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Improving the Accuracy of Death Certification among Secondary Care Physicians

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Objective: To assess the impact of an educational intervention on the accuracy of death certification of secondary healthcare physicians in Bahrain.

Setting: Secondary Health Care, Ministry of Health.

Design: Interventional study.

Method: Twenty-seven secondary healthcare physicians were invited to attend an interactive workshop about death certificate completion. They were asked to complete a death certificate based on a Case-scenario at the start and after the end of the workshop. The errors made by the physicians were compared before and after the intervention.

Result: Five (18.5%) physicians had some type of training about death certificate completion and 3 (11.1%) were aware of the death certificate completion guidelines. A highly significant ($p<0.001$) reduction in errors prior to the intervention and after was revealed, 25 (92.6%) errors versus 11 (40.7%). The most frequent error was listing the mechanism but it markedly dropped to one-third following the workshop.

Conclusion: The number of errors has declined after attending the workshop. Training physicians in death certificate completion would improve the accuracy of mortality statistics.

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Recent studies have reported many inaccuracies in death certificates worldwide, and their reliability has come under increasing criticism in medical journals and among health officials[1]. While data on the number of deaths in a community or a country is precise and accurate, the identification of the causes of death is often incorrect[2].

Few studies have examined deficiencies in death certification in the developing world; the

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limited available information suggests that the inaccuracies in the data derived from death certificates are influenced by the certifier, the certificate, the deceased and the cause of death[3].

The death certification is used for medico-legal and epidemiological purposes to evaluate the health status of a population and to allocate health care resources for health service and research[4-6]. Most physicians complete death certificates as part of their professional duty. However, the information contained in death certificates frequently reveals non-intentional errors[7].

Correct certification of the cause of death needs: 1) the distinction between "cause" and "mechanism" of death, and 2) the distinction between "immediate cause of death" and "underlying cause of death", both of which are included in the death certificate form. Educational interventions have been successful in reducing these errors and improving the accuracy of completion of death certificates by physicians[8-10].

A study showed that 44% of death certificates with "cardiopulmonary failure" as the cause of death may be largely due to the physicians' ignorance that "cardiopulmonary failure" is an "ill-defined" cause of death and hence they failed to assign the actual underlying cause[11]. Another study assessed the knowledge and practices of physicians in the completing death certificates at the Salmaniya Medical Complex (SMC) showed that 83.1% of the physicians achieved a suboptimal level and only 16.9% achieved optimal level[12]. Fifty-two percent of the physicians expressed discomfort in their abilities to complete death certificates, and 75.4% suggested that there is a need for extended training to improve their skills in completing death certificates. The study indicates the inadequate knowledge and experience of SMC physicians in completing death certificates and their need for further training[12].

The aim of this study is to assess the impact of educational intervention on the accuracy of death certification issued by secondary healthcare physicians in Bahrain.

METHOD

Twenty-seven physicians were invited to attend an interactive workshop about death certificates completion on 19 January 2011 at SMC.

At the start of the workshop, the doctors were asked to answer a Case-scenario and complete a death certificate for that case, see below. The Case-scenario was based on the one used by internal medicine residents in Canada[8]. Once completed by the doctors, the death certificates were collected. This was followed by a discussion on the: (i) current legislation of death certification, (ii) causes and mechanisms of death, (iii) errors in certification of death cause, and (iv) ways to improve the quality and completion of death certificate. At the end of the workshop, the participants were again asked to complete the death certificate for the same Case-scenario they used at the start of the workshop.

Common errors were the following: (a) mechanism of death without the underlying cause of death; (b) improper sequencing of events; (c) listing two unrelated, etiologically specific diseases as the cause of death; (d) use of abbreviations, (e) listing the mechanism of death followed by the

underlying cause of death, and (f) listing the cause of death as one of other significant conditions contributing to the death.

Summary of a Case-scenario Used in the Seminar to Illustrate Common Errors in Death Certification

A seventy-five year old male, smoker and had 5 year medical history of emphysema was admitted in the hospital for exacerbation of his lung disease caused by *Haemophilus influenza* pneumonia. His only other medical problem is coronary artery disease of 10 years duration. His clinical condition deteriorated but he decided against (not to undergo) further extraordinary therapeutic measures, such as, endotracheal intubation and mechanical ventilation. A week after admission, he was found in bed with absent vital signs. You were called to pronounce and certify his death.

Medical Certification of Death
Part I
(a) Immediate cause of death……..

(b) Underlying cause of death……

Part II
Other significant conditions contributing to the death but not causally related to the immediate cause of death……. ……

Data was entered and analyzed using SPSS version 18. The completed death certificates were analyzed by the presence and types of errors made. Due to the small numbers, Fisher's Exact test was used to find the differences in the proportions of correct or incorrect completion of death certificates before and after the workshop. The improvement attributed to the workshop was found by the relative risks of the estimates (RR) with confidence intervals (CI).

RESULT

The age of the participants ranged from 24-29 years old, the qualification was either MBBS or MD. Only 5 (18.5%) physicians had some type of training about death certificate completion, one (3.7%) had formal training and 3 (11.1%) were aware of the death certificate completion guidelines, see figure 1.

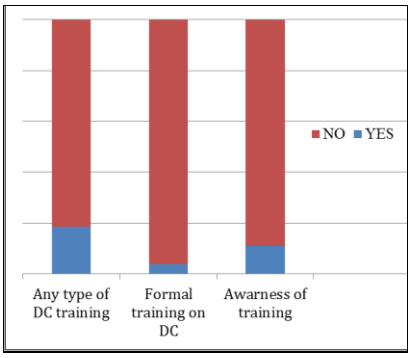

Figure 1: Training and Awareness of Guidelines on Death Certificate Completion

This study showed a highly significant ($p<0.001$) reduction of errors (92.7%) prior to the intervention and after (40.7%). None of the physicians committed error 'd' (use of abbreviations as a mean of identifying diseases). The frequent error prior to the intervention was in listing the mechanism of death followed by the underlying cause of death (error 'e'). However, the error markedly dropped to one-third following the workshop, see table 1.

Table 1: Types of Errors before and after Workshop

Type of Error	Pre Intervention Number (%)	Post Intervention Number (%)	Difference between Proportions (95% CI)	p-value
a) Listing the mechanism of death without an underlying disease	2 (7.4%)	0 (0%)	7.4 (-2.4,17.3)	0.491
b) Improper temporal sequencing of events	1 (3.7%)	2 (7.4%)	-3.7 (-15.9, 8.5)	1.0
c) Listing two causally unrelated, etiologically specific diseases as the cause of death	3 (11.1%)	0 (0%)	11.1 (-0.74, 23.0)	0.236
d) Listing the mechanism of death followed by the proper underlying cause of death	18 (66.7%)	9 (33.3%)	33.3 (8.2, 58.5)	0.009
e) Listing the cause of death as one of other significant conditions contributing to the death but not causally related to the immediate cause of death	1 (3.7%)	0 (0%)	3.7 (-3.4, 10.8)	1.0
f) No Error	2 (7.4%)	16 (59.3%)	51.9 (72.9, 30.85)	<0.001

DISCUSSION

SMC physicians made major errors in the completion of the Case-scenario. Similar to other studies, simple intervention resulted in decreasing these errors[9,13]. Ill-defined causes of death are the leading cause of death in Bahrain comprising 28.8% in 2008 and a similar percentage in the previous years[11,14].

In this study, five (18.5%) physicians had some type of training and one (3.7%) had formal training about death certificate completion. Many studies showed that a small percentage of doctors receive formal training and most hospitals and medical universities do not provide such training[13-16].

Two-thirds of physicians in the study made an error before the workshop. None of the physicians used abbreviations (error 'd'). The most frequent error made by physicians prior to the intervention was in listing the mechanism of death followed by the proper underlying cause of death (error 'e'). The error markedly dropped to one-third following the workshop. Similar studies resulted in decreasing these errors[9,17]. A study revealed that a significant reduction in the

error rate was achieved after a short course was given to physcians[18]. Further, a review reported the role of educational interventions in improving death certification accuracy. In the same review it was shown that the most effective intervention was interactive workshop and the least was printed educational material[19].

Physicians lack training in death certification partly explains why the ill-defined causes of death are the leading cause of death in Bahrain, comprising 28.8% in 2008 and a similar percentage in the previous years[20].

CONCLUSION

The workshop conducted on death certificate completion had resulted in marked reduction of errors.

The Ministry of Health should embark on conducting workshops on death certificate completion to improve the accuracy in death certificates, which would result in more reliable and accurate mortality statistics and reduce the percentage of ill-defined causes of death. Consequently, the quality of mortality data in the country will improve by these efforts.

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