an autopsy requested?										☐ Yes		☐ No		☐ Unknown					
If yes were the findings used in the certification?										☐ Yes		☐ No		☐ Unknown					
Manner of death:																			
☐ Disease					☐ Assault					☐ Could not be determined									
☐ Accident					☐ Legal intervention					☐ Pending investigation									
☐ Intentional self harm					☐ War					☐ Unknown									
If external cause or poisoning:										Date of injury		D	D	M	M	Y	Y	Y	Y
Please describe how external cause occurred (If poisoning please specify poisoning agent)																			
Place of occurrence of the external cause:																			
☐ At home			☐ Residential institution			☐ School, other institution, public administrative area						☐ Sports and athletics area							
☐ Street and highway			☐ Trade and service area			☐ Industrial and construction area						☐ Farm							
☐ Other place (please specify):										☐ Unknown									
Fetal or infant Death																			
Multiple pregnancy										☐ Yes		☐ No		☐ Unknown					
Stillborn?										☐ Yes		☐ No		☐ Unknown					
If death within 24h specify number of hours survived												Birth weight (in grams)							
Number of completed weeks of pregnancy												Age of mother (years)							
If death was perinatal, please state conditions of mother that affected the fetus and newborn																			
For women, was the deceased pregnant?										☐ Yes		☐ No		☐ Unknown					
☐ At time of death										☐ Within 42 days before the death									
☐ Between 43 days up to 1 year before death										☐ Unknown									
Did the pregnancy contribute to the death?										☐ Yes		☐ No		☐ Unknown					

Suggested additional detail of perinatal deaths (stillbirths and liveborn infants dying within 168 hours [1 week] from birth)

Identifying particulars											
Child was born live on				D	D	M	M	Y	Y	at hh:mm	hours
Child was stillborn on				D	D	M	M	Y	Y	at hh:mm	hours
		☐ Died before labour		☐ During labour				☐ Not known			

Mother											
Date of birth				D	D	M	M	Y	Y		

Number of previous pregnancies Live birth _____ Stillbirth _____ Abortion _____				Date of last pregnancy				D	D	M	M	Y	Y
				Outcome of last previous pregnancy ☐ Live birth ☐ Stillbirth ☐ Abortion									

1st day of last menstrual period				D	D	M	M	Y	Y		
---	--	--	--	---	---	---	---	---	---	--	--

Delivery ☐ Normal spontaneous vertex ☐ Other (specify) _____				Antenatal care, two or more visits ☐ Yes ☐ No ☐ Not known							
---	--	--	--	--	--	--	--	--	--	--	--

Attendant at birth											
☐ Physician				☐ Other trained person (specify) _____							
☐ Trained midwife				☐ Other (specify) _____							

Child											
☐ Single birth				☐ Second twin							
☐ First twin				☐ Other multiple (specify) _____							

Annex 3. Death certification flyer: a tool for certifying physicians

Prompt and accurate certification of the cause of death is very important. It not only helps with legal and administrative tasks but also assists governments in keeping an eye on the health of their citizens.

By having this information, governments can plan and evaluate public health programs more effectively. Moreover, this data plays a vital role in supporting research on diseases and their patterns.

- Uphold professional integrity and respect for the law.
- Display ethical behavior and respect religious and cultural practices.
- Maintain confidentiality after death, follow proper procedures, and ensure proper authorization before sharing confidential information related to medical certification of cause of death.

Methods to confirm death include observing signs of death, verifying the absence of cardiac and respiratory activity, or checking for neurological activity; certifying physicians should be aware of local guidelines for confirming death.

Manner of death

- Distinction between natural and unnatural deaths is fundamental in medical certification of cause of death
 - Natural death: result of evident disease process
 - Unnatural death: result of external causes (accidents, violence), requires further review by legal authorities
- Certifying physicians should familiarize themselves with reportable cases in their country or jurisdiction
- Deaths with reasonable suspicion of unnatural cause should be investigated

Information gathering:

- Information gathering for medical certification of cause of death includes administrative data and medical history review
- Verify deceased's name, address, date of birth, and date of death
- Medical history: focus on pertinent aspects, such as past medical problems, surgeries, recent hospitalizations, medications, and medical allergies
- Consider notes on key points of deceased's medical history related to cause of death
- In hospital deaths: access recent hospital notes and records for valuable insights
- Consult potential sources of information, including discharge summaries, ambulance records, GP records, pathology and imaging reports, and non-health sources like police reports
- Converse with household members, caregivers, or nursing home staff for additional information
- Investigate any contradictions between sources of information and refer to medicolegal authorities if necessary

Examination

- External examination of a deceased's body is crucial for determining cause and manner of death
- Health and safety of examining physician is a primary consideration
- Precautions should be taken to not destroy or contaminate evidence
- Examination should be performed respectfully and privately
- As a general rule, the body should be undressed for examination (in some regions, undressing may not be culturally acceptable)
- Adequate lighting is necessary for the physical examination
- Both front and back of the entire body should be examined
- A systematic approach and use of a checklist is recommended

Information gathering	
Yes/No	Identity of deceased confirmed (name, gender, date of birth, address)?
Yes/No	Details of death confirmed – date, time, location of death (address), type of place (e.g. hospital, home etc.)?
Yes/No	Next of kin/non-family contact identified (name, age, sex, relationship to deceased or role [e.g. care home manager], address)?
Yes/No	Pre-mortem circumstances considered (carer, duration of illness, symptoms, allergies, medications, death expected/unexpected)?
Yes/No	Is the deceased pregnant or have they recently given birth?
Yes/No	Any recent unusual circumstances (travel, exposure to substances, behaviour change)?
Yes/No	Any witnesses to death (and what they saw) identified?
Yes/No	Any suggestion of injuries or poisoning ? Police involved?
Yes/No	Healthcare records available/examined (GP notes, hospital notes, recent admission)?
Yes/No	Any recent surgery , invasive investigations, changes to medications, other intervention?
Yes/No	Any recent or prior pathology reports to confirm/support circumstances/diagnosis?
Yes/No	Any other records available (e.g. ambulance service, social services, care home)?
External circumstances and examination of the body	
Yes/No	Environmental surroundings – any signs of alcohol, drugs, violence?
Yes/No	Have you undressed the body (NOT in suspected homicide or suspicious death)?
Yes/No	Clothing – correctly placed, fastened, wet, soiled or torn?
Yes/No	Any tourniquets, medical devices or dressings, sign of therapeutic intervention?
Yes/No	Does the body have an unusual smell/odour ?
Yes/No	Skin – any abnormal discolouration, jaundice, cyanosis?
Yes/No	Scalp – fractures or injuries?
Yes/No	Eyes – haemorrhages?
Yes/No	Ears – haemorrhages, blood or cerebrospinal fluid in the canal?
Yes/No	Mouth – lacerations, bruises, blood or foreign material, injuries to teeth/other structures?
Yes/No	Neck – abrasions, bruises, ligature marks, furrows?
Yes/No	Chest/abdomen – rib fractures, subcutaneous crepitus (pneumothorax), bite marks?
Yes/No	Genitals – abrasions, lacerations, contusions?
Yes/No	Arms – fractures (mobility), grip marks, injection marks, bondage marks, burns (especially finger-tips), broken nails, finger injuries?
Yes/No	Legs – contusions (especially inner thighs), bondage marks, burns on soles of feet?
Yes/No	Back – abrasions (especially over prominent bony structures), wounds?
Yes/No	Anal region – abrasions, lacerations, contusions, bloody or tar-like stool?
Completion of Medical Certificate of Cause of Death (MCCD)	
Yes/No	Have you prepared a draft with time intervals? Does the causal sequence make sense?
Yes/No	Are all demographic details complete?
Yes/No	Have you completed Frame A part 1 including time intervals with the correct causal sequence?
Yes/No	Does Frame A Part 1 include a valid underlying cause of death ?
Yes/No	Is Frame A part 2 complete including other significant conditions with time intervals (if available)?
Yes/No	Have you completed Frame B and any other remaining sections?
Yes/No	Submit MCCD to appropriate authorities within the required deadline.

Think: Should this case be referred to the police or medicolegal authorities? Is a post-mortem required?