
CAUSE OF DEATH CERTIFICATION

STUDENT WORK BOOK

2017

Contents

Introduction	2
Why Cause of Death certification is important?	2
Causes of Death	2
Underlying Cause of Death	2
Understanding the International Form of Medical Certificate of Cause of Death	3
Sequence of events leading to death	3
Completing Demographic data	4
Completing Part I of the certificate	5
Completing Part II of the certificate	8
Recording approximate interval between onset and death	9
General instructions for medical practitioners in completing death certificates	10
General guidelines for medical practitioners on reporting specific conditions	11
Symptoms and Signs	11
Modes of Dying	11
Ill-defined conditions	12
Unknown cause of death	12
Reporting death of an elderly person	12
Injuries, poisonings and external causes of death	12
Hypertension	13
Infectious and parasitic diseases	13
Neoplasms (tumours)	13
Operations	13
Pregnancy	13
Practice exercises	14
Medical Scenarios	14
Surgical Scenarios	29
Paediatric Scenarios	35
Gynaecological and Obstetric Scenarios	41
Cancer Scenarios	45

INTRODUCTION

Why Cause of Death certification important?

The death certificate completed by medical practitioners, is the major source of mortality statistics. Cause of Death statistics, and the use of these statistics for demographic and health purposes, supports understanding of a society now and in the future. These statistics guide the formulation and monitoring of health and lifestyle policies and impact on the funding of medical and health research. Cause of death information provides insights into the diseases, lifestyle issues and external factors contributing to reduced life expectancy.

The cause of death completed by medical practitioners in the death certificate is then coded according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) by coders who are trained in the application of ICD-10. The International Classification of Diseases (ICD), produced by the World Health Organization (WHO), is the international standard diagnostic classification used to classify diseases and other health problems recorded on many types of health and vital records including death certificates and hospital records (WHO, 2007).

Causes of Death

Twentieth World Health Assembly held in 1967, defined the Causes of Death to be entered in the Medical Certificate of 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' (WHO, 2004). This definition ensures that all relevant information are recorded and the certifier does not select some conditions for reporting and reject others.

Underlying Cause of Death

World Health Organization has defined the underlying cause of death as,

The disease or injury which initiated the train of morbid events leading directly to death or the circumstances of the accident or violence which produced the fatal injury (WHO, 2004).

In other words, the Underlying Cause of Death is the condition, event or circumstance, without which the patient would not have died (WHO, 2004).

Understanding the International Form of Medical Certificate of Cause of Death

The International Form of Medical Certificate of Cause of Death (also known as the death certificate) is recommended by the WHO for international use. The death certificate provides a framework for the organization of clinical diagnoses used for public health purposes. Figure 1 shows the death certificate recommended by the WHO.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
I Disease or condition directly leading to death*	(a) due to (or as a consequence of)	.....
Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) due to (or as a consequence of)	.....
	(c) due to (or as a consequence of)	.....
	(d) .....	.....
II Other significant conditions contributing to the death, but not related to the disease or condition causing it		.....
	
<i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i>		

Figure 1: International Form of Medical Certificate of Cause of Death

The death certificate is divided into three sections:

1. Part I—including the diseases or conditions directly leading to death and antecedent causes
2. Part II—including the other significant conditions that may have contributed to death
3. A column to record the approximate interval between onset and death

Sequence of events leading to death

Mortality statistics are based on the underlying cause of death, which is the disease or injury that initiated the sequence of events that led directly to death. For example, imagine a person dies of a cerebral haemorrhage following a motor vehicle accident. Cerebral haemorrhage is the direct cause of death—the motor vehicle accident is the underlying cause of death. The surgeon is concerned with the treatment of cerebral haemorrhage; the public health concern is to prevent deaths due to motor vehicle accidents (the underlying cause of death in this case). It is not always possible to complete all lines in the death certificate. On some death certificates, there will only be one cause of death, which becomes the underlying cause. But, in filling out death certificates, certifiers should try to identify and record all the

conditions in the sequence of events leading to death. For many deaths, there will be more than one cause and, in these cases, the certifier will need to establish a sequence of causes before determining the underlying cause.

Case Scenario 1

A 53-year-old male was admitted to the hospital vomiting blood and was diagnosed as having bleeding oesophageal varices. Investigation revealed portal hypertension. He had a history of hepatitis B infection. Three days later, he died. Figure 2 outlines the sequence of events that led to his death. It is extremely important that the underlying cause of each death is correctly determined and accurately recorded. In this case, hepatitis B was the underlying cause of death—not bleeding oesophageal varices, which was the immediate cause of death. Knowing this, the public health response is to implement immunization programs against hepatitis B virus to prevent such deaths in future.

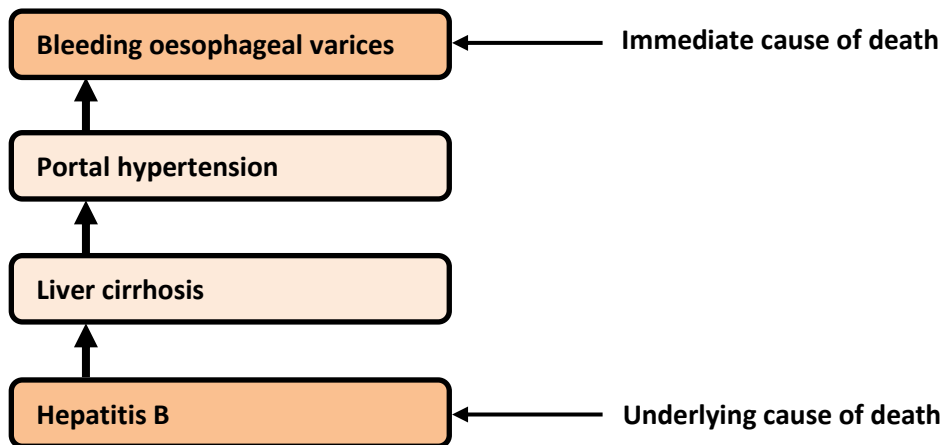


Figure 2: Sequence of events leading to the death in Case study 1

Completing Demographic data

Demographic data documented in the death certificate is vital for the proper identification of the deceased that is essential for legal as well as for statistical purposes. Basic demographic information required by the statistical offices include;

1. Full name and residence
2. Date and place of death
3. Sex and race
4. Age
5. Profession/Occupation of the deceased

Completing Part I of the certificate

Part I of the death certificate has four lines for reporting the sequence of events leading to death; these are labelled I(a), I(b), I(c) and I(d). The immediate cause of death is entered at Part I(a). If the death was a consequence of another disease or condition, this underlying cause should be entered at I(b). If there are more events leading to death, write these in order at I(c) and I(d). Accordingly the sequence of events leading to death is reported in Part I of the death certificate in reverse order from final disease/condition to the originating cause (Figure 3). Furthermore, each condition listed in Part I should cause the condition above it.

If there is only one cause, it is entered in line I(a). In the event of two or more conditions must be recorded, the certifying officer should record the sequence of events leading to death. Each event should be recorded in a separate line in reverse order (WHO, 2004; Health Information Systems Knowledge Hub, 2012).

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
I Disease or condition directly leading to death* Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	Direct cause (a) due to (or as a consequence of)	.....
	Intervening cause of (a) (b) due to (or as a consequence of)	.....
	Intervening cause of (b) (c) due to (or as a consequence of)	.....
	Originating cause of (c) (d) .....	.....
	<hr/> II Other significant conditions contributing to the death, but not related to the disease or condition causing it	
<i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i>		

Figure 3: Proper completion of Part I of the Certificate

Case Scenario 2

A 49-year-old man dies from acute myocardial infarction within 2 hours of its onset. He did not have any other known illnesses. While it is rare to only have one event leading to death, it does occur. In these cases, cause of death would be reported at I(a) and it would also form the **underlying cause of the death**, shown in Figure 4. If more information is available in the sequence of events leading to death, these must be reported using the lines provided at I(b), I(c) or I(d).

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH		Approximate interval between onset and death
I	Cause of death	
Disease or condition directly leading to death*	(a) Acute myocardial infarction	2 hours
	due to (or as a consequence of)	
Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) .....	.....
	due to (or as a consequence of)	
	(c) .....	.....
	due to (or as a consequence of)	
	(d) .....	.....
<hr/>		
II	Other significant conditions contributing to the death, but not related to the disease or condition causing it	.....

<p><i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i></p>		

Figure 4: A death certificate with only one cause of death reported

Sequence of events:

Acute myocardial infarction-> Death

Case Scenario 3

A 68-year-old man dies from cerebral haemorrhage 2 days after its onset. This resulted from secondary hypertension, which he had for the last six months. The hypertension was secondary to chronic pyelonephritis, which he had for the last 1 year. He also had a prostatic adenoma for the last 6 years. Figure 5 shows a death certificate that has used four lines. These events are recorded at I(a), I(b), I(c) and I(d). The underlying cause of death is reported in line I(d). In rare situations, there could be more than four sequences leading to death. In this case, you can add a line I(e) and record the underlying cause of death in that line. **Do not record underlying cause of death in Part II of the death certificate.**

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH		
Cause of death		Approximate interval between onset and death
I Disease or condition directly leading to death* Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) Cerebral haemorrhage	2 days
	due to (or as a consequence of)	
	(b) Hypertension	6 months
	due to (or as a consequence of)	
	(c) Chronic pyelonephritis	1 year
	due to (or as a consequence of)	
	(d) Prostatic adenoma	6 years
II		
Other significant conditions contributing to the death, but not related to the disease or condition causing it .....		.....
.....	
<i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i>		

Figure 5: A death certificate where four events leading to death are reported

Sequence of events:

Prostatic adenoma -> Chronic pyelonephritis -> Hypertension -> Cerebral haemorrhage -> Death

Completing Part II of the certificate

Part II of the death certificate records all other significant or contributory diseases or conditions that were present at the time of death, but did not directly lead to the underlying cause of death listed in Part I.

Case Scenario 4

A 62-year-old hypertensive patient for the last 20 years was admitted to the surgical casualty ward with severe abdominal pain and vomiting. She was diagnosed as having strangulated femoral hernia with a bowel perforation. She underwent surgery to release the hernia and resect the intestine, with an end-to-end anastomosis. Two days after the surgery she developed signs of peritonitis and she died 2 days later.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
I Disease or condition directly leading to death* Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) Peritonitis	2 days
	due to (or as a consequence of)	
	(b) Strangulated femoral hernia with bowel perforation	3 days
	due to (or as a consequence of)	
	(c) .....	.....
	due to (or as a consequence of)	
	(d) .....	.....
<hr/> II Other significant conditions contributing to the death, but not related to the disease or condition causing it		
	Hypertension	20 years

<i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i>		

Note:

In this example, the underlying cause of death is strangulated femoral hernia. Hypertension, which is not in the sequence of events leading to death but would have contributed to the death, should be entered in Part II of the death certificate, as shown in Figure 6.

Sequence of events:

Strangulated femoral hernia with bowel perforation -> Peritonitis -> Death

Recording approximate interval between onset and death

The column on the right-hand side of Part I and Part II of the death certificate is for recording the approximate time interval between the onset of the condition and the date of death. The time interval should be entered for all conditions reported on the death certificate, especially for the conditions reported in Part I. These intervals are usually established by the doctor on the basis of available information. In some cases, the interval will have to be estimated. Time periods, such as minutes, hours, days, weeks, months or years can be used. If the time of onset is unknown or cannot be determined, write 'Unknown'.

This information is useful for coding certain diseases and provides a check on the accuracy of the reported sequence of conditions. Therefore, it is important to fill in these lines.

Case Scenario 5

A 55-year-old man presented at a clinic with a long history of haemoptysis and weight loss. The diagnosis was advanced pulmonary tuberculosis, reactivation type with cavitations, approximately of 9 years duration. The patient also suffered from generalized arteriosclerosis, probably of long duration. Immediately after the admission, the patient had an acute and massive pulmonary haemorrhage and died about 2 hours later. The patient's death certificate is shown in Figure 7.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH		
Cause of death		Approximate interval between onset and death
I Disease or condition directly leading to death* Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) Pulmonary haemorrhage	2 hours
	due to (or as a consequence of)	
	(b) Advanced pulmonary tuberculosis	9 years
	due to (or as a consequence of)	
	(c) .....	.....
	due to (or as a consequence of)	
	(d) .....	.....
<hr/> II Other significant conditions contributing to the death, but not related to the disease or condition causing it		
	Generalized arteriosclerosis	Unknown

<i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i>		

Figure 7: A death certificate where the time intervals are recorded for Case Scenario 4

Sequence of events:

Advanced pulmonary tuberculosis -> Pulmonary haemorrhage -> Death

General instructions for medical practitioners in completing death certificates

General instructions for medical practitioners when filling in death certificates are given in Box 1. It is important that medical practitioners pay attention to these guidelines because they will help coders correctly identify and code the death. In most countries, coders are not medically trained, so even a small misinterpretation may result in confusion and the incorrect underlying cause of death being selected.

- Carefully complete each item, adhering any specific instructions given for that item in your country.
- All entries should be legible. Use black ink for documentation.
- Use of block letters for entries in the certificate is preferred.
- Do not use abbreviations.
- Accuracy of the name of the deceased should be verified with the informant.
- Do not make alterations or erasures in the certificate. Draw a single line across an entry to delete a wrong entry. Use of correction fluid is not allowed.

Box 1: General guidelines for medical practitioners completing death certificates

General guidelines for medical practitioners on reporting specific conditions

Following guidelines are provided for the medical practitioners, to aid them to know about the common conditions they need to provide more information about and the kind of descriptions required for classification purposes.

Symptoms and Signs

Symptoms and signs (e.g. chest pain, cough and fever) are considered to be ill-defined conditions on the death certificate. These are not of any use for public health, so certifiers should avoid using these terms when completing a death certificate.

Modes of Dying

A mode of dying does not positively identify a cause of death. They do not specify the morbid condition or circumstances that initiated the chain of events leading to death. In other words, no person would die without going through one or more of the modes of dying listed in box 2.

Modes of Dying	
• Cardiac/Heart failure	• Multi organ failure
• Cardiovascular event/incident/accident	• Shock
• Ventricular failure	• Syncope
• Cardiac arrest	• Vagal inhibition
• Respiratory arrest	• Vasovagal attack
• Cardio-respiratory arrest	• Asphyxia
• Cardio-respiratory failure	• Asthenia
• Hepatic/Liver failure	• Brain failure
• Hepato-renal failure	• Brain death
• Liver and kidney failure	• Cachexia
• Renal failure	• Coma
• Uraemia	• Exhaustion
• Septicaemia	• General debility

Box 2: Modes of Dying

Ill-defined conditions

When organ failure (e.g. heart failure or renal failure) is entered as a cause of death, it is called an ill-defined condition. Ill-defined conditions should not be entered on a death certificate. The term 'septicaemia', in the absence of more specific information, is also an ill-defined condition and should not be used as an underlying cause of death.

Unknown cause of death

Where there is insufficient information to be certain of the cause of death, it is 'legitimate' for the doctor to state 'Unknown cause of death'. However, this diagnosis should only be used in exceptional circumstances. Usually these cases are referred to a forensic pathologist to conduct a postmortem and arrive at a proper cause of death. Unknown or vague cause-of-death diagnoses are of no public health value. They do not provide any information to decision-makers to guide them in designing preventive health programs.

Reporting death of an elderly person

'Senility' or 'old age' should not be included in Part I of the death certificate. If senility is a contributory factor, it can be included in Part II of the death certificate.

Injuries, poisonings and external causes of death

The circumstances of death from, for example, a motor vehicle accident, suicide or homicide, is known as the external cause of death. When death occurs as a consequence of injury or violence, the external cause should always be listed as the underlying cause. The external cause is described in as much detail as possible; for example, 'motor traffic accident' is not sufficiently accurate; however, 'pedestrian hit by motor car' is both clear and accurate. In a case of suicide, simply entering 'suicide' is insufficient; the method of suicide should be entered. For example, 'Suicidal death by hanging' is a clear description.

Example

A person dies following cerebral compression due to subdural haematoma due to a fall from a height.

What is the underlying cause of death?

'fall from a height'

Hypertension

It is important to state whether hypertension was essential or secondary to some other disease condition (e.g. chronic pyelonephritis).

Infectious and parasitic diseases

If the causative agent is known, it should be noted on the certificate. If the causative agent is unknown, write 'Cause unknown'. It is also important to include the site of the infection, if known (e.g. urinary tract, respiratory tract).

Neoplasms (tumours)

Record the following information when certifying deaths due to neoplasms:

- site of the neoplasm
- whether benign or malignant
- primary or secondary (if known), even if the primary site was removed long before death
- histological type (if known)

If the primary site of a secondary neoplasm is known, it must be stated; for example, primary carcinoma of the lung. If the primary site of a secondary neoplasm is unknown, 'Primary unknown' must be stated on the death certificate.

Operations

Names of operations without stating the condition for which the operation was performed is not acceptable as causes of death. For example, appendectomy for acute appendicitis.

Pregnancy

If a woman dies during pregnancy or within 42 days of the termination of a pregnancy, the fact that the woman was pregnant should be indicated on the certificate, even if the direct cause of death is not related to the pregnancy or to childbirth. For example, the entry could read 'Pregnant, period of gestation 32 weeks'. If the death certificate includes a pregnancy check box, it should be ticked to indicate the woman was pregnant or was within 42 days of delivery when the death occurred, if that was the case.

Practice exercises – Medical Scenarios

Scenario 1

A male aged 49 years was admitted to hospital with a history of fever, disorientation and drowsiness for the last 2 days. Focal neurological findings were identified on physical examination and a provisional diagnosis of meningitis was made. A diagnostic lumbar puncture was performed for CSF examination. Staphylococcus aureus organism was isolated from CSF and the provisional diagnosis was confirmed as Staphylococcus aureus meningitis. Despite IV antibiotic administration his condition worsened and on 3rd of admission blood cultures were also positive for Staphylococcus aureus and the patient expired on 4th day of admission due to septic shock. He was a diagnosed case of type II diabetes for the last 10 years and has had a renal transplant 6 years back.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
I Disease or condition directly leading to death* Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) .....	.....
	due to (or as a consequence of)	
	(b) .....	.....
	due to (or as a consequence of)	
	(c) .....	.....
	due to (or as a consequence of)	
	(d) .....	.....
<hr/>		
II	Other significant conditions contributing to the death, but not related to the disease or condition causing it	.....

<i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i>		

Notes:

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Scenario 2

A male aged 64 years admitted to hospital with an arteriosclerotic cerebral infarction. He was transferred to rehabilitation two months later where he developed hypostatic pneumonia. In ICU sputum cultured *Klebsiella pneumoniae* and the patient died 2 days after admission to the ICU. He was also addicted to alcohol for the past 20 years and on regular medication for Ischaemic heart disease for the last 10 years.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
I Disease or condition directly leading to death* Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) .....	.....
	due to (or as a consequence of)	
	(b) .....	.....
	due to (or as a consequence of)	
	(c) .....	.....
	due to (or as a consequence of)	
	(d) .....	.....
<hr/>		
II		
Other significant conditions contributing to the death, but not related to the disease or condition causing it	.....	.....

<i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i>		

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Scenario 3

A female aged 24 years, pregnant for 4 months, was admitted to hospital with sudden onset of hemiplegia. Her history revealed that she had suffered from rheumatic fever at the age of 10 years, and a diagnosis of mitral stenosis was made. Furthermore, a MRI scan of the brain identified a cerebral embolus and on her second day in hospital the patient died.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
I Disease or condition directly leading to death* Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) .....	.....
	due to (or as a consequence of)	
	(b) .....	.....
	due to (or as a consequence of)	
	(c) .....	.....
	due to (or as a consequence of)	
	(d) .....	.....
<hr/>		
II	Other significant conditions contributing to the death, but not related to the disease or condition causing it	.....

<i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i>		

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Scenario 4

A 50 year old male was admitted to hospital with severe anorexia, extreme pallor and generalized oedema. He was a diagnosed patient as having focal glomerular sclerosis 2 years ago and Insulin dependent diabetes mellitus for the last 25 years with very poor control. Furthermore, this patient was a heavy cigarette smoker for the past 10 year duration. On further assessment at the hospital a diagnosis of end-stage renal failure was made and the patient expired one week following admission to the hospital.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
I Disease or condition directly leading to death* Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) .....	.....
	due to (or as a consequence of)	
	(b) .....	.....
	due to (or as a consequence of)	
	(c) .....	.....
	due to (or as a consequence of)	
	(d) .....	.....
<hr/>		
II		
Other significant conditions contributing to the death, but not related to the disease or condition causing it	.....	.....

<i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i>		

Notes:

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Scenario 5

A 54 year old male who is on regular medication for coronary arteriosclerosis for the last 5 years was rushed to the emergency with a history of severe tightening chest pain, sweating and dyspnea. He collapsed in the emergency department and despite immediate resuscitation the patient expired. ECG findings confirmed an acute myocardial infarction. He was suffering from emphysema for the last 20 years and was an alcohol addict for the past 25 years.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
I Disease or condition directly leading to death* Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) .....	.....
	due to (or as a consequence of)	
	(b) .....	.....
	due to (or as a consequence of)	
	(c) .....	.....
	due to (or as a consequence of)	
	(d) .....	.....
<hr/>		
II		
Other significant conditions contributing to the death, but not related to the disease or condition causing it	.....	.....

<i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i>		

Notes:

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Scenario 6

Shortly after dinner on the day prior to admission to the hospital, this 48-year-old male developed a cramping, epigastric pain, which radiated to his back, followed by nausea and vomiting. The pain was not relieved by positional changes or antacids. The pain persisted, and 24 hours after its onset, the patient sought medical attention. He had a 10-year history of excessive alcohol consumption and a 2-year history of frequent episodes of similar epigastric pain. The patient denied diarrhea, constipation, hematemesis, or melena. The patient was admitted to the hospital with a diagnosis of an acute exacerbation of chronic pancreatitis. Radiological findings included a duodenal ileus and pancreatic calcification. Serum amylase was 4,032 units per liter. The day after admission, the patient seemed to improve. However, that evening he became disoriented, restless, and hypotensive. Despite intravenous fluids and vasopressors, the patient remained hypotensive and died. Autopsy findings revealed many areas of fibrosis in the pancreas with the remaining areas showing multiple foci of acute inflammation and necrosis.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
I Disease or condition directly leading to death* Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) .....	.....
	due to (or as a consequence of)	
	(b) .....	.....
	due to (or as a consequence of)	
	(c) .....	.....
	due to (or as a consequence of)	
	(d) .....	.....
<hr/> II Other significant conditions contributing to the death, but not related to the disease or condition causing it ..... .....		..........
<i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i>		

Notes:

Scenario 7

This 75-year-old male was admitted to the hospital complaining of severe chest pain. He had a 10-year history of arteriosclerotic heart disease with ECG findings of myocardial ischemia and several episodes of congestive heart failure controlled by digitalis preparations and diuretics. Five months before this admission, the patient was found to be anemic, with a hematocrit of 17, and to have occult blood in the stool. A barium enema revealed a large polypoid mass in the cecum diagnosed as carcinoma by biopsy.

Because of the patient's cardiac status, he was not considered to be a surgical candidate. Instead, he was treated with a 5-week course of radiation therapy and periodic packed red cell transfusions. He completed this course 3 months before this hospital admission. On this admission the ECG was diagnostic of an acute anterior wall myocardial infarction. He expired 2 days later.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
I Disease or condition directly leading to death* Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) .....	.....
	due to (or as a consequence of)	
	(b) .....	.....
	due to (or as a consequence of)	
	(c) .....	.....
	due to (or as a consequence of)	
	(d) .....	.....
<hr/> II Other significant conditions contributing to the death, but not related to the disease or condition causing it		.....
	
<i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i>		

Notes:

Scenario 8

A 68-year-old obese female was admitted to the ICU with dyspnea and moderate retrosternal pain of 5-hours duration, which did not respond to nitroglycerin. There was a past history of obesity, non-insulin dependent diabetes mellitus, hypertension, and episodes of non-exertion chest pain, diagnosed as angina pectoris, for 8 years. Over the first 72 hours, she developed a significant elevation of creatine phosphokinase, confirming an acute myocardial infarction. She subsequently developed dyspnea with fluid retention and cardiomegaly on chest radiograph. She improved with diuretics. On the seventh hospital day, during ambulation, she suddenly developed chest pain and increased dyspnea. An acute pulmonary embolism was suspected and intravenous heparin was started. The diagnosis of pulmonary embolism was confirmed by a ventilation/perfusion scan as well as arterial blood gas measurements. One hour later, she became unresponsive and resuscitation efforts were unsuccessful.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
I Disease or condition directly leading to death* Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) .....	.....
	due to (or as a consequence of)	
	(b) .....	.....
	due to (or as a consequence of)	
	(c) .....	.....
	due to (or as a consequence of)	
	(d) .....	.....
<hr/>		
II Other significant conditions contributing to the death, but not related to the disease or condition causing it	.....	.....

<i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i>		

Notes:

Scenario 9

A 74-year-old female with a temperature of 102.6° F was admitted to the hospital from a nursing home. She first became a resident of the nursing home 2 years earlier following a cerebrovascular accident, which left her with a residual left hemiparesis. Over the next year, she became increasingly dependent on others to help with her activities of daily living, eventually requiring an in-dwelling bladder catheter 8 months before the current admission. For the 3 days prior to admission, she was noted to have lost her appetite and to have become increasingly withdrawn.

On admission to the hospital her leukocyte count was 19,250 and she had pyuria. Intravenous Ampicillin and gentamicin were administered but her condition did not improve. On third day of admission blood cultures were done and was positive for *Pseudomonas aeruginosa*, which was resistant to ampicillin and gentamicin. Antibiotic therapy was changed to ticarcillin clavulanate, to which the organism was sensitive. Despite the antibiotics and intravenous fluid support, the patient's fever persisted. On the fourth hospital day, she became hypotensive and died.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
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	due to (or as a consequence of)	
	(b)
	due to (or as a consequence of)	
	(c)
	due to (or as a consequence of)	
	(d)
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Scenario 10

A 34-year-old male was admitted to the hospital with severe shortness of breath. He had a 9-month history of unintentional weight loss, night sweats, and diarrhea. The patient had no history of any medical condition that would cause immunodeficiency. An Elisa test and confirmatory Western Blot test for Human Immunodeficiency Virus (HIV) were positive. Further, investigations revealed that he is having Pneumocystis Carinii Pneumonia (PCP), indicating a diagnosis of Acquired Immune Deficiency Syndrome (AIDS).

The patient's pneumonia responded to appropriate therapy, and the patient was discharged. The patient had two additional admissions for PCP. One and a half years after the patient was first discovered to be HIV positive, he again developed PCP but did not respond to therapy. He died 2 weeks later.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

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Scenario 11

A 75-year-old male had a 10-year history of chronic bronchitis associated with smoking two packs of cigarettes a day for more than 40 years. When seen by his physician approximately 2 years prior to his terminal episode, he had moderately reduced FEV₁ and FVC with no response to bronchodilators. During his last year, he required corticosteroids to prevent wheezing and coughing at night; however, he was unable to reduce his smoking to less than one pack of cigarettes per day. When seen 3 months prior to his terminal episode, he had significantly reduced FEV₁ and FVC with no response to bronchodilators. He awoke one evening complaining to his wife about coughing and worsening shortness of breath. He was taken to the emergency room where he was found to have an acute exacerbation of chronic obstructive airway disease. He was admitted to the hospital. At the patient's request, no mechanical ventilation was employed, and he died 12 hours later in respiratory arrest.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

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Scenario 12

A 75-year-old female had a 15-year history of non-insulin-dependent diabetes mellitus (NIDDM), a 13-year history of mild hypertension treated with thiazide diuretics, and an uncomplicated myocardial infarction 6 years prior to the present illness. She was found disoriented in her apartment and brought to the hospital. On admission she was noted to be unresponsive, without focal neurologic signs, and severely dehydrated with a blood pressure of 90/60. Initial laboratory tests disclosed severe hyperglycemia, hyperosmolarity, azotemia, and mild ketosis without acidosis. A diagnosis of hyperosmolar nonketotic coma was made.

The patient was vigorously treated with fluids, electrolytes, insulin, and broad-spectrum antibiotics, although no source for infection was documented. Within 72 hours, the patient's hyperosmolar, hyperglycemic state was resolved. However, she remained anuric with progressive azotemia. Attempts at renal dialysis were unsuccessful, and the patient died on the 8th hospital day in severe acute renal failure.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

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	Antecedent causes	
	(b)
Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	due to (or as a consequence of)	
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Scenario 13

This 53-year-old male was admitted to the hospital following 2 days of intermittent mid epigastric and left-sided chest pain. The pain radiated to his left arm and was accompanied by nausea and vomiting. He gave a history that included 2 years of occasional chest discomfort, a near syncopal episode 6 months prior, hypertension, a 30-year history of one-pack per-day cigarette smoking, congenital blindness, and insulin-dependent diabetes mellitus. He was noted to be markedly obese and to have severe hypercholesterolemia.

At the time of admission, his enzyme studies were normal, but the ECG suggested myocardial ischemia. Two days later, he experienced an episode of severe chest pain that did not respond to nitroglycerin and was accompanied by ST-segment elevation. A cardiac catheterization demonstrated severe multi-vessel coronary artery stenosis. He underwent quadruple coronary artery bypass surgery. Shortly, after being taken off the cardiopulmonary bypass machine, he went into cardiac arrest. As resuscitation was being attempted by open cardiac massage, a rupture developed in his left ventricular wall that resulted in rapid exsanguination and death.

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Scenario 14

A 102-year-old female was brought to the hospital with dyspnea and orthopnea. She had a history of arthritis, hypertension, blocked arteries, coronary thrombosis (25 years before), stroke (10 years before), periodic TIAs (8-year period), and congestive heart failure (hospitalized 6 years before). On clinical examination it found that both her legs were oedematous in addition to lung signs suggestive of congestive cardiac failure. Despite appropriate treatment for her condition she did not improve and she died 2 days later.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

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Practice exercises – Surgical Scenarios

Scenario 15

Female aged 80 years, fell on stairs at home while vacuuming the floor and sustained a fracture of the neck of the left femur. She had an operation for insertion of a pin the following day. Four weeks later her condition deteriorated, she developed hypostatic pneumonia and died two days later.

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Scenario 16

On January 2, 2013, a 21-year-old female was critically injured in an automobile accident and died from a fractured skull causing cerebral contusion soon after being brought to the hospital. Police records indicated she was the driver in a two-car collision that occurred at 3 am at the corner of Edward Street and Queens Street. The decedent crossed the center line and struck an oncoming car head on. Autopsy showed injuries and very high blood alcohol level.

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Scenario 17

May 15, 2013, a 49-year-old male gardener was brought to the emergency room with an infected wound of the right foot. Because of repeated convulsions, he was admitted to the hospital. The examining physician made a diagnosis of tetanus. His wife reported that while employed as a gardener on April 1, 2013, he stepped on a garden rake. He treated the laceration himself. Patient died of asphyxia during convulsions on May 16, 2003. Autopsy supported diagnosis.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

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Scenario 18

A 36 year old man with chronic alcoholism for 10 years had a previous history of duodenal ulcer with antacids treatment for 3 years. On the day of admission he had symptoms of acute abdominal pain with high fever. Initial chest X-rays showed free air under both domes of diaphragm. The patient was diagnosed as having peritonitis from peptic ulcer perforation. Emergency exploratory laparotomy was performed on the 1st day of admission. The surgeon found perforated duodenal ulcer size 2cm at anterior wall of first part duodenum. Five days later, the patient had high fever with chills, his abdominal ultrasound revealed sub-phrenic abscess under the right diaphragm. A revision exploratory laparotomy was planned. However the patient suddenly showed signs of septic shock that night and had a sudden cardiac arrest and the patient died within 2 hours of septic shock.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

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Scenario 19

A 25 year man was working in a building construction site while the whole building suddenly collapsed. He was buried in the debris of the building for 24 hours. When recovery team found him, his lower body was buried under a fallen concrete wall, the team took 3 hours to get him out and sent to the hospital with severe crush injuries in both legs.

He was in severe hypovolemic shock when he arrived at the emergency room. Fluid resuscitation and blood replacement was given before amputation of both lower limbs. Seven hours later his urine colour became red. After urine examination was done, doctor diagnosed myoglobinuria. Two days later he had severe dyspnoea with less urine output with diagnosis of pulmonary oedema and acute renal failure. He died on the 3rd day of admission.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

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Practice exercises – Paediatric Scenarios

Scenario 20

A 1.4kg male infant was born at 32-weeks' gestation to a 20-year-old primiparous woman. The infant developed respiratory distress syndrome and required mechanical ventilation for 7 days. Despite receiving adequate calories for growth, the infant did not gain weight adequately and had persistent diarrhea. Steatorrhea was confirmed upon microscopic examination. On the 37th day after birth, the infant became lethargic and was noted to be oedematous. Escherichia coli was cultured from the infant's cerebral spinal fluid, total serum proteins were reported to be low, and clotting studies were prolonged. The infant died at 45 days of age despite appropriate life-saving efforts. Gross autopsy confirmed the clinical impression of cystic fibrosis.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

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Scenario 21

An 8 year old boy was admitted with symptoms of high fever, nausea and vomiting for 2 days. He was diagnosed with Dengue Hemorrhagic Fever and was treated with intravenous fluid and supportive treatment. Three days after admission, he had severe dyspnoea with diagnosis of pulmonary oedema and was treated by antidiuretics and respiratory support using a ventilator. On the next day, his respiratory function deteriorated with diagnosis of respiratory distress syndrome. He died on the 5th day of admission.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

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Scenario 22

A 3 year old boy was brought to the hospital with a history of difficulty in breathing and cough. On examination he was dyspnoeic with a respiratory rate of 52 per minute. He had tachycardia, peripheral cyanosis and the face was puffy. The child had a history of Fallot's Tetralogy and the surgery was delayed due to lack of consent from the parents. The diagnosis of congestive cardiac failure was made and the boy was treated with inhaled oxygen, Digoxin and Frusemide. Despite treatment the child died on the second day of admission.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
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	due to (or as a consequence of)	
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Scenario 23

A 7 year old girl was taken to hospital with a history of fever, headache & vomiting of 6 days duration. She also had gum bleeding and multiple purpuric patches. Blood counts were low and dengue antibodies were positive. A diagnosis of Dengue Haemorrhagic Fever was made. She was transferred to the intensive care unit and transfused with platelets since her platelet count was 6000. Later she became extremely dyspnoeic and also developed haematuria & anuria. The patient died following 2 days after admission.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

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Scenario 24

A 10 year old boy was taken to hospital with a history of swelling of legs and facial puffiness of one week duration, fever and cough of 3 days. On examination he had severe pallor, oedema with hepatosplenomegaly. His respiratory rate was 44/min and air entry to the left lobe of lung was diminished. Chest x-ray showed left lower lobe consolidation. Child was a diagnosed case of Thalassaemia for the last 4 years. He was resuscitated in the ward and despite antibiotic cover and blood transfusions his condition deteriorated and died the next day.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

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Practice exercises – Gynaecological and Obstetric Scenarios

Scenario 25

A 30-year-old, gravida-six, para-five, with a history of gestational hypertension for the past 3 months, reported to the emergency room at 36 weeks gestation with complaints of abdominal cramping and light vaginal bleeding during the past 12 hours. At the time of first assessment, fetal heart sounds were detected. The uterus was tense, irritable, and tender. The mother was hypotensive with tachycardia. A presumptive diagnosis of abruptio placenta was made, and an emergency cesarean section was performed under general anesthesia. The baby was stillborn. The mother continued to bleed from her uterus and phlebotomy sites and went into profound shock secondary to disseminated intravascular coagulation. Despite administration of blood and clotting factors, intravascular pressure could not be maintained, and the mother died on the operating table. Maternal autopsy confirmed the clinical diagnosis.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

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	Antecedent causes	
	(b)
Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	due to (or as a consequence of)	
	(c)
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Scenario 26

A 24 year old married, nulliparous woman was admitted with severe right sided abdominal pain of 6 hours duration. She collapsed in the outpatient department. She looked severely anaemic and was resuscitated in the emergency department. Intravenous fluid replacement was started and blood was ordered. The history from her husband showed that she had amenorrhoea for 11 weeks. She had never contacted a health care professional to confirm a pregnancy.

Ultra sound scan confirmed the clinical suspicion of a ruptured ectopic pregnancy and she was prepared for surgery. But before the surgery was performed to arrest internal bleeding, she died of hypovolaemic shock after 2 hours of admission.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

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	due to (or as a consequence of)	
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Scenario 27

A 36 year old multiparous woman was admitted to the maternity ward in labour pains. She delivered a 2.7kg baby after 4 hours of admission and since her placenta was not delivered spontaneously, it was removed manually by the doctor who delivered the baby. However, the woman continued to bleed and therefore blood was ordered for transfusion.

The specialist Obstetrician was consulted and he advised to get the patient ready for surgery to arrest the bleeding. However, despite all life saving measures the she died 7 hours after admission.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

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Practice exercises – Cancer Scenarios

Scenario 28

A female aged 54 years admitted to hospital for palliative care due to secondary adenocarcinoma of the liver. The secondary growth occurred one year ago due to the primary adenocarcinoma of the lung diagnosed 3 years before. She was also suffering from ischaemic heart disease for the last 10 years.

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Scenario 29

A male aged 54 years admitted to hospital for surgery to remove the colon due to carcinoma of the sigmoid colon. The patient developed a postoperative deep vein thrombosis. A pulmonary embolism later developed and the patient died shortly after. He was diagnosed as having arteriosclerosis and ischaemic heart disease for the last 5 years.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

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Scenario 30

A 68-year-old male was admitted to the hospital with progressive right lower quadrant abdominal pain of several weeks' duration. The patient had lost approximately 40 pounds, with progressive weakness and malaise. On physical examination, the patient had an enlarged liver span that was four finger breadths below the right costal margin. Rectal examination was normal and stool was negative for occult blood. Routine laboratory studies were within normal limits. A chest x-ray and barium enema were negative. His ECG showed a right bundle branch block. CT scan showed numerous masses within both lobes of the liver. A needle biopsy of the liver was diagnostic of moderately differentiated hepatocellular carcinoma, and the patient was started on chemotherapy. Three months after the diagnosis, the patient developed sharp diminution of liver function as well as a deep venous thrombosis of his left thigh, and he was admitted to the hospital. On his third day, the patient developed a pulmonary embolism and died 30 minutes later.

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