

ASSESSMENT OF MEDICAL CERTIFICATE OF CAUSE OF DEATH AT A NEW TEACHING HOSPITAL IN VADODARA

Amul B. Patel¹, Hitesh Rathod², Himanshu Rana³, Viren Patel⁴

¹Assistant Professor, Community Medicine Department, ²Assistant Professor, Forensic Medicine Department, ³Associate Professor, Medicine Department, ⁴Assistant Professor, Pathology Department, GMERS Medical College, Gotri, Vadodara

Correspondence:

Dr. Amul B. Patel

"Gurukrupa", 229, Nandanvan society,

Near Abhilasha cross roads,

New Sama Road, Vadodara-390008

Email: dramulpatel@rediffmail.com Mobile: 9429823997

ABSTRACT

The study was conducted to find out errors in the medical certification of cause of death during July 2011 at a new teaching hospital in Vadodara. All certificates of in-hospital deaths in medical record department, from May 2010 to June 2011, were assessed for major and minor errors. Data were analyzed with SPSS 17 version software. The results revealed that out of 40 death certificates, not a single was free from any error. Major errors occurred in 23(57.5%) cases with improper sequencing (55%) as most frequent. Most common minor error was the absence of time interval between the onset of disease and death (92.5%). No significant association was found between major errors and factors like age, sex, ward and underlying cause of death. This study concluded that educational intervention is necessary to increase physicians' awareness regarding importance of medical certificate of cause of death and accuracy of death certificates.

Key-words: Death certificate, MCCD, Major error, Minor error, mortality statistics, ICD

INTRODUCTION

Mortality statistics is quite essential for welfare of the community. The cause specific mortality rates are key indicators of the health trends in the population and are provided on scientific basis by the system of medical certification of cause of death (MCCD). The data on cause of death contained in the death certificate serves many purposes, such as assessing the effectiveness of public health programs, providing a feed-back for future policy and implementation, better health planning and management, and deciding priorities of health and medical research programmes.¹

The standard cause of death report in India follows the recommendations of the WHO. The causes of death are classified according to the

International Classification of Diseases (ICD) and the MCCD is as per the format presented in Volume 2 of ICD-10. ²After introduction of Gujarat Registration of Births and Death Act 1973, during 1973 to 1978, the teaching hospitals of four cities including Vadodara were brought under the MCCD scheme on a regular basis. According to this scheme, a medical person attending the deceased in his/her last illness, after death of a person shall fill in form no. 4 for institutional deaths/4A for non-institutional deaths. The cause of death is determined by the certifying physician and entered in two parts in the form. Part 1 records a sequence of conditions beginning with the immediate cause of death (the final disease or condition resulting in death) on line (a) which is due to the antecedent condition recorded on line (b), which is due to

the underlying cause of death (the disease or injury that initiated events resulting in death) on line (c). However, if the sequences of event comprise more than three stages, extra line may be made as (d). In part 2, other significant conditions contributing to death, but not resulting in the underlying cause, must be entered. Normally the condition in the lowest line of Part I is taken as the underlying cause of death and used for statistical analysis of mortality by ICD-10.^{1,3}

A new medical college and hospital has started in the summer of last year in Vadodara city. Medical record department of this new general hospital was assigned to us for monitoring and supervision and to make it functioning better. So we took this opportunity to carry out this study in order to find out errors in the medical certification of cause of death.

MATERIALS AND METHODS

This study was carried out during July 2011 at a new 300-bedded teaching hospital in Vadodara,

Gujarat. The general hospital has been started since May 2010, which was previously a small tuberculosis hospital. Medical record department of this hospital receives death certificates in two copies from all the departments. Then out of two copies, one copy is sent to the registrar of births and deaths in the city and other is kept for record in the department. All certificates of in-hospital deaths from May 2010 to June 2011, which were kept in medical record department, were included. They were assessed for the frequency and type of errors made in the completion of MCCD.

Our main focus was on the cause of death section of the form which we assessed for errors, using categories previously reported with minor modifications.⁴ Major errors were considered to be those that could affect the accurate coding of the underlying cause of death, including any of the following: (i) unacceptable cause of death in part 1; (ii) competing causes of death in part 1; (iii) immediate, intermediate and underlying causes of death presented in an incorrect order (sequencing error); or (iv) mechanism of death not followed by a proper cause of death. Minor errors, less likely to lead to misclassification of the underlying cause of death, were any of the following: absence of a time interval between onset of the condition and death, use of

abbreviations, mechanism of death followed by a legitimate underlying cause of death and illegible writing. We also evaluated information for completion like age, sex, date of death, the ward where the patient died, manner of death, status of pregnancy and delivery in case of females. Further, from the information in the cause of death section, underlying cause of death was ascertained and coded using ICD-10 volumes². Data were entered and analyzed with computer software SPSS 17 version. A chi-square test was used to find out association between major errors and various factors like age, sex, ward and underlying cause of death.

RESULTS

Total deaths occurred in hospital during May 2010 to June 2011 were 45. Out of which five were still births and their death certificates were not received and kept in medical record department. So they were excluded leaving 40 death certificates for study.

Table 1: Underlying causes of death according to ICD-10 classification (N=40)

ICD-10 Chapter	No	%
Certain infectious and parasitic diseases	16	40.0
Diseases of the circulatory system	7	17.5
Diseases of the respiratory system	5	12.5
Diseases of the digestive system	4	10.0
Diseases of the blood and blood-forming organs, and the immune mechanism disorder	3	7.5
Endocrine, nutritional and metabolic diseases	2	5.0
Injury, poisoning and certain other consequences of external causes	1	2.5
Certain conditions originating in the perinatal period	1	2.5
Neoplasms	1	2.5

Out of 40 deceased, 52.5% were male. The median age at death was 52 years; 30% were aged ≥ 65 , and 2.5% were neonates. In 3(7.5%) cases, only a single cause of death was found. A cause was listed on all lines of part I in 34(85%) certificates and part II was used in 16(40%) cases. In 3(7.5%) cases, attendant physician's help was needed to ascertain underlying cause of death according to ICD-10 classification.

Table 1 shows underlying cause of death according to ICD-10 classification. Major underlying cause of death was infectious and parasitic diseases (40%) followed by circulatory (17.5%) and respiratory (12.5%) causes.

Table 2: Type and frequency of errors in death certificates (N=40)

Type of Error	No	%
Major Error		
Improper sequencing	22	55.0
Competing causes of death	2	5.0
At least one major error	23	57.5
Minor error		
Absence of time intervals	37	92.5
Mechanism of death with underlying cause	32	80.0
Use of abbreviations	13	32.5
Illegible handwriting	6	15.0
At least one minor error	40	100.0

Table 2 presents frequency of error types. Not a single death certificate was free from any error. Major errors occurred in 23(57.5%) cases, among which most common was improper sequencing (55%). Competing causes of death was found only in 2(5%) cases. One or other minor error was found in all death certificates. By far the most common was the absence of time interval between the onset of disease and death, which occurred in 37(92.5%) cases. Out of them in 8(21.6%) cases, column of time interval was completely blank. Mechanism of death like cardio-respiratory arrest, respiratory failure and heart failure was written as immediate cause of death and followed by legitimate causes of death in majority (80%) of cases. Abbreviations were used in 13(32.5%) cases. While some abbreviations were relatively clear (COPD = chronic obstructive pulmonary disease), others were difficult to interpret. Illegible handwriting was found in 6(15%) cases.

Major errors were found in two third (66.7%) cases among ≥ 65 years of age followed by 15 - 64 years age group (56%). They were predominant in female (63.1%) cases. Ward wise, they were most common in medicine ward (66.7%) followed by intensive care unit (60%) and casualty (54.5%). According to underlying cause of death, they were more frequent in infectious and parasitic diseases (62.5%) and circulatory causes (57.1%). No significant association was found between these factors and major errors [Table 3].

Completeness of information: Age, sex, date of death and ward of deceased were entered in all cases. Information was written at other place than specified and corrections were made after striking the words in 5(12.5%) cases. Manner of death was mentioned in all cases except one. Regarding information of pregnancy and delivery, mistakes were made in 7(17.5%) and 13(32.5%) cases respectively.

Table 3: Distribution of major errors according to age, sex, hospital ward and cause of death

Characteristic	N	Major error (%)	P value
Age (yrs)			
≥ 65 years	12	8(66.7)	0.56
15 - 64 years	25	14(56.0)	
<15 years	3	1(33.3)	
Sex			
Male	21	11(52.4)	0.54
Female	19	12(63.1)	
Ward			
Casualty	22	12(54.5)	0.92
Intensive care unit	5	3(60.0)	
Medical	9	6(66.7)	
Other	4	2(50.0)	
Causes by ICD-10			
Infectious and parasitic diseases	16	10(62.5)	0.33
Circulatory	7	4(57.1)	
Respiratory	5	1(20.0)	
Other	12	8(66.7)	
Total	40	23(57.5)	

DISCUSSION

In the present study, underlying cause of death could be ascertained and coded according to ICD-10 from the information provided in cause of death section in most (92.5%) cases. While only in 3(7.5%) cases, it was coded with difficulty and attending physician's assistance was required. It shows that information provided in death certificates at this hospital was well suited for coding to ICD definitions. A study⁵ reported that 12.5% causes could be coded with difficulty and 4% could not be coded.

We found that all certificates had some avoidable error, while in other studies^{5, 6} using identical criteria error rates were 92% to 99.2%. Studies^{7, 8} using different criteria for assessment reported error rates varying from 32% to 45%. Major errors (57.5%) were somewhat more than

in studies^{5, 6, 9} from other places, where it was ranging from 38% to 45%. Improper sequencing of causes of death (55%) which contributed to 95.6% of major errors was comparatively double of other studies (24-28%)^{4,6}. Competing causes of death was reported only in 2(5%) cases, which was very less compared to 15% to 38% found in other studies^{4,6}. Though studies^{4,6} showed major errors like unacceptable cause of death in 15% to 40% cases and only mechanism of death without underlying cause of death in 13% cases, in our study no such case was found.

At least one minor error was found in all death certificates in this study, whereas studies^{5, 6, 9} reported minor error rates from 78% to 98%. By far the most common was the absence of time interval between the onset of disease and death, which occurred in 37 (92.5%) cases. Other studies^{5, 6, 9} also found the same result with absence of time interval as most prevalent minor error (65%-98%). A time estimate for each cause of death is crucial in providing complete picture of the cause of death and determining underlying cause of death. Since these entries give the chronology of events and ensure the correctness of the sequence which can prevent major error of improper sequencing, attending doctor should pay attention to this element carefully. In majority (80%) of cases, mechanism of death like cardio-respiratory arrest, respiratory failure and heart failure were entered as the immediate cause of death, which was comparable with a study¹⁰ from Gujarat (86%). However, other studies^{4, 5, 9} reported it in 13%-22% cases. It was quite surprising to see this error in such abundance. Because in the death certificate itself, instruction is written under the heading of immediate cause in Part I that state the disease, injury or complication which caused death, not the mode of dying such as heart failure, asthenia, etc. Further, the difference between cause of death and mode of dying is covered in MBBS curriculum and explicitly mentioned in textbooks and literature, still doctors get confused. Abbreviations were used in 13 (32.5%) cases, higher than in other studies^{4,6} as they reported it in 11%-24%. Illegible handwriting (15%) was six times more than in a study⁶ from abroad (2.5%).

Studies^{5,6} have reported increased error rates with advancing age, while in our study seemingly there was increased percentage with increase in age but there was no statistically significant association. Gender wise, major error rate did not differ which was comparable with

other study⁵. A study⁵ from South Africa showed significant association of major errors with ward and cause of death in contrast to our study. With increase in sample size, we might get significant association.

Many doctors qualify with little or no formal training in death certification, whereas others may be inexperienced or have had insufficient practice. This might be the reason for occurrence of errors in death certificates. Other reasons may be that doctors had lack of understanding regarding importance of medical certificate of cause of death in mortality statistics for epidemiology, public health policy and research; or carelessness and reluctance on their part to fill in such forms. Studies^{4, 11, 12} showed that a simple educational intervention can improve the accuracy of death certificate completion and reduce major and minor error rates in the cause of death section. The present study is a single hospital based study and therefore results cannot be applied to the whole city. Nonetheless, findings could be applicable to hospitals with similar settings and can initiate such studies on a large scale.

CONCLUSION

This study showed avoidable errors in all death certificates. It reflects inadequate practice, training and lack of awareness about importance of medical certificate of cause of death, carelessness and negligence on the part of attending doctors. More attention has to be devoted to raising physicians' awareness of the types of errors made in completing death certificates and they should be made aware that certification is a fundamental requirement for building up epidemiological data. Recurring educational sessions, practical training on the case to case basis at regular intervals, periodic auditing of death certificates and feedback are necessary to increase the accuracy of these important documents.

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