Adequacy of death certification in a tertiary teaching hospital in Sudan

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Abstract

Aims proper certification of death has legal, social, and epidemiological significance. The main objectives of this research were to assess the accuracy of death certification in Soba university hospital, to find out the underlying cause of death in different departments and to compare the accuracy of filling between different departments.

Methods this was a retrospective study carried out in Soba University Hospital, a total of 233 deceased patients were included in the study, data was obtained retrospectively from clinical records (files) as well as the Arabic death certificate. Results were analyzed using SPSS program. Chi square test was used to determine the association between departments and other variables. Level of significance was set on an alpha level at 0.05.

Results The mean age was 40.16 years, in 22 cases (9.4%) the translation was incorrect, in 24 cases (10.3%) the causes of death were not written at all. In 100 cases (42.9%) the immediate cause of death was filled incorrectly and in 76.4% the underlying cause of death was not written at all. In 98 cases (42.1%) the causes of death were written in English. In almost all cases (99.1%) there were missed information, the commonest missed information observed was the national number in 178 cases (76.4%).

Conclusions In almost all cases there were missed information due to lack of training. A simple educational intervention is urgently needed to improve the accuracy in the completion of death certificates by doctors.

Adequacy of death certification in a tertiary teaching hospital in Sudan

Introduction

Death certificate is an important source from which population based mortality statistics are derived. These statistics are used greatly for the development of public health programs and the allocation of health care resources. The consequences of erroneous information are significant, not only for families, but also for health planners and funders. It is vital that information entered on the death certificate must be accurate as this could be used for medico legal, insurance and inheritance purposes, yet studies from elsewhere have found error rates as high as 60%.

Inaccuracies can emerge from the initial entry by the attending doctor and the assignment of codes by the concerned person. The World Health Organization (WHO) as well as other organizations, produced rules and guidelines for mortality and morbidity coding. Nevertheless, death registration is fragmented and largely inadequate in most developing countries.

Physicians without training in death certificates may not even understand the correct definitions of the common terms used when filling a death certificate. The underlying cause of death is defined as the condition that triggered the chain of events leading to death; temporally, the most remote condition; etiologically specific. The immediate cause of death is the final complication resulting from the underlying cause of death, occurring closest to the time of death and directly causing death. Whereas the antecedent cause of death is defined as a disease or condition that occurred as a result of the underlying cause of death but was not the final complication or immediate cause of death.
There is currently little in the medical literature to instruct and guide practicing doctors in Sudan on such an important matter, therefore there is critical need for practical instructions on the process of proper completion of death certificates.

Aims

The main objectives of this research were
(i) To assess the accuracy of death certification in Soba university hospital
(ii) To find out the underlying cause of death in different departments
(iii) To assess if the cause of the death is filled correctly from the file
(iv) To assess the accuracy of translation of the diagnosis from English to Arabic language in the death certificate and to compare the accuracy of filling between different departments.

Audit Standards

The standard criteria used for this audit included the WHO definitions (5), local hospital policy and national country guidelines on death certification. Points taken from the above guidelines which were used as standards for comparison included the following:

- Inclusion criteria
- Date and time
- National number of the deceased
- Bio data of the deceased (gender, age)
- Correct translation
- The immediate cause of death
- The underlying cause of death
- The antecedent cause of death
- Name and rank of the certifier

Methods

This was a retrospective study carried out in Soba University Hospital (SUH) which is the main teaching hospital linked to University of Khartoum, the leading university in Sudan. The study was carried out during the period September 2014 to April 2015. A total of 233 deceased patients were included in the study from all departments except the department of obstetrics and Gynaecology as there were no maternal mortalities during the study period. The inclusion criteria were deceased patients with files, who died in SUH during the study period and died of medical causes. The exclusion criteria were patients without files and those who died of traumatic or iatrogenic causes.
Data was obtained retrospectively from clinical records (files) as well as the Arabic death certificate for each deceased patient. All files are filled in English. Information included demographic data (age, sex), variables related to death like date and time of death, underlying and immediate causes of death and correct translation from English to Arabic language. Other information gathered included rank of the doctor filling the death certificate, date and time of filling the records and any missed information.

The process of issuing a death certificate in SUH goes through a number of steps after confirmation of death. The death certificate book is available in the Matron’s office and it is filled in Arabic by handwriting, usually by the registrar on call of the department concerned and sometimes by the consultant. The relatives of the deceased receive a copy of the death certificate for burial purposes and a similar copy goes to the department of statistics in SUH and then forwarded to the national registry department. A final typed copy of the death certificate may be issued upon request from the national registry department.

Results were analyzed using SPSS program. Frequency analysis for background variables was conducted. Chi square test was used to determine the association between departments and the following variables: Correct translation from English to Arabic language, the immediate cause of death is filled correctly, the underlying cause of death is filled correctly, the antecedent cause of death is filled correctly and any other missed information. Level of significance was set on an alpha level at 0.05. Ethical clearance and approval for conducting this study was obtained from the ethical committee of Soba University Hospital.

Results

233 deceased patients who died in hospital during the study period were included in the study. Males were 138 and females were 95 with a ratio of 1.45:1. The mean age was 40.16 years. Most of the deceased patients were from the department of medicine (55.4%), followed by the department of Paediatrics and neonatology (33.5%) and lastly surgery as shown in table (1).

<table>
<thead>
<tr>
<th>Department</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicine</td>
<td>129</td>
<td>55.4</td>
</tr>
<tr>
<td>Paediatrics &amp; Neonatology</td>
<td>78</td>
<td>33.5</td>
</tr>
<tr>
<td>Surgery</td>
<td>26</td>
<td>11.2</td>
</tr>
<tr>
<td>Total</td>
<td>233</td>
<td>100.0</td>
</tr>
</tbody>
</table>
When checking the correct translation from the file to the death certificate, in 22 cases (9.4%) the translation was incorrect, in 24 cases (10.3%) the causes of death were not written at all. In 98 cases (42.1%) the causes of death were written in English despite the fact the death certificate is written in Arabic.

Regarding the filling of the immediate cause of death, in 100 cases (42.9%) it was not filled correctly, in 36 cases (15.5%) it was not filled at all and in 32 cases (13.7%) more than one cause was written. With regards to the underlying cause of death, in most of the cases (76.4%) it was not written at all, in 29 cases (12.4%) it was not filled correctly and in 8 cases (3.4%) more than one cause was written. Table (2) shows the underlying causes of death among the deceased.

<table>
<thead>
<tr>
<th>Type of disease</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malignancy</td>
<td>38</td>
<td>16.3</td>
</tr>
<tr>
<td>Renal disease</td>
<td>17</td>
<td>7.3</td>
</tr>
<tr>
<td>Not written/Not diagnosed</td>
<td>26</td>
<td>11.2</td>
</tr>
<tr>
<td>Cardiac disease</td>
<td>13</td>
<td>5.6</td>
</tr>
<tr>
<td>Liver disease</td>
<td>23</td>
<td>9.9</td>
</tr>
<tr>
<td>CNS disease/infections</td>
<td>58</td>
<td>24.9</td>
</tr>
<tr>
<td>Lung disease</td>
<td>21</td>
<td>9.0</td>
</tr>
<tr>
<td>Others</td>
<td>8</td>
<td>3.4</td>
</tr>
<tr>
<td>Neonatal sepsis/prematurity</td>
<td>15</td>
<td>6.4</td>
</tr>
<tr>
<td>Infection</td>
<td>10</td>
<td>4.3</td>
</tr>
<tr>
<td>Congenital anomalies</td>
<td>4</td>
<td>1.7</td>
</tr>
<tr>
<td>Total</td>
<td>233</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The results revealed that when filling the antecedent cause of death in more than half the cases (54.1%) it was not filled, in 77 cases (33%) it was not filled correctly and in 16 cases (6.9%) more than one cause was written. In almost all cases (99.1%) there were missed information, the commonest missed information observed was the national number in 178 cases (76.4%) followed by the age of the deceased in 24 cases (10.3%). Table (3) shows the type and frequency of missed information.
Table (3) type and frequency of missed information

<table>
<thead>
<tr>
<th>Information</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>National number only</td>
<td>178</td>
<td>76.4</td>
</tr>
<tr>
<td>National number+age</td>
<td>24</td>
<td>10.3</td>
</tr>
<tr>
<td>National number+gender</td>
<td>4</td>
<td>1.7</td>
</tr>
<tr>
<td>National number+date &amp; place</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>National number+clerk</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>National number+others</td>
<td>23</td>
<td>9.9</td>
</tr>
<tr>
<td>Total</td>
<td>231</td>
<td>99.1</td>
</tr>
<tr>
<td>Correct information</td>
<td>2</td>
<td>.9</td>
</tr>
<tr>
<td>Total</td>
<td>233</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Cross tabulation between departments and correct translation of the diagnosis to Arabic language revealed significant association ($P=0.01$). Correct filling of the immediate cause of death in the department of medicine was in 55.4% of the cases, 33.5% in the department of paediatrics and neonatology and 11.2% in the department of surgery with significant association between department and correct filling of the immediate cause of death ($P=0.03$). There was no significant association between departments and missed information ($P=0.135$) as shown in table (4).
<table>
<thead>
<tr>
<th>DEPARTMENT</th>
<th>MISSED INFORMATION</th>
<th>YES</th>
<th>NO</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEDICINE</td>
<td>Count</td>
<td>129</td>
<td>0</td>
<td>129</td>
</tr>
<tr>
<td></td>
<td>% within DEPARTMENT</td>
<td>100.0%</td>
<td>.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within MISSED INFORMATION</td>
<td>55.8%</td>
<td>.0%</td>
<td>55.4%</td>
</tr>
<tr>
<td>PAEDIATRICS &amp; NICU</td>
<td>Count</td>
<td>77</td>
<td>1</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>% within DEPARTMENT</td>
<td>98.7%</td>
<td>1.3%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within MISSED INFORMATION</td>
<td>33.3%</td>
<td>50.0%</td>
<td>33.5%</td>
</tr>
<tr>
<td>SURGERY</td>
<td>Count</td>
<td>25</td>
<td>1</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>% within DEPARTMENT</td>
<td>96.2%</td>
<td>3.8%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within MISSED INFORMATION</td>
<td>10.8%</td>
<td>50.0%</td>
<td>11.2%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>231</td>
<td>2</td>
<td>233</td>
</tr>
<tr>
<td></td>
<td>% within DEPARTMENT</td>
<td>99.1%</td>
<td>.9%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within MISSED INFORMATION</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

P=0.135

**Discussion**

Mortality is one of the key and important vital statistics used to measure the health status of a country. Therefore, the accuracy and adequacy of the medically certified death reporting system are vital to the overall mortality statistics. The leading causes of death in SUH represent a mixture of communicable and noncommunicable diseases as well as a relatively high proportion of deaths from malignancy (16.3%), this could be explained by the fact that this is a tertiary referral center, however the low percentage of death due to cardiovascular disease raises the possibility of underdiagnosing these cases. A similar observation was reported from Thailand ⁷. Most studies rank cardiovascular diseases as the leading cause of death ⁸, ⁹ which is contrary to our finding. These issues need to be addressed to improve the quality of information on causes of death from medical records.

Our study showed higher rates of errors when filling the causes of death as in 42.9% of cases the immediate cause of death was filled incorrectly and in 76.4% the underlying cause of death was not filled at all. Previous studies have shown that 16 to 33% of sampled death certificates contain major errors in the cause of death statement ¹⁰, ¹¹. Major errors in the completion of the correct cause of death on death certificates are
common among our practicing doctors which could be explained by the fact that most
doctors lack the knowledge of the proper way of filling in these death reports due to
insufficient training in this task in SUH. Unfortunately, there is little in the medical
curriculum and medical literature to guide doctors in this matter.
In almost all cases (99.1%) there were missed information, the commonest missed
information observed was the national number in 76.4% of cases. This is extremely
high and quite alarming when compared to international figures. International reports of
inaccuracies in death certificates range from 20–65% 12, 13.
An intervention program in Spain showed that death certificates were completed with
errors by 71.1% of the physicians before the educational intervention. Following the
seminar, the proportion of death certificates with errors decreased to 9% 14. In our
situation a simple educational intervention is urgently needed with the hope that it will
improve the accuracy in the completion of death certificates by doctors.

Conclusions

The accuracy and adequacy of the medically certified death reporting system are vital
to the overall mortality statistics. There were a lot of errors when filling the causes of
death and in almost all cases there were missed information due to lack of training. A
simple educational intervention is urgently needed to improve the accuracy in the
completion of death certificates by doctors.

Recommendations

• A simple educational intervention in the form of a workshop is needed to improve
  the accuracy in the completion of death certificates by doctors.
• The audit team should inform the hospital manager and heads of the departments
  about the results of the audit.
• The audit team should distribute the audit report in the form of a leaflet to the whole
  medical staff in order to increase the awareness about the importance of the health
  information system and the role of adequate information in the death certificate.

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