
REVIEW OF ERRORS IN THE ISSUE OF MEDICAL CERTIFICATES OF CAUSE OF DEATH IN A TERTIARY HOSPITAL IN GHANA

Patrick K. Akakpo¹, Yaw A. Awuku², Leonard Derkyi-Kwarteng¹, Kelvin A. Gyamera³ and Sebastian Eliason³

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¹Department of Pathology, School of Medical Sciences, University of Cape Coast, Cape Coast Teaching Hospital, Cape Coast, Ghana, ²Department of Internal Medicine and Therapeutics, School of Medical Sciences, University of Cape Coast, Cape Coast Teaching Hospital, Cape Coast, Ghana, ³Department of Community Medicine, School of Medical Sciences, University of Cape Coast, Cape Coast Teaching Hospital, Cape Coast, Ghana

Corresponding author: Dr. Patrick Kafui Akakpo

Email: k.p.akakpo@uccsms.edu.gh

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SUMMARY

Objective; Reliable mortality statistics are useful in determining national policies on preventive and interventional medicine. This study reviews, completed medical certificates of cause of death at the Cape Coast Teaching Hospital, in order to determine their accuracy and reliability.

Methods: A one-year review of Medical Certificates of Cause of Death (MCCD) signed between 01-01-2013 and 31-12-2013 in the medical, pediatric, surgical and obstetrics/gynecology departments of Cape Coast Teaching Hospital were done, analyzing for errors using the WHO/ICD-10 guidelines as the standard. The errors were grouped into minor and major errors.

Results: In all, 337 medical certificates of cause of death were audited. Majority, 212(62.9%) were issued in the internal medicine and therapeutics department. 30.86% (104) MCCDs were completed by specialists while 69.14% (233) were completed by non-specialist medical officers. Over half (56.68%) of the MCCDs had major errors while all (100%) had at least one minor error.

Conclusion: Our study showed significant errors in MCCD records, with the errors more likely in certificates issued by non-specialist medical officers. All the certificates audited had at least one minor error. Training of doctors on proper completion of MCCDs is strongly advocated.

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INTRODUCTION

Statistical data relating to diseases that result in death are useful in determining the distribution of health resources in a country. Such data should be specific, accurate and complete.^{1,2} The WHO defined cause of death as "...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".¹

There is the awareness that a chain of events culminates in death and the Medical Certificate of Cause of Death (MCCD) is designed to capture these events with nosologists placing emphasis on the one that initiated these events during capture of mortality data.

The gold standard for cause-of-death reporting is to have the cause certified by a medical practitioner using the rules and procedures of ICD, which is currently available in its tenth revision (ICD-10).¹

In Ghana, the Registration of births and deaths Act of 1965 (Act 301) stipulates that the MCCD should be issued free of charge by the medical practitioner who was last in attendance during the illness of the deceased, and this certificate shall forthwith be delivered to the Registrar.

Inter alia, this Act also stipulates the setting up of registration offices, employment of officers, duties of these

officers and the responsibility of nationals who have to use the services of the registry.

The Ghanaian MCCD form is mirrored on the International certificate of Cause of Death recommended by the WHO following ICD-10 guidelines. The main sections identified on the form are shown in Figure 1 and include;

Part I—for immediate, intermediate and underlying conditions directly leading to death. This is known as the primary cause of death.

Part II—other indirect, significant conditions contributing to death but not directly related to the primary cause of death (Part I).

Others- for patient’s demographic details, degree of certainty with which certifier completes the MCCD, timing of events and finally the personal details of the certifier.

In the accepted scheme of recording, Part I captures the sequence of conditions directly causing death. This begins with the immediate cause of death (the final/terminal disease or condition directly resulting in death) on line (i) which is due to (results from) the antecedent (intermediate) condition recorded on line (ii), which is due to (results from) the underlying cause of death (the disease or condition that initiated all the events resulting in death) on line (iii).

In part II, other significant conditions contributing to death, but not directly related to the underlying cause, are entered. The condition captured on the lowest line of Part I (iii) is the underlying cause of death. It is the first domino that ultimately resulted in all the events that led to death and is used for statistical analysis of mortality by ICD-10.

Though in recent years, a number of continuing professional development programs have aimed at teaching registered medical practitioners in Ghana, the proper way of completing the MCCD, most medical schools and residency programs in Ghana still do not include this in their curricula. Studies elsewhere have shown that the clinical information entered on death certificates does not allow the construction of a logical cause of death, and that up to 10% are completed to a poor standard, and further, only 55% are completed to a minimum standard.³

In some centers it was found that up 82% of MCCDs contain one or more errors.³ There is as yet no study known to us dealing with the types of errors in death certification in Ghana.

The aim of this study was to determine the types of errors in the completed MCCDs in a teaching hospital in

Ghana, discuss these errors and make recommendations aimed at improving death certification and registration in Ghana.

METHODS

The study was conducted at the Cape Coast Teaching Hospital (CCTH) which serves the Central Region of Ghana and its neighboring communities. All MCCDs issued from 1st January, 2013 to 31st December, 2013 within the medical, surgical, pediatric and obstetrics and gynecology departments of the Cape Coast Teaching Hospital were retrieved and audited for errors.

Data gathered from the certificates were initially entered into a simple tally sheet. The data entered included accuracy of entries related to patient details such as whether or not (a) a complete address was entered as opposed to just a town, (b) the age of the deceased was stated and followed the stipulated format on the MCCD form (omitting ‘apparent’ or ‘stated’ as the case may be), (c) and (d) date and time of death of the deceased had been entered and whether or not the medical practitioner completing the form indicated he was aware of the death himself or he was informed of the death (deleting as applicable), the duration of illness or causes of death were stated (e).

Table1 Categorization of errors as detailed on the Births and Deaths Registry form 22

MAJOR ERRORS (PRIMARY CAUSE OF DEATH)	MINOR ERRORS (DEMOGRAPHY, DATES, DURATION)
Wrong sequence of causal events	Omission of Address of deceased (a)
Unrelated causal events stated as related	Certainty about age not clarified** (b)
	Certainty about fact of death not clarified*(c)
	Time of death not stated (d)
	Duration of illness not stated (e)
	Use of internationally unacceptable Abbreviations (u)

* * The Ghanaian Medical Certificate of Cause of Death provides that a certifier should indicate whether he knows the age of a deceased patient for a fact or is making an informed guess

* The Ghanaian Medical Certificate of Cause of Death provides that a certifier should indicate whether he knows for a fact that a person has died or that he has been informed of a person’s death ‘a, b, c, d, e’ can be found as a key at the bottom of the Ghanaian MCCD (Figure 1)

Finally, the appropriateness and accuracy of the sequence of events leading to death and whether or not the stated causes of death were related to each other was entered. Inaccuracies in the sequence and in the relationship between the stated primary causes of death were classified as major errors. All other errors relating to patient’s demographic data, dates, time and duration

of illness were classified as minor, (Table 1). The accuracy of the signed MCCD was compared to the WHO/ICD-10 guidelines. The vetting was done by a pathologist.

Figure 1 The Births and Deaths Registration (BDR) form 22 also known as FORM V, the Ghanaian MCCD

Ethical Approval

Ethical approval was obtained from the ERC of UCC through the community medicine department. Institutional assent was also obtained from CETH.

RESULTS

A total of 337 medical certificates of cause of death were audited. Of these, 212(62.9%) were issued in the Internal Medicine and Therapeutics department, 77(22.8%) in the Surgery department, 27(8%) in Obstetrics and Gynecology department and 21(6.2%) in Pediatrics. A total of 104(30.86%) MCCDs were completed by specialists in surgery, internal medicine, obstetrics and gynecology and pediatrics while 69.14% (233) were completed by medical officers /non-specialists up to five years out of medical school with no specialist training in any of the earlier stated specialties.

Of the 337 MCCDs 191 (56.68%) had major errors, with 159(83.25%) of these being sequence errors, while 32 (16.75%) were errors due to unrelated causes stated as related primary causes of death (Table 2). Examples of these major errors are illustrated in Figures 2 and 3. Of the certificates signed by specialists 45.15% had

major errors compared to 61.8% of those signed by non-specialist medical officers.

Table 2 Numbers of major and minor errors on the 337 certificates reviewed

TYPE OF ERROR	SUBTYPE OF ERROR	NUMBER	%
MAJOR	SEQUENCE ERRORS	159	83.2
	UNRELATED CAUSES	32	16.7
MINOR	A	168	49.9
	B	324	96.1
	C	302	89.5
	D	21	6.2
	E	320	95
	U	20	5.9

- A; improper address of deceased
- B; stipulation to indicate whether age is 'stated' or 'apparent' not followed
- C; stipulation to indicate whether certifier 'is informed' or 'aware' of date of death not followed
- D; time of death not stated
- E; duration of illness not stated
- U: use of unacceptable abbreviations

All the MCCDs audited had minor errors and in many of these the minor errors were multiple per MCCD (Table 2). There were some entries that have not been provided for on the MCCD. For example: two MCCDs were... signed out as 'Brought in Dead' (BID). Fifteen other MCCDs did not have any underlying cause of death; anemia was stated as the sole cause of death on eight (8) of these MCCDs.

DISCUSSION

A correctly completed death certificate is a legal requirement. It is also a useful tool to aid in equitable distribution of finite health care and promotion resources.² In Ghana the Registration of Births and Deaths Act of 1965 (Act 301) stipulates who can sign the MCCD, the conditions under which it must be signed and how a death must be registered following the signing of an MCCD. The correct completion of the MCCD is dependent on the certifying doctor adhering to the ICD-10 rules and ensuring that data retrieved from the MCCD at the Births and Deaths registry are accurate.

In our study, none of the 337 MCCDs audited was free of error, a finding that is not different from that found in a study by Patel et al.² Their results revealed that out of 40 death certificates, not a single one was free from any error. Major errors occurred in 23(57.5%) cases with improper sequencing (55%) as the most frequent major error. In our study 56.68% of the MCCDs had major errors with 83.25% of these being sequence errors. In the example illustrated in Figure 2, the cause of death was stated as 'stroke' due to (as a consequence of) 'aspiration pneumonia'.

MEDICAL CERTIFICATE OF CAUSE OF DEATH FORM V
(Section 18, Act 301)

I HEREBY CERTIFY that I have medically attended... of (a) Tallorun

(b) apparently/stated to be aged 70 years that I last saw her on the 10th day of July 2013 that she was then suffering from Stroke that she died as I am aware, (c) informed on the 10th day of July 2013 at (d) 3:15 pm and that the cause of death was to the best of my knowledge and belief herein stated (e) viz.

Disease or condition directly leading to death* (i) Stroke	Approximate interval between onset and death
Antecedent causes: (ii) Aspiration pneumonia due to (or as a consequence of)	
Morbid conditions, if any, giving rise to the above cause starting the underlying conditions last (iii)	
Other significant conditions contributing to the death, but not related to the disease or condition causing it.	

Witness my hand this 12th day of July 2013
Name and Medical Qualifications: MRS. C. K. B.
Signature: _____
Address: Central Regional Hospital

This* does not mean the mode of dying, eg. heart failure, asthma, etc. It means the disease, injury or complication which caused death. BDR Form 22

Figure 2 An example of major sequence error in addition to minor errors in ‘a’, ‘b’, ‘c’ and ‘e’

The sequence here is wrong and the cause of death should rather read: ‘aspiration pneumonia due to ‘stroke’, although this in itself is still inconclusive, since it fails to state the underlying cause of the ‘stroke’. ICD-10 rules stipulate that the underlying cause of a ‘stroke’ should be stated.

In the example shown in Figure 3, the cause of death was stated as ‘immunosuppression’ due to ‘severe anaemia’. This should rather read: ‘severe anaemia’ due to ‘immunosuppression’, keeping in mind that immunosuppression is non-specific and best not entered on the MCCD. Instead, the specific cause of immunosuppression such as HIV/AIDS should rather be entered. For these deaths the Registrar may record the causes of death as ‘aspiration pneumonia’ and ‘severe anaemia’ respectively, since they are the last items recorded under primary cause of death.

Conversely, even if stroke and immunosuppression were recognized by the Registrar’s office as more important, the true causes of these (e.g. ‘primary / secondary hypertension /atherosclerosis or HIV/AIDS) will not be captured since they were not entered on the MCCD. The result will be underreporting of these underlying disorders in the national statistics.

MEDICAL CERTIFICATE OF CAUSE OF DEATH FORM V
(Section 18, Act 301)

I HEREBY CERTIFY that I have medically attended... of (a) Cape Leaf

(b) apparently/stated to be aged 58 years that I last saw her on the 21st day of July 2013 that she was then suffering from Immunosuppression that she died as I am aware, (c) informed on the 21st day of July 2013 at (d) 4:30 am and that the cause of death was to the best of my knowledge and belief herein stated (e) viz.

Disease or condition directly leading to death* (i) Immunosuppression due to (or as a consequence of)	Approximate interval between onset and death
Antecedent causes: (ii) Severe anaemia due to (or as a consequence of)	
Morbid conditions, if any, giving rise to the above cause starting the underlying conditions last (iii)	
Other significant conditions contributing to the death, but not related to the disease or condition causing it.	

Witness my hand this 24th day of July 2013
Name and Medical Qualifications: MRS. C. K. B.
Signature: _____
Address: Central Regional Hospital

This* does not mean the mode of dying, eg. heart failure, asthma, etc. It means the disease, injury or complication which caused death. BDR Form 22

Figure 3 An example of MCCD with a major sequence error in addition to minor errors in ‘a’, ‘b’, ‘c’ and ‘e’

The second type of major error was made up of ‘unrelated’ causes stated as related primary causes of death. There were 32 (16.75%) of these errors. In the example shown in Figure 4, the cause of death was stated in one case as ‘sepsis due to HIV wasting syndrome due to vitiligo’. In another case, the cause of death was stated as ‘hypoglycaemic coma due to cardiovascular accident’. Again in another case the cause of death was stated as ‘lymphoproliferative disease,? Chronic lymphocytic leukaemia due to hyperactive malaria syndrome, due to chronic liver disease to rule out chronic kidney disease’. In all these cases the various causes of death stated were unrelated to each other. It is important that primary causes of death are related to each other. They should make sense when joined together with ‘due to’ or ‘as a consequence of’. Any other causes that are contributory but not directly related to the primary causes of death should be entered into part II of the MCCD. All the MCCDs with these ‘unrelated errors’ also had minor errors.

The most common minor error in the study by Patel et al was the absence of time interval between the onset of disease and death (92.5%).² All the MCCDs audited in our study had at least one minor error and a significant proportion had more than one minor error.

The commonest minor error in our study was the failure of clinicians to omit ‘apparent or stated’ relating to the age of the patient as stipulated on the Ghanaian MCCD (b).

MEDICAL CERTIFICATE OF CAUSE OF DEATH FORM V
(Section 18, Act 301)

I HEREBY CERTIFY that I have medically attended _____ J No: _____

(b) apparently/stated to be aged 43 years that I last saw her on the 16th day of September 2013 that she was then suffering from Sepsis that she died as I am aware, (c) informed on the 16th day of September 2013 at (d) 6:23pm and that the cause of death was to the best of my knowledge and belief herein stated (e) in

Disease or condition directly leading to death* (i) <u>Sepsis</u> due to (or as a consequence of)	Approximate interval between onset and death
Antecedent causes: Morbid conditions, if any, giving rise to the above cause starting the underlying conditions last (ii) <u>HIV Kissing Syndrome</u> due to (or as a consequence of)	
Other significant conditions contributing to the death, but not related to the disease or condition causing it. (iii) <u>Meningo</u>	

Witness my hand this 16th day of September 2013
Name and Medical Registration No. _____
Signature _____
Address Central Regional Hospital, Cape Coast
(a) State address
(b) Omit "apparently" or "stated to be" as the case may be.
(c) Delete as applicable.
(d) Insert the time.

Figure 4 An example of MCCD with a major ‘unrelated’ error in addition to minor errors in ‘a’, ‘b’, ‘c’ and ‘e’

This error was present in 96.14 % (324) of the MCCDs audited. It suggests that certifying clinicians rarely followed this stipulation (b). Its importance however lies in making the registrar or any other party interested in the MCCD aware of the fact that the stated age is the correct age of the deceased, or it is an apparent one. The reason why clinicians ignore this guideline may be due to ignorance or a deliberate refusal to accord the necessary importance to that stipulation.

The next commonest minor error was the absence of information on duration of the conditions stated as causes of death. These errors were found in 95% of the MCCDs audited, similar to the findings of Patel et al.² These findings appear to be universal and the same authors have also concluded that worldwide, errors in the completion of MCCDs are common, with up to 82% of MCCDs containing errors.²

In our study, most (62.9%) of the MCCDs were signed on the medical wards pointing to a higher number of deaths occurring on these wards during the year under review. This may be due to the tertiary hospital status of the Cape Coast Teaching Hospital, where many serious medical conditions are referred from other smaller hospitals for management. A total of 104 (30.86%) MCCDs were completed by a specialist (obstetrician gynecologist, pediatrician, surgeon or internist), while 233 (69.14%) were completed by non-specialist medical officers.

About 45% of the certificates signed by specialists had major errors compared to 61.8% of those signed by non-specialist medical officers. This is similar to findings in a study by Tuffin et al that showed that majority of death certificates were completed by junior doctors.³ In their study they concluded that “junior doctors rarely receive formal training in the completion of MCCDs; nor is knowledge of the correct procedures involved in completing a MCCD required for competency based training in any of the four hospital specialties audited”.³ This they believe accounted for the high rate of errors. The same situation pertains in our setting where there is little structured teaching on the completion of MCCDs.

Selinger et al have demonstrated that simple educational measures reduce the number of certificates not meeting legal criteria, as well as the number of mistakes and omissions.⁴ In their study, the rate of correctly completed certificates improved from 54 of 63 (85.7%) to 42 of 43 (97.6%) for Senior House Officers (doctors 2 years out of medical school) and from 30 of 40 (75%) to 28 of 29 (96.5%) for middle grade doctors who were more than 2 years out of medical school but not specialists, after simple educational measures were instituted.⁴ This suggests that introduction of educational measures may help decrease the error rates at the Cape Coast Teaching Hospital.

Selinger et al have also concluded that clinical information entered onto MCCDs do not allow the construction of a logical cause of death and that 10 % of MCCDs are completed to a poor standard and again that 55% are completed to only a minimum standard.⁴ These findings mirror those of our audit and it is recommended that a review of the national death register be carried out to ascertain the true impact of the poor completion of MCCDs on national mortality statistics. It can however, be inferred that for some of the MCCDs audited, information provided did not allow the extraction of any relevant cause of death. A typical example is a certificate completed with the cause of death stated as “Brought In Dead (BID)”.

This does not allow for the derivation of cause of death from the MCCD. For MCCDs completed with such unacceptable causes of death as BID or with causes that fall into the category of “unnatural” deaths (accidents, suicides, homicides, poisonings), it is the duty of the Registrar of Births and Deaths to reject them and refer them to the Coroner for the appropriate action to be taken.

In cases where only an immediate cause of death or mode of death was provided as cause of death without any underlying cause; an example being anaemia stated as the sole cause of death in eight (8) certificates, the

MCCDs should have been rejected by the Registrar and sent back to the doctors for correction.

CONCLUSION

Our study showed that majority of MCCDs had major errors (56.68%) and none of the audited MCCDs was free of minor errors. It is recommended that training and regulatory institutions such as, the Ghana Medical and Dental Council and the Ghana College of Physicians and Surgeons should have annual Continuing Professional Development activities/workshops on completion of MCCD forms and other medical certificates, in order to reduce or eliminate errors by doctors in the issue of such certificates. In addition, there is the need to train Birth and Deaths Registry staff to recognize errors on MCCD forms, so that remedial action can be taken.

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