

Original Article

Evaluation of death certificates in the pediatric hospitals in Khartoum State during 2004

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Abstract

Background: As the death certificate was not recently revised or updated and doctors had no training on death certification, then accuracy and proper completion of the death certificate should be checked. The main objective of the study was to evaluate the death certificate.

Methods: This study was conducted in the 4 pediatric hospitals in Khartoum state during the year 2004. Quantitative data were collected using pre-tested, pre-coded questionnaire for doctors and checklist for certificates and medical records; qualitative data were also collected from respondents of focus group discussions and by informants in in-depth interviews.

Results: The filling out of the death certificate was inappropriate and incomplete. Part II of the cause of death item was not filled out in (97%) of the certificates. The completion of most items of the death certificate was partial (98.2%). In comparison between causes of death on the death certificate and the diagnoses in the deceased medical record only (36.7%) were corresponding. 63.3% of the filled out lines of the cause of death item were incorrect causes of death and (47%) of them were mode of dying. 78% of the doctors agreed that the death certificate should be filled out by them and not by house officers. The death certificate format was judged to be confusing and not clear.

Conclusion: There was serious lack of training of doctors on death certification; training should be conducted for doctors at all levels. The death certificate format has to be modified, updated and simplified.

Key words: Death certificate, Sudan,

Introduction

Population-based mortality statistics are derived from the information recorded on death certificates. This information is used for many important purposes, such as the development of public health programs and the allocation of health care resources⁽¹⁾. It is also used to set national priorities in the health field and in determining long-term health trends in the country.

Mortality statistics are one of the principal sources of health information and in many countries they are the most reliable type of health data⁽²⁾.

A death certificate is a permanent record intended for the notification and proof of an individual death. On every death certificate there is an immediate cause and an underlying cause of death⁽¹⁾, which is a disease or an accident that dominates the sequence to death.

Not only is the cause identified as the primary cause of death, but additional risk factors are also significant, need to be listed, and are used in planning to improve national health care⁽³⁾.

The analysis of these data provides the best health information.

Though the mortality data derived from death certificate in the Sudan is known to be incomplete and inaccurate, it remains the best available source of these data.

Most of cause of death determination and death certification procedures is based on guidelines established by the World Health Organization (WHO) ⁽⁴⁾.

The classification system for coding causes of death is based on the latest revision of the International Classification of Diseases and Related Health Problems (ICD-10).

The purpose of the ICD and of WHO guidelines is to promote international comparability in the collection, classification, processing and presentation of mortality statistics ⁽⁵⁾.

In the national level, death certificate information is collected and maintained by the National Health Information Center (NHIC) in a format that enables compilation of national statistics, state-to-state comparisons, and comparisons to other countries that are signatories to the agreements of the WHO.

The (ICD) is used to code and classify mortality data from death certificates. So that the medical terms reported by certifying doctors on death certificates can be grouped together for statistical purposes.

The cause of Death section in the death certificate format is based on recommendations of the World Health Organization (WHO). It is designed to facilitate the selection of the underlying cause of death when two or more causes are recorded ⁽²⁾.

The causes of death to be entered on the medical certificate are all those diseases, morbid conditions or injuries, which either resulted in or contributed to death ⁽⁴⁾. It is the responsibility of the medical practitioner signing the death certificate to indicate which morbid conditions led directly to death and to state any antecedent conditions giving rise to this cause.

Death known or suspected of having been caused by injury or poisoning should be reported to the Forensic Pathologist for postmortem examination.

Although most doctors are confronted with the task of completing death certificates, many do not receive adequate training in this skill. Resulting inaccuracies in information undermine the quality of the data derived from death certificates ⁽³⁾ and eventually undermine the value of the health information in the national database.

The quality of mortality data and the accurate information drawn from cause of death statements on death certificate are necessary for effective planning and evaluation of health care programs and health status. The accuracy and completeness of the death certificate as a source of mortality data are essential. So there is a great need to improve the quality of death certification.

The specific objectives of the study were to assess the situation of filling death certificate, to determine the accuracy of the information provided in the death certificate, to evaluate the appropriateness of death certificate format, to assess the knowledge, attitude, and practice of doctors towards death certification and to identify measures and methods for improving the accuracy of death certificate.

Materials and Method

Study Design: This is a descriptive hospital based study.

Study Area: This study was conducted in the following 4 pediatric hospitals in Khartoum State: Khartoum Pediatric Hospital, Omdurman Pediatric Hospital, Ahmed Gasim Pediatric Hospital and Buluk Pediatric Hospital.

Study population: The study populations were:

- All death certificates of children who died and had medical records (Files) in the 4 hospitals during the period of the study.

- Doctors (Medical officers, Registrars, and Consultants) working in the wards in the 4 hospitals during the period of the study.

Sample selection (For death certificates): In each hospital the death register book was taken as a sample frame of the death certificate study population. The systematic random sample technique was applied to determine the sample members. When the name of the deceased was nominated to be included in the sample, his medical record was requested and a comparison was done with the copy of his death certificate.

Sample Size: Sample size was determined by the following equation:

$$n = \frac{t^2 PQ}{d^2} = \frac{4 \times (0.5)^2}{(0.05)^2} = 348 \quad (\text{Increased to } 400)$$

Sample Allocation: The sample for each hospital was calculated by using (probability proportion to size-PPS), according to the numbers of deaths reported in the annual report of 2004

Sample Size for Doctors population: Total coverage of all doctors: (consultants, registrars and medical officers) working in the pediatrics wards in the 4 hospitals during 2004 (150 doctors).

Tools of data collection:

- A pre-prepared checklist to review the medical records, death registries and death certificate copies.
- Structured questionnaire for doctors.
- In depth interviews with purposely selected persons.
- Focus group discussions.

Ethical Consideration: According to a letter from Sudan Medical Specialization Board sent to the managers of the 4 pediatric hospitals, so as to help and facilitate the job; the managers permitted the following: Using 2004 death registries, copies of death certificates and deceased medical records in

the hospital, filling questionnaires by responding doctors and holding focus group discussions.

Data analysis: Quantitative data was entered in the computer using software (SPSS-10) and frequency tables were obtained. The checklist was entered and frequency tables obtained. Qualitative data from focus group discussions and in depth interviews were obtained and analyzed narratively.

Results

The study showed that the complete filling out of all items of the death certificate in the 4 hospitals in the period of study was poor. Very few death certificates were completely filled out (1.8%). The majority (98.2%) were partially filled out.

The item of the cause of death (Part I (a, b, c) lines and Part II) was always deficient. Moreover the dotted line printed in front of the title: (Cause of Death) was misleading; it was treated as the first line of the cause of death item. In 98.5% of the death certificates the dotted line was filled out as the direct cause of death. Part II was not filled out in 97% of the certificates.

Items of identification information about death and deceased and items of registration were highly filled out, 92.8% and 71.5% successively. 18% of the certificates were not signed by the doctor. They were incomplete and improper.

The completion of the deceased medical record according to quality control criteria showed that only 32.2% were (A) v. good and (B) good medical records, 61.8% were (C) moderate and (D) weak. The discharge sheet of the deceased was also revised and only 16.8% of the sheets were filled.

78% of the doctors agreed that doctors: (consultants 12%, registrars 21.3% and medical doctors 44.7%). should fill out the death certificate.

40% of the doctors saw a death certificate for the first time after graduation and before appointment, which was internship period.

67.3% doctors filled out the death certificate for the first time within 3 months after appointment and 18% filled it during 4-9 months. All the 85.3% filled out the certificate as house officers in the internship.

63.3% of the filled out lines of causes of death item on the death certificates were incorrect. 47% of them were mode of dying which is not a cause of death.

Figure 1: The filling out of part I items (a, b, c) and part II death certificate by respondents

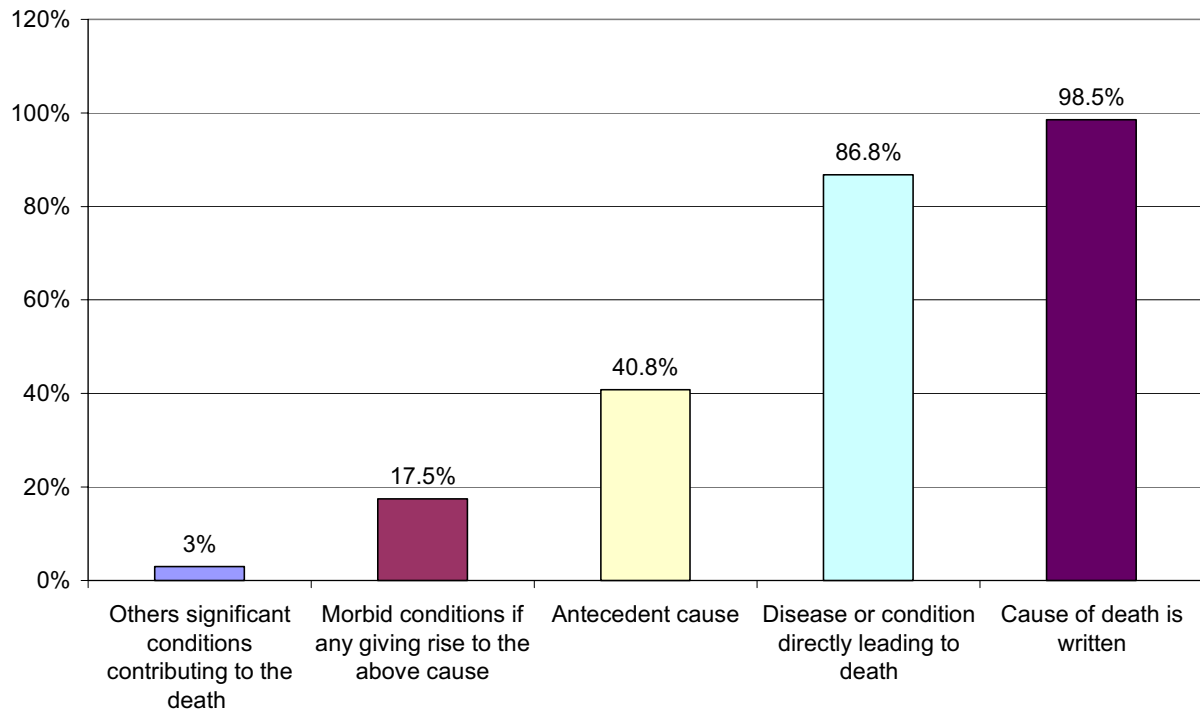


Table 1: First time to fill the death certificate by respondents

	Frequency	Percentage (%)
Within 3 months after appointment	101	67.3%
During 4-6 months	16	10.7%
After 6-9 months	11	7.3%
After more than 9 months	14	9.3%
Never filled it	8	5.4%
Total	150	100%

Table 2: Level of accuracy in filling out causes of death item on the death certificate by respondents

Causes	Filled and unfilled lines		Correct and incorrect causes		Distribution of errors among lines of cause of death			
	Unfilled lines	Filled lines	Correct causes	Incorrect causes	Mode of dying	Competing causes	Abbreviations	Undefined errors
Cause of Death (Title line)	6	394	92	302	224	55	23	-
Part 1 line (a) direct cause	53	347	183	164	33	10	26	95
Part 1 line (b) Antecedent cause	297	163	77	86	15	4	2	65
Part 1 line (c) morbid condition giving rise to the above cause	330	70	22	48	10	2	8	28
Total	626	974	374	600	282	71	59	188
Percentage	39.1%	60.9%	36.7%	63.3%	47%	11.8%	9.8%	31.4%

82% of the death certificate signature of doctors was present
 94.9% of the doctors agreed that the filling out of the portion of the cause of death is the responsibility of doctors.

65.8% of doctors see that all other parts besides causes of death portion should be filled out by doctors: (consultants, registrars and medical officers).

90% of the doctors mentioned that medical records and patient files were their source of information to fill out all items of the death certificate.

60.7% of doctors depended on patient's file only as a source to identify cause of death.

By comparing the lines of cause of death item on the death certificate with the diagnoses in the deceased medical record, the corresponding causes were 36.7%.

Figure 2: Source of identification of cause of death mentioned by respondents

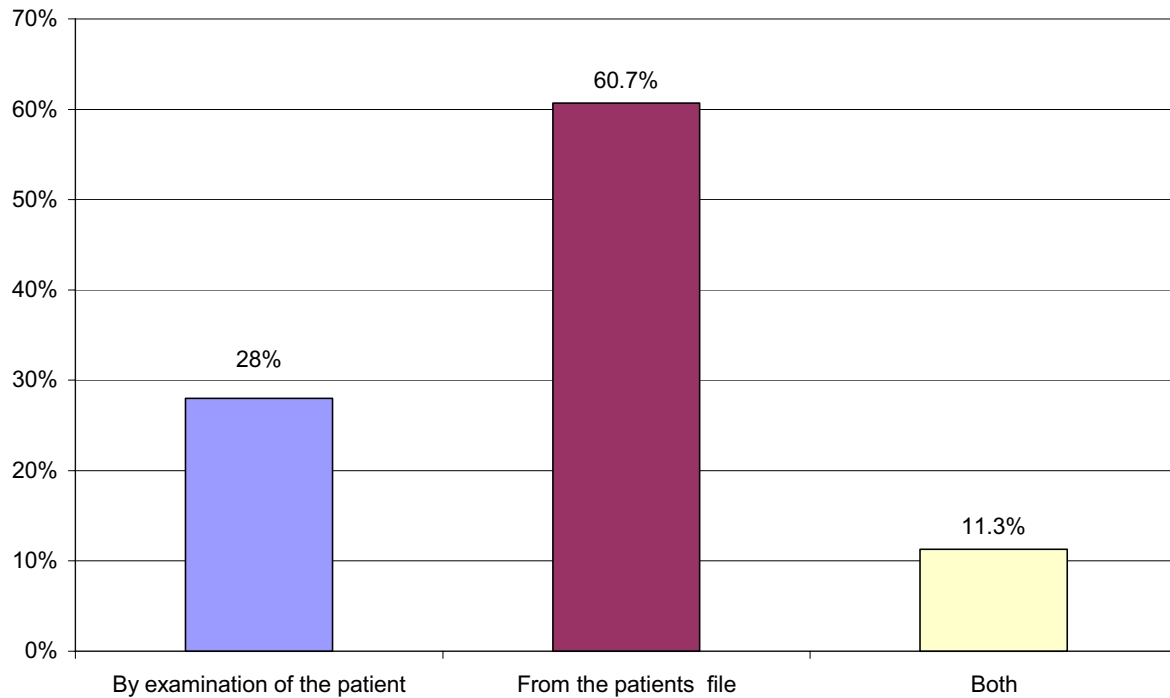


Table 3: Comparison between causes of death item on the death certificate and the diagnoses in the deceased Medical Record

Causes	Corresponding (Freq.)	Not Corresponding (Freq.)	Total
Cause of Death (Title)	92	302	394
Part 1 Line (a) Direct cause	183	164	347
Part 1 Line (b) Antecedents cause	77	86	163
Part 1 Line (c) Morbid condition giving rise to above cause	22	48	70
Total	374	600	974
Percentage	36.7%	63.3%	100%

A comparison of the of standard death certificates of the Sudan, Egypt and USA showed that the three of them are similar in most of the items.

The USA death certificate is more comprehensive. It comprises besides the items of international death certificate: items about autopsy performance, manner of death and injury. It is clear, plain and easy to fill out, because of the close-ended responses, the instructed guided answers or the multi-chaise busies.

The certifying doctor, in addition to his signature, writes his name, title or degree, license number and

also his address in case of filling out the cause of death statement.

On the back page of the certificate, there are instructions to fill out selected items and two models of standard filling out of cause of death item.

The Egyptian certificate alone allocated an item for the ICD code of the underlying cause and another for pregnancy and abortion.

In the Sudanese death certificate, the time intervals section in part 1 was not at all printed.

about the importance of death certificate, 115 doctors said, "It explains causes of mortality". 65 Said, "It indicates priorities for health action". 31 Said, "It's for academic research". In fact all the three statements confirm the importance of the death certificate.

Measuring the level of knowledge of importance by scoring showed that 74.7 % of doctors in the 4 hospitals have low knowledge of death certification.

The most important opinions and comments of the focus group discussions were:

- The cause of death item on the death certificate is complicated, confusing and not clear, the titles of part one lines (a, b, c) are written in obscure Arabic and the death certificate, which has not been changed for a long time, needs updating.
- The ideal filling out of the medical record and the death certificate protects doctors from any legal inquires expected.
- Training doctors on death certification is very important, and studies, orientation and training on how to fill out death certificates should be started at schools of medicine and continued after graduation and appointment

The important results obtained from in depth interviews were:

All over the world postmortem is regarded as the gold standard for the determination of the cause of death.

Since postmortem investigation has been established in the industrialized countries, the quality of mortality statistics has been improved.

In the Sudan and some other developing countries postmortem examination is not carried routinely only criminal cases and child suicide are definitely sent for postmortem. But for other unnatural causes of death, the relatives of the deceased usually refuse postmortem.

Although forensic medicine is mainly concerned with certifying the criminal causes of death, it can help greatly in the orientation and training of doctors on death certification.

In spite of the inaccuracies of the cause of death in the death certificate, the application of ICD-10 in state ministries of health and federal referral hospitals and then in NHIC in FMOH was quite satisfactory, because the international rules for selection of the underlying cause of death assist to select and determine the underlying cause of death regardless of its position on part 1 and even without sequence. This fact, however, does not discard the need of instructing doctors on the correct completion of the death certificate.

As certifying doctors are not familiar with ICD guidelines and instructions for filling out death certificates, training doctors on how to use ICD-10 lists and categories is essential so as to improve death certification.

Discussion

The incomplete medical information in the death certificate; increases the rate of ill-defined cause of death. The certificates not signed by doctors were incomplete and improper.

In Beirut, where around half of the certificates did not carry a certifier's signature, an underlying cause was reported on only 6.3 % of the certificates that did not include a certifier's signature⁽⁷⁾.

Lack of understanding of the principles used in completing death certificates is not a particular issue to developing countries. More than 50 % of general practitioners in the United Kingdom and in the USA reported being insufficiently instructed about the process of death certification^(8,9).

The discharge sheet of the deceased was neglected in spite of its importance in discussing and revising causes of death with the consultant or in the clinical meeting.

The accuracy of the death certificate could be audited and confirmed from a perfectly completed medical record. In Swedish hospital discharge records of the deceased, the main diagnoses had been reported some where on 83% of the death certificates (as underlying cause in 59% of cases, as contributing cause in 24%).

The majority of the responding doctors agreed that they should fill out the death certificate. This result coincided with the instructions of the Sudan Medical Council in his circular No. 1/2001 issued in November 2001.

The best certifier should be the doctor who had practiced the treatment of the deceased and recorded all details of his/her condition ⁽⁴⁾ on the medical record so as to put them in proper sequence in the death certificate.

38.7% of the doctors mentioned that they were oriented on filling death certificates by house officers while house officers themselves were prohibited from filling out and signing death certificates. The top trainers have to be consultants and registrars. In some countries house officers are allowed to fill out death certificates after orientation and training, under the supervision of the consultants, but house officers are not allowed to sign the death certificate ⁽⁸⁾.

The incorrect causes written on cause of death (title line) and line (a) (direct cause) were 77.6%. 56.25% of them were mode of dying; while the international form of medical certificate of cause of death explained in a footnote that a mode of dying should not be used as a cause of death.

Because of lack of training among doctors only mode of death or immediate cause of death were identified ⁽¹⁰⁾. In 1993 Jordan and Bass ⁽¹¹⁾ discovered that 31.9% of a sample of death certificates completed at a Canadian tertiary care teaching hospital contained such errors.

The filling out of the portion of the cause of death is the responsibility of doctors.

Some doctors see that all other parts besides causes of death portion should be filled out by them. In all cases, the certifying doctor should revise the information written and check the completion of the death certificate before signing it.

The study showed that in most cases the causes of death on the death certificate and the diagnoses in the medical record were not coincident. This result reflected that most of the doctors did not refer to the corresponding diagnoses in the medical record to identify the underlying cause of death, the antecedent cause(s) and the direct cause of death.

There were many inaccuracies in the cause of death item:

- Stating the underlying cause of death on the last written line of part one was not regarded, accordingly the sequence of causes was not regarded as well.
- The correct causes of death were scattered amongst part I lines without being sorted according to definition.

These inaccuracies were due to lack of knowledge among doctors on how to identify and select the underlying cause, direct cause and antecedent cause(s) of death ⁽¹⁰⁾.

So, to improve the accuracy of death certificate, errors should be lessened first, and then got rid of, and this can not be done unless doctors are trained on death certification and death certificate s immediately revised by the consultant and his team in the clinical meeting (with the deceased medical record and discharge sheet present).

Many authors believe that the necropsy and subsequent audit are the only valid means by which these inaccuracies can be remedied ⁽¹²⁾ but in the Sudan and some other developing countries, there are religious, cultural or traditional issues around necropsy and it is usually refused.

90% of the doctors confirmed the clarity of the death certificate items. 74% of the doctors said that the death certificate is reasonable and complete.

These results are contrary to the results of the focus group discussions and the actual low standard of completing the death certificate.

Only 33.3% of doctors saw the death certificate for the first time before graduation, which means that few schools of medicine in the universities teach and train medical students how to fill out the death certificate. 66% of the doctors saw it after graduation and appointment.

Orientation, teaching and training should be started in universities and continued after graduation and appointment.

The problems of death certification in hospital deaths may be a consequence of inadequate training of doctors⁽¹³⁾. Doctors in the 4 hospitals have low knowledge of death certification. The most striking finding is that so little is known about the quality of medical certification and its effect on diagnostic statistics in general and on national cause of death statistics in particular⁽¹⁴⁾.

Conclusions

There was serious lack of training of doctors on death certification. Training should be conducted for doctors at all levels. Condensed training courses for trainers, immediate educational interventions to improve the poor current situation and mandatory training for all house-officers when appointed are all recommended to be urgently held. Formal training and refreshing courses should be regularly implemented according to schedule in both federal and state levels.

The death certificate format was not modified or updated for long, it has to be modified and updated to be appropriate and easy to fill by: simplifying the death certificate format as a method for improving accuracy, adding items recommended by WHO, and using understandable Arabic language in

translating titles and subtitles of cause of death item. A manual on death certification with instructions and guidelines should be developed.

Revision of accuracy, completion and quality of death certificate should be achieved by the following:

- Immediate audit of death certificate information by attending staff.
- Weekly revision of death certificates and medical records (clinical meeting) by the treating team under the supervision of the consultant to check accuracy and completion of death certificates.
- Establishment of hospital-based expert panels to amend inaccurately completed certificates.

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