

Guidance for appropriate recording of COVID-19 related deaths in India



Impacting NCD Public Health Actions and Policies
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1. Introduction

1.1 What is Cause of Death?

The cause of death (COD) is defined as “all those diseases, morbid conditions or abnormalities, injuries which either resulted in or contributed to death and the circumstances of the accident or violence which produced any such injuries.”(1)

1.2 How to record Cause of Death?

Medical Certificate of Cause of Death (MCCD) is the certificate issued by the attending medical practitioner who had treated the person during admission in a medical institution or in the last illness (prior to death) while taking treatment from a physician outside of a medical institution. Medical certification of cause of death is the process of recording and reporting death using standard Form 4 (institutional deaths) and Form 4A (non-institutional deaths) as per the rules of the Registration of Births and Death Act, 1969. The MCCD form contains Part 1 to record the immediate and antecedent causes, and Part 2 to record the significant conditions that contributed to the death but were not part of the sequence of events leading to death.

Image 1: Cause of Death section of Form 4/4A

<u>CAUSE OF DEATH</u>		Interval between onset and death approx
I Immediate cause State the disease, injury or complication which caused death, not the mode of dying such as heart failure, assthenia, etc	a) due to (or as a consequence of)
Antecedent cause Morbid conditions, if any, giving rise to the above cause stating underlying conditions last.	b) due to (or as a consequence of)
II Other significant conditions contributing to the death but not related to the disease or condition causing it	c)

1.3 What is Underlying COD?

Death often results from the combined effect of two or more independent or related conditions, that is, one condition may lead to another, which in turn leads to a third condition and so on. Where there is a sequence, the disease or injury which initiated the sequence of events, called the **underlying cause of death** is recorded and reported. It is:

- (a) The disease or injury which initiated the train of morbid events leading directly to death;
- Or
- (b) The circumstances of the accident or violence which produced the fatal injury.

All the morbid conditions or injuries consequent to the underlying cause relating to death are termed as antecedent and immediate cause.

The medical part of the certificate consists of two parts-

I. Sequence of events leading to death -

First line is the immediate cause of death – the condition / disease that directly led to death / that preceded death.

The cause of death antecedent to immediate cause should be entered in line (b), and a cause further antecedent to this should be entered in line (c).

Underlying cause of death is on the lowest line of part I – It is the disease or condition that started the sequence of events between normal health to immediate cause of death. Conditions if any, as a consequence thereof will be entered above it in ascending causal order of sequence.

How many cause of death can be entered in Part I?

Only one cause is to be entered on each line of Part I. There may be many morbid events that happened, but the sequence of events that caused death should be sorted out, and one cause should be written on each line of Part 1 so that there is a **logical sequence of events leading to death**.

What if there is only one condition?

The disease, injury or complication that immediately preceded death can be the only entry in the MCCD FORM if only one condition is present at death.

What if there is only one condition antecedent to the immediate cause?

The condition antecedent to the immediate cause should be entered in line (b). Line (c) should be kept blank.

How to record time interval from onset of disease to death?

The time interval between the presumed onset of the condition, not the diagnosis, and death should be reported. It is acceptable to approximate the intervals or use general terms, such as hours, days, weeks, or years.

II. Other significant conditions that contributed to the death

All other diseases or conditions believed to have unfavourably influenced the course of the disease leading to death, but were not related to the disease or condition directly causing death.

What should be entered in Part II - Other significant conditions?

Any disease, abnormality, injury or late effects of poisoning, believed to have adversely affected the deceased should be reported such as chronic conditions, and also information such as:

<ul style="list-style-type: none">• Chronic Bronchitis /COPD/Asthma/ Tuberculosis• Cancer –Primary / Metastatic cancer / On cancer directed treatment /Old cancer - cured or treated• Cardiovascular disease- Hypertension / IHD/Coronary Heart Disease / heart failure• Stroke / Neurological conditions like epilepsy, Parkinson’s disease, dementia, Alzheimer’s disease• Rheumatoid arthritis / Immune related conditions	<ul style="list-style-type: none">• Use of alcohol and/or other substances.• Tobacco use (smoking / smokeless)• Recent pregnancy, if believed to have contributed to the death.• Environmental factors-exposure to toxic fumes, history of working in specific industry, professional exposure to toxins, specific animals• Late effects of injury, including head injury sequelae• Any iatrogenic underlying cause• Surgical information, if applicable
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1.4 Public health significance of Cause of Death data

Stating the sequence of morbid conditions in order, allows selection of the cause of death that is considered as “underlying” cause. It is the underlying cause of death that is coded with ICD -10 codes and is counted for statistical purposes.

Robust cause of death information in a population is useful for understanding disease burden estimations, and explains trends in the health of populations. It is useful for evaluation and planning of health services and programmes. Good cause of mortality statistics also aids in identifying research questions of public health significance.

2 COVID-19

2.1 COVID-19 pandemic and need for cause of death

COVID-19 is the infectious disease caused by the most recently discovered coronavirus (SARS- CoV- 2) from Wuhan, China, in December 2019. The COVID-19 disease outbreak was declared a Public Health Emergency of International Concern (PHEIC) on 30 January 2020 by the World Health Organization, and later on 11 March 2020 as a Global Pandemic. During such situations, mortality surveillance becomes a very important public health tool to assess the impact of the viral infection.

2.2 COVID-19 as Underlying Cause of Death (UCOD)

COVID-19 is reported to cause pneumonia / acute respiratory distress syndrome (ARDS) / cardiac injury / disseminated intravascular coagulation and so on. These may lead to death and may be recorded in line ‘a’ or ‘b’. It is likely that COVID-19 is the underlying cause of death (UCOD) that lead to ARDS or Pneumonia in most of the deaths due to COVID-19 (test positive and symptoms positive). In these cases COVID-19 must be captured in the last line / lowest line of Part 1 of MCCD form 4/4 A. Acute respiratory failure is a mode of dying and it is prudent not to record it in line a/b/c.

Patients may present with other pre-existing comorbid conditions such as chronic obstructive pulmonary disease (COPD) or asthma, chronic bronchitis, ischemic heart disease, cancer and diabetes mellitus. These conditions increase the risk of developing respiratory infections, and may lead to complications and severe disease in a COVID-19 positive individual. These conditions are not considered as UCOD as they have directly not caused death due to COVID-19. Also a patient may have many co-morbid conditions, but only those that have contributed to death should be recorded in Part 2.

2.3 ICD-10 Codes for COVID-19 provided by World Health Organization

Emergency ICD-10 Code	Usage conditions
U07.1	COVID-19,virus identified
U07.2	COVID-19, virus not identified, Clinically-epidemiologically diagnosed COVID-19 Probable COVID-19 Suspected COVID-19

2.4 Public health significance of recording cause of death in COVID-19 pandemic

COVID-19 is a new disease and is a pandemic affecting all communities and countries. It's clinical presentation ranges from mild to severe, and fatality depends on the severity of the illness, associated co-morbid conditions and age of patients. Patterns of disease and patterns of death can come from only standardised recording of clinical disease history and cause of death, and therefore epidemiological surveillance of disease and death are important. Robust data is needed from every district and state in India to measure the public health impact of COVID 19 and to plan for timely health interventions and protect communities. At the same time, other health conditions affecting populations need to be also monitored so that the health system is prepared for responding to the needs of the population.

3 Completing Medical Certification of Cause of Death (MCCD) in COVID-19

3.1 Mortality coding of COVID-19 with ICD-10 codes

The ICD-10 codes presently recommended by WHO for mortality coding are:

Test	Symptoms of COVID-19	Diagnosis	Code
+ve	None	Confirmed COVID-19	U07.1
+ve	Present	Confirmed COVID-19 documented as UCOD	U07.1
+ve	Present with comorbid conditions like heart disease, asthma, COPD, Type 2 diabetes	Confirmed COVID-19 documented as UCOD	U07.1
Test Negative	Present	Clinically –Epidemiologically diagnosed COVID -19	U07.2
Test awaited	Present	Suspected COVID-19	
Test inconclusive	Present	Probable COVID-19	

3.2 Examples of underlying cause of death in COVID-19

Some examples are provided to help physicians' record cause of death in COVID-19

Example 1 : 40 year old male diagnosed with COVID-19			
CAUSE OF DEATH			
Part I		Interval between onset and death approx	For statistical use
Immediate Cause State the disease, injury or complication which caused death, not the mode of dying such as heart failure, asthenia, etc	a) Respiratory acidosis	2 days	

Antecedent cause Morbidity conditions, if any, giving rise to the above cause stating underlying conditions last.	b) Acute respiratory distress syndrome (ARDS) c) COVID-19	3 days 7 days	U07.1
Part II Other significant conditions contributing to the death but not related to the disease or condition causing it.		

Example 2 : 60 year old male, father of COVID-19 patient and a known diabetes individual presented with Influenza like illness (ILI) and died, test for COVID-19 not available			
CAUSE OF DEATH			
Part I		Interval between onset and death approx	For statistical use
Immediate Cause State the disease, injury or complication which caused death, not the mode of dying such as heart failure, asthenia, etc	a) Acute respiratory distress syndrome (ARDS)	1 day	
Antecedent cause Morbidity conditions, if any, giving rise to the above cause stating underlying conditions last.	b) Influenza like illness c) COVID-19 suspect	4 days 4 days	U07.2
Part II Other significant conditions contributing to the death but not related to the disease or condition causing it.	Diabetes 	15 years	

Example 3 : 50 year old female completed chemotherapy for Breast cancer admitted with breathlessness and developed shock and died			
CAUSE OF DEATH			
Part I		Interval between onset and death approx	For statistical use
Immediate Cause State the disease, injury or complication which caused death, not the mode of dying such as heart failure, asthenia, etc	a) Disseminated Intravascular Coagulation (DIC)	2 days	

Antecedent cause Morbid conditions, if any, giving rise to the above cause stating underlying conditions last.	b) Pneumonia	5 days	U07.1
	c) COVID-19	5 days	
Part II Other significant conditions contributing to the death but not related to the disease or condition causing it.	Breast Cancer	6 months	

Example 4 76 year old male with Ischemic heart disease developed fever and breathlessness two days ago, and was admitted and died in 24 hours, first test was inconclusive			
CAUSE OF DEATH			
Part I		Interval between onset and death approx	For statistical use
Immediate Cause State the disease, injury or complication which caused death, not the mode of dying such as heart failure, asthenia, etc	a) Acute cardiac injury	1 day	
Antecedent cause Morbid conditions, if any, giving rise to the above cause stating underlying conditions last.	b) Probable COVID-19	2 days	U07.2
Part II Other significant conditions contributing to the death but not related to the disease or condition causing it.	Ischemic heart disease		

3.3 What to avoid as Cause of Death?

- Avoid Mode of Dying as Cause of Death – Mode of dying merely tells you that death has occurred and is not specifically related to the disease process.

Mode of dying		
Respiratory Arrest	Emaciation	Vasovagal attack
Asphyxia	Exhaustion	Cardiac arrest
Asthenia	Heart Failure	Heart attack
Brain failure	Hepatic/Liver failure	Hepatic failure
Cachexia	Hepatorenal failure	Liver Failure
Cardiac Arrest/Heart Attack	Kidney failure/Renal failure	Cardio respiratory failure
		Multiorgan/System failure

Cardio Respiratory Arrest Coma Debility	Respiratory arrest/Failure Shock Syncope Uraemia Vagal inhibition	Respiratory Failure Cardio Pulmonary failure
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- Avoid abbreviations and short forms like ARDS, COPD, SARI.

Incorrect	Correct
ARDS	Acute respiratory distress syndrome
COPD	Chronic obstructive pulmonary disease
SARS	Severe Acute Respiratory illness
CRF	CRF could be Cardio respiratory failure or Chronic Renal failure
MI	Myocardial Infarction / Mitral Incompetence
AD	Acute Diarrhoea / Alzheimer`s Dementia
MS	Mitral Stenosis / Multiple Sclerosis
RTI	Respiratory Tract Infection / Reproductive Tract Infection

- Though COVID-19 (Corona virus disease -19) is an abbreviation, it has been specified by the WHO and is an acceptable term to be used as UCOD.

- Avoid vague terms or ambiguity –

Sometimes it is difficult to provide a simple description of cause of death when there are no medical records or a doctor is seeing the patient in a critical condition for the first time or the doctor is not the treating physician.

Incorrect	Correct
Irrelevant talking and feverishness	Delirium due to fever
Very poor nourishment	Severe Malnutrition
Less healthy at birth	Low birth weight / Congenital Anomaly

- Avoid short forms / incomplete description –

Incorrect	Correct
Ca Br	Cancer Breast / Cancer Brain
Ac. Infarct	Acute Myocardial Infarction / Acute Cerebral Infarction
Sev Mal	Severe Malaria / Severe Malnutrition

- Avoid symptoms / signs

Incorrect	Correct
Jaundice	Hepatitis
Fever	Infection
Chest pain	Angina

- Avoid terms such as senescence, old age, senility, infirmity, and advanced age.

These terms cannot be the immediate cause of death. There may be 1 or 2 conditions that have been due to old age and thus the etiological sequence should be specified. If old age was a contributory factor, it should be entered in Part II.

Part I	Incorrect	Correct
la	Bed ridden	Aspiration Pneumonia
lb	Old Age	Stroke
lc	Hypertension	
Part II		
I		Old Age
		Hypertension

3.4 Other considerations in recording MCCD for COVID -19

- i. Provide specific medical terms as cause of death. COVID-19 is a 'viral infection' and presentations include 'influenza like illness' (ILI) or "Severe acute respiratory illness (SARI). These are not specific and can be used in the sequence of the events and the specific virus / bacteria / agent that caused the disease should be recorded as UCOD, for example COVID-19.
- ii. Record the logical sequence of events in Part 1. There may be many medical conditions in a person. Based on the most logical events that caused death, only these conditions are mentioned in Part 1 of the MCCD form.
- iii. **Manner of death:** It refers to the circumstances under which death has occurred.
 - Manner of death due to COVID-19 infection will mostly be 'natural', as it is the disease that led to the death.
 - In case of suicide by an individual tested +ve for COVID-19, the manner of death may be captured as suicide / pending investigation if the medical autopsy is awaited.
- iv. **Place of death:** Most of the deaths due to COVID-19 occur in a hospital and in such cases the place of death should be captured as 'Hospital'. In case an individual is discharged from hospital and the death occurs in his/her residence, the place of death must be captured as 'House'.

4. Use of ICMR-NCDIR e-Mortality (e-Mor) software for recording cause of death

The ICMR-NCDIR e-Mortality (e-Mor) software application aids in recording and reporting cause of deaths as per national standards of death reporting laid down by the Office of Registrar General of India (ORGI) under its Civil Registration System (CRS). This software can be implemented by hospitals and district local registrar offices in a district (to record deaths occurring in residence). Institutions should register with ICMR-NCDIR or State authority for provision of authorized login credentials. This will allow access to the software with its technical training on MCCD), ICD-10 coding for cause of death and use of software for recording and reporting deaths. The application data entry form is designed to record all details of Form 2 (Death Report) and Form 4 / 4A (MCCD Forms).

NCDIR e-Mor software features include:

- a. Record details of death of all institution and non-institution based deaths with guide to prevent errors in cause of death
- b. Guide in recording the sequence of death events and underlying cause of death

- c. Guide in ICD-10 coding as per the National list of the ORGI and codes for COVID-19 announced by the World Health Organization.
- d. Quality check modules to reduce errors in recording like date check, missing field check and search and export features
- e. Exporting data to maintain mortality register of the institutional deaths and generate statistical tables for data analytics to establish mortality audit systems in hospitals.
- f. On completion of accurate data entry, Form 2 and Form 4 can be printed, signed by appropriate authority for further submission to the Local Registrar for Death registration under CRS.
- g. District Registrar and Chief Registrar Office at the state level can monitor data coverage, MCCD coverage, and generate statistical tables on leading causes of death district and state wise.

Role of NCDIR: NCDIR e-Mor software is accessible online through dedicated secure webserver that hosts the software and shall support the online data transmission and standard data encryption. Offline access to the software may also be facilitated.

As coordinating unit, NCDIR team shall provide technical resources in implementation and monitoring of data quality. As per the NCDIR policy of data processing and disclosure, all necessary safeguards for data confidentiality and data security will be maintained. NCDIR shall develop data analytics for reporting all-cause mortality statistics and deaths related to COVID-19 as per guidelines. NCDIR will assist state/UT governments in strengthening MCCD through technical assistance.

5. Additional Guides

1. ICMR-NCDIR e-Mor : <http://ncdirindia.org/e-mor/>

[This software is available free of cost for use by any hospital/health facility/private practitioner/administrative unit concerned with recording cause of death]

2. World Health Organization. COVID-19 coding in ICD-10. Available from: <https://www.who.int/classifications/icd/COVID-19-coding-icd10.pdf?ua=1>
3. National Center for Health Statistics. Guidance for certifying deaths due to COVID–19. Hyattsville, MD. 2020.
4. Physicians Manual on Medical Certification of Cause of Death by ORGI, India.