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# CAUSE OF DEATH CERTIFICATION

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## ANSWER BOOK

2022

## Contents

Solutions and explanations for Medical Scenarios .....	2
Scenario 1 .....	3
Scenario 2 .....	4
Scenario 3 .....	5
Scenario 4 .....	6
Scenario 5 .....	7
Scenario 6 .....	8
Scenario 7 .....	9
Scenario 8 .....	10
Scenario 9 .....	11
Scenario 10 .....	12
Scenario 11 .....	13
Scenario 12 .....	14
Scenario 13 .....	15
Scenario 14 .....	16
Solutions and explanations for Surgical Scenarios .....	17
Scenario 15 .....	18
Scenario 16 .....	19
Scenario 17 .....	20
Scenario 18 .....	21
Scenario 19 .....	22
Solutions and explanations for Paediatric Scenarios .....	23
Scenario 20 .....	24
Scenario 21 .....	25
Scenario 22 .....	26
Scenario 23 .....	27
Scenario 24 .....	28
Solutions and explanations for Gynaecological and Obstetric Scenarios .....	29
Scenario 25 .....	30
Scenario 26 .....	31
Scenario 27 .....	32
Solutions and explanations for Cancer Scenarios .....	33
Scenario 28 .....	34
Scenario 29 .....	35
Scenario 30 .....	36

## **Solutions and explanations for 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 3<sup>rd</sup> of admission blood cultures were also positive for Staphylococcus aureus and the patient expired on 4<sup>th</sup> 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
<b>I</b> Disease or condition directly leading to death*  <b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	<b>Septic shock</b> (a) ..... due to (or as a consequence of)	<b>1 day</b> .....
	<b>Staphylococcus aureus sepsis</b> (b) ..... due to (or as a consequence of)	<b>4 days</b> .....
	<b>Staphylococcus aureus meningitis</b> (c) ..... due to (or as a consequence of)	<b>6 days</b> .....
	(d) .....	.....
	<hr/>	
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>Renal transplant</b> .....	<b>6 years</b> .....
	<b>Type II diabetes</b> .....	<b>10 years</b> .....
<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:

Type II diabetes and renal transplant contributed to death and hence included in Part II of the MCCD.

#### Sequence of events:

Staphylococcus aureus meningitis-> Staphylococcus aureus sepsis-> Septic shock -> Death

## 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
<b>I</b> Disease or condition directly leading to death*	(a) <b><i>Klebsiella pneumoniae</i></b> ..... due to (or as a consequence of)	<b>2 days</b> .....
<b>Antecedent causes</b> Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Cerebral infarction</b> ..... due to (or as a consequence of)	<b>2 months</b> .....
	(c) <b>Arteriosclerosis</b> ..... due to (or as a consequence of)	<b>Many years</b> .....
	(d) .....	.....
	<hr/>	
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>Ischaemic heart disease</b> .....	<b>10 years</b> .....
	<b>Alcoholism</b> .....	<b>20 years</b> .....
<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:

As the arteriosclerosis was the condition beginning the sequence of morbid events, this will be selected as the underlying cause of death. Ischaemic heart disease and alcohol addiction contributed to death but was not related to the condition that led him to death and hence included in Part II of the MCCD.

#### Sequence of events:

Arteriosclerosis -> Cerebral infarction -> *Klebsiella pneumoniae* -> Death

### 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
<b>I</b> Disease or condition directly leading to death*  <b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) <b>Cerebral embolism</b> .....	<b>2 days</b> .....
	due to (or as a consequence of)	
	(b) <b>Mitral stenosis</b> .....	<b>13 years</b> .....
	due to (or as a consequence of)	
	(c) <b>Rheumatic fever (inactive)</b> .....	<b>14 years</b> .....
	due to (or as a consequence of)	
	(d) .....	.....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>Pregnancy</b> .....	<b>4 months</b> .....
	.....	.....
<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:

The pregnancy contributed to death, but is not related to the pre-existing condition, it should therefore be reported in Part II of the certificate.

#### Sequence of events:

Rheumatic fever -> Mitral stenosis -> Cerebral embolism -> Death

## 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
<b>I</b> Disease or condition directly leading to death*	(a) <b>End-stage renal failure</b> .....	<b>1 week</b> .....
	due to (or as a consequence of)	
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Focal glomerular sclerosis</b> .....	<b>2 years</b> .....
	due to (or as a consequence of)	
	(c) <b>Insulin Dependent Diabetes Mellitus</b> .....	<b>25 years</b> .....
	due to (or as a consequence of)	
	(d) .....	.....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>Cigarette smoker</b> .....	<b>10 years</b> .....
	.....	.....
<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:

Where renal failure is entered on to the Medical Certificate of Cause of Death, please identify if the renal failure was acute, chronic or end-stage, the underlying cause and type of renal failure if known. Cigarette smoking may also have contributed death and hence entered in Part II.

#### Sequence of events:

Insulin Dependent Diabetes Mellitus -> Focal glomerular sclerosis -> End-stage renal failure -> Death

## 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
<b>I</b> Disease or condition directly leading to death*  <b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) <b>Acute myocardial infarction</b> .....	<b>Minutes</b> .....
	due to (or as a consequence of)	
	(b) <b>Coronary arteriosclerosis</b> .....	<b>5 years</b> .....
	due to (or as a consequence of)	
	(c) ..... .....	.....
	due to (or as a consequence of)	
	(d) ..... .....	.....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>Emphysema</b> .....	<b>20 years</b> .....
	<b>Alcohol addiction</b> .....	<b>25 years</b> .....
<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:

If the use of alcohol, tobacco or any other drug contributed to death, this should be reported on the certificate. Also indicate if the deceased was addicted to any substance. Here alcohol addiction contributed to the death, but is not related to the acute myocardial infarction and is documented in Part II of the certificate.

#### Sequence of events:

Coronary arteriosclerosis -> Acute myocardial infarction -> Death



## 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
<b>I</b> Disease or condition directly leading to death*	(a) <b>Acute exacerbation of chronic pancreatitis</b> .....	<b>3 Days</b> .....
	due to (or as a consequence of)	
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Chronic pancreatitis</b> .....	<b>2 Years</b> .....
	due to (or as a consequence of)	
	(c) <b>Chronic Alcoholism</b> .....	<b>10 Years</b> .....
	due to (or as a consequence of)	
	(d) .....	.....
<b>II</b> 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>		

#### Sequence of events:

Chronic Alcoholism -> Chronic pancreatitis-> Acute exacerbation of chronic pancreatitis -> Death

## 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
<b>I</b> Disease or condition directly leading to death*	(a) <b>Acute Anterior Myocardial Infarction</b> ..... due to (or as a consequence of)	<b>2 Days</b> .....
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Arteriosclerotic Heart Disease</b> ..... due to (or as a consequence of)	<b>10 Years</b> .....
	(c) ..... due to (or as a consequence of)	.....
	(d) ..... .....	.....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>Carcinoma of Cecum</b> .....	<b>5 Months</b> .....
	<b>Congestive Cardiac Failure</b> .....	<b>7 Years</b> .....
*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.		

#### Note:

Carcinoma of cecum is listed in Part II because it caused anemia and weakened the patient, but it did not cause arteriosclerotic heart disease. Congestive heart failure is also listed in Part II because it also weakened the patient. Although it was caused by the arteriosclerotic heart disease, it was not part of the causal sequence leading to the acute myocardial infarction.

#### Sequence of events:

Arteriosclerotic Heart Disease -> Acute Anterior Myocardial Infarction -> Death

## 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 (CPK), confirming an acute myocardial infarction. She subsequently developed dyspnea with fluid retention and cardiomegaly on chest radiograph. She improved with diuretics. On the 7<sup>th</sup> 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
<b>I</b> Disease or condition directly leading to death*	(a) <b>Acute pulmonary embolism</b> .....	<b>1 Hour</b> .....
	due to (or as a consequence of)	
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Acute myocardial infarction</b> .....	<b>7 Days</b> .....
	due to (or as a consequence of)	
	(c) <b>Chronic ischaemic heart disease</b> .....	<b>8 Years</b> .....
	due to (or as a consequence of)	
	(d) .....	.....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>Non-Insulin Dependent Diabetes Mellitus</b> .....	<b>8 Years</b> .....
	<b>Hypertension, Obesity</b> .....	<b>8 Years</b> .....
*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.		

#### Notes:

In this case, noninsulin-dependent diabetes mellitus, obesity and hypertension would all be considered factors that contributed to the death. However, they would not be in the direct causal sequence of Part I, so they would be placed in Part II.

#### Sequence of events:

Chronic ischaemic heart disease -> Acute Myocardial Infarction -> Pulmonary embolism -> Death

## 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
<b>I</b> Disease or condition directly leading to death*	(a) <b><i>Pseudomonas aeruginosa</i> sepsis</b> .....	<b>3 Days</b> .....
	due to (or as a consequence of)	
<b>Antecedent causes</b> Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b><i>Pseudomonas aeruginosa</i> Urinary Tract Infection</b> .....	<b>6 Days</b> .....
	due to (or as a consequence of)	
	(c) <b>Left hemiparesis</b> .....	<b>2 Years</b> .....
	due to (or as a consequence of)	
	(d) <b>Old cerebrovascular accident</b> .....	<b>2 Years</b> .....
<b>II</b> 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>		

#### Note:

As cerebrovascular accident and resultant hemiparesis lead to the insertion of an indwelling urinary catheter contributed for the UTI, cerebrovascular accident was selected as the underlying cause of death.

#### Sequence of events:

Old cerebrovascular accident -> Left hemiparesis -> *Pseudomonas aeruginosa* Urinary Tract Infection -> *Pseudomonas aeruginosa* sepsis -> Death

## 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

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*	(a) <b>Pneumocystis Carinii Pneumonia</b> .....	<b>2 Weeks</b> .....
	due to (or as a consequence of)	
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Acquired immunodeficiency syndrome</b> .....	<b>1.5 Years</b> .....
	due to (or as a consequence of)	
	(c) <b>Human Immunodeficiency Virus Infection</b> .....	<b>2 Years</b> .....
	due to (or as a consequence of)	
	(d) .....	.....
<b>II</b> 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>		

#### Note:

HIV infection and AIDS are not synonymous, and there is a variable clinical course between the time of HIV infection and onset of AIDS. This patient developed AIDS six months following HIV infection.

#### Sequence of events:

HIV Infection -> Acquired immunodeficiency syndrome -> Pneumocystis Carinii Pneumonia -> Death

## 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 FEV<sub>1</sub> 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 FEV<sub>1</sub> 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

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*	<b>Acute exacerbation of chronic obstructive airway disease</b> (a) .....	<b>12 Hours</b> .....
	due to (or as a consequence of)	
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Chronic Bronchitis</b> .....	<b>10 Years</b> .....
	due to (or as a consequence of)	
	(c) .....	.....
	due to (or as a consequence of)	
	(d) .....	.....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>Cigarette Smoking</b> .....	<b>40 Years</b> .....
	.....	.....
<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 case, respiratory arrest is considered a mode of death, and therefore it was not listed as the immediate Cause of Death. As cigarette smoking contributed significantly to his illness it is included in Part II of the MCCD.

#### Sequence of events:

Chronic Bronchitis -> Acute exacerbation of chronic obstructive airway disease -> Death

## 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 8<sup>th</sup> hospital day in severe acute renal failure.

### INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*  <b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) <b>Acute renal failure</b> .....	<b>5 Days</b> .....
	due to (or as a consequence of)	
	(b) <b>Hyperosmolar nonketotic coma</b> ..	<b>8 Days</b> .....
	due to (or as a consequence of)	
	(c) <b>Non-Insulin Dependent Diabetes Mellitus</b> .....	<b>15 Years</b> .....
	due to (or as a consequence of)	
	(d) .....	.....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>Past myocardial infarction</b> .....	<b>6 Years</b> .....
	<b>Hypertension</b> .....	<b>13 Years</b> .....
<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 case, hypertension and a previous myocardial infarction would both be considered factors that contributed to the death. However, they would not be in the direct causal sequence of Part I, so they were placed in Part II.

#### Sequence of events:

NIDDM -> Hyperosmolar nonketotic coma -> Acute renal failure -> Death

## 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.

### INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*	(a) <b>Rupture of R/ventricle</b> .....	<b>Minutes</b> .....
	due to (or as a consequence of)	
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Acute myocardial infarction</b> .....	<b>2 Days</b> .....
	due to (or as a consequence of)	
	(c) <b>Coronary arteriosclerosis</b> .....	<b>2 Years</b> .....
	due to (or as a consequence of)	
	(d) .....	.....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>Insulin Dependent Diabetes Mellitus, Cigarette smoking, Hypertension</b> .....	<b>30 years</b> .....
	<b>Hypercholesterolemia, Obesity</b> .....	<b>Years</b> .....
*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.		

#### Note:

In this case, IDDM, cigarette smoking, hypertension, hypercholesterolemia and obesity would all be considered factors that contributed to the death. However, they would not be in the direct causal sequence of Part I, so they would be placed in Part II.

#### Sequence of events:

Coronary arteriosclerosis -> Acute myocardial infarction -> Rupture of R/ventricle -> Death



## 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

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*	(a) <b>Congestive Heart Failure</b> .....	<b>7 Years</b> .....
	due to (or as a consequence of)	
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Coronary Heart Disease</b> .....	<b>25 Years</b> .....
	due to (or as a consequence of)	
	(c) ..... due to (or as a consequence of)	.....
	(d) .....	.....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>Hypertension</b> .....	<b>25 Years</b> .....
	.....	.....
*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.		

#### Note:

In this case, hypertension would have contributed to her death and therefore placed in Part II of the MCCD.

#### Sequence of events:

Coronary Heart Disease -> Congestive Heart Failure -> Death

## **Solutions and explanations for 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.

### INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*	(a) <b>Terminal hypostatic pneumonia</b> ..... due to (or as a consequence of)	<b>2 days</b> .....
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Fractured neck of femur</b> ..... due to (or as a consequence of)	<b>4 weeks</b> .....
	(c) <b>Fall at home while vacuuming</b> ..... due to (or as a consequence of)	<b>4 weeks</b> .....
	(d) ..... .....	.....
	<hr/>	
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>General frailty</b> ..... .....	<b>2 years</b> ..... .....
<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:

Injuries should never be reported on the certificate without the circumstances that lead to the injury. In most instances deaths occurring as the result of an accident must by law be referred to the Coroner. When a medical practitioner has occasion to issue a Medical Certificate of Cause of Death relating to a death resulting from an accident, the circumstances of the accident as well as the injuries incurred need to be reported. For example, "fractured skull with cerebral haemorrhage due to accidental fall on stairs at home", or "fractured neck of femur due to fall from bed in nursing home". Please include all injuries sustained and avoid using non-specific terms such as multiple injuries. If a death is due to late effects of a previous injury, please state the circumstances of this injury e.g. bronchopneumonia due to paraplegia due to motor vehicle accident - 3 years ago.

#### Sequence of events:

Fall at home while vacuuming -> Fractured neck of femur -> Terminal hypostatic pneumonia -> Death

## 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.

### INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*  <b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) <b>Cerebral contusion</b> .....	<b>30 minutes</b> .....
	due to (or as a consequence of)	
	(b) <b>Fractured skull</b> .....	<b>30 minutes</b> .....
	due to (or as a consequence of)	
	(c) <b>Collision of two motor cars</b> .....	<b>30 minutes</b> .....
	due to (or as a consequence of)	
	(d) .....	.....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>Acute alcohol intoxication</b> .....	<b>Hours</b> .....
	.....	.....
<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 case, acute alcohol intoxication would have contributed to her death and therefore placed in Part II of the MCCD.

#### Sequence of events:

Collision of two motor cars -> Fractured skull -> Cerebral contusion -> Death

## 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, 2013. Autopsy supported diagnosis.

### INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*	(a) <b>Tetanic convulsions</b> .....	<b>2 days</b> .....
	due to (or as a consequence of)	
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Clostridium tetanus infection</b> .....	<b>6 weeks</b> .....
	due to (or as a consequence of)	
	(c) <b>Infected puncture laceration of foot</b> .....	<b>6 weeks</b> .....
	due to (or as a consequence of)	
	(d) ..... .....	..... .....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	..... .....	..... .....
*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.		

### Sequence of events:

Infected puncture laceration of foot -> Clostridium tetanus infection -> Tetanic convulsions -> Death

## 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 1<sup>st</sup> 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

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*  <b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) <b>Septic shock</b> .....	<b>2 hours</b> .....
	due to (or as a consequence of)	
	(b) <b>Right sub-phrenic abscess</b> .....	<b>1 day</b> .....
	due to (or as a consequence of)	
	(c) <b>Perforated duodenal ulcer</b> .....	<b>5 days</b> .....
	due to (or as a consequence of)	
	(d) <b>Duodenal ulcer</b> .....	<b>3 years</b> .....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>Chronic alcoholism</b> .....	<b>10 years</b> .....
	.....	.....
<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:

Chronic alcoholism contributed, but not directly related to the death therefore recorded in Part II of the certificate. The term "cardiac arrest" is a mode of dying and should not be written in the certificate.

#### The sequence of events:

Duodenal ulcer -> Perforated duodenal ulcer -> Right sub-phrenic abscess -> Septic shock -> Death

## 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 myoglobulinuria. 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

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*  <b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) <b>Pulmonary oedema</b> .....	<b>1 day</b> .....
	due to (or as a consequence of)	
	(b) <b>Acute renal failure</b> .....	<b>1 day</b> .....
	due to (or as a consequence of)	
	(c) <b>Myoglobulinuria due to crushed injuries to both legs</b> .....	<b>3 days</b> .....
	due to (or as a consequence of)	
	(d) <b>Buried in collapsed building</b> .....	<b>4 days</b> .....
<hr/> <b>II</b> 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>		

#### Note:

In case of injury, it is important that external cause of injury be clearly mentioned as underlying cause of death. Please do not write ambiguous terms like "severe injury" or "multiple injuries"

#### The sequence of events:

Buried in collapsed building -> Crush injuries both legs -> Myoglobulinuria -> Acute renal failure -> Pulmonary oedema -> Death

## **Solutions and explanations for 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 37<sup>th</sup> 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

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*	(a) <b>Escherichia coli Meningitis</b> .....	<b>7 Days</b> .....
	due to (or as a consequence of)	
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Cystic Fibrosis</b> .....	<b>45 days</b> .....
	due to (or as a consequence of)	
	(c) ..... due to (or as a consequence of)	.....
	(d) .....	.....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>LBW, Prematurity, Malabsorption, Respiratory distress syndrome, Failure to thrive</b> .....	<b>45 days</b> .....
*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.		

#### Note:

In this case, LBW, prematurity, malabsorption, respiratory distress syndrome and failure to thrive would all be considered factors that contributed to the death and were placed in Part II of the MCCD.

#### Sequence of events:

Cystic Fibrosis -> Escherichia coli Meningitis -> Death

## 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 5<sup>th</sup> day of admission.

### INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*  <b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) <b>Respiratory Distress Syndrome</b> .....	<b>1 day</b> .....
	due to (or as a consequence of)	
	(b) <b>Pulmonary edema</b> .....	<b>2 days</b> .....
	due to (or as a consequence of)	
	(c) <b>Dengue Hemorrhagic Fever</b> .....	<b>7 days</b> .....
	due to (or as a consequence of)	
	(d) .....	.....
<hr/> <b>II</b> 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>		

**Note:**

**Sequence of events:**

Dengue hemorrhagic fever -> Pulmonary oedema -> Respiratory distress syndrome -> Death

## 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
<b>I</b> Disease or condition directly leading to death*	(a) <b>Congestive Cardiac Failure</b> .....	<b>2 days</b> .....
	due to (or as a consequence of)	
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Fallot's tetralogy</b> .....	<b>3 years</b> .....
	due to (or as a consequence of)	
	(c) .....	.....
	due to (or as a consequence of)	
	(d) .....	.....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	.....	.....
	.....	.....
*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.		

#### Note:

The child had a history of Fallot's Tetralogy and the surgery was delayed due to lack of consent from the parents. This led the patient to the condition of congestive cardiac failure leading to death.

#### Sequence of events:

Fallot's Tetralogy -> Congestive Cardiac Failure -> Death

## 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

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*  <b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) <b>Acute renal failure</b> .....	<b>2 days</b> .....
	due to (or as a consequence of)	
	(b) <b>Dengue haemorrhagic fever</b> .....	<b>8 days</b> .....
	due to (or as a consequence of)	
	(c) .....	.....
	due to (or as a consequence of)	
	(d) .....	.....
<hr/> <b>II</b> 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>		

#### Note:

The child had a history of fever, headache & vomiting of 6 days duration and a diagnosis of Dengue Haemorrhagic Fever was made. Later the patient developed haematuria & anuria leading to Acute Renal Failure leading to death.

#### Sequence of events:

Dengue Haemorrhagic Fever -> Acute Renal Failure -> Death

## 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 and 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

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*  <b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) <b>Lobar Pneumonia</b> .....	<b>2 days</b> .....
	due to (or as a consequence of)	
	(b) <b>Lower Respiratory Tract Infection</b> .....	<b>3 days</b> .....
	due to (or as a consequence of)	
	(c) <b>Severe Anaemia</b> .....	<b>1 week</b> .....
	due to (or as a consequence of)	
	(d) <b>Thalassaemia</b> .....	<b>Since birth</b> .....
<b>II</b> 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>		

#### Note:

The child was a diagnosed case of Thalassaemia for the last 4 years and this led to severe anaemia. Later the patient had developed a Lower Respiratory Tract Infection which progressed to Lobar Pneumonia and death.

#### Sequence of events:

Thalassaemia -> Severe Anaemia -> Lower Respiratory Tract Infection ->Lobar Pneumonia ->Death

**Solutions and explanations for 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

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*	(a) <b>Disseminated Intravascular Coagulation</b> ..... due to (or as a consequence of)	<b>1 Hour</b> .....
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Abruptio placenta</b> ..... due to (or as a consequence of)	<b>12 Hours</b> .....
	(c) <b>Pregnancy induced hypertension</b> ..... due to (or as a consequence of)	<b>3 Months</b> .....
	(d) .....	.....
<b>II</b> 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>		

#### Sequence of events:

Pregnancy induced hypertension -> Abruptio placenta -> Disseminated Intravascular Coagulation -> Death

## 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

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*	(a) <b>Internal Bleeding</b> .....	<b>8 Hours</b> .....
	due to (or as a consequence of)	
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Ruptured ectopic pregnancy (Period of gestation 11 weeks)</b> .....	<b>8 Hours</b> .....
	due to (or as a consequence of)	
	(c) ..... due to (or as a consequence of)	.....
	(d) .....	.....
<b>II</b> 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>		

#### Note:

In this case it is obvious that the patient died due to Hypovolaemic shock due to internal bleeding caused by ruptured ectopic pregnancy. Hypovolaemic shock which is a mode of dying and doesn't need to be mentioned in the certificate.

#### Sequence of events:

Ruptured ectopic pregnancy -> Internal Bleeding -> Death



## 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 she died 7 hours after admission.

### INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*	(a) <b>Postpartum haemorrhage</b> .....	<b>3 hours</b> .....
	due to (or as a consequence of)	
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Retained placenta</b> .....	<b>3 hours</b> .....
	due to (or as a consequence of)	
	(c) ..... due to (or as a consequence of)	.....
	(d) .....	.....
<b>II</b> 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>		

#### Note:

In this case she died following Hypovolaemic shock due to postpartum haemorrhage. Retained placenta was the initiating cause which led to postpartum haemorrhage. Hypovolaemic shock which is a mode of dying and doesn't need to be mentioned in the certificate.

#### Sequence of events:

Retained placenta -> Postpartum haemorrhage -> Death

## **Solutions and explanations for 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. 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
<b>I</b> Disease or condition directly leading to death*	(a) <b>Secondary adenocarcinoma of liver</b> ..... due to (or as a consequence of)	<b>1 year</b> .....
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Primary adenocarcinoma of lung</b> ..... due to (or as a consequence of)	<b>3 years</b> .....
	(c) ..... due to (or as a consequence of)	.....
	(d) ..... due to (or as a consequence of)	.....
	(d) ..... due to (or as a consequence of)	.....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>Ischaemic heart disease</b> ..... .....	<b>10 years</b> ..... .....

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

#### Note:

Even though the primary was removed and has not reoccurred, it will be selected as the underlying cause of death. The precise site of the primary neoplasm should always be indicated. The histology of the neoplasm should also be stated if known. For neoplasms of bone, where the histology is unknown, the kind of tissue of origin (i.e. marrow, osseous tissue) should be indicated.

#### Sequence of events:

Primary adenocarcinoma of lung -> Secondary adenocarcinoma of liver -> Death

## 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

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*  <b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(a) <b>Pulmonary embolism</b> .....	<b>1 hour</b> .....
	due to (or as a consequence of)	
	(b) <b>Deep vein thrombosis</b> .....	<b>3 days</b> .....
	due to (or as a consequence of)	
	(c) <b>Carcinoma of the sigmoid colon</b> .....	<b>18 months</b> .....
	due to (or as a consequence of)	
	(d) .....	.....
<b>II</b> Other significant conditions contributing to the death, but not related to the disease or condition causing it	<b>Ischaemic heart disease</b> .....	<b>5 years</b> .....
	<b>Arteriosclerosis</b> .....	<b>5 years</b> .....
<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:

As the carcinoma of the sigmoid colon was the condition necessitating the surgery, this will be selected as the underlying cause of death. As ischaemic heart disease and arteriosclerosis was not directly related to death but may have contributed they will be documented in Part II of the certificate.

#### Sequence of events:

Carcinoma of the sigmoid colon -> Deep vein thrombosis -> Pulmonary embolism -> Death

## 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.

### INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
<b>I</b> Disease or condition directly leading to death*	(a) <b>Pulmonary embolism</b> .....	<b>30 Minutes</b> .....
	due to (or as a consequence of)	
<b>Antecedent causes</b> Morbidity conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) <b>Deep vein thrombosis of L/thigh</b> .....	<b>3 Days</b> .....
	due to (or as a consequence of)	
	(c) <b>Acute hepatic failure</b> .....	<b>3 Days</b> .....
	due to (or as a consequence of)	
	(d) <b>Moderately differentiated hepatocellular carcinoma</b> .....	<b>3 Months</b> .....
<b>II</b> 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>		

**Note:**

#### Sequence of events:

Moderately differentiated hepatocellular carcinoma -> Acute hepatic failure -> Deep vein thrombosis of L/thigh -> Pulmonary embolism -> Death