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DATA FOR
HEALTH INITIATIVE

IMPROVING CAUSE OF DEATH INFORMATION

Assessing the quality of death certification

Resources and Tools 2
October 2016



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Working papers are the principle knowledge products of the Civil Registration and Vital Statistics Initiative at The University of Melbourne. Easily accessible, they collectively form a lasting repository of knowledge generated under the Data for Health Initiative based on in-country experience. Working papers are intended to stimulate debate and promote the adoption of best practice in CRVS in partner countries and world-wide.

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Why it is important to assess the quality of death certification

The best way to obtain good-quality mortality statistics is to have deaths certified by a medically qualified doctor. Death certification by doctors is considered to be the “gold standard” for producing cause of death data. How well a doctor manages to diagnose the diseases and conditions that led to a person’s death depends upon a number of factors such as the training received by the doctor, his/her experience in death certification, support within the hospital in the form of clinical records and diagnostic equipment and whether the medical certificate is correctly filled in.

Evaluation studies have repeatedly shown that medical certificates are often of poor quality, even when the cause of death has been certified by a doctor.¹⁻⁴ Evidence shows that doctors in many countries do not get adequate opportunities to learn about death certification as part of their medical training. In addition, some hospitals lack the basic diagnostic facilities that may be needed to determine the cause of death with accuracy. In general if the Medical Record Department is functioning poorly, this is reflected in the accuracy and completeness of the death certificates as doctors cannot locate supporting information, which consequently will lead to poorer quality certification.

The causes of death recorded in the medical certificate are:

“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.”

Twentieth World Health Assembly, 1967

The underlying cause of death (UCOD) is:

“the disease or injury which initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury.”

WHO, 1994

¹ Rao C et al. (2007). Validation of cause-of-death statistics in urban China. *International Journal of Epidemiology*, 36(3):642–651. doi:10.1093/ije/dym003. Abstract retrieved 22 August 2012 from: <http://www.ncbi.nlm.nih.gov/pubmed/17329316>

² Khosravi A et al. (2008). Impact of misclassification on measures of cardiovascular disease mortality in the Islamic Republic of Iran: a cross-sectional study. *Bulletin of the World Health Organization*, 86(9):688–696. Retrieved 22 August 2012 from: <http://www.who.int/bulletin/volumes/86/9/07-046532.pdf>

³ Pattaraarchachai J et al. (2010). Cause-specific mortality patterns among hospital deaths in Thailand: validating routine death certification. *Population Health Metrics*, 8(1):12. doi:10.1186/1478-7954-8-12. Retrieved 22 August 2012 from: <http://www.pophealthmetrics.com/content/pdf/1478-7954-8-12.pdf>

⁴ Pattaraarchachai J et al. (2010). Cause-specific mortality patterns among hospital deaths in Thailand: validating routine death certification. *Population Health Metrics*, 8(1):12. doi:10.1186/1478-7954-8-12. Retrieved 22 August 2012 from: <http://www.pophealthmetrics.com/content/pdf/1478-7954-8-12.pdf>

The International Form of Medical Certificate of Cause of Death

The International Form of Medical Certificate of Cause of Death (known as the death certificate) is recommended by the World Health Organization for the certification of death in all countries. One way of looking at the death certificate is that it provides a framework for the organisation of clinical diagnoses used for public health purposes. Figure 1 shows Frame A of the death certificate which was introduced with the adoption of ICD-10 and used by most countries. An example of the full, updated death certificate introduced by WHO in 2016, which includes demographic and other medical data, is provided in Annex 1 (page 17).

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

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

The death certificate is divided into three sections:

1. Part 1—diseases or conditions directly leading to death and antecedent causes
2. Part 2—other significant conditions
3. A column to record the approximate interval between onset and death.

Before reviewing the sections in detail, it is essential to understand the following concepts:

- The sequence/chain of events leading to death
- The contributory cause(s) of death.

To fill in the medical certificate correctly, the doctor must first identify the disease leading directly to death then trace the sequence of events back to the UCOD. Other diseases contributing to death are entered in a second part of the form (Figure 2). This is quite different from the logic that the doctor applies to making the clinical diagnosis which is the basis for patient management. Because many doctors have not been trained in medical certification there is extensive misclassification of the UCOD in deaths reported by hospitals from all parts of the world where accuracy of hospital medical certificates has been studied.

Figure 2: Example of a correctly completed death certificate

Frame A: Medical data: Part 1 and 2				
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death	Time interval from onset to death
		a	<i>Renal failure</i>	<i>1 year</i>
		b	Due to: <i>Nephritic syndrome</i>	<i>3 years</i>
		c	Due to: <i>Diabetes mellitus</i>	<i>20 years</i>
		d	Due to:	
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)		<i>Ischaemic right foot (3 months)</i> -----		

About this tool

This tool is designed to quickly assess the quality of death certification practices through checking for the presence of common errors in death certificates. This can be used to assess the quality of death certification as part of routine assessment, or to assess the training needs of doctors in designing cause of death certification training. This tool can also be used to evaluate the effect of death certification training.

WHO SHOULD USE THIS TOOL?

This document provides guidance on how to use the assessment tool. Information generated from this assessment would be helpful for Ministry of Health staff, hospital administrators, health information officers or medical record officers to determine the quality of death certificates.

This tool can be used by a doctor who is trained in death certification practices and understands the International Classification of Diseases (ICD) death certification rules. This tool can also be used by a well-trained coder. However, in the absence of properly trained mortality coders in many countries, coders may need to refer to the Mortality Medical Data System (MMDS) tables or consult a doctor to confirm the correct sequencing of cause of death.

HOW MANY CERTIFICATES TO CHOOSE?

The number of death certificates that should be assessed using this tool will depend on the objectives of the assessment and availability of the resources to carry out the study. If a large sample of death certificates can be assessed (more than 500) the results would be more robust. However, in the presence of limited resources, for a periodic assessment in one hospital, even 100 death certificates would be enough to generate evidence on current death certification practices.

Guidelines on using the tool

This tool is essentially a check list of the most common errors that are seen in death certificates, presented in a table. Use the checklist to identify the presence of errors and mark them on the table. Use one table per death certificate reviewed.

All the examples provided below are real examples taken from a collection of death certificates reviewed between 2010 and 2013 in several countries.

ASSOCIATED DOCUMENTS

To help with use of the tool, it is recommended you also download the print version of the assessment tool, and the excel spreadsheet for analysis (both available from mspgh.unimelb.edu.au/dataforhealth/resources).

ONLINE VERSION

An online version of the assessment tool is being created for countries to use as part of the Data for Health initiative. You will need a stable internet connection and a desktop or laptop computer. To request a username and password, and a copy of the user manual, email CRVS-info@unimelb.edu.au

1. DOCUMENTING MULTIPLE CAUSES PER LINE

According to the WHO ICD guidelines, only one cause should be recorded per line in a death certificate. When more than one cause is reported on a single line in the death certificate, it makes it difficult for coders to establish the sequence of events leading to death, and so selecting the correct underlying cause of death would be more difficult (see Figure 3).

However, if there are multiple causes in the sequence leading to death, and not enough blank lines to record them on, then it may be acceptable to write multiple causes per line. If this is the case, it is important that the certifier clearly demonstrates the sequence, by writing 'due to' in between conditions written on the same line (see Figure 4).

Instructions for completing the table: Mark with a tick or cross in the 'Yes' column if there is more than one cause reported on one line (this is an error). If there is one cause per line, mark the 'No' column.

If there is more than one cause reported on one line, and the certifier has clearly demonstrated the sequence by writing 'due to' in between causes; mark with a tick or cross in the 'No' column. If there is more than one cause reported on one line and the certifier has not used 'due to' in between causes and the sequence is unclear; mark with a tick or cross in the 'Yes' column (this is an error).

Figure 3: An incorrectly completed certificate with multiple causes per line

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

Two causes recorded in line 1a

Figure 4: A correctly completed certificate with multiple causes per line

Frame A: Medical data: Part 1 and 2			
1		Cause of death	Time interval from onset to death
Report disease or condition directly leading to death on line a	a	<i>Cerebral compression</i>	<i>30 mins</i>
Report chain of events in due to order (if applicable)	b	Due to: <i>Extradural hemorrhage</i>	<i>3 hours</i>
	c	Due to: <i>Fractured temporal bone</i>	<i>3 hours</i>
State the underlying cause on the lowest used line	d	Due to: <i>Blunt trauma to head DUE TO car collided with a pick-up truck on public highway</i>	<i>3 hours</i>
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)		-----	

2. APPROXIMATE INTERVAL BETWEEN ONSET AND DEATH

The column on the right-hand side of Part 1 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 1. For conditions listed in Part 2, the time interval can be written in brackets after the condition, for example, obesity (15 years). These intervals are usually established by the doctor on the basis of available information in the clinical records. In some cases, the time 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 because of lack of further information, it can be written as 'unknown'. Time intervals are very important for correctly coding certain diseases and provides a check on the accuracy of the reported sequence of conditions. Therefore, doctors should be asked to fill in the time lines.

Instructions for completing the table: Mark with a tick or cross in the 'Yes' column if the time interval between onset and death has been left blank (ie not completed) (this is an error). If the time interval has been filled out, mark the 'No' column.

Figure 5: An incorrectly completed certificate with no time interval between onset and death

Time not recorded

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

Figure 6: An incorrectly completed certificate with no time interval between onset and death

Time not recorded

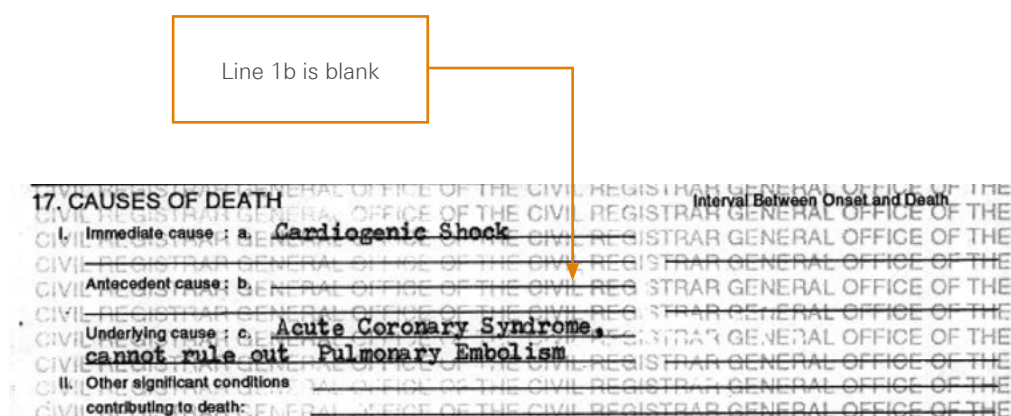
Frame A: Medical data: Part 1 and 2				
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death	Time interval from onset to death
	↻	a	<i>Acute myocardial infection</i>	
	↻	b	Due to: <i>Chronic ischemic heart disease</i>	
	↻	c	Due to:	
		d	Due to:	
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)		<i>Obesity, non-insulin-dependant, diabetes mellitus, hypertension</i>		

3. PRESENCE OF BLANK LINES WITHIN THE SEQUENCE OF EVENTS

In completing a death certificate the certifier should use consecutive lines in Part 1 of the death certificate starting at Line 1a. The underlying cause should be recorded in the lowest used line of Part 1. There should not be any blank lines within the sequence/chain of events leading to death, this is because the death certificate is a legal document and it is important that it cannot be easily altered or changed.

Instructions for completing the table: Mark with a tick or cross in the 'Yes' column if there are blank lines within the sequence of events (this is an error). If the sequence is recorded on consecutive lines, mark the 'No' column.

Figure 7: An incorrectly completed certificate with blank lines between causes



4. ABBREVIATIONS USED IN CERTIFYING THE DEATH

Doctors are encouraged not to use abbreviations when certifying deaths as abbreviations can mean different things to different people. There is a chance that coders may misinterpret the abbreviation and code the death to a non-relevant code.

Here are some of the examples of abbreviations used:

- MI
- HT
- HONK
- ESRD
- K/C/O
- HTN
- DM
- IHD
- AAA
- DEH
- BHP

Instructions for completing the table: Mark with a tick or cross in the 'Yes' column if abbreviations are used in certifying the death (this is an error). If abbreviations are not used, mark the 'No' column.

5. ILLEGIBLE HAND WRITING

Death certificates need to be completed clearly so that coders and other users can read the information provided in the death certificate. However some doctors have illegible handwriting and this makes it hard for coders to correctly identify the stated condition.

Instructions for completing the table: Mark with a tick or cross in the 'Yes' column if the handwriting on the certificate is illegible (this is an error). If the handwriting is legible, mark the 'No' column.

Figure 8: The following three examples all show incorrectly completed certificates with illegible hand writing

17. CAUSES OF DEATH

Interval Between Onset and Death

I. Immediate cause : a. _____

Antecedent cause : b. _____

Underlying cause : c. _____

II. Other significant conditions contributing to death: _____

The form contains three lines of illegible handwriting for causes a, b, and c. The background is a repeating watermark of 'GENERAL OFFICE OF THE CIVIL REGISTRAR'.

Figure 9

17. CAUSES OF DEATH

Interval Between Onset and Death

I. Immediate cause : a. _____

Antecedent cause : b. _____

Underlying cause : c. _____

II. Other significant conditions contributing to death: _____

The form contains three lines of illegible handwriting for causes a, b, and c. The background is a repeating watermark of 'GENERAL OFFICE OF THE CIVIL REGISTRAR'.

Figure 10

17. CAUSES OF DEATH

Interval Between Onset and Death

I. Immediate cause : a. _____

Antecedent cause : b. _____

Underlying cause : c. _____

II. Other significant conditions contributing to death: _____

The form contains three lines of illegible handwriting for causes a, b, and c. The background is a repeating watermark of 'GENERAL OFFICE OF THE CIVIL REGISTRAR'.

6. INCORRECT/CLINICALLY IMPROBABLE SEQUENCE OF EVENTS LEADING TO DEATH

Mortality statistics are based on the underlying cause of death (UCOD), which is the disease or injury that initiated the sequence of events that led directly to death. For example, when 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. Reporting the direct cause of death as the underlying cause is probably the most common error seen in many countries.

According to the guidelines the certifying doctor should identify a sequence of events leading to death and document that in the death certificate. When a clinically improbable sequence of events is recorded it becomes impossible to select the correct UCOD.

Instructions for completing the table: Mark with a tick or cross in the 'Yes' column if the sequence of events recorded are not clinically correct or are clinically improbable (this is an error). If the sequence is correct, mark the 'No' column.

Figure 11: An incorrectly completed certificate with a clinically improbable sequence of events leading to death

This shows a clinically improbable sequence of events leading to death, as chronic bronchitis does not cause gangrene or diabetes. It is likely that the diabetes caused the gangrene, which lead to death, and that chronic bronchitis was a significant condition. This certificate also does not state if it was Type I or Type II diabetes.

Frame A: Medical data: Part 1 and 2				
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death	Time interval from onset to death
	↻	a	<i>Diabetes</i>	<i>20 years</i>
	↻	b	Due to: <i>Gangrene foot</i>	<i>2 years</i>
	↻	c	Due to: <i>Chronic bronchitis</i>	<i>5 years</i>
		d	Due to:	
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)		-----		

Due to the overall poor quality of death certification practices, we often do not see the time interval recorded in death certificates with clinically improbable sequences. This makes it harder for coders to correctly identify the underlying cause of death.

Figure 12: An incorrectly completed certificate with a clinically improbable sequence of events leading to death

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

As well as an improbable sequence, this certificate also has two causes recorded on line b

Figure 13 : An incorrectly completed certificate with a clinically improbable sequence of events leading to death

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

7. ILL-DEFINED CONDITION ENTERED AS UNDERLYING CAUSE OF DEATH

Entering ill-defined or vague conditions on death certificates are of no value for public health and do not provide any information for decision-makers to guide them in designing preventive health programs.

Such conditions are usually coded to unusable (previously referred to as 'garbage') codes, which belong to four main types:

1. Impossible underlying causes, including signs and symptoms (R codes)
2. Intermediate causes
3. Modes of dying (ie cardiac or respiratory arrest)
4. Unspecified causes within a larger death category (ie ill-defined site of cancer or injury, unspecified accident).

Organ failure (ie heart or liver failure) is not acceptable as an underlying cause of death. The disease or condition causing the organ failure should be entered as underlying cause if possible.

Similarly, the term '**septicaemia**' should not be used as an underlying cause but instead the source of the infection (ie septic abortion or community acquired pneumonia) should be identified whenever possible. These are known as ill-defined conditions and should be avoided.

Symptoms and signs (ie chest pain, cough and fever) are symptoms and as such should not be used on the death certificate. The disease or conditions that caused them should be reported.

Doctors should **not** report the **mode of dying** on the death certificate. This includes terms such as 'cardio-pulmonary arrest' or 'brain death'.

In reporting the death of an elderly person, the terms 'senility' or 'old age' should be avoided. If at all possible the doctor should enter a specific cause.

Instructions for completing the table: Mark with a tick or cross in the 'Yes' column if ill-defined conditions are entered as the underlying cause of death (this is an error). Also specify what type of ill-defined condition was listed. If the underlying cause of death is not ill-defined, mark the 'No' column.

Figure 14: An incorrectly completed certificate with an ill-defined condition listed as the underlying cause

Frame A: Medical data: Part 1 and 2				
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death	Time interval from onset to death
	↻	a	<i>Cardio- respiratory failure</i>	<i>30 mins</i>
	↻	b	Due to:	
	↻	c	Due to:	
		d	Due to:	
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)				

Figure 15: An incorrectly completed certificate with an ill-defined condition listed as the underlying cause







Frame A: Medical data: Part 1 and 2				
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death	Time interval from onset to death
		a	<i>Chest pain</i>	<i>10 hours</i>
		b	Due to:	
		c	Due to:	
		d	Due to:	
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)				

Figure 16: An incorrectly completed certificate with an ill-defined condition listed as the underlying cause

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

8. ADDITIONAL ERRORS

As well as the seven major errors identified and described above, there may be other additional errors on the death certificate.

Instructions for completing the table: Mark with a tick or a cross in the 'Yes' column if the certificate had any other errors. If there are no additional errors, mark the 'No' column.

Common errors are described below.

8.1 External Causes of Death

In certifying deaths due to injuries, poisonings and other external causes, the circumstances of death should be reported as the underlying cause of death. The external cause should be described in as much detail as possible. For an example, 'motor vehicle accident' is too broad; instead, 'pedestrian hit by motor car at night' is providing important details for prevention. In a case of suicide, simply entering 'suicide' is insufficient; the method of suicide should also be entered. For example, 'suicidal death by hanging' is a clear description.

For deaths due to injuries, the certifier should include details on (see Figure 17):

- Site of the injury
- Type of injury (ie laceration, abrasion, fracture)
- Intent of the injury (accidental, intentional, or undetermined)
- Nature of the injury (ie death by hanging).

For deaths due to poisonings, the certifier should include details on (Figure 18):

- Substance used
- Intent of the poisoning (accidental, intentional, or undetermined)
- Adverse effect in therapeutic use.

Figure 17: A correctly completed certificate for a death due to an injury







Frame A: Medical data: Part 1 and 2				
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death	Time interval from onset to death
		a	<i>Traumatic shock</i>	<i>1 hour</i>
		b	Due to: <i>Multiple fractures</i>	<i>5 hours</i>
		c	Due to: <i>Pedestrian hit by truck</i>	<i>5 hours</i>
		d	Due to:	
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)				

Figure 18: A correctly completed certificate for an external cause of death due to poisoning

Frame A: Medical data: Part 1 and 2				
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death	Time interval from onset to death
		a	<i>Carbon monoxide poisoning</i>	<i>30mins</i>
		b	Due to: <i>Suicidal inhalation of automobile exhaust fumes</i>	<i>2 hours</i>
		c	Due to:	
		d	Due to:	
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)				




8.2 Neoplasms

When reporting deaths due to neoplasms it is required to provide detailed information about the tumour. This should include:

- Site of the neoplasm (where appropriate)
- Whether benign or malignant
- Whether primary or secondary (if known), even if the primary neoplasm had been 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.

Figure 19: A correctly completed certificate for a cause of death due to a neoplasm

Frame A: Medical data: Part 1 and 2				
1 Report disease or condition directly leading to death on line a Report chain of events in due order (if applicable) State the underlying cause on the lowest used line			Cause of death	Time interval from onset to death
		a	<i>Pulmonary embolism</i>	<i>minutes</i>
		b	Due to: <i>Deep vein thrombosis</i>	<i>2 days</i>
		c	Due to: <i>Carcinoma of the sigmoid colon</i>	<i>6 months</i>
		d	Due to:	
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)				

8.3 Surgical procedures

If death is a consequence of a surgical procedure the names of the procedure should include the condition for which it was performed; for example, appendectomy for acute appendicitis.

8.4 Pregnancy and maternal deaths

If the death certificate includes a pregnancy check box, it should be completed to indicate if the woman was pregnant or was within 42 days of delivery when the death occurred, if that was the case.

8.5 Hypertension

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

8.6 Infectious and parasitic diseases

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

8.7 General errors

Other general errors may include:

- Making changes or alterations to the certificate by any other means other than drawing a line through the original text. The use of correction fluid, or other means that erase the original text, are not best practice. This is because the certificate is a legal document, and changes should be clearly visible.
- Not specifying units of the age.

How to judge the results

Once you have assessed the selected sample of death certificates you can assess them in many ways. We have found the following measures useful and easy to apply:

Step 1: Calculate the percentage of death certificates correctly completed

$$\frac{\text{Number of death certificates without any errors}}{\text{Total number of death certificates assessed}} \times 100$$

Step 2: Calculate the percentage of death certificates with at least one error

$$\frac{\text{Number of death certificates with at least one error}}{\text{Total number of death certificates assessed}} \times 100$$

Step 3: Calculate the percentage of death certificates with two or more errors

$$\frac{\text{Number of death certificates with two or more errors}}{\text{Total number of death certificates assessed}} \times 100$$

Step 4: Calculate the percentage errors in each category out of the total number of death certificates assessed

Error category	Number of certificates with errors	Percentage
1. Multiple causes per line		
2. Time interval between onset and death was blank		
3. Blank lines within the sequence/ chain of events (not using consecutive lines)		
4. Illegible hand writing		
5. Abbreviations used		
6. Incorrect/ clinically improbably sequence of events leading to death		
7. Ill-defined condition entered underlying COD		
8. Other errors		

How to use the results

Results of this assessment can be used in many ways. This can inform the quality of cause of death reporting to convince hospital administrators to request improvement training, decide on the training needs, used as a baseline and follow up of medical certification of cause of death training and also for periodic audit of the quality of death certificates and feedback to the certifiers. Information can be included in periodic newsletters of the hospital, presented at review meetings and used in determining training needs and continuing quality improvement processes.

COUNTRY EXAMPLE: FIJI

A training curriculum, handbook, and a set of teaching aids to train doctors in correct death certification practice were developed in 2012. These were used in interactive workshops with 38 doctors in Fiji. The impact of the training was evaluated by pre-intervention and post-intervention tests using a vignette approach. It was also evaluated by assessing accuracy of death certification by these doctors five months after the workshops.

The findings suggested that the percentage of correctly entered death certificates increased from 33.3% (65 of 195) in pre-intervention to 69.2% (132 of 195) in post-intervention ($p < 0.0001$). In certificates that had been wrongly entered, clinically improbable sequences accounted for the highest proportion of errors both in pre-intervention and post-intervention tests. For more information go to: [thelancet.com/journals/lancet/article/PIIS0140-6736\(13\)61376-8/fulltext](http://thelancet.com/journals/lancet/article/PIIS0140-6736(13)61376-8/fulltext)

LIMITATIONS OF THE ASSESSMENT TOOL

This tool is designed to identify common errors in death certification practices. It is a good measure of death certification quality and overall quality of mortality statistics. However, this tool cannot assess the presence of any misclassification in identifying the underlying cause of death. For example, the tool cannot determine if the cause of death reported in the death certificate was the actual cause of death of the person.

This tool cannot identify these misclassification errors. However, when you are going through the death certificates, it may be possible to recognize possible errors that may exist in death certificates and add that information to the report.

For more information on how to assess the quality of death certification, see Technical Report 1 'Improving cause of death data in hospitals', available at mspgh.unimelb.edu.au/dataforhealth/resources

Annex 1: International Form of Medical Certificate of Cause of Death (WHO 2016)

Administrative Data (can be further specified by country)																	
Sex	<input type="checkbox"/> Female				<input type="checkbox"/> Male				<input type="checkbox"/> Unknown								
Date of birth	D	D	M	M	Y	Y	Y	Y	Date of death	D	D	M	M	Y	Y	Y	Y
Frame A: Medical data: Part 1 and 2																	
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line			Cause of death	Time interval from onset to death													
		a															
		b	Due to:														
		c	Due to:														
d	Due to:																
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)																	

Frame B: Other medical data															
Was surgery performed within the last 4 weeks?						<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Unknown					
If yes please specify date of surgery						D	D	M	M	Y	Y	Y	Y		
If yes please specify reason for surgery (disease or condition)															
Was an autopsy requested?						<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Unknown					
If yes were the findings used in the certification?						<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Unknown					
Manner of death:															
<input type="checkbox"/> Disease			<input type="checkbox"/> Assault			<input type="checkbox"/> Could not be determined									
<input type="checkbox"/> Accident			<input type="checkbox"/> Legal intervention			<input type="checkbox"/> Pending investigation									
<input type="checkbox"/> Intentional self harm			<input type="checkbox"/> War			<input type="checkbox"/> Unknown									
If external cause or poisoning:						Date of injury		D	D	M	M	Y	Y	Y	Y
Please describe how external cause occurred (If poisoning please specify poisoning agent)															
Place of occurrence of the external cause:															
<input type="checkbox"/> At home		<input type="checkbox"/> Residential institution		<input type="checkbox"/> School, other institution, public administrative area				<input type="checkbox"/> Sports and athletics area							
<input type="checkbox"/> Street and highway		<input type="checkbox"/> Trade and service area		<input type="checkbox"/> Industrial and construction area				<input type="checkbox"/> Farm							
<input type="checkbox"/> Other place (please specify):						<input type="checkbox"/> Unknown									
Fetal or infant Death															
Multiple pregnancy						<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Unknown					
Stillborn?						<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Unknown					
If death within 24h specify number of hours survived						Birth weight (in grams)									
Number of completed weeks of pregnancy						Age of mother (years)									
If death was perinatal, please state conditions of mother that affected the fetus and newborn															
For women, was the deceased pregnant?						<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Unknown					
At time of death						<input type="checkbox"/> Within 42 days before the death									
Between 43 days up to 1 year before death						<input type="checkbox"/> Unknown									
Did the pregnancy contribute to the death?						<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Unknown					

Annex 2: Medical certificate of cause of death assessment tool

This tool is designed to assess the quality of death certification practices through checking for the presence of common errors in death certificates. This can be used to assess the quality of death certification as part of routine assessment, or to assess the training needs of doctors in designing cause of death certification training. This tool can also be used to evaluate the effectiveness of death certification training.

This tool should be used in conjunction with the following documents, available to download at mispgh.unimelb.edu.au/dataforhealth/resources:

- Assessing the quality of death certification: Guidance Tool
- Assessing the quality of death certification: Instructions for the online assessment tool
- Assessing the quality of death certification: Excel spreadsheet

GENERAL INSTRUCTIONS

Country	Relates to the country where the death was certified.
Hospital name	Name of hospital (or health facility) where the certificate was completed.
Place of death	For example, hospital, other health facility, home, or other. Insert 'not recorded' if unknown.
Certifier	For example, doctor or other. Insert 'not recorded' if unknown.
Reference no.	If the death certificate has a medical record or patient number, insert it here. If not, leave blank.
Age at death	Age of the deceased at death. Remember to include units (hours, days, months, years). Insert 'not recorded' if unknown.
Age group	Based on the age at death, select from: 0 – 28 days; 29 days – <1 year; 1 – 4 years; 5 – 14 years; 15 – 44 years; 45 – 64 years; 65 – 84 years; 85+ years.
Gender	Male or female. Insert 'not recorded' if unknown.
Error types	Detailed instructions on how to assess the quality of the death certificate against each error type are provided in the document 'Assessing the quality of death certification: Guidance Tool'.

The assessment tool

DEATH CERTIFICATE DETAILS

Country:	
Hospital name:	
Place of death:	
Certifier:	
Reference no.:	

GENERAL DETAILS ABOUT THE DECEASED

Age at death:	
Age group:	
Gender:	

A correctly filled death certificate has none of the following errors.
Did the certificate have:

Error type	Yes	No	Unsure due to illegible handwriting
1. Multiple causes per line			
2. Time interval between onset and death was blank			
3. Blank lines within the sequence/chain of events (not using consecutive lines)			
4. Abbreviations used			
5. Illegible hand writing			
6. Incorrect/clinically improbable sequence of events leading to death			
7. An ill-defined condition entered as the underlying COD			
■ If yes, was the ill-defined condition:			
– Impossible underlying cause (ie signs and symptoms)			
– Intermediate cause			
– Mode of dying (ie respiratory arrest)			
– Unspecified causes within a larger death category (ie unspecified accident)			
– Other – specify:			
8. Were there additional errors on the certificate?			
■ If yes, select all those that apply:			
– For deaths due to external causes, additional details were missing			
– For deaths due to neoplasms, additional details were missing			
– Changes/alterations made by any means other than drawing a line through the original text (ie using correction fluid)			
– No units specified for the age			
– Other – specify:			
9. Overall, was the medical certificate of COD correctly filled-in?			

Notes

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Notes

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The program partners on this initiative include: The University of Melbourne, Australia; CDC Foundation, USA; Vital Strategies, USA; Johns Hopkins Bloomberg School of Public Health, USA; World Health Organization, Switzerland.

Civil Registration and Vital Statistics partners:



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