academicJournals

Vol. 9(4), pp. 41-46 April 2017
DOI: 10.5897/IJMMS2017.1296
Article Number: F06CE3063603
ISSN 2006-9723

http://www.academicjournals.org/IJMMS

International Journal of Medicine and Medical Sciences

Full Length Research Paper

Death certificates errors in academic hospital; Review of 617 cases at Komfo Anokye Teaching Hospital (KATH), Kumasi

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Received 20 February, 2017; Accepted 27 March, 2017

The importance of death certification goes beyond the benefits to the health facility as they also provide invaluable legal and epidemiological benefits. Errors in filling Medical Certificates of Cause of Death (MCCD) greatly affect global mortality statistics and hence create challenges for public health programs to be executed effectively. The present study used both retrospective and prospective study design to review 617 death certificates. Male mortality rate was prevalent, accounting for 54.0% (p=0.033), modal age range was from 40 to 59 years (p=0.000), while most certificates were issued in January (p=0.000). Most death cases and errors were from the medicine specialty with Bachelor of Medicine, Bachelor of Surgery/Chirurgery (MBCHB) qualification. Single, double and multiple errors were recorded in the present study. Absence of time interval of cause of death, incomplete cause of death and abbreviations were the prevailing errors. Others include absence of physician qualification and department/ward, handwriting and cause of death queries (p=0.000). Errors can be reduced by organizing periodic seminar on death certification for clinicians, especially trainees/interns.

Key words: Death certification, errors, benefits, clinician.

INTRODUCTION

The importance of death certification goes beyond the benefits to the health facility as they also provide invaluable legal and epidemiological benefits. The emergence of public health programs is highly influenced by mortality statistics obtained from death certification (Pritt et al., 2005; Myers and Farquhar, 1998).

Errors in filling Medical Certificates of Cause of Death (MCCD) greatly affect global mortality statistics and hence create challenges for public health programs to be executed effectively. Studies conducted in South America (Antini et al., 2015), Asia (Haghighi et al., 2014) and Africa (Izegbu et al., 2006) have confirmed high incidence of inaccuracies in death certification. Contrarily, some measures have been put in place over the years to ensure accurate death certification in many countries such as USA, Scotland, Finland and Sweden (Lahti and

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Penttilä, 2001; Cameron and McGoogan, 1981; Johansson and Westerling, 2000; Kelson and Farebrother, 1987).

Cause of death must provide information on the mechanism and the underlying conditions leading to demise of subject. These must be properly sequenced without any competing cause. Incomplete filling or improper sequencing of cause of death are regarded as a major error. Hence, it must be written without ambiguity or query (Azim et al., 2014). Minor errors on the other hand refers to the use of symbols, abbreviations, absence of deceased and physician information, time interval and illegible handwriting (Filippatos et al., 2016; Azim et al., 2014; National Center for Health Statistics, 2003).

A major factor for the high inaccuracies in determining the cause of death is lack of formal training of interns, residents and medical officers in filling death certificates (Messite and Stellman, 1996; Sehdev and Hutchins, 2001). This study seeks to identify the various certification errors by clinicians at teaching hospital.

MATERIALS AND METHODS

This study used both retrospective and prospective study design to review all the death certificates received at the Department of Pathology- KATH (Kumasi-Ghana) from August, 2015 to July, 2016. Retrospective review was adopted to retrieve certificates from archives from August to December, 2015. All the 2016 files were recorded daily as they are received at the department.

A total of 617 MCCD were reviewed; 293 in 2015 and 324 in 2016. Details of deceased recorded from certificates include sex, age and date of death. Clinician information includes qualification and ward/department address.

The major errors identified for the present study were related to cause of death and it includes incomplete filling of cause of death and queries. The minor errors of certification were absence of ward/department address and physician qualification, abbreviations and illegible handwriting. Multiple errors were recorded from some certificates. All the certificates issued within the period of study were included in present study since anomalies in certificate are being considered. Accuracy of cause of death were not considered for this study due to absence of independent reviewer of certificates from the health facility. Time interval of cause of death was excluded since it was absent in almost all the certificates issued.

Data was transferred and grouped on excel spreadsheet according to the month of issue. Data analysis was carried using IBM Statistical Product for Social Sciences (SPSS) software version 20 with confidence level of 95% (α=0.05).

RESULTS

All MCCD received within the period were recruited in this study. Statistical significant figures were obtained for age and sex distribution. Male mortality rate was prevalent accounting for 54.0%, while that of females was 46.0%. Majority of the deceased were within the age range of 40 to 59 years. This was marginally trailed by the age ranges of 60 to 79 and 20 to 39 years. Mortality rate of aged (80 years and above) was higher than that of children (below 1 year old), while those from 1 to 19 years had higher prevalence than both. Data on ages of 7 deceased were unknown (Table 1).

A significant month and year distribution showed a modal certification in January while June recorded the least. The lead was closely followed by October, February and December (Table 2).

Medicine issued the highest number of MCCD (57.1%); designated either emergency medicine, internal medicine or medicine. This was followed by surgery (11.3%), pediatrics (9.7%), obstetrics and gynecology (O&G) (5.7%) and intensive care unit (ICU) (2.4%). Accident and emergency (A&E), and Anesthesia had equal number of MCCD (1.8% each) while ear, nose and throat (ENT), pathology, radiology and oral health had less than 10 MCCD each. Oncology had the least certificates (0.2%), while 0.5% MCCD were received from satellite hospitals. Department or wards were not provided on 47 certificates (Table 3).

The peak qualifications of medical practitioners as seen on MCCD were MBCHB accounting for 70.8%. Physicians who are either specialist or senior specialist constituted 12.3%, consultants were 3.2%, resident doctors and medical officers were 2.8 and 0.8%, respectively. Physician assistants and Bachelor of dental surgery (BDS) also accounted for 0.2 and 0.3%. Certificates with missing physician qualifications accounted for 9.6% (Table 4).

Statistical relevant values were obtained in the study showing 378 certificates were without major or minor errors (excluding time interval). One hundred and twenty-eight certificates had incomplete filling of cause of death, while 2 certificates showed completely filled cause of death with queries. Abbreviation of medical conditions was observed on 33 certificates, while handwritings on 5 certificates were not legible. Absence of physician qualification and department/ward details were identified on 39 and 8 certificates, respectively. The remaining certificates had multiple errors. Only 3.7% of all the certificates had time interval written for cause of death.

Most errors were found to stem from medicine, while the least was from oncology. Surgery, pediatrics and O&G recorded appreciable number of certificates with errors. Certificates from pathology, ENT and satellite hospitals recorded null certification errors (Table 3). The peak qualification with errors was MBCHB, followed by specialist and consultant. Few errors were associated with medical officers and dentists (Table 4).

DISCUSSION

Accurate death certification is paramount to public health surveillance in every country. Its importance goes beyond medical significance as it provides statistical mortality rate demographics of age, sex and the cause of death within a population. It also provides data for research and also aids in proper planning and execution of preventive

Table 1. Age and sex distribution of the deceased.

Age	Sex		Total (%)	p-value
	Male (%)	Female (%)		
Below 1	23 (3.7)	16 (2.6)	39 (6.3)	0.033
1 to 19	35 (5.7)	38 (6.2)	73 (11.8)	
20 to 39	58 (9.4)	57 (9.2)	115 (18.6)	
40 to 59	117 (19.0)	74 (12.0)	191 (31.0)	
60 to 79	78 (12.6)	61 (9.9)	139 (22.5)	
80 and Above	19 (3.1)	34 (5.5)	53 (8.6)	
Unknown	3 (0.5)	4 (0.6)	7 (1.1)	
Total	333 (54.0%)	284 (46.0%)	617 (100.0)	

Table 2. Monthly distribution of certification in 2015 and 2016.

Month	Year		%	p-value
	2015	2016		
August	10		1.6	0.000
September	44		7.1	
October	99		16.0	
November	57		9.2	
December	83		13.5	
January		101	16.4	
February		92	14.9	
March		57	9.2	
April		26	4.2	
May		18	2.9	
June		9	1.5	
July		21	3.4	
Total	293 (47.5%)	324 (52.5%)	617 (100.0)	

measures for health issues (Pritt et al., 2005). It is therefore cardinal for physicians to be veracious during certification.

Demographics of sex mortality rates in this study is in concordance with Filippatos et al. (2016) and Haghighi et al. (2014). Both studies documented high male mortality rate than females. Filippatos et al. (2016) had 50.7% male prevalence, slightly below that of this study. Haghighi et al. (2014) recorded 62.6% male prevalence which is above that of this study. However, Antini et al. (2015) and Nojilana et al. (2009) recorded 59.2 and 51% female prevalence, respectively, which is antipodal to findings of the present study.

Age demographics by different studies have documented disparate findings. This is primarily influenced by culture, genetics, nutrition and other environmental factors in ensuring quality and healthy lifestyle. Bowen et al. (1998) evidenced higher mortality rate among children below 1 year than those from 1 to 10 years. Findings of this study is polar to this findings. Filippatos et al. (2016) had a peak mortality among those above 80 years, while that of this study was from 40 to 59 years. Some studies recorded peak mortality from 60 years and above (Katsakiori et al., 2007). Average life expectancy of Ghanaians according to 2015 WHO report is 62.4 years (61 for males and 63.9 for females) (www.who.int). The modal age range mortality of present study is slightly below the estimated life expectancy.

Medicine issued the highest number of certificates than any other specialty or departments. This is similar to findings of most research on death certification. Some studies recorded most death cases at the Intensive Care Unit whiles others recorded most death cases at obstetrics and gynaecology (Izegbu et al., 2006; Madboly and Metwally, 2014).

Death certification is assigned to attending physician who has been with deceased within a period 14 days. However, it must be noted that this delicate responsibility is to be carried out by qualified and registered medical practitioners (National Center for Health Statistics, 2003). Unlike other medical facilities, teaching hospitals have the luxury of medical practitioners than the district and

Table 3. Distribution of major, minor and multiple errors among the various departments/wards.

Departments	Major errors			Minor errors				Multiple errors	Total	p-value
	Complete	Query	Incomplete	Abbreviation	No Qualification	No Ward Address	Handwriting			
Medicine	225 (36.5)		74 (13.1)	19 (3.1)	20 (3.2)		4 (0.6)	10 (1.6)	352 (57.1)	
Surgery	41 (6.6)	2 (0.3)	13 (2.1)	7 (1.1)	5 (0.8)			2 (0.3)	70 (11.3)	
Pediatrics	39 (6.3)		11 (1.9)		8 (1.3)			2 (0.3)	60 (9.7)	
O&G	18 (2.9)		8 (1.4)	4 (0.6)	3 (0.5)			2 (0.3)	35 (5.7)	
ICU	11 (1.8)		2 (0.3)		1 (0.2)			1 (0.2)	15 (2.4)	
A&E	6 (1.0)		4 (0.7)	1 (0.2)					11 (1.8)	
Anesthesia	7 (1.1)		2 (0.3)		2 (0.3)				11 (1.8)	
ENT	3(0.5)								3 (0.5)	
Pathology	3 (0.5)								3 (0.5)	0.000
Radiology	1 (0.2)		2 (0.3)						3 (0.5)	
Oral Health	1 (0.2)		2 (0.3)						3 (0.5)	
Satellite Hospital	3 (0.5)								3 (0.5)	
Oncology			1 (0.2)						1 (0.2)	
Unknown	20 (3.2)		9 (1.5)	2 (0.3)		8 (1.3)	1 (0.2)	7 (1.1)	47 (7.6)	
Total	378 (61.3)	2 (0.3)	128 (20.7)	33 (5.3)	39 (6.3)	8 (1.3)	5 (0.8)	24 (3.8)	617 (100.0)	

Complete = Without major or minor errors (without time interval); Incomplete = missing information on cause of death; Query = cause of death with question marks (?); No qualification = absence of physician qualification; No ward address = absence of ward/department of physician; Multiple Errors = more than 1 major, minor or both errors.

regional hospitals in Ghana. Graduate and undergraduate medical students are giving the opportunity to acquire practical knowledge during internships. Hence patients are usually assigned to team of doctors with different qualifications. For accuracy and precision sake, death certification must be done by the attending physician with the highest qualification and training in certification (Azim et al., 2014). MBCHB is the basic qualification of every medical practitioner and hence it is likely that some may not have adequate training in death certification (Izegbu et al., 2006; Myers and Farquhar, 1998). This account for the high number of errors committed by this group of medical practitioners. Furthermore, some studies have questioned the eligibility of house officers, residents, physician assistants and other trainees in death certification. These interns are temporal workers at health facilities and are likely to spend less time with patients in most cases (Maharjan et al., 2015). Studies conducted in Greece recorded more specialist and consultants than interns (Filippatos et al., 2016).

The present study documented 96.3% inaccuracy in recording time interval of cause of death. This is unacceptable as it questions the efforts of physicians in management of cause of death. Some studies recorded almost 100% absence of time intervals between causes (Filippatos et al., 2016; Nolijana et al., 2009). Myers and Farquhar (1998) recorded 71.6% omission of time interval during certification. Unlike Ghana, countries like Scotland and South Africa can boast of accurate death records certification by implementing effective quality assurance of death certificates. Advanced medical settings have independent medical reviewers who ensure accuracy in certification by physicians especially in the cause of death. KATH presently have no quality assurance mechanism to ensure high accuracy of death certification. Incomplete cause of death was the only major error considered in the present study. This was due to the absence of independent reviewer and also to avoid suspicion of partiality.

More than half of the certificates were filled without errors considered in the present study. This is expected since most physicians are educated on death certification during their medical training at the teaching hospital. Studies at academic hospital in South Africa recorded a lower number error-free certification (Nolijana et al., 2009). Certificates with only one minor error constituted 7.4%; include abbreviations, handwritings and absence of physician information while multiple errors constituted 4.0%. Absence of physician qualification was the prominent minor error in the present study. Madboly and Metwally (2014) recorded 3.5, 74.3 and 22.2% for single,

Table 4. Distribution of major, minor and multiple errors with qualification of physicians.

Qualification	Complete	Major errors (%)		Minor errors (%)					Total	p-value
		Query	Incomplete	Abbreviation	No qualification	No ward address	Handwriting	Multiple errors		
MBCHB	287 (46.5)		102 (16.5)	29 (4.7)		5 (0.8)	5 (0.8)	9 (1.5)	437 (70.8)	
Snr Specialist	60 (9.7)	1 (0.2)	13 (2.1)	1 (0.2)				1 (0.2)	76 (12.3)	
Consultant	13 (2.1)		4 (0.6)	2 (0.3)		1 (0.2)			20 (3.2)	
Resident	11 (1.8)	1 (0.2)	3 (0.5)	1 (0.2)		1 (0.2)			17 (2.8)	
Medical officer	4 (0.6)		1 (0.2)						5 (0.8)	0.000
BDS			1 (0.2)			1 (0.2)			2 (0.3)	
Physician assistant	1 (0.2)								1 (0.2)	
Unknown	2 (0.3)		4 (0.6)		39 (6.3)			14 (0.5)	59 (9.6)	
Total	378 (61.3)	2(0.3)	128 (22.3)	33 (5.3)	39 (6.3)	8 (1.3)	5 (0.8)	24 (2.2)	617 (100.0)	

double and multiple errors, respectively. Major errors were recorded among 22.6% certificates and this included incomplete filling and querying of cause of death. Most major errors were due to incomplete cause of death. This is consistent with findings of Antini et al. (2015).

Death certificates are used by clinicians, administrators, planners, epidemiologist and researchers. Accuracy is thus a prime consideration during certification. Clinicians may be acquainted with most medical terms or abbreviations and thus may be employed in certification. It must be noted that mortality records are mostly handled by people who are not familiar with medical clichés. Medical practitioners are advised to employ legible handwriting in certification. Medical symbols such as Rx, Tx, Dx, ?, etc, must be avoided. Abbreviation of medical conditions is not acceptable as this can lead ambiguity and delay in registration process. Cause of death must be accurate, precise, complete and sequentially filled. Each cause of death must also be reported with the appropriate time interval during certification. Details of physician such as name and qualification must always be properly and legibly provided to eradicate death certification errors (National Center for Health Statistics, 2003; www.sehd.scot.nhs.uk).

Limitation of study

This study did not consider other major errors such us improper sequencing of cause of death and hence further study is recommended to completely ascertain death certificates. It was also limited to one hospital and therefore more research must be conducted nationwide to aid having accurate database. Finally, information on mortality rate in Ghana is dearth and therefore calls for studies in this field.

Conclusion

The study has shown the flaw in death certification at teaching hospital. The incidence rate of inaccuracies in death certification is quite alarming. Furthermore, most of these are major errors which are mainly incomplete filling of cause of death. Majority of the errors were by physicians at their early stage of practice, primarily from the medicine unit. This can be rectified by adequate training of young physician on death certification as seen in other parts of the world. Independent reviewers can be employed to ensure proper death certification. This must be extended to other hospitals to ensure proper mortality statistics database in Ghana.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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