

Evaluation of Errors on Death Certificates

Alok Atreya,¹ Bina Acharya,² Purushottam Prasad Yadav,² Ritesh G Menezes,³ Samata Nepal⁴

¹Department of Forensic Medicine, Lumbini Medical College, Palpa, Nepal, ²Lumbini Medical College, Palpa, Nepal, ³Forensic Medicine Division, Department of Pathology, College of Medicine, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia, ⁴Department of Community Medicine, Lumbini Medical College, Palpa, Nepal.

ABSTRACT

Background: Death certificates provide vital data for disease surveillance and health policy. However, errors are common globally, undermining data reliability. This study analyzed prevalence and types of errors in death certificates at a tertiary hospital in Nepal.

Methods: A cross-sectional study reviewed all death certificates issued at Lumbini Medical College, Nepal from April 2020 to April 2022. Certificates were assessed for errors including improper sequencing, absent time intervals, abbreviations, illegible writing, and inaccurate immediate, antecedent, and underlying causes of death as per international guidelines. Errors were classified as major or minor.

Results: Of 139 certificates, none were error-free. The most common error was incorrectly or incompletely filling the immediate cause of death (77.7%). Other errors included absent time of death (17.3%), abbreviations (57.6%), illegible writing (22.3%), and omitting the hospital stamp/medical council registration number (8.6%). Based on international criteria, 76.3% had minor errors, 23% had both major and minor errors.

Conclusions: This study found a high rate of errors in death certification at a tertiary hospital in Nepal, undermining data accuracy. Regular training and monitoring with feedback are recommended to improve certification practices. Accurate cause-of-death data is vital for healthcare policy and decision-making in Nepal.

Keywords: Cause of death; certification; international classification of diseases; major errors and minor errors.

INTRODUCTION

Death certificates are essential documents that provide vital mortality data for disease surveillance, health care resource allocation, and public health program development.¹ National mortality statistics, derived from death certificates, help countries understand disease trends and formulate policies.² Accurate completion of death certificates is critical to providing cause-specific mortality data, which can predict mortality during targeted screening programs and treatment.³ However, death certificate errors are a global phenomenon, especially in low- and middle-income countries like Nepal undermining the reliability of mortality statistics, which can lead to misallocation of healthcare resources and inaccurate disease prevalence

estimates, undermining public health efforts.⁴⁻⁹ The World Health Organization (WHO) provides guidelines for standardized death certification through the Medical Certification of Cause of Death (MCCD) form.¹⁰ However, errors still occur on these forms globally, including issues with properly attributing cause of death according to the International Classification of Diseases (ICD).^{8,10}

The rationale for this study is to analyze the prevalence and types of errors in death certificates issued at a tertiary care hospital in Nepal. The aim is to identify common errors and recommend strategies to improve certification practices. This will provide insight into enhancing the quality of cause-of-death data in Nepal to better inform health policymaking.

Correspondence: Dr Alok Atreya, Department of Forensic Medicine, Lumbini Medical College, Palpa 32500, Nepal. Email: alokraj67@hotmail.com, Phone: +9779857052193.

METHODS

This cross-sectional study was conducted at Lumbini Medical College in Palpa, Nepal, which reviewed all death certificates issued between April 14, 2020, and April 13, 2022 (April 14 coincides with New Year as per the official Nepalese calendar), which was a form of convenience sampling, retrieved from the medical record department (MRD).

Lumbini Medical College is a 500-bed tertiary care center in the western region of Nepal that uses the international template of MCCD issued by the WHO in 1979.

Lumbini Medical college uses a two-part MCCD form for the cause of death. Part I is used to report disease or conditions that directly lead to death, with section "a" used to describe the immediate cause of death and the antecedent causes written in sub-sections "b", "c", and so on. The last filled line of Part I mentions the underlying cause of death. Part II is used to mention other significant conditions that accelerated the process without a causal link to the underlying cause of death. The certifier is expected to approximate the time interval between the onset of the event/condition and death in both parts.

The death certificates were manually retrieved from the MRD during May-June 2022, and a checklist was prepared for data collection. The data thus collected was then entered into Microsoft Excel worksheet during July-August 2022 for analysis. The data collection and analysis were performed by two authors (BA and PPY), and to ensure a lack of bias, one forensic pathologist (AA) reviewed 20 of the selected death certificates and recorded the findings. The authors agreed on each category. The Microsoft Excel worksheet was then imported into SPSS vs 21 and analyzed.

The study classified the death certificate errors as major and minor errors based on Myers and Farquhar method (Table 1).¹¹

All data were obtained from death certificates retrieved from the MRD of Lumbini Medical College, and no personal identifiers were collected or recorded. The study protocol was reviewed and approved by the institutional research committee (IRC-LMC 04-E/021) to ensure compliance with ethical guidelines and data protection.

RESULTS

The present study reviewed 139 death certificates issued over a two-year period. The mean age at death was 50.48 ± 28.92 years with deaths ranging from newborns to elderly (98 years old). There were 9 newborns, 5 neonates, and 5 infants. The baseline characteristics of the study population are shown in Table 2. Although most of the deaths were due to natural causes, there were five cases of suicide and nine cases of accidents where a death certificate was issued.

The immediate causes of death reported were cardiac arrest or cardiopulmonary arrest, accounting for nearly 49% of cases (Table 3). Other major causes included sepsis (10%), pneumonia (7%), and poisoning (4%). Only a small proportion were attributed to accidents (7%) or suicide (4%).

The most common error identified was incorrectly or incompletely filling the immediate cause of death, affecting 108 certificates (78%). Another key finding was failure to specify the time of death on 24 certificates (17%). Additional errors included use of abbreviations (58%), illegible handwriting (22%), and omitting the hospital seal/stamp and Nepal Medical Council registration number (9%). According to the Myers and Farquhar classification, 76.3% of certificates had minor errors, while 23% had both major and minor errors. None of the death certificates reviewed were error-free (Table 4).

Table 1. Major and minor errors in death certification based on Myers and Farquhar method.¹¹

| Type of Error | Definition |
|---|---|
| Major | |
| Mechanism of death listed without an underlying cause | Mechanism or nonspecific condition listed as the underlying cause of death |
| Improper sequencing | Sequence of events does not make sense; underlying cause of death not listed on the lowest completed line of part I |
| Competing causes | Two or more causally unrelated, etiologically specific diseases listed in part I |
| Minor | |
| Abbreviations | Abbreviations used to identify diseases |
| Absence of time intervals | No time intervals listed in part I or part II |
| Mechanism of death followed by a legitimate underlying cause of death | Use of a mechanism, but qualified by an etiologically specific cause of death |

Table 2. Baseline characteristics of study population.

| Variable | | Distribution |
|-----------------|---------------------|--------------|
| Sex | Male | 74 (53.2%) |
| | Female | 65 (46.8%) |
| Age | 50.48 ± 28.92 years | |
| Manner of Death | Natural | 125 (89.9%) |
| | Suicide | 5 (3.6%) |
| | Accident | 9 (6.5%) |

Table 3. Immediate cause of death as mentioned in the death certificate (n=139).

| Cause of Death | Frequency N (%) |
|---|-----------------|
| Cardiac arrest/ Cardiopulmonary arrest/ Cardio respiratory arrest | 68 (48.9%) |
| Myocardial infarction | 3 (2.2%) |
| Stroke | 2 (1.4%) |
| Cardiogenic shock | 5 (3.6%) |
| Hemorrhagic shock | 7 (5.0%) |
| Pneumonia (chemical, bacterial) | 9 (6.5%) |
| Meningitis | 1 (0.7%) |
| Road traffic accident | 4 (2.9%) |
| Fall from height | 1 (0.7%) |
| Poisoning | 5 (3.6%) |
| Encephalitis | 1 (0.7%) |
| Sepsis | 14 (10.1%) |
| Acute respiratory distress syndrome (ARDS) | 1 (0.7%) |
| Respiratory failure | 3 (2.2%) |
| Microcephaly | 1 (0.7%) |
| Gastro-intestinal bleeding | 1 (0.7%) |
| Cardiac arrhythmia | 2 (1.4%) |
| Disseminated intravascular coagulation (DIC) | 1 (0.7%) |
| Hypoxic ischemic encephalopathy (HIE) | 1 (0.7%) |
| Ventricular tachycardia | 1 (0.7%) |
| Abdominal compartment syndrome | 1 (0.7%) |
| Acute pulmonary edema | 2 (1.4%) |
| Perinatal asphyxia | 3 (2.2%) |
| Pulmonary embolism | 1 (0.7%) |
| Metabolic acidosis | 1 (0.7%) |

Table 4. Types of errors in death certificate.

| Types of errors | | Frequency N (%) |
|--|---|-----------------|
| Time of death | Not mentioned | 24 (17.3%) |
| Seal/stamp with medical council number | Not provided | 12 (8.6%) |
| Abbreviations | Used | 80 (57.6%) |
| Handwriting | Illegible | 31 (22.3%) |
| Immediate cause of death | Not mentioned | 1 (0.7%) |
| Incorrectly filled cause of death | Immediate cause | 108 (77.7%) |
| | Antecedent cause (not mentioned or inappropriate) | 40 (28.8%) |
| | Underlying cause (not mentioned or inappropriate) | 39 (28.1%) |
| Error as per Myers and Farquhar method | Major error | 1 (0.7%) |
| | Minor error | 106 (76.3%) |
| | Major + Minor error | 32 (23.0%) |

Table 5. Possible reasons for death certificate errors.

| |
|--|
| Lack of proper training |
| Lack of experience |
| Lack of knowledge of patient's disease/condition |
| Ignorance of importance of death certificate |
| Pressure from family/relatives of deceased |
| Fatigue |
| Lack of cross check or counter sign by a senior which leads the junior doctor develop a temperament that anything could be written |
| Lack of verification and lack of feedback |
| Manually writing rather than digital typing |

DISCUSSION

The objective of the present study was to evaluate the quality of death certificates issued at Lumbini Medical College, Palpa, Nepal. We identified that none of the death certificates issued during the study period were error free. The results of the present study demonstrate a high rate of errors in death certification, with the majority containing inaccuracies in documenting the immediate cause of death.

The cessation of the functioning of the heart, lungs, and

brain is used to diagnose death clinically. However, the cause of death is the specific disease, injury, or condition that ultimately led to the cessation of function. Cardiopulmonary arrest is a terminal event rather than a cause of death and should not be mentioned as cause of death. Despite this, it is often used in death certificates, leading to errors in mortality data.

WHO requires causes of death to be recorded using the ICD coding system.¹² The ICD is the global standard for classifying diseases, injuries, and health conditions, containing more than 55,000 unique codes.¹³ The current ICD-11 version included many aspects of mortality data systems such as instruction manuals, software, and data analysis.¹³ To facilitate ICD code use for cause-of-death reporting, ICD-11 contains tabular lists of conditions and codes and also a mortality list that can be downloaded. Reported conditions on death certificates should be translated into ICD codes using the classification structure and coding rules. While the use of computer systems with drop-down menus for selecting ICD codes can make the process easier, the reliance on handwritten documentation in Nepal's hospitals presents a challenge for accurately recording the cause of death according to the ICD classification.

Residents and junior doctors often record cardiovascular events as the cause of death, even when this may be incorrect or overstated.^{14,15} To ensure accurate mortality data, the cause of death should not be recorded based on a random ICD code. Additionally, in cases where an elderly person may have multiple comorbidities, it can be difficult to prioritize a single cause of death, however, phrases like 'advanced age', 'senescence' or 'infirmary' should not be used as the cause of death.¹⁶

The accurate establishment of the diagnosis of the underlying morbidity of the patient is crucial for filling out the MCCD form. The treating medical doctor, who is responsible for declaring death and issuing the death certificate, must have a detailed knowledge of the patient's condition and be aware of correctly filling out the death certificate. In teaching hospitals in Nepal, junior doctors and/or residents are often the ones who fill out death certificates, which can be challenging when the patient is new and without any significant prior medical history. In such cases, the doctor may need to rely on educated guesswork and information from patient's relatives. A study in Nepal conducted by Maharjan et al., found that 78.4% of death certificates issued had errors and the major error identified was inappropriate underlying cause of death.¹⁷

It is mandatory that in all cases of unnatural deaths, police intimation is to be done, and the doctor should not issue a death certificate.¹⁸ However, in the present study, we found that death certificates were issued in cases of poisonings, road traffic accidents, and fall from height, where the manner of death is considered unnatural. For instance, in case of an elderly man who slipped and fell on the bathroom floor, resulting in a fracture of the left femur, and later developed pressure sores while on treatment, the cause of death would be septicemia as a complication. In this case, the manner of death would be an accident due to fall injury. Although the cause and manner of death seem distinct in this case, the doctor should not issue a death certificate but rather intimate the police as mandated by law.

Junior doctors may lack experience but have more confidence, and they may feel that they could put any cause of death in the death certificate and clear up.¹⁷ In a country like Nepal, the actual cause of death is solely dependent on the doctor certifying it. Training doctors to correctly fill out the MCCD can help reduce errors in death certificates.¹⁹ The international MCCD form issued by the WHO provides detailed instructions on how to complete it and what to write on the death certificate. However, many doctors may not read or follow these instructions correctly, which can lead to errors.¹⁷

Other errors encountered in the present study were use of abbreviations, failure to mention the time interval between the onset of the and causes of death, illegible handwriting, failure to mention time of death, failure to provide seal/stamp and signature of the certifying doctor.

Medical education in Nepal has a primary focus on diagnosing and treating disease, with little attention given to filling out forms and documentation. Students are taught how to draft a death certificate in their third year of medical school but lack practical application and often forget what was taught by the time they enter rotatory internship training. As a result, doctors must learn how to fill out forms and certificates on their own or imitate the methods of their seniors. This lack of proper training and guidance increases the risk of error in medical certificates, including death certificates. For example, we witnessed a death certificate issued by a junior doctor for a 'brought dead' case, where the cause of death was mentioned as 'cardiopulmonary arrest'.

Furthermore, the doctor-patient ratio in Nepal is quite inadequate, and junior doctors often work round the clock to treat patients. Senior consultants are rarely

available during odd hours, leaving junior doctors to handle patient care and treatment. Handover during shift changes is also inadequate, with short window period and a lack of motivation leading to missed patient conditions.²⁰ Errors in death certificates are more likely to occur within the first 48 hours of hospitalization, especially during shorter hospital stays.²¹

Death certificates are legal documents needed for civil registration, insurance, property rights, etc. Incomplete or inaccurate certificates can lead to legal issues.²² Accurate death certificates are vital to determine disease burden, mortality rates, and guide public health interventions.⁷ However, errors from incomplete or wrong information reduce data reliability and credibility.²³ Consequences include incorrect resource allocation, ineffective public health responses, and insufficient surveillance.⁷ Impacts are greater for minorities and low-income groups with limited healthcare access.²⁴ In Nepal, with limited information on death certificate errors, impacts may be more pronounced.¹⁷ For example, inaccurate mortality data can cause misallocated health resources and inadequate surveillance, disproportionately affecting already marginalized vulnerable populations.²⁵ Addressing errors is crucial to ensure accurate data, proper resource allocation, and equitable healthcare access in Nepal.²⁶

Table 5 highlights the possible reasons for death certificate errors in Nepal. To address this issue, we recommend regular training and fresher course for doctors in collaboration with various clinical departments.²⁷ Hands-on training is advocated as a superior method compared to CMEs and journal articles alone.^{28,29} Verification of certificates by a senior and feedback during mortality review would also help reduce errors.³⁰ Digitalization of medical certificates would reduce illegible handwriting and make it easier to insert the cause of death as per the ICD classification. Furthermore, the carbon copy of the death certificates would fade out with time which would hinder the data review in future. All the fields should be completely filled in for the file to be completed for printout. Mortality review should be conducted regularly in the hospital and all the deaths should be discussed.

In contrast to the United Kingdom, there are no legal requirements for a doctor to issue a death certificate in Nepal. In the UK, the legal system mandates the treating doctor to have attended to the patient during terminal illness and also has seen the patient within 2 weeks before death.²⁷ Furthermore, the doctor should be satisfied that the death is due to a natural cause

and should know the cause of death without the need to refer to the coroner.²¹ Therefore, we suggest that only doctors who have attended to the patient during terminal illness and know the cause of death should issue death certificates. If the primary attending doctor is unavailable, another doctor who has attended to the patient should issue the certificate after validation by a senior doctor.

It should be noted that our study is a cross-sectional study from a single institution and many not be generalized to other institutions in the country. Additionally, we did not validate the accuracy of the cause of death from the treatment records as the present study aimed to assess errors in death certificates.

CONCLUSIONS

This study discussed the issue of death certificate errors in a teaching hospital in Nepal. Based on the results, the conclusion drawn from the study is that there is a crucial need for training and education for doctors on how to accurately fill out death certificates. This can be done through regular training and fresher courses in collaboration with various clinical departments. It is also essential to strictly adhere to laws and regulations regarding the need for medicolegal autopsies in unnatural deaths. By addressing these issues, the quality of mortality data can be improved, leading to better healthcare policy and decision-making.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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