

## ORIGINAL ARTICLE

## Issuing and Appropriate Completion of Medical Certification of Cause-of-Death Forms by Physicians at a Tertiary Teaching Hospital in Nigeria

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**ABSTRACT**

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**Background:** Medical certificates of cause-of-death are essential public health documents needed in proof of death, crime prevention, health planning, setting of priorities, monitoring of the health of the population, outcome review studies and others. When cause-of-death forms are filled out erroneously, they provide misleading and inaccurate information; and thus not useful in cause-of-death statistics.

**Objective:** This retrospective study was to answer the following questions: how frequent is death certificates issued for deaths occurring at a tertiary hospital in Nigeria, and are death certificate forms completed correctly by physicians?

**Methods:** All deaths occurring at the hospital over a 5-year-period were stratified by ward and sex. Errors in death certificate's completion were grouped into 4 categories according to the classification system adopted by Tsung-Hsueh Lu *et al.* We also extracted other information such as decedents' ages and qualifications of the certifiers from the reviewed forms.

**Results:** A total of 5,392 deaths were recorded, 53.3% of whom were males; only 350 (6.5%) death certificates were issued - 299 (85.4%) in males and 51 (14.6%) in females - out of which only 125 (35.7%) were completed correctly as regards the section on cause of death. Less than 1% of these certificates were issued in decedents less than 20 years of age. The most common type of error was Minor Error, 2 (41.3%). A total of 321 (91.7%) of the certifiers included their qualifications in the forms. Consultants in charge of the cases directly completed the cause-of-death forms in only 3.1% of the cases. Also, very insignificant proportion (0.6%) of the certificates was issued following autopsies.

**Conclusion:** Death certification forms are not routinely issued by physicians; more than half of the issued certificates completed by both the lowest and highest echelons of medical professionals contained no useful information for epidemiological studies. Thus, there is a strong reason for a continuous medical education on the need for a vigorous and systematic documentation of causes of deaths in Nigeria.

**Keywords:** Death, Certificate, Request, Accuracy, Clinicians, Hospital-based.

## INTRODUCTION

The physician's primary responsibility in death registration is pronouncing the death and documenting the cause-of-death in a medical certification of cause-of-death form.<sup>1</sup>

Medical certificates of cause-of-death are important public health tool that have varied benefits. The benefits include proof of death, monitoring of the health of the population, health planning, setting of priorities for disease prevention, outcome review studies, clinical trials, and crime prevention.<sup>2</sup> In Nigeria, we believe that death certificates are only issued in very few deaths with legal significance and that information on cause-of-death forms issued in our health-care facilities is not suitable for epidemiological studies. When cause-of-death forms are filled out erroneously they provide misleading and inaccurate information, and thus not useful in cause-of-death statistics.<sup>3</sup>

To ensure valid comparisons within and among countries, the World Health Organization (WHO) has recommended a standard cause-of-death diagnosis form to be used on death certificates.<sup>4</sup> This WHO standardized death certificate form is what is used in our centre for medical documentation of deaths. "The cause-of-death section consists of two parts: Part I is for reporting a chain of morbid events leading directly to death, with the immediate cause-of-death (the final disease, injury, or complication directly causing death) on line (a) and the underlying cause-of-death (the disease(s) or injury/injuries that initiated the chain of events that led directly and inevitably to death) on lines (b), (c), and (d) in Part I; and Part II is for entering of all other disease(s) or condition(s) contributing to death that were

not reported in Part I and did not result in the underlying cause-of-death. In each line only one type of disease or injury is listed.

The immediate cause of death does not mean the mechanism of death or terminal event (for example, cardiac arrest or respiratory failure). The mechanism of death (for example, cardiac or respiratory arrest) should not be reported as immediate cause of death as it is a statement not specifically related to the disease process, and it merely attests to the fact of death. Therefore, the mechanism of death provides no additional information on the cause of death".<sup>1,4</sup>

For example, a 30 year old obese woman with a 7 year medical history of secondary hypertension that resulted from pheochromocytoma (diagnosed histopathologically) in her left adrenal gland died soon after an episode of acute left heart failure (confirmed at autopsy). In this example, the cause-of-death form should be completed in this way: In Part I of the form, the immediate cause of death (on line (a)) is Left heart failure (not cardiac arrest), line (b) is Hypertension, line (c) is Pheochromocytoma, and line (d) should be left blank; In Part II of the form, Obesity should be listed as contributing to the death.

Many instruction handbooks and articles are available to teach physicians how to complete death certificates.<sup>1,5</sup> We are not aware of any study in Nigeria on the accurate filling of cause-of-death certificate forms; however, many studies outside Nigeria have shown that clinicians make errors on 30% to 89% of the death certificates issued.<sup>3</sup> In our community, there is no hospital based study on the documentation of deaths and/or

accuracy of complete filling of medical certification of cause-of-death form. Thus, we believe that there is a need to study the documentation and appropriate completion of medical certification of Cause-of-death forms by physicians at Nnamdi Azikiwe University Teaching Hospital, Nnewi. The hospital is a referral centre and covers the whole of Anambra state, parts of Delta, Imo and Enugu states. The institution is multi-centered with four out-stations. The main centre is at Nnewi with a total of about 253 hospital beds.

The purpose of our study is to answer the following questions: How frequent is death certificates issued for deaths occurring in the hospital, and are death certificate forms completed correctly by our physicians?

#### METHODOLOGY

All deaths that occurred at Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi from January 1<sup>st</sup>, 2006 to December 31<sup>st</sup>, 2010 were retrieved from the institution's medical record department and the deaths were stratified by ward and sex. In addition, death certificates issued by doctors at NAUTH, Nnewi covering the same period were retrieved and reviewed by the authors. We examined the wording and statements on the death certificates and determined whether the underlying cause-of-death was listed in an acceptable manner.

We grouped the errors into 4 categories according to the classification system adopted by Tsung-Hsueh Lu, *et al.*<sup>5</sup> They are: - **1.** Major error type 1: Only the mechanism(s) of death (or mode of dying) is given. Because there could be hundreds of different causes leading to the same mechanism of death, this kind of

description provides no useful information for cause-of-death statistics; **2.** Major error type 2: Here multiple causal sequences are given in part I. Standard form indicates that the different cause-of-death should all be listed in part I of the death certificate and should be in the sequence of events leading to death. The judgement of correct causal sequence was based on ACME (Automated Classification of Medical Entities) Decision Tables;<sup>6</sup> **3.** Minor error type1: Here a single casual sequence is given but is not specific enough. For examples, listing tumour without specifying the malignancy, listing cancer without specifying the primary site, listing stroke or cerebrovascular accident without specifying the subtype, listing gastrointestinal bleeding without specifying the location, and listing traffic accident without specifying type of vehicle(s) involved; and **4.** Minor error type 2: Here a single causal sequence is given but the order was incorrect. This type of error has no significant impact on the quality of cause-of-death statistics; because the underlying cause-of-death can still be correctly determined.<sup>7</sup> We also extracted other information in the cause-of-death forms, such as decedents' ages and qualifications of the certifiers.

We used Epi Info version 3.5.3 January 26, 2011 software, in storing and analyzing our observations.

#### RESULTS

In the years under review, we observed that a total of 5,392 deaths were recorded at NAUTH between January1<sup>st</sup>, 2006 and December 31<sup>st</sup>, 2011 in 9 different wards of the hospital, namely: Medical, Surgical, Paediatrics, Special Care Baby Unit, Adult

Accident & Emergency, Children Accident & Emergency, Obstetrics, Gynaecology wards, and Intensive Care Unit. Two thousand eight hundred and seventy five (53.3%) of the recorded deaths occurred in males while 2,517 (46.7%) occurred in females {See table 1}. Table 1 shows that most (1,907 [35.4%]) of the deaths occurred in the Medical Ward, and the least number of deaths were recorded in Gynaecology Ward (13 [0.2%]).

**Table 1.** Number and proportion of deaths occurring in males and females stratified by wards

Ward	Sex		TOTAL (n %)
	Male (n %)	Female (n %)	
Medical	972 (51.0)	935 (49.0)	1907 (35.4)
Surgical	218 (48.1)	235 (51.9)	453 (8.4)
Paediatrics	140 (58.3)	100 (41.7)	240 (4.5)
Special Care Baby Unit	434 (57.4)	322 (42.6)	756 (14.0)
Adult Accident & Emergency	697 (60.5)	456 (39.5)	1153 (21.4)
Children Accident & Emergency	259 (49.2)	268 (50.8)	527 (9.8)
Obstetrics	0 (0.0)	78 (100.0)	78 (1.5)
Gynaecology	0 (0.0)	13 (100.0)	13 (0.2)
Intensive Care Unit	155 (58.5)	110 (41.5)	265 (4.9)
<b>TOTAL</b>	<b>2875 (53.3)</b>	<b>2517 (46.7)</b>	<b>5392 (100.0)</b>

Of the 5,392 deaths in the period under-review, only 350 (6.5%) death certificates were issued, 299 (85.4%) in males and 51 (14.6%) in females. Out of these 350 death certificates reviewed in this study, 125 (35.7%) were completed correctly as regards the Part I and II sections of the form. In 75 (33.3%), only the mechanism(s) of death was given (Major Error 1); in 23 (10.2%), multiple causal sequences were given (Major Error 2); in 34 (15.1%), a single casual sequence was given but was not specific enough (Minor Error 1); while in 93 (41.3%), a single casual sequence was given but the order was incorrect (Minor Error 2). Three hundred and twenty three (92.3%) of the issued certificates contain the decedents' ages {See table 2}.

Table 2 shows that less than one percent (< 1%) of the certificates was issued in decedents

less than 20 years of age. Three hundred and twenty one (91.7%) of the certifiers included their qualifications in the forms {See table 3}. Table 3 shows that only 10 (3.1%) of the certifiers were consultants in-charge of the cases. Six (60%) of the consultants and one hundred and ninety seven (63.3%) of the non-consultants did not accurately complete the Part I and II sections of the form. The difference between the two groups is not statistically significant. Only two (0.6%) of the cause-of-death certificate were issued following autopsies. Those two cases were accurately filled. However, there is no statistical significance between these two cases and the other cases completed by non-pathologists.

**Table 2.** Age Distribution of the 323 cause-of-death certificates containing information on age

Age Group	Frequency					Total
	2006	2007	2008	2009	2010	
0-4 Years	0	0	2	1	0	3
5-9 Years	0	0	0	0	0	0
10-14 Years	0	0	0	0	0	0
15-19 Years	0	0	0	0	0	0
20-24 Years	0	2	2	1	0	5
25-29 Years	1	1	4	5	2	13
30-34 Years	1	5	2	6	7	21
35-39 Years	0	4	8	5	6	23
40-44 Years	1	4	9	7	4	25
45-49 Years	1	4	8	5	6	24
50-54 Years	2	6	12	5	10	35
55-59 Years	4	8	8	8	10	38
60-64 Years	0	5	8	12	4	29
65-69 Years	0	9	7	10	9	35
70-74 Years	2	3	7	11	7	30
75-79 Years	0	4	2	6	7	19
80 Years +	1	3	11	4	4	23
<b>TOTAL</b>	<b>13</b>	<b>58</b>	<b>90</b>	<b>86</b>	<b>76</b>	<b>323</b>

## DISCUSSION

In this retrospective hospital-based study, we observed that only 6.5% of the deaths occurring at Nnamdi Azikiwe University Teaching Hospital in Nnewi had medical certification of cause-of-death forms filled. Out of this, close to 90% of these certificates were filled in deaths occurring in males. Also, almost 100% of the filled certificates involved deceased adults. These findings support our belief that physicians in our community do not routinely fill medical certificates of cause-of-death, but they only do so when there is a demand from deceased relatives in cases where insurance or inheritance matters are involved.

This point is buttressed by the finding that almost all the death certificates (nearly 90%) reviewed were issued in deaths affecting males and that almost all (99.1%) of the issued certificates were issued for deceased adults.

**Table3.** Tabulation of the 321 certifiers according to their status

Year	Consultants	Non-Consultants	TOTAL
2006	2	11	13
2007	1	55	56
2008	4	86	90
2009	2	84	86
2010	1	75	76
<b>TOTAL</b>	<b>10</b>	<b>311</b>	<b>321</b>

This finding was expected, and it is due to our socio-cultural system on insurance and inheritance, which are weaved around the male gender.

Our study also revealed that nearly two-third (64.3%) of the death certificates reviewed was erroneously filled and that there was no significant statistical difference in the error rates between the consultants and the non-consultants certifiers. This figure is within the

30% to 89% error rates in studies carried out in different other parts of the world, and it is also comparable to the 50% error reported in Boward County, Florida, USA.<sup>3</sup>

About half of these errors are serious in that the death certificates provide no useful information for cause-of-death statistics. The most common type of error was Minor Error 2 (41.3%). This figure is more than 4 times compared to a figure of 9% reported by Lu, *et al.* in Taiwan, but it is comparable to the value of 38% reported by Fernando in Colombo.<sup>5,8</sup> Interestingly, death certificates with this type of error (the order of casual sequence being incorrect) contain sufficient information for accurate coding, and would not affect subsequent cause-of-death statistics. However, the second most frequent type of error was Major Error 1 (here, only mechanism(s) of death was documented) with a significant proportion of 33.3%. This figure is very high compared to 7% reported in Taiwan, but it is comparable to 29% figure reported in Cincinnati.<sup>5,9</sup> The observed high rate of Major Error 1 supports the statement that most physicians tend to confuse the cause-of-death with the mechanism of death.<sup>7</sup>

Another important fact that is evident in this study is that the autopsy rate at Nnamdi Azikiwe University Teaching Hospital Nnewi is very low (0.6%). This finding is far lower than the lowest rate of 3% found by Oluwasola, *et al.* at University College Hospital Ibadan.<sup>10</sup> The reason for this very low autopsy rate could among other reasons be due to aversion of the host tribe (the Igbos) to autopsies. However, the reason for this low autopsy needs to be studied.

## CONCLUSION

Our study revealed that cause-of- death certificate forms are not routinely issued by physicians in our hospital. The study also demonstrated that more than half of the issued medical certification of cause-of-death forms completed by both consultants and non-consultants contained no useful information for epidemiological studies. Thus, there is an urgent need for a continuous, robust, and systematic medical education in Nigeria, on the importance of issuing and appropriate completion of certificate-of-cause of death forms in order to reverse this observed trend. The targets of this education intervention should be medical students, nursing students, physicians, and nurses.

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