Research Article

Accuracy in completion of death certificate in Vadodara Municipal Corporation of Gujarat, India

Amit S Ganasva, Bhaveshbhai R Bariya, Jivraj R Damor, Vihang Mazumdar

Department of Community Medicine, Government Medical College Baroda, MS University, Vadodara, Gujarat, India.
Correspondence to: Amit S Ganasva, E-mail: dramitganasva@gmail.com

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Abstract

Background: Death certificates render epidemiologists and other researchers with statistical data concerning causes of death within the society. The certificates that are filled out incorrectly would furnish false and unreliable data.

Objective: To determine whether death certificates are being filled correctly by clinicians, how frequently errors are occurring, and what types of errors are being committed by the physicians in our country.

Materials and Methods: A total of 1,947 consecutive death certificates issued by community physicians were collected from 12 administrative wards of 4 zones of Vadodara Municipal Corporation (VMC) from June 2012 to November 2013. Errors were grouped into major (unacceptable cause of death, nonspecific cause of death, and incorrect order) and minor categories (absence of time interval, irrelevant information, and incorrectly completed).

Result: Of 1,947 certificates, only 1.1% certificates were error free. Major and minor errors were found in 98.9% certificates, and 81.5% revealed at least one major error, most commonly listing the mechanism of death without mention of an underlying disease as the cause of death, which was found in 1,325 (69.6%) certificates. Causes of these errors (99%) were lack of training and diagnostic difficulty. Several errors were found in nonmedical part, which highlight "routine attitude" of certifier.

Conclusion: Errors are common in the completion of death certificates issued by community physicians in VMC. There is a pressing need for appropriate intervention/s to resolve this important issue.

KEY WORDS: Death, certificate, error, ICD-10, MCCD

Introduction

The death certificate is a legal document with diverse and far-reaching applications. It is the final certification of a patient's life and cause of death (disease or injury), provides invaluable information to the deceased person's family, and is required for most end-of-life legal matters such as life insurance inheritance and the deterrence of crime. It also contains epidemiologic data that are essential for formulating vital statistics and allocating public health resources.[1]

The age, sex, and cause-specific mortality rates are important indicators for evidence-based monitoring of the health and trends in the population. The statistics on causes of death is necessary for planners, administrators, and medical professionals in undertaking suitable healing and preventive measures for several health issues. It may also play an important role in furtherance of medical research and may contribute immensely in improving the methods of diagnosis and analysis.[2]

The benefits of death certification are varied. Considering this importance, in Gujarat, the registration of births and deaths is carried out under provisions of the Registration of Births and Deaths (RBD) Act, 1969 under the system of RBD, the scheme of Medical Certification of Cause of Death (MCCD)—an integral part of the Vital Statistics System, which aims at providing a reliable database for generating cause-specific mortality statistics on a regular basis.[3]

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Given the importance to death certification, it is important that its completion be thorough and precise. Therefore, knowing the current situation is the first step of any improvement in the situation. An exact and verifiable system for the recording of causes of death is an insignificant prerequisite for purposeful collection of epidemiological data and should ideally protect against illegitimate practice on the part of individual practitioners. The imprecision of death certificate information is well-documented and can occur as a consequence of mistakes at a number of steps in the certification process. Insufficient or misconceived clinical information can lead to incorrect antemortem diagnoses, which are then recorded by the physician on the death certificate. Regrettably, mistakes in death certification are usual and range from incomplete certificates and illegible handwriting to imprecise causes and manners of death. Moreover, the use of medical abbreviations is seen,[4] rendering the certificate unintelligible to the general public.

This study was aimed at determining the accuracy of death certificates, to identify the types and frequency of errors, and to press the need to improve the death certificates writing skills of the physicians.

Materials and Methods

This descriptive, cross-sectional study was carried out at Vadodara Municipal Corporation, Vadodara, Gujarat, India, which consisted of 4 zones and 12 administrative wards, during the time period from April 2013 to September 2013. On the basis of available data, a total of 9,710 forms (Form-4A) were filled up in the previous year (2012). A sample size consisting 20% of these forms (i.e., 1,947 forms) were included in the study. To enable equal representation of each of the 12 wards, 231 forms per ward were taken. Therefore, 250 forms from each ward were studied for completeness and errors in the cause of death sequence. All the forms submitted during the study period were included in the study. In case of deficit to reach the sample size, the remainder forms were scrutinized from the past months (before April 2013).

The forms were evaluated using the pretested, semistructured pro forma, which included the check list for all the variables included in MCCD form.

Data were entered into MS Excel, and Epi Info (version 1.1.67, developed by the WHO CDC)[5] software was used for further analysis.

The errors identified in the death certificates were categorized as shown in Table 1. These grades were analyzed and presented as numbers and percentages. Proportions of variables were calculated for interpreting the results.

For categorical variables, frequency and proportions were calculated. Proportions were compared using χ^2-test using Statistical Package for Social Sciences (SPSS, version 19). A p value of <0.05 was considered to indicate statistical significance.

Result

In this study, we obtained a total of 1,947 MCCD certificates filled up by private practitioners from 12 wards of Vadodara Municipal Corporation. Different variables such as personal information of deceased, information about sequence of death event (medical part), and medicolegal portion were assessed for its completeness. We also determined the number and type of errors in death certifications.

Error in the MCCD Forms

After analyzing the completeness in MCCD forms, the MCCD forms were assessed for the presence of various types of errors as mentioned in Table 2.

Major Errors of MCCD Certificates were as follows:

The most frequent major error was listing the mechanism of death (MOD) without mention of an underlying disease as the cause of death, which was found in 1,325 (69.6%) certificates. The most common example of MOD mention was cardiorespiratory arrest found in 457 (24.03%; 95% CI: 23.53%–26.750%) MCCD certificates, However, as stated earlier, the underlying causative factor that was responsible for cardiorespiratory arrest was not written.

We observed that MOD was not mentioned with proper underlying cause of death in 30.1% certificates. For example, MOD was followed by legitimate causes of death, but link could not be established between the mechanism and the proper cause of death (e.g., dehydration owing to hypertension).

Improper temporal sequencing of events were (immediate, intermediate, and underlying cause of death presented in death certificate) found in 335 (18.2%; 95%CI: 16.49%–19.39%) certificates. This type of error was commonly found in MCCD forms of deceased with more than one disease causative factor.

Competing causes of death were found in 334 (18.1%; 95%CI: 16.54%–19.54%) of MCCD certificates. A common example of this category of error is “hypertension,” followed by “diabetes mellitus,” or vice versa. The appropriate place to record competing causes would be in part two of the cause of death (13.6% MCCD certificates).

In 430 cases (22.5%; 95%CI: 21.2%–23.4%), no acceptable cause of death was given. Of these 430 cases forms, 250 (13.15% of all MCCD certificates) had mentioned “natural” as cause of death. Other examples included signs and symptoms and ill-defined terms such as “Old age” and “severe headache.”

There were 69 (4.1%) MCCD forms in which no cause of death was mentioned in any line of medical part in MCCD forms.

Minor Errors of MCCD Certificates were as follows

The most common minor error was the absence of a time estimate between the onset of disease and death, which

occurred in 1,556 (80.8%; 95%CI: 78.8%–84.0%) cases. Another common error was putting final diagnosis in part one, line (a) only, which was seen in 1,125 (58.4%; 95%CI: 56.65%–61.4%) cases. Abbreviations were used in 713 (37.2%; 95%CI: 34.3%–38.65%) MCCD forms. Some of these abbreviations may be relatively clear (DM = diabetes mellitus, HT= hypertension, CCF= congestive cardiac failure, and MI= myocardial infarction) for medical persons but hard to interpret by nonmedical persons. As the data entry for MCCD certificates is done by nonmedical person, it may lead to misclassification and misinterpretation of the data.

Illegible writing was found in 854 (44.3%) forms, and, lastly, recording of inappropriate information was found in 155 (7.9%) forms.

Only 21 (1.1%) MCCD certificates were free of any errors, meaning that 1,926 (98.92%) had at least one major [14 (0.7%)], or minor error [325 (16.5%)] or both major and minor errors [1,587 (81.5%)]. Of this, major error was found in 14 (0.7%) certificates, minor error in 325(16.5%), and both errors in 1,587 (81.5%) **[**Table 3**].**

Discussion

Death certificate has been used as a health indicator and as a monitoring tool for public health policy. They enable us to describe disease patterns within a specified population. Moreover, the absence of reliable data on causes of death impedes the structuring of health-related activities and can thus result in misleading appraisals of research and improper decisions regarding health care. To meet this need, medical students and interns are taught about death certificate all over the globe. However, despite repeated instructions, training workshops to clinician, frequency of error remains more or less static. Hence, this study included evaluation of death certificate, assessment of errors found in medical and nonmedical part of certificate, and study of causes of these errors.

Direct comparison of our study with previous studies is difficult owing to differences in the definitions and interpretations of error between studies. However, there is uniform agreement among most of these studies, including ours that the wrong cause or manner of death and a lack of an acceptable underlying cause of death qualify as major errors. In our study, 1,926 (98.26%) certificates included a combination of such errors that significantly changed the death certificate interpretation and would, therefore, have major public health implications. Hanzlick and Randy,[6]in their study, examined 1,267 deaths during the period from May 2003 to May 2004 at The Fulton Medical Center, Atlanta, GA, and found 47% of errors involved omissions and incomplete and incorrect information.[7] In our study, 570 (30.1%) certificates were not followed by proper underlying cause of death. The reason behind this may be inadequate knowledge of the certifying doctor to the illness of the deceased, as the doctors are called in after death of the patient, just to fill up the death certificate. Reason behind inaccuracy was found to be lack of training (72% of errors). Similar findings were observed by Lakkireddy et al.[8] About 80.8% of certificates of this study revealed mention of the absence of a time estimate between the onset of disease and death, which occurred in 1,556 (80.8%; 95% CI: 78.8%–84.0%) cases, a most common minor error.

Errors found in this study are slightly on a higher side. Shantibal et al. from Imphal, India, observed 77.6% minor errors and 38.3% major errors in 2007, while, in this study, there were 16.5% and 81.5%, minor and major errors, respectively. However, they found "Listing of MOD at line Ia" in 21.9% of certificates. While a study conducted in Sudan observed 47% of certificates listed MOD at the place of COD, this study presumed and drew inference from observations and discussion with certifier that clinicians wrote "with" instead of "due to" because they assumed that diagnoses are to be written in place of COD statement.[9] Clinicians did not conceive difference between diagnoses and COD.[6] Clinicians did not comprehend that COD is to be written in a particular order, where "due to" is the only conjunction allowed. This error also occurred because clinicians normally exercise application of "with" while building all inclusive/complete antemortem diagnoses.

Thus, causes of errors of COD were speculated by many investigators. Ambiguity of antemortem diagnoses and death—an incomprehensible event and incomprehensible immediate COD comprise together of "Diagnostic difficulty," which is a reason behind 18% of errors of COD found in this study.[10] Attems et al.[10] from Austria observed that overall clinical diagnostic accuracy rate of immediate cause of death was (CDARCD) 52.5% in geriatric population. So, "lack of training" (73%) and "diagnostic difficulty" (26%) comprises major chunk of causes of errors of COD. Together, they amount to 99% and are responsible for almost all errors of COD.[10] In this study, we found 62.25 % of MCCD certificates were of age group > 60 years.

This study observed that 99% have legible signature or name of doctor mentioned, but 55.7% of certificates did not have mentioned date of verification at the bottom of certificate. Pediatric hospitals of Sudan had observed 18% of certificates were not signed by doctors. In Beirut, almost 50% of certificates did not contain signature of certifier.[11] Omission in writing details of "Identity" of deceased was found in 5% of certificates. About 5% and 10% of certificates did not mention sex and age of deceased, respectively. Swift and West of Department of Histopathology from UK observed 10% of certificates were of very poor standard, illogical, and inappropriately completed.[12]

Numerous studies have shown that clinicians make errors on 30%–80% of DCs. This is most likely owing to a lack of training, a paucity of CME-Continuing Medical Education in this area, and/or a lack of appreciation for the need for accuracy in this final patient service.

Table 1: Classification of errors found in MCCD forms

Major error
1. Listing the MOD without an underlying disease as the cause of death
2. Listing two causally unrelated, etiologically specific diseases as the cause of death (competing cause of death) in part one
3. Improper temporal sequencing of events (immediate, intermediate, and underlying cause of death presented in death certificate)
4. Listing the MOD not followed by the proper underlying cause of death
5. Not mentioning any cause of death in any line of medical part of MCCD form
Minor error
1. Absence of time interval between onset of the condition and death, yes/no
2. Putting final diagnosis in part one, line (a) only
3. Use of abbreviations as a means of identifying diseases
4. Illegible writing
5. Recording of inappropriate information

Table 2: Type of errors in MCCD certificates

Major error	**No.**	**%**	**95%CI**
Listing the MOD without an underlying disease as the cause of death	1,325	69.6	66.53–70.7
Listing two causally unrelated, etiologically specific diseases as the cause of death (Competing cause of death) in part one	334	18.1	16.54–19.4
Improper temporal sequencing of events (immediate, intermediate, and underlying cause of death presented in death certificate)	335	18.2	16.49–9.39
Listing the MOD not followed by the proper underlying cause of death	570	30.1	27.7–31.81
Not mention any cause of death in any line of medical part of MCCD form	69	4.1	4.68–5.78
Minor error			
Absence of time interval between onset of the condition and death	1,556	80.8	78.3–82.64
Putting final diagnosis in part one, line (a) only	1,125	58.4	56.65–61.4
Use of abbreviations as a means of identifying diseases	713	37.2	34.3–38.65
Illegible writing	854	44.3	42.0–46.46
Recording of inappropriate information	155	7.9	6.82–9.28

Table 3: Frequency and type of errors in the cause of death section

Type of error	**Frequency**	**%**
No error	21	1.1
Major error	14	0.7
Minor error	325	16.5
Major error and minor error	1,587	81.5
Total	1,947	100.0

However, there were certain limitations of this study. In our study, we did not have immediate access to medical records; so, we could not comment on the medical reasoning behind the determination of the cause of death in these cases. As data were collected during specified time period only, it could not represent full 1 year data. We checked for the use of abbreviations, illegibility, failure to check all appropriate boxes, and writing in the wrong place (all grade I errors). Although these errors may not significantly misrepresent the underlying cause of death, they signify a degree of carelessness, haste, or lack of experience with death certificates on the part of the physician.

Conclusion

This study concludes that MOD was mentioned without stating underlying disease responsible for death in almost three-fourths MCCD forms regarding the frequency of the different type of errors. Other errors were writing competing causes of death in single line (part one) and improper temporal sequencing of death events, illegible writing, and abbreviation.

Depending on the study findings, there is a pressing need for appropriate interventions to improve and enhance the accuracy of physicians' death certificate and completion skills. Medical certification of death training needs to be extended to more areas and institutions. Training of Ayush doctors for filling of the MCCD forms should be included in their curriculum. Penalty/memorandums to the certifier making frequent mistakes can be implemented. Public private partnerships (with IMA, UNICEF, and NGOs such as PRIA for advocacy and training) would help to create political will and ensure speedier implementation of more universal death certification.

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